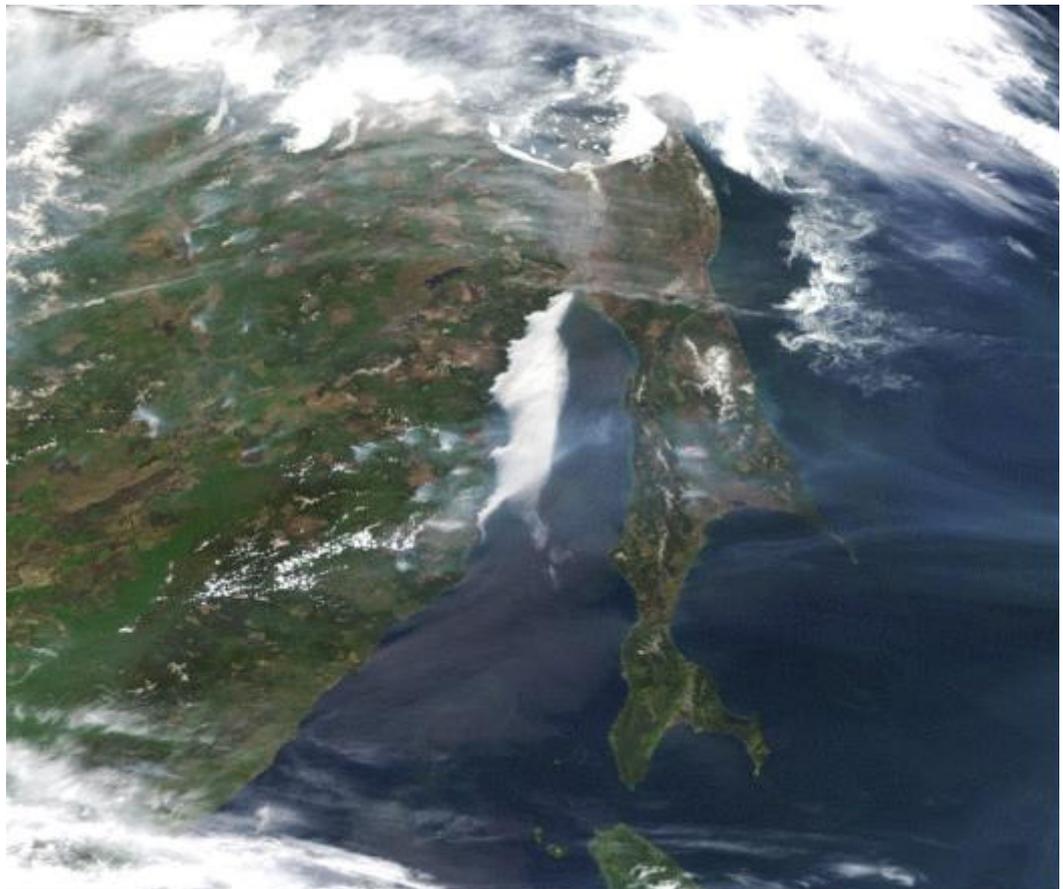


AEA in Confidence

Independent Environmental Consultant Final Report – Agency Lenders

Sakhalin II Phase 2 Project Health, Safety, Environmental and Social
Review



September 2007

 **AEA**

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LIST OF ABBREVIATIONS

ADR	European agreement on the international carriage of dangerous goods by road
BAP	Biodiversity Action Plan
BAR	Beach Access Road
BLF	Beach Landing Facility
BOD	Basis of Design
BOD ₅	Biological Oxygen Demand
BCS	Booster Compressor Station
BNNB	Big Northern Nysh Bypass
BPBs	Bank Protection Belts
BSNB	Big Southern Nysh Bypass
CEAR	Comparative Environmental Assessment Report
CEO	Chief Executive Officer
CGBS	Concrete Gravity Base Structure
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLO	Community Liaison Officer
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CO	Carbon Monoxide
COLREGs	Convention on the International Regulations for Preventing Collisions at Sea
COMAH	Control of Major Accident Hazards
CRI well	Cuttings Re-Injection well
CTA	Common Terms Agreement
CTSD	Chiyoda Toyo engineering partnership
DMR	Double Mixed Refrigerant
EAP	Environmental Action Plan
EBRD	European Bank for Reconstruction and Development
ECGD	Export Credits Guarantee Department
EEE	Ecological Expert Examination
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ENL	Exxon Neftegas Limited
EPB	Environmental Protection Book
EPS	Environmental Protection Section (within the TEOC)
ERP	Emergency Response Plan
ESDD	Environmental & Social Due Diligence
ESHIA	Environmental, Social and Health Impact Assessment
ESIA	Environmental and Social Impact Assessment
Espoo	The Convention on Environmental Impact Assessment in a Transboundary Context
ESRP	Environment and Social Review Procedure
EU	European Union
FDC	Fish Damage Compensation calculation
FEED	Front End Engineering and Design
FERC	Federal Energy Regulatory Commission
FLA	Final Land Acquisition
FOC	Fibre Optic Cable
FSO	Floating Storage and Offloading
GCS2	Gas Compressor Station 2

LIST OF ABBREVIATIONS

GDT	Gas Disposition Terminal
GGE	GlavGosExpertisa
GGTN	GosGorTechNadzor
GHG	Greenhouse Gas
GIS	Geographical Information System
GRE	Glass Reinforced Epoxy
HAC	Health Advisory Committee
HDD	Horizontal Directional Drilling
HEMP	Hazards and Effects Management Process
HIA	Health Impact Assessment
H ₂ S	Hydrogen Sulphide
HSE	Health, Safety and Environment
HSE LIS	Health, Safety and Environment Legal Information System
HSES	Health, Safety, Environment and Social
HSESAP	Health, Safety, Environment and Social Action Plan
HSE-MS	Health, Safety and Environmental Management System
IBRC	International Bird Rescue Centre
IEC	Independent Environmental Consultant
IFAW	International Fund for Animal Welfare
IFC	International Finance Corporation
IISG	Interim Independent Scientist Group
ILA	Independent Legal Advisors
ILO	International Labour Organisation
IMO	International Maritime Organisation
ITC	Independent Technical Consultant
IP	Indigenous People
IPDP	Indigenous Peoples Development Plan
IPPC	Integrated Pollution Prevention and Control
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ISO	International Standards Organisation
ISRP	Independent Scientific Review Panel
IUCN	The World Conservation Union
IWC	International Whaling Commission
IWMF	Integrated Waste Management Facility
IUP	Infrastructure Upgrade Project
JBIC	Japanese Bank for International Cooperation
KP	Kilometre Point
KPI	Key Performance Indicator
LIS	Legal Information System
LNG	Liquefied Natural Gas
LNGC	Liquefied Natural Gas Carrier
LUN	Lunskoye fields
LSSSES	Lunskoye Seismic Survey Environmental statement
Lun-A	Lunskoye field platform A
MARPOL	MARine POLLution Regulation
MChS	RF Ministry of Emergencies
MDPC	Maritime Disaster Prevention Centre
MEG	Monoethylene Glycol

LIST OF ABBREVIATIONS

MHMS	Minimum Health Management Standards
MMM	Marathon, McDermott, Mitsui Consortium
MMO	Marine Mammal Observers
MMPP	Marine Mammal Protection Plan
MNR	RF Ministry of Natural Resources
MOF	Material Offloading Facility
MOU	Memorandum of Understanding
MPC	Maximum Permitted Concentration (in environment)
MPD	Maximum Permitted Discharge (liquid discharges)
MPE	Maximum Permitted Emission (gaseous emissions)
MSDS	Material Safety Data Sheet
MVA	Multi variate analysis
NEBA	Net Environmental Benefit Analysis
NGO	Non Governmental Organisation
NO _x	Nitrogen Oxides
NTU	Nephelometric Turbidity Units
OBM	Oil Based Mud
OCIMF	Oil Companies International Marine Forum
OET	Oil Export Terminal
OP	Onshore Pipeline
OPF	Onshore Processing Facility
OPRC	Oil Pollution Preparedness, Response and Co-operation regulations
OSRP	Oil Spill Response Plan
OTSUREN	Central Fisheries Expert Committee
PA-A	Piltun field platform A
PA-B	Piltun field platform B
PAP	Project Affected People
PCDP	Public Consultation and Disclosure Plan
PEIA	Preliminary Environmental Impact Assessment
PM ₁₀	Particulate Matter <10 micron size
PPAH	Pollution Prevention and Abatement Handbook
PPE	Personal Protective Equipment
PSA	Production Sharing Agreement
PSS	Piled substructure
QRA	Quantitative Risk Assessment
RAIPON	Russian Association of Indigenous Peoples of the North
RAP	Resettlement Action Plan
RBCA	Risk Based Corrective Action
RCR	River Crossing Report
RCS	River Crossing Strategy
RDB	Red Data Book
RemAP	Remedial Action Plan
RF	Russian Federation
RGN	Regulation Guidance Notes
RoW	Right of Way
RPN	Rosprirodnazor
SALM	Single Anchor Leg Mooring
SAR	Southern Access Road

LIST OF ABBREVIATIONS

SBM	Single Buoy Mooring
SCMH	Social Compliance Monitoring Handbook
SD	Sustainable Development
SEER	State Environmental Expertisa Review
SEIC	Sakhalin Energy Investment Company
SERP	Sea Eagle Research Programme
SHI	Samsung Heavy Industries
SI	Social Investment
SIA	Social Impact Assessment
SIAA	Social Impact Assessment Addendum
SIEP	Shell International Exploration and Production
SIMDP	Sakhalin Indigenous Minorities Development Plan
SoW	Scope of Work
SPP	Social Performance Plan
SPT	Social Performance Team
SPZ	Sanitary Protection Zone
SREPPs	Soil Remediation Erosion Protection Plans
SSI	Sakhalin Salmon Initiative
Stakeholder	Person, group or organisation that has an interest in the Sakhalin II project.
STASCO	Shell International Trading and Shipping Company Limited
STD	Sexually Transmitted Disease
STEW	International Convention on Standards of Training Certification and Watchkeeping for Seafarers
STP	Sewage Treatment Plant
STW	Sewage Treatment Works
SSE	Steller's Sea Eagle
SSL	Steller Sea Lion
SSNB	Small Southern Nysh Bypass
SWMP	Solid Waste Management Plan
TAPS	Trans-Alaskan Pipeline
TBT	TriButyl Tin
TEA	Traditional Economic Activity
TEASP	Traditional Economic Activity Support Programme
TEOC	Technical and Economic Substantiation - Construction
TLU	Tanker Loading Unit
TSS	Total Suspended Solids
TSUREN	Central Fisheries Expert Committee
UoB	University of Birmingham
US Exim	United States Export-Import Bank
UXO	Unexploded Ordnance
VNIRO	Russian Federal Research Institute of Fisheries and Oceanography
WB	World Bank
WBM	Water Based Mud
WMP	Waste Management Plan
WPZs	Water Protection Zones
WUL	Water Usage License
WGW	Western Gray Whale
WGWAP	Western Gray Whale Advisory Panel

LIST OF ABBREVIATIONS

WGPP	Western Gray Whale Protection Plan
WSC	Wild Salmon Centre
WWF	World Wildlife Fund

Executive Summary

SCOPE AND APPROACH

AEA Technology (AEA) was engaged as the Independent Environmental Consultant (IEC) for the Sakhalin II Phase 2 Project (the Project) in September 2001. Since our engagement we have undertaken extensive review of the Project's Health, Safety, Environmental and Social (HSES) matters and assessed the performance of the Project sponsor, Sakhalin Energy Investment Company (SEIC), against a comprehensive set of standards, guidelines, legislative requirements and international treaties and conventions.

This report has been produced specifically for the potential Lenders to the Project, namely ECGD, JBIC and US Exim (the Agency Lenders)¹, that may be providing funds/other financial support. It has been prepared against the Scope of Work (SoW) prepared by the Agency Lenders and provided to AEA by SEIC. Under this SoW, the report focuses on an assessment of the HSES performance of the Project against the following requirements:

- IFC/World Bank guidelines
- the regulatory requirements of the Russian Federation and Sakhalin Regional Authorities
- international law including relevant conventions and treaties
- industry best practice standards
- European Union environmental assessment guidelines
- requirements of the Agency Lenders
- SEIC's own health, safety and environmental (HSE) standards.

Within this context AEA has assessed the Project in terms of:

- The extent to which the Project's assessments, proposed mitigation measures and plans meet these requirements. This includes review of the adequacy of the impact assessment studies and the Health, Safety, Environmental and Social Action Plan (HSESAP) which detail the Project's mitigation measures and monitoring requirements.
- The extent to which plans and procedures have been effectively implemented during actual construction activities to date, including the implementation of commitments detailed in the HSESAP.

In undertaking this assessment, AEA has determined for each identified issue:

- the relevant requirement to which the issue relates

¹ The European Bank for Reconstruction and Development (EBRD) also engaged as a potential Lender in the development of the Project. In January 2007, EBRD announced that 'following significant changes in the ownership of SEIC it would not longer consider the financing package for the Project, although if the new group of shareholders were to request it and make a case that the Project could be eligible for EBRD investment, the Bank could consider financing in the future.' In August 2007, EBRD further announced that in mutual agreement with OAO Gazprom and the other shareholders, it has been decided that it would not resume negotiations on financing the Sakhalin II project because the timetable envisaged by the shareholders made financing by EBRD unfeasible.

- the materiality of the issue
- whether the issue relates to the adequacy of either
 - the Project's assessments and plans, or
 - the implementation of Project plans during construction.
- the degree to which the issue is resolved and, for issues that relate to previous activities or ongoing construction, whether there may be historical legacy issues.

The report primarily highlights non-compliance issues. As such it does not explicitly detail the areas of full compliance against agreed standards and guidelines, although a number of particularly noteworthy laudable practices are reported throughout the report and summarised in Table 1-3.

VALIDITY

This is the finalised version of the IEC Final Report produced by AEA on behalf of the Agency Lenders in September 2007. The report is based on information available as of July 2007².

BREADTH OF PROJECT

The Project is an integrated oil and gas development project that will develop the Piltun-Astokhskiye and Lunskiye hydrocarbon fields located approximately 20km off the north east coast of Sakhalin Island in far east Russia. The Project will build on the existing Phase 1 project, allowing year round production of oil and gas, which will be transported to the south of the island for export. The Project is massive, even by industry standards, and effectively comprises a number of major sub-projects. The main Project facilities/assets include:

- two new offshore platforms (in addition to modifications to an existing platform)
- offshore pipelines
- onshore pipelines
- an onshore processing facility
- an LNG/Oil Export Terminal and associated jetty facilities, and
- a Terminal Loading Unit.

These facilities are distributed over a wide geographical area, which includes numerous environmental and social sensitivities where the Project has potential to cause impacts. Such sensitivities include habitats for the critically endangered WW, wetland areas that are important for endangered bird species, protected areas and a large number of commercially and ecologically sensitive rivers. The Project also creates the potential for a variety of social impacts, in part resulting from the influx of a large workforce and construction activities across the island. Such social impacts range from relatively minor nuisance issues to direct impacts such as physical or economic displacement, including impacts on indigenous people, commercial fisheries and community health. At the same time, the Project will bring

² With the exception of matters relating to the Remedial Action Plan which are provided in Appendix 2.

economic prosperity to the island, improved infrastructure and other benefits such as new skills and training.

COMPLIANCE WITH KEY REQUIREMENTS

Project assessments and plans

Many of the requirements specified in the agreed guidelines and standards³ relate to the preparation of comprehensive impact assessment studies and associated management plans. We find, at the time of writing this report, that SEIC's written assessments and plans fully meet the large majority of the individual requirements against which the Project has been assessed and indeed there are examples of laudable best practice. Where non-conformances with requirements have been identified in the documentation these are either minor in nature or else SEIC has plans in place for their resolution, details of which are provided in this report.

There is however a generic issue of the timeliness of these plans relative to Project activities and, specifically, the finalisation of plans to meet Agency Lender requirements following the start of construction and potential impacts. The two key issues are i) the preparation of impact assessments and ii) the preparation of management plans. This is discussed in general terms in the following paragraphs, with greater detail on the most significant specific examples provided in Table 1-1.

The development of suitable **impact assessments** addressing all relevant aspects has been achieved through the production of the Environmental Impact Assessment (EIA), EIA addenda, Social Impact Assessment (SIA), SIA addendum, Health Impact Assessment (HIA), Resettlement Action Plan (RAP), Sakhalin Indigenous Minorities Development Plan (SIMDP), the River Crossing Strategy (RCS), the Chaivo Bay EIA/SIA, and a number of supplementary topic-specific standalone documents. Whilst these are generally comprehensive, in some cases the level of detail provided in the baseline characterisation (pre-construction) is limited, making the quantification of impacts difficult. Furthermore, the EIA addenda and SIA addenda materials, RCS, SIMDP and the RAP were all finalised after the commencement of construction activities.

As an important part of its **management plans** SEIC has developed the HSESAP in line with IFC Guidance Note C. AEA confirms that the HSESAP is both comprehensive and detailed, and provides a good framework for the implementation of the required mitigation measures and monitoring programmes. The HSESAP also provides a demonstration that the Project meets most emission, discharge and social compensation standards required under the relevant guidelines and standards; where any aspects of such standards will not be fully met by the Project, these have been highlighted and suitably justified in the HSESAP. However, the HSESAP was finalised in December 2005, whereas construction started in 2003, with the result that, despite SEIC using pre-existing plans, certain requirements of the HSESAP were not met in the early phases of construction. The most significant of these relate to detailed erosion control commitments and river crossing commitments to meet the RCS (see Table 1-1 for details).

³ Guidelines and standards agreed by the Agency Lenders (Section 3.6)

Implementation of Plans (during construction)

As far as implementation of the plans is concerned there is a high level of compliance for most of the Project's facilities/assets. However, there are a small number of areas, but nonetheless very important areas, where Project performance to date has fallen significantly short of HSESAP requirements.

The key area in this respect is the construction of the onshore pipelines, and specifically is related to:

- River crossings. Compliance issues during river crossings include the relatively low number of the desirable dry cut crossing methods and construction practices during winter river crossings. These issues were most prevalent during the 2004/05 and 2005/06 winter seasons, and significant improvements were realised in the latter half of the winter 2006/07 river crossings season.
- Erosion control. The implementation of temporary and permanent erosion control measures since commencement of pipeline right of way (RoW) construction in 2004 has fallen significantly short of HSESAP requirements, and most importantly in relation to surface stabilisation to reduce the risk of erosion.
- Wetland crossings. Compliance issues include importation of materials for road construction, loss of top peat/moss layers over the installed pipelines and interruption of the hydraulic functioning.
- Construction Chaivo. Construction during the most sensitive bird nesting period contrary to HSESAP requirements.

In addition, other important issues identified are:

- Western Gray Whale (WGW) protection. The general approach to protection of the WGW has been precautionary in nature and SEIC has adopted an independent scientific review and advice process that includes the formation of the WGW Advisory Panel (WGWAP). Nonetheless, some deficiencies have been observed principally associated with the timeliness of elements of the independent review process. These include:
 - timely delivery (relative to construction activities) of important whale related studies for independent scientific review (*e.g.* multivariate analyses)⁴;
 - lack of agreement between SEIC and the WGWAP on certain of the scientists' recommendations (principally noise intervention criteria) for implementation during 2005, 2006 and 2007 construction activities;
 - concerns expressed by the WGWAP that some of its other recommendations (*e.g.* commencement of monitoring activities and rapid analysis of WGW distribution data) were not fully implemented during the 2006 construction season.
- The management of certain social issues. SEIC has been progressing the implementation of plans throughout construction and has made good progress *e.g.* improving awareness of the grievance procedure and the implementation of the SIMDP. However some

⁴ These are multivariate analyses (MVA) to identify and assess whether construction work in 2005 and 2006 resulted in any behavioural change in the WGW. The MVA of the 2005 monitoring data was not completed until Q1 2007, although an earlier draft was available for discussion from the summer of 2006. The current estimate for the completion of the MVA for the 2006 monitoring data is early 2008. The extended timescales for the production of the analyses limits the extent to which their conclusions have been able to inform the design of subsequent construction activities.

concerns remain with respect to the timely implementation of activities defined within plans, such as the provision of compensation as required by the RAP (*e.g.* for the loss of the beach adjacent to the LNG) and full implementation of the social impact management system.

In some cases these breaches of the HSESAP will have resulted in impacts on the natural and social environments, although it is often difficult to determine accurately the significance of such impacts at this stage. In order that the effects of these historical breaches are better understood, monitoring and post-construction analyses are required by SEIC. These activities are either planned or ongoing (although we make recommendations for additional work in Table 1-1 below). Once the results of such studies are available, the ability of SEIC to rectify or offset the impacts effectively (*e.g.* through the ‘no net loss’ river habitat enhancement programme to which SEIC is committed) can be better determined. In this report, where uncertainties currently exist in the significance of such impacts, we provide conservative estimates of the likely materiality of impact together with indications of the level of uncertainty. The most significant of these issues are summarised in Table 1-1.

Good contractor management is an important aspect of ensuring that the Project meets the HSESAP requirements thereby preventing re-occurrence of such breaches. This has proven to be challenging for SEIC for the onshore pipeline contract, and has been the underlying cause of many of the issues surrounding the construction of the onshore pipeline system. SEIC has initiated a number of measures to improve onshore pipeline contractor compliance with Project requirements, including financial incentive schemes, amendments to contracting arrangements, training in HSESAP commitments and changes to management structures to provide more direct SEIC control over key aspects such as erosion control. Improvements in erosion control practices identified by AEA during site visits in November 2006 and May 2007 have shown that these measures are having some positive effects, although ongoing efforts will be required to ensure that such improvements are maintained and compliance is attained.

In addition to historical⁵ issues some material ongoing non-compliances with HSESAP commitments exist that are unlikely to be fully resolved prior to financial closure (based on the anticipated timeframes). The most significant of these, in terms of potential adverse effects, are timely and adequate implementation of erosion control measures and, most particularly, temporary and permanent surface stabilisation (progress on the important areas of stabilisation of steep slopes and final reinstatement along the RoW remains slow⁶), and adequate implementation of certain recommendations of the WGWAP. Further details are provided in Table 1-1.

REMEDICATION AND REINSTATEMENT

Rectification of non-compliances entails bringing ongoing Project activities back into compliance with the HSESAP, preventing reoccurrence and the remediation (including

⁵ This refers to any historical instance where relevant standards have not been met. This includes instances where previous construction activities have not met the required project plans and mitigation measures, including where this has led to environmental impacts or other legacy issues.

⁶ We note, for example, that final biological reinstatement of the pipeline RoW is not scheduled to commence until 2008.

natural recovery) or offset of any actual impacts that have resulted from these non-compliances.

Although the time taken for complex ecosystems to recover is difficult to estimate with certainty, recovery is generally possible and we provide in Table 1-1 estimates of the extent of recoverability (including timescales) that is likely to be realised provided that suitable remedial measures are implemented. In some instances actions to ensure full recovery to prescribed reinstatement standards may be particularly difficult to achieve (for example complete removal of imported road materials in wetlands may pose significant technical, safety and environmental risks). In such instances suitable offset options may need to be considered.

The recoverability of river systems and the RoW is further summarised below:

- In some cases rivers have been exposed to varying impacts for over 2 years due to poor erosion control and multi season river crossings. Although the habitat in many rivers is typically expected to recover over a period of approximately two years, recovery of habitats may take longer in some rivers depending on the nature of the river and the degree of disturbance.
- With the implementation of appropriate remedial actions reinstatement of the RoW to appropriate standards is achievable over several years. However, without such actions recovery of the RoW may take significantly longer to occur by purely natural means, especially in areas where topsoil has been lost.

The most significant social impacts that need to be offset relate to resettlement compensation for the beach at Prigorodnoye and the dacha community, close to the LNG site. SEIC has been working to remediate these impacts through the provision of alternative resources and/or financial compensation. Good progress is being made and SEIC has agreed to continue to demonstrate to Agency Lenders that they are making best efforts to expedite the delivery of an offset.

Remedial Action Plan

In order to address non-compliances specific to soil erosion and reinstatement, river habitats and wetland crossings SEIC is developing a remedial action plan (RemAP). The RemAP will be an evolving document as progress on remediation is achieved and necessary follow-on actions are identified. Once complete, the initial version of the RemAP will be reviewed on behalf of the Agency Lenders⁷ and subsequent reviews will also be undertaken as necessary as the plan evolves.

The RemAP must clearly identify measurable and time-bound objectives, targets and success criteria. These should be phased as necessary and include interim targets to enable ongoing progress to be monitored in an effective and timely manner. Furthermore, the RemAP must describe what actions are required to meet all stated objectives and targets, and how these actions will be implemented, including identification of the associated resource requirements, responsibilities and sign-off authorisation. The RemAP must provide this information in sufficient detail to demonstrate the Company's capacity to effectively meet all objectives. In

⁷ Post July 2007 update: the RemAP was finalised in August 2007. Whilst this was too late for incorporation in the main body of this report, our opinion on the adequacy of this plan is provided in Appendix 2.

addition to these generic requirements, the specific needs of the individual sections of the RemAP are summarised below:

- **River Habitats.** All the sensitive river crossings were completed by mid-April 2007. The River Habitats section of the RemAP must therefore focus on remediation of river habitats and, where appropriate, offset options. In the first instance this section of the RemAP needs to define the monitoring programmes necessary to characterise, to the extent possible, the nature of construction impacts on rivers, with a particular focus on the most sensitive rivers and those where significant non-compliances were identified during pipeline construction. While appropriate remedial actions and offset options cannot be detailed until the results of the monitoring programmes are available, the RemAP should nonetheless outline the nature of remedial actions and offsets that will be considered.
- **Soil Erosion and Reinstatement.** The Soil Erosion and Reinstatement section of the RemAP needs to describe the actions required to undertaken final technical and biological reinstatement. While technical aspects of reinstatement are due to commence in 2007, SEIC plans to undertake final biological reinstatement in 2008. Until final reinstatement is complete, the Project will be out of compliance with HSESAP commitments and the potential for soil erosion risks will remain. The RemAP must therefore also address minimization of erosion risks prior to final reinstatement through the use of temporary measures and most importantly improvements in surface stabilisation of steep slopes.
- **Wetland Crossings.** Before detailed remedial actions can be defined, it is first necessary that SEIC undertakes a more detailed evaluation of the ecological sensitivity of the wetland areas crossed by the RoW and assesses the nature and extent of physical and ecological impacts resulting from pipeline construction activities. Therefore, at this stage, the Wetlands section of the RemAP must focus on the development and implementation of appropriate monitoring programmes, surveys and assessments. Although precise remedial actions and offset options can only be identified once these assessments have been undertaken, the RemAP should outline potential options.

SUMMARY OF SIGNIFICANT ISSUES

More detail on the most significant non-compliance issues referred to above is provided in Table 1-1 below in terms of:

- relevant standard/guideline requirement
- estimated level of materiality (based on criteria outlined in Section 4.2)
- status
- the nature of the issue (*i.e.* adequacy of plans and assessments, or implementation of the plans)
- resolution/mitigation (actions in hand or required).

Issues Requiring Further Monitoring

There are a number of other areas of ongoing activity that require future monitoring to ensure they are satisfactorily addressed in a timely fashion. Although SEIC has reasonable plans to address these issues, failure to fully action such plans could compromise the Project's ability to meet Lender requirements. We therefore list the most important of these in Table 1-2.

Examples of Best Practice

While there have been some shortcomings in certain areas of implementation of the HSESAP, equally the HSESAP incorporates commitments to many specific areas of laudable best practice. In addition, SEIC is committed to a number of important environmental and social development and research plans and programmes. The most noteworthy of these are highlighted below and further described in Table 1-3.

- support to the GWAP
- management of drill muds
- upgrade of municipal landfills
- year-round use of double hulled tankers
- road safety campaigns
- development of a robust SIMDP
- funding of social and sustainable development programmes
- commitment to develop a Biodiversity Action Plan
- health infrastructure upgrades.

Table 1-1 Significant Issues

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>River crossings (use of flume). Dry cuts effected with flume pipes are regarded as a best practice approach to river crossing where technically feasible and form a central part of the RCS. In particular, the use of dry cuts can reduce sediment release to rivers in some instances by up to an order of magnitude as compared with wet cut methods. However, dry cuts with flume pipes had not been required by SEIC prior to finalisation of the RCS (earlier versions of the RCS did not explicitly require flume crossings). As a result, several rivers, which under the criteria defined in the final RCS would have been dry cut, were crossed by wet cut techniques in winter 2004/05.</p> <p>A second issue occurred after the finalisation of the RCS, when the Russian Federal authorities initially determined that the use of flume was outside of the permit conditions and a number of fines were imposed in early 2006 where flumes had been utilised. Following protracted discussions between SEIC and the authorities, agreement for the use of flume pipes for a total of 45 rivers was reached in April 2006. In addition, during the latter half of the 2006/07 construction period SEIC, in agreement with local authority inspectors, implemented a different form of dry crossing, namely a modified form of dam & pump, to good effect at a number of river crossings. In total nearly 80% of crossings undertaken in winter 2006/07 were effected as dry cuts. The cumulative proportion of all group 2/3 river crossings undertaken as dry cuts since the commencement of construction (<i>i.e.</i> since winter 2004 through to winter 2006/07) is nearly 30%.</p>	<p>In terms of alleviating/offsetting historical impacts, SEIC has committed to undertake riverbed surveys in order to assess the extent of impact on spawning and taimen habitat (additional detailed surveys are also required on those rivers that were subject to significant HSESAP breaches such as drying out). This information will need to be used by SEIC as input to a river habitat enhancement programme as part of ensuring No Net Loss of salmon habitat. The River Habitats RemAP currently being developed by SEIC will define the scope and timescales for the required monitoring programmes.</p>	<p>Potential regulatory issue</p>	<p>Compliance with the regulatory requirements of the Russian Federation and Sakhalin Regional Authorities</p>	<p>Adequacy of plans and implementation of plans</p>	<p>Historical</p>
		<p>Environment Potentially Moderate</p>	<p>Industry best practice, RCS, HSESAP</p>	<p>Adequacy of plans and Implementation of plans</p>	<p>Historical</p>

⁸ The ‘materiality’ criteria and ‘status’ are defined in Chapter 4. In the case of ‘historic’ issues the materiality refers to the actual situation following the implementation of mitigation measures; in other cases the materiality is pre mitigation. In some instances the level of materiality is uncertain either because the issue relates to (i) a future risk, the consequences of which are variable in extent, or (ii) an historical impact for which additional monitoring is required to accurately assess the level of significance. In these cases the *potential* level of materiality has been estimated.

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>River crossings (baseline data) Limitations in the baseline characterisation of sensitive rivers beyond the near vicinity of pipeline crossing locations. This led to limited ability to undertake micro-realignment of the pipeline route to avoid specific sensitivities such as spawning habitat and/or presence of taimen and also makes detailed assessment of impacts further downstream difficult to undertake.</p>	<p>See above regarding post-construction surveys and the No Net Loss programme. In addition, SEIC is also supporting a taimen research programme. This research programme has the <i>potential</i> to offset, at least to some extent, any historical impacts on taimen that may have occurred by enhancing the long-term sustainability of this species (although only high-level objectives for the programme have so far been made available and hence overall ability of the programme to provide such offset cannot be confirmed at this time).</p> <p>Limitations in the detailed modelling of sedimentation were addressed by a precautionary approach to worst-case impact assessment and by a commitment to monitoring of actual sediment releases and by the use of adaptive management. Significant deficiencies in monitoring were identified during the first half of the winter 2005/2006 construction period limiting the ability to apply adaptive management measures. However monitoring during later construction was improved in line with HSESAP requirements. We understand from SEIC that such data played an important role in gaining approval for flume crossings (see above).</p>	<p>Environment Potentially Moderate</p>	<p>WB OP 4.01 Annex B</p>	<p>Adequacy of assessments</p>	<p>Historical</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>River crossings (construction practices) Construction practices during river crossings have been identified that do not meet HSESAP commitments, including: non-consecutive crossings (including multi-season, contrary to regulatory requirements) in individual rivers, river drying incidents, long duration of in-stream construction activities and crossing of sensitive rivers outside of mid-winter without use of dry cut methods (in particular some crossings were undertaken either at the very end or outside of the wider winter period, hence coinciding with the more sensitive salmon and taimen seasons). In total nearly half of the group 2 and 3 rivers have been affected by one or more of the above breaches. The salmon spawning habitats downstream of the crossing locations in these rivers will have been exposed to the risk of increased detrimental impact. These spawning habitats equate to approximately 6% of the total spawning habitat within all the rivers crossed by the pipeline. However, not all of this 6% will have incurred actual damage. Indeed, evaluation of available monitoring data suggests that in the case of sedimentation effects, the majority of the released sediment typically deposits on the riverbed over the first few hundred metres downstream of the crossing location, and on this basis the area of actual damage is likely to be significantly less than 6% although this needs to be confirmed by SEIC's ongoing monitoring and analysis. In addition to impacts on salmon, 14 of the rivers affected by the above breaches are identified as potentially supporting taimen (a red data book species), although the actual locations of over-wintering habitats of this species downstream of the crossing points is uncertain.</p> <p>On the basis of these potential impacts, and the likelihood of recovery, the overall environmental materiality of these HSESAP breaches on salmon is potentially moderate, although monitoring is essential to confirm the actual impact. Given the uncertainty surrounding the presence/ location of taimen there is the possibility, albeit small, that the HSESAP breaches may have harmed this red data book species (and hence the reference to potential high materiality). This is a potential regulatory issue.</p>	<p>See above regarding post-construction surveys and the No Net Loss programme.</p> <p>Natural recovery of river habitats following construction is assessed as typically occurring within 2 years, although recovery times may be more prolonged in some cases. Actual recovery times will need to be monitored over several years following construction, and provisions for this type of monitoring are included in the HSESAP and RCS.</p> <p>SEIC is currently developing a River Habitats RemAP section that will focus on remediation of river habitats and, where appropriate, offsets. In the first instance this RemAP must define the monitoring programmes necessary to characterise the nature and extent of construction impacts of rivers.</p>	<p>Environment Potentially Moderate (although the potential for high impacts cannot be entirely ruled out if taimen are lost)</p> <p>Potential regulatory issue</p>	<p>WB OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Adequacy of implementation of plans</p>	<p>Historical (Pending for Rivers Habitat RemAP)</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>River crossings (Tributaries) In line with the RCS, SEIC undertook a river basin assessment in order to identify any Group 1 rivers (<i>i.e.</i> rivers of low ecological sensitivity in themselves) in which sediments released during pipeline construction may lead to impacts on more sensitive receiving rivers downstream. This assessment identified 55 such tributaries and under the RCS these tributaries were to be treated as being of the same sensitivity as the Group 2 or 3 rivers into which they flow. However, this re-assessment of tributaries was not completed until mid 2006, by which time all 55 ‘upgraded’ tributaries had already been crossed by at least one pipeline while still treated as Group 1 rivers, and hence afforded a lower level of environmental protection. In particular, 28 of these crossings (affecting 24 streams) were constructed outside of winter (winter being defined in the RCS as between October to April inclusive), thus leading to the potential to impact spawning salmon in the receiving sensitive rivers (which include major salmon spawning rivers and rivers that support taimen, such as the Nabil and Tym rivers).</p> <p>Based on the numbers and sensitivity of the receiving rivers involved and the potential for severe short-term impacts within the receiving waters, we estimate that the overall materiality of the tributary crossings is likely to be moderate.</p>	<p>See discussion on River Habitats RemAP section above.</p>	<p>Environment Potentially Moderate</p>	<p>WB OP 4.01 Annex C</p>	<p>Implementation of Plans</p>	<p>Historical</p>
<p>Wetland Crossings Non-compliances in relation to early wetland crossings include inappropriate construction of access roads through wetland areas (including importation of soils and aggregate), inadequate segregation and replacement of surface peat and vegetation during reinstatement, and maintenance of hydraulic functioning. Assessment of the environmental significance of these non-compliances is difficult without further evaluation of the ecological sensitivity of the affected wetlands, although on the basis of currently information we judge that this to be potentially moderate.</p>	<p>SEIC is developing a wetlands section of the RemAP. Before detailed actions can be defined it is first necessary to undertake a more detailed evaluation of the ecological sensitivity of the wetlands and assesses the nature and extent of any impacts.</p>	<p>Environment Potentially Moderate</p>	<p>WB OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Implementation of plans</p>	<p>Historical (Pending RemAP)</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>Erosion Control (temporary) Material breaches have been identified in relation to temporary erosion control commitments in HSESAP Part 2 Table 2.5. These include:</p> <ul style="list-style-type: none"> • Lack of surface stabilisation measures, particularly prior to the onset of winter (commitments 22, 55, 64, 65 & 68) • Inadequate installation of drainage controls (commitments 22 and 67) • Lack of provision of adequate erosion control materials and equipment in good time (commitments 57 & 58) <p>These non-compliances are both historical and, despite recent improvements, to a lesser extent ongoing. In particular surface stabilisation of slopes remains an area of key concern. The cumulative significance of these impacts is difficult to gauge without monitoring data, but we estimate the environmental materiality of these impacts to be moderate (although it may be high if required improvements in performance are not achieved). This assessment is based on the spatial and temporal extent of these non-compliances along the RoW (the vast majority of the RoW has been opened, and hence subject to erosion risks without adequate control measures being in place for significant periods of time, in some cases over 2 years) and the presence of sensitive rivers and wetlands adjacent to the exposed RoW. Furthermore, we consider that the prolonged and persistent breaches of SEIC's own requirements and HSESAP is materially high from a procedural/best practice perspective.</p>	<p>SEIC is currently finalising an Erosion Control and Reinstatement section of the RemAP in order to rectify outstanding non-compliances and improve future performance. In the interim SEIC has instigated a temporary erosion control campaign to be run from May to June 2007 in order to effect immediate improvements and repairs.</p>	<p>Environment Potentially Moderate</p> <p>Procedural/ Best Practice High (due to breach of key Company requirements)</p>	<p>WB OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Adequacy of Assessments & Plans</p> <p>Implementation of Plans</p>	<p>Historical</p>
		<p>Environment Potentially Moderate (High if required improvements are not achieved)</p> <p>Procedural/ Best practice High</p>	<p>WB OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Implementation of Plans</p>	<p>Unresolved (Pending RemAP)</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>Erosion control (Reinstatement) Under HSESAP Table 2.5 commitment 113 final grading, topsoil replacement and installation of permanent erosion control structures should be completed within 20 days of backfilling the pipeline trench. Pipeline construction activities commenced in 2004 and by May 2007 over 90% of the pipeline had been installed and backfilled. However, despite the progress made on pipeline installation, with the exception of a few limited locations, final reinstatement has not typically been completed on the RoW (although significant temporary seeding has been undertaken we consider it unlikely that this will represent adequate final reinstatement). This represents a material and ongoing breach of commitment 113. Given the importance of timely and successful reinstatement in reducing medium-to-long term impacts on, for example, sensitive rivers and pipeline integrity, we consider this issue to be of moderate environmental materiality.</p> <p>Detailed targets and timescales for permanent reinstatement are not available at the time of writing. However, from discussions with SEIC personnel we understand that in broad terms 50% of the total length of the RoW will be technically reinstated by the end of 2007 (except where ongoing activities prevent completion). The remaining technical and all biological reinstatement will be completed by the end of 2008. These timescales mean that full compliance with the HSESAP is not anticipated to be achieved until the end 2008.</p> <p>Until reinstatement is complete, soil erosion risks will remain and these will need to be minimised through the use of temporary measures, the most important of which relate to surface stabilisation progress (described above).</p> <p>Soil erosion issues have also been identified in audits undertaken by regulatory authorities.</p>	<p>SEIC is currently developing an Erosion Control and Reinstatement RemAP section. This plan should provide phased reinstatement targets at key time intervals, such as prior to the onset of winter, and also provides details of when full compliance will be restored. Once complete, this remedial action plan will need to be reviewed on behalf of the Agency Lenders.</p>	<p>Environment Potentially Moderate</p>	<p>WB OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Adequacy of Assessments & Plans Implementation of Plans</p>	<p>Historical</p>
		<p>Environment Potentially Moderate Procedural/ Best practice High (due to breach of key Company requirements) Potential regulatory issue</p>	<p>WB OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Implementation of Plans</p>	<p>Unresolved (Pending RemAP)</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>Western Gray Whales (implementation of independent advice) Timely establishment of an effective independent WGW advisory panel (WGWAP) and implementation of the Panel’s recommendations by SEIC is an important aspect in SEIC’s management of WGW protection. Due to initial delays in forming the WGWAP, an Interim Independent Scientific Group (IISG) was established in April 2006 to address priority issues prior to the 2006 construction season. The WGWAP itself was subsequently formed in autumn 2006. Although SEIC has implemented the majority of IISG/WGWAP recommendations, the Panel has identified some areas where its recommendations have not been fully implemented. This includes agreement on noise intervention criteria (this is discussed in detail below) and commencement of certain monitoring activities during 2006 and these represents non-compliance with the HSESAP commitments (Table 2.4 Commitment 35).</p> <p>The Panel has also expressed concerns that it has not always received information in a timely manner.</p> <p>The environmental significance of this issue is potentially high due the status of the WGW; although the MVA (see below) indicates that actual impacts were not significant, the analysis provided to date is not fully conclusive. In addition to the environmental significance, failure, for whatever reason, for the recommendations of the independent scientists to be agreed and implemented in a timely fashion also poses a risk to the overall WGWAP process.</p>	<p>See below regarding development of the MVA.</p> <p>The adequate functioning of the WGWAP requires that the Panel be provided with all relevant information and assessments in a timely manner, and that the Panel feels it has had full discussion on issues with SEIC.</p>	<p>Environment Potentially High</p> <p>Reputation/ Procedural High</p>	<p>WB OP 4.01 Annex B Environmental Assessment and Annex C Environmental Action Plan</p> <p>HSESAP Table 2.4 (Commitment 35)</p>	<p>Implementation of plans</p>	<p>Unresolved</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>Western Gray Whales (2005/06 construction; MVA) One of the priority issues raised in Vancouver-I⁹, namely assessment of any impacts on WGW from the 2005 construction works (through a multivariate analysis or 'MVA'), was not undertaken in time for review by the IISG at Vancouver-II. This limited the potential for the findings of the 2005 MVA study to be used by the scientists to influence the 2006 construction and monitoring programmes (although a draft of the 2005 MVA was available internally to SEIC shortly before commencement of 2006 construction). The 2005 MVA was completed in April 2007, in time for review at the second WGWAP meeting, and represents a laudable effort to assess whether impacts on WGW occurred during 2005 construction activities. The 2005 MVA does not identify any large-scale effects on WGW behaviour during the 2005 construction period, although some small-scale behavioural changes are identified; most particularly the study shows that WGW were observed further offshore when noise exposure was higher. While these findings are broadly encouraging, definitive conclusions on whether WGW were significantly impacted cannot be drawn due to:</p> <ul style="list-style-type: none"> • Limitations in the available data (<i>e.g.</i> limited visual observations due to low visibility conditions) and analysis methods (<i>e.g.</i> lack of consideration of confidence limits). • A lack of investigation into the biological significance of the small-scale behavioural changes identified. • Difficulties in distinguishing between effects from construction activities and (SEIC or non-SEIC-funded) research vessels, although some evidence indicates that the identified small-scale behavioural changes were in were response to research vessels. <p>An MVA is also being undertaken on the monitoring data from the longer duration and more spatially extensive 2006 construction activities. The 2006 MVA will include a number of improvements in the analysis recommended by the WGWAP and AEA, but it is not anticipated that this will be completed until early 2008. The pending status of the 2006 MVA represents an uncertainty in understanding whether SEIC's offshore construction activities have resulted in any detectable or significant impact on the WGW.</p>	<p>The current estimate for the completion of the 2006 MVA is early 2008 (<i>i.e.</i> too late to influence the 2007 construction season).</p>	<p>Environment Potentially High</p>	<p>WB OP 4.01 Annex B Environmental Assessment and Annex C Environmental Action Plan</p> <p>HSESAP Table 2.4 (Commitment 35)</p>	<p>Adequacy of assessments and implementation of plans</p>	<p>Historical and Unresolved (pending 2006 MVA)</p>

⁹ Vancouver I and II refer to the meetings involving international whale scientists held in Vancouver in September 2005 and April 2006 respectively.

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>Western Gray Whales (Noise intervention criteria) The installation of the Concrete Gravity Base Structure (CGBS) for PA-B during 2005 was undertaken using noise-based intervention criteria that had not been fully agreed with the relevant independent scientists. The overall scale of the worst-case potential impacts is limited to some extent by the relatively short duration of the noise intensive activities and by the results of the 2005 MVA, which while not fully conclusive, are encouraging (see above).</p> <p>The issue of noise intervention criteria for 2006 construction was discussed by the IISG at Vancouver II in April 2006, where they recommended a set of five intervention criteria. SEIC accepted these criteria with the exception of the lower noise criteria, which it did not agree with, and hence SEIC implemented a reduced (and hence less restrictive) set of criteria during 2006 construction. The issue was further discussed at WGWAP-1 and WGWAP-2, but a consensus has still not been reached; the Panel still recommend adoption of the IISG criteria (with refinements), while SEIC used its reduced set of criteria during 2007 construction. Under the HSESAP, SEIC has committed to implement all “reasonable recommendations from the WGWAP”. In this instance, assessment of whether SEIC’s rejection of the lower noise intervention criteria represents a non-compliance with the HSESAP commitment comes down to a determination of whether the WGWAP’s proposed criteria are ‘reasonable’. However, the Panel is only in a position to fully judge the reasonableness of its recommendations if it is provided with all relevant information, including technical and logistical aspects which to date have not been presented by SEIC to the Panel. We therefore consider that SEIC needs to seek alignment with the WGWAP on this issue through discussion of all biological, technical and logistical aspects.</p>	<p>See above regarding development of the MVA.</p> <p>SEIC should seek alignment with the WGWAP on this issue of noise intervention criteria through discussion of all biological, technical and logistical aspects.</p>	<p>Environment Potentially High</p> <hr/> <p>Reputation/ Procedural High</p>	<p>WB OP 4.01 Annex B & C</p>	<p>Implementation of plans</p>	<p>Historical</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>Construction at Chaivo Some construction activities were undertaken in summer 2006 outside of the winter period on the Chaivo Spit, contrary to HSESAP (2005) commitments. However, based on further analysis of the Chaivo sensitivities, it was agreed that some work in the region was environmentally acceptable once the RDB birds have either left the area or where construction activities were outside of the zone of influence (and therefore would not affect the birds). In both cases these refined mitigation measures (captured in an updated HSESAP, 2007) require that observations are made prior to construction activities to confirm the absence of birds.</p> <p>During the spring and early summer of 2007 some construction work occurred at the pigging station. The work commenced prior to the arrival of the birds and continued throughout the nesting period, but observations did not take place prior to construction in order to confirm RDB birds were outside of the zone of influence. This represents a breach of the refined mitigation measures. Survey work undertaken during ongoing construction activities reveals only one RDB bird nest site to be in close proximity (150m) of construction activities, although the possibility that construction activities influenced the birds' selection of nesting sites cannot be ruled out.</p> <p>With respect to the pair of Steller's sea eagles, it is possible that construction-related activities, in excess of that allowed in the nest specific mitigation measures, contributed to, or were directly responsible for, the failure to breed.</p>	<p>In future similar situations SEIC should consult with the Agency Lenders when they believe there is a case to be made to deviate from agreed commitments/plans.</p>	<p>Procedure and Reputation High</p> <p>Environmental Potentially Moderate (for SSE)</p> <p>Environmental Low (for other RDB bird species)</p>	<p>WB OP 4.01 Annex C</p>	<p>Implementation of plans</p>	<p>Historical</p>

Issue	Resolution/Mitigation	Materiality ⁸	Requirement	Nature of Issue	Status ⁵
<p>Indigenous Peoples Development Plan An Indigenous Peoples Development Plan was not produced prior to construction. However, such a plan was subsequently completed and tripartite agreement on cooperation with the SIMDP has been signed by the vice governor of Sakhalin, representatives of the IP and SEIC.</p>	<p>If people are found to have been affected following finalisation of the SIMDP, SEIC is prepared to provide (retrospective) mitigation/compensation in line with the procedures specified within the RAP.</p>	<p>Social/ Reputation Potentially Moderate</p>	<p>Indigenous Peoples, OD4.20 (Potential for impacts on IPs to occur prior to collection of all baseline data and development/ implementation of mitigation measures)</p>	<p>Adequacy of assessments & plans</p>	<p>Historical</p>
<p>Resettlement Action Plan The Resettlement Action Plan (RAP) was not finalised prior to construction. In November 2006 the Grievance database had ten unresolved grievances relating to land use, seven of which had been unresolved for over 8 weeks, and some of which dated back to May and June 2006. However, in May 2007 there was a total of only one RAP related grievance outstanding.</p> <p>SEIC has committed to paying compensation for the loss of the beach adjacent to the LNG site, although this has not yet been provided. SEIC is pursuing a number of options for the provision of this offset and we are aware that delays are due to third party involvement.</p>	<p>Compensation can be provided retrospectively, and SEIC has recently been further increasing awareness of the RAP and strengthening their own internal processes for the resolution of claims on a timely basis</p>	<p>Social Moderate</p>	<p>Involuntary Resettlement, WB OP 4.30. Requirements for the timely implementation of a RAP</p>	<p>Adequacy of assessments & plans</p>	<p>Historical</p>
<p>Grievance management system Low visibility of the Grievance Procedure and its associated public information leaflet, and the timely resolution of grievances were a concern until Quarter 3, 2006. Awareness of the procedure and leaflet amongst affected communities, contractors, and staff was poor, suggesting inadequate information dissemination. SEIC put in place a number of initiatives to raise awareness of the Grievance Procedure and improved their grievance management system. Monitoring by AEA has shown the system to be now working much more effectively.</p>	<p>This issue is addressed by improved information dissemination, quicker resolution of grievances and through the commissioning of an independent mediation review process.</p>	<p>Social Potentially Moderate</p>	<p>IFC Guidance Note F. Content of Public consultation and disclosure plan</p>	<p>Implementation of plans</p>	<p>Historical</p>

Table 1-2 Key Issues Requiring Further Monitoring

There are a number of other areas of ongoing activity that must be satisfactorily addressed in a timely fashion. SEIC has reasonable plans to address these issues, however, failure to fully action such plans could compromise the Project’s ability to meet Lender requirements. Thus, further monitoring is required to confirm the implementation of plans. Details of the most important of these areas are provided below.

Issue	Category	Specific Requirement	Comment
Preparation of Oil Spill Response Plans	Best Practice/ Procedure	IFC Guidance Oil and Gas Offshore Development, WB PPAH for Oil and Gas Development Onshore	Five out of seven OSRPs have been prepared and approved by RF authorities. These five plans have been reviewed by the Agency Lenders’ specialist oil spill consultant, and the comments provided are being incorporated within the approved plans. Agency Lenders agreed with SEIC that approved plans are to be in place at least 6 months prior to first oil. Timely completion and approval of the two remaining plans is essential.
The outcome of ongoing legal proceedings. The outcome of other regulatory matters mentioned in the report that have been referred to the Independent Legal Advisers.	Regulatory	Compliance with the regulatory requirements of the Russian Federation and Sakhalin Regional Authorities.	A number of legal cases against the Project remain unresolved. SEIC is only a third party to some of these actions. Other cases may be subject to an appeal. These and any other future proceeding will require ongoing monitoring on behalf of the Agency Lenders by their legal advisers.
Following finalisation of the design of the Booster Compression Station 2 (BCS2) assessments of atmospheric emissions and noise impacts are required to ensure that RF and international standards are met. However, SEIC are aware of these requirements.	Regulatory Environment	WB OP 4.01 Annex B.	The necessity for both gas compressor and oil pump stations has been confirmed. The need for air quality and noise assessments is pressing given the proximity of the village of Gastello to the proposed BCS-2 location.

Issue	Category	Specific Requirement	Comment
<p>Development of environmental and social monitoring plans for the commissioning and operations phase of the Project.</p>	<p>Environment Social</p>	<p>WB OP 4.01 Annex C Environmental Action Plan</p>	<p>Conflicting timeframes are provided in the Common Terms Agreement and the 2005 HSESAP regarding the release of the commissioning and monitoring plans. However, regardless of the precise date for the plans, the intent is for these plans to be released in the public domain via an updated Annex C in a timely manner. In our view, monitoring plans should be made available for review such that they are in place at least 3 months prior to activities. Given the current plans for commissioning the LNG and oil handling components of the Project this summer/autumn, the development and approval of the monitoring plans should be resolved as a matter of urgency.</p>
<p>SEIC has committed to a number of important initiatives in relation to river protection/management, namely:</p> <ul style="list-style-type: none"> - No Net Loss programme for salmon habitat. - Taimen research project - Induced access control programme <p>SEIC is also developing a Biodiversity Action Plan</p>	<p>Environment</p>	<p>WB OP 4.01 Annex C.</p>	<p>These plans/projects, including the BAP, are in development. In the light of issues raised in implementation to date of onshore pipeline construction, impacts on rivers crossed by the pipeline need to be assessed by detailed monitoring as part of these programmes.</p>
<p>There is some uncertainty regarding the wetland construction practices. These include</p> <ul style="list-style-type: none"> - Long term use of access roads - Construction across Type II/III wetland outside of the winter. <p>Poorly constructed access roads/compaction due to construction outside of winter has potential to alter wetland hydrology and therefore lead to persistent alteration of ecosystems.</p>	<p>Environment</p>	<p>WB OP 4.01 Annex B. HSESAP Table 2.5, row 87</p>	<p>The extent to which any of these practices takes place is unclear. However, they have potential to cause increased environmental harm and therefore the extent to which they are applied, and the adequacy of associated environmental protection measures should be monitored. SEIC is to produce a wetlands remedial action plan</p>

Issue	Category	Specific Requirement	Comment
<p>A number of other important studies to be completed/under review include:</p> <ul style="list-style-type: none"> - Volumetric flaring forecast (for commissioning) - Tanker collision risk assessment - Long term impacts of the MOF (require review) - Post construction Demobilisation Plans (required prior to demobilisation) 	<p>Environment</p> <p>Social</p>	<p>WB OP 4.01 Annex B.</p>	<p>Given that the environmental impacts from commissioning of the LNG plant may be significant, the materiality of the need to undertake adequate assessment is considered to be high from a best practice perspective. This flaring study has been completed and is currently under AEA review.</p> <p>The collision risk study will be completed 6 months prior to first oil.</p>
<p>At the time of writing, SEIC is developing a remedial action plan that will address known HSESAP non-compliances. This plan, anticipated to address soil erosion, river crossing, and wetlands, should define a course of actions and targets set against defined timescales.</p>	<p>Various</p>	<p>Various</p>	<p>Final draft plan will be made available to Agency Lenders. The original timeframes (Oct 2006) have lapsed; revised timeframes envisage finalisation of the plans in August 2007. Such plans are required to be in place under the HSESAP methodology and ahead of financial close.</p>
<p>SEIC has confirmed that it plans to undertake seismic surveys of the Piltun-Ashtokhskoye field. SEIC is to produce an EIA for these activities and this needs to address potential cumulative impacts from both other operators and coordination of SEIC's surveys in the northern and southern portions of the field.</p>	<p>Environmental</p>	<p>OP 4.01</p>	<p>The WGAP will provide input and review to the EIA and associated aspects relating to the surveys. While SEIC has no direct control over seismic surveys undertaken by other operators in the region, the Company's intention to develop its seismic programme with input from the WGAP has the potential to create a standard of good practice.</p>

Table 1-3 Examples of Best Practice

<p>Best Practice HSESAP Commitments</p>	<p>Funding of an independent review and advice process for the management of issues pertaining to the critically endangered WGW in the form of the WGWAP, which builds on previous independent review work. In order to maintain the independence and integrity of the WGWAP, it is to be convened by the World Conservation Union (IUCN). The use of world-renown experts in this transparently independent manner is both novel and highly commendable.</p> <p>A commitment that no drill muds, cuttings or produced waters will be discharged to sea (rather these will be disposed via dedicated injection wells). Industry practice is often to dispose of many of these waste products into the sea, which can lead to smothering and toxic impacts of marine life. SEIC’s commitment to re-inject into well formations is therefore commendable best practice and is especially important in eliminating a potential source of impact on the foodchain of the WGW.</p> <p>The upgrade of three municipal landfill sites for use by both SEIC and local communities. These facilities represent significant improvements on the existing municipal landfills in terms of their environmental performance and the use of these upgraded landfills for municipal waste represents an important and tangible improvement to waste management on Sakhalin.</p> <p>Implementation of strict tanker vetting procedures and a year-round commitment to allowing only double-hulled tankers at the oil export terminal.</p> <p>Comprehensive road safety programmes whereby SEIC is undertaking a highly visible road safety campaign targeted at company and contractor staff as well as at community members, via a variety of media, and also require contractors to undertake a number of measures (<i>e.g.</i> compulsory daily alcohol tests for drivers) to promote road safety.</p> <p>SEIC developed an Indigenous Peoples Development Plan (the SIMDP), in line with OD 4.20. Although the plan was not finalised until well into the construction phase, SEIC’s proactive engagement with the island’s indigenous people, and their part in the establishment of an indigenous minorities council has resulted in a very strong SIMDP.</p>
<p>Environmental Programmes</p>	<p>SEIC is committed to the development of a Biodiversity Action Plan (BAP) and has also committed to a number of research projects as part of its biodiversity management programme, such as research programmes aimed at sea eagles, WGW and the Sakhalin taimen.</p>
<p>Social Programmes</p>	<p>Health-related initiatives, such as the establishment of a joint (SEIC-Oblast) Health Advisory Committee, HIV-AIDS awareness programmes, and the provision of a financial support for a health infrastructure upgrade programme for the island.</p>

	<p>A programme of social investment in projects designed to promote sustainable development on the island. According to data supplied by SEIC, the scheduled social contributions of the company include:</p> <ul style="list-style-type: none">• \$100 million contributed to the Sakhalin Development Fund between 1997 and 2003• A \$24 million Sustainable Development Fund between 2003 and 2008• A social investment fund in External Affairs totalling \$1.7 million between 2003 and 2006
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1 Introduction

1.1 PREAMBLE

AEA has been commissioned by Sakhalin Energy Investment Company (Sakhalin Energy) to provide an independent review of the Health, Safety and Environmental (HSE) and Social performance of the Sakhalin II, Phase 2 Project (the “Project”). Notwithstanding the appointment of AEA by Sakhalin Energy, AEA has a duty of care to the Agency Lenders. Therefore the work has been undertaken for and on behalf of those banks and financial institutions that will potentially be providing financial support to the Project.

The Project involves the development of the Piltun-Astokhskoye oil field, the Lunskeye gas field and associated pipelines and downstream facilities. Both fields are located offshore of Sakhalin Island, which is part of the Russian Federation (RF) Territory and situated north of Japan.

As the Lenders’ Independent Environmental Consultant (IEC), AEA has liaised with other independent consultants appointed by Sakhalin Energy, which also have a duty of care to the Agency Lenders, including:

- The Independent Technical Consultant
- The Independent Reserves Consultant
- The Independent Shipping Consultants
- The Independent Legal Advisors.

In order to enable AEA to undertake the due diligence review, Sakhalin Energy has adopted an “open book” policy with respect to the Company’s environmental information. Sakhalin Energy has provided AEA with access to work-in-progress, key personnel and all relevant information on the Project.

1.2 AEA’S ROLE

AEA has been engaged with the Project, providing due diligence support to the Agency lenders for over 5 years. At the time of our appointment our scope of work, extending through to financial close, primarily related to the review of HSE documentation and a limited number of visits to the island for verification purposes and information gathering. However, as the duration of our involvement has increased, our role has also evolved to include monitoring of ongoing construction activities through to financial close.

Due to the nature of our role we have been involved in a variety of reviews, audits and verification exercises. Thus our involvement has included review of:

1. Environmental, Social and Health impact assessment documentation including:
 - Russian TEOC materials
 - Preliminary EIA (2001)
 - ‘International style’ EIA, SIA and HIA (2003)

- Western Gray Whale (WGW) EIA (2003)
 - Lunskeye Seismic Survey Environmental Statement (LSSES) (2003)
 - The Comparative Environmental Analysis Report (CEAR) (2004)
 - All environmental and social addenda to the original 2003 EIA (2005)
 - The Chaivo Bay EIA (2005)
 - Numerous environmental and social position papers
2. Project plans, mitigation measures and management systems including:
- Public Consultation and Disclosure Plan (PCDP)
 - Updated Waste Management Plans (WMP)
 - Construction phase Oil Spill Response Plans (OSRP) excluding operational plans for production
 - Emergency Response Plans (ERP)
 - WGW Protection Plan¹⁰ (WGWPP) and associated documentation
 - Environmental Management Plans for the Infrastructure Upgrade Project (IUP) works
 - Resettlement Action Plan
 - Sakhalin Indigenous Minorities Development Plan (SIMDP)
 - Cultural Heritage Plan
 - The Grievance Procedure
 - Various HSE management plans, and the HSE-MS
 - The Environmental Action Plan, referred to as the Health, Safety, Environmental and Social Action plan (HSESAP) on this project
 - Russian regulatory requirements/documentation e.g. audit reports

We also intend to review the adequacy of a forthcoming Remedial Action Plan (RemAP) that will be prepared in response to HSESAP non-compliances (see Sections 6.5 - 6.7).

In addition to reviews of the Project HSE and social assessments, procedures and plans against relevant standards, AEA has undertaken assessments of the implementation of such plans during project construction (which gained momentum in 2004). In order to undertake such assessments AEA has completed numerous project monitoring field trips as follows:

- 2004 (March, June and October)
- 2005 (October, February, April, July and September)
- 2006 (January, March, May, July, September and November)
- 2007 (April and May)

AEA also had a continuous environmental monitoring presence since late December 2005 dedicated to the monitoring of winter river crossings and soil erosion control activities.

1.3 SCOPE OF REPORT

This report is prepared against the Scope of Work (SoW) finalised by the Agency Lenders in Quarter 4, 2001. Throughout AEA's engagement as the IEC we have liaised closely with the

¹⁰ Now renamed the Marine Mammal Protection Plan (MMPP)

Agency Lenders and incorporated relevant information in response to their requests as the Project has evolved. The report provides AEA's assessment of Project performance in relation to WB/IFC requirements, Russian law, international treaties and conventions and Agency Lenders' own policy requirements, highlighting areas that may not meet (either fully or partially) these requirements.

Within the context of the above SoW AEA has assessed the extent to which:

- the Project's assessments, proposed mitigation measures and plans meet the Agency Lenders' requirements. This includes an assessment of the adequacy of the Health, Safety, Environmental and Social Action Plan (HSESAP) for the implementation of the Project's mitigation measures and monitoring.
- plans and procedures have been effectively implemented during actual construction activities to November 2006.

In undertaking this assessment, AEA has determined for each identified issue:

- the relevant Lender requirement to which the issue relates
- whether the issue relates to the adequacy of either:
 - the Project assessments and plans in relation to the Lender requirement, or
 - the implementation of Project plans during construction.
- the materiality of the issue (if it were inadequately resolved)
- the status of the issue in terms of its resolution or otherwise and, for issues that relate to previous activities, whether there may be historical legacy issues.

The report is structured as follows:

- Section 2 provides a description of the Project, including material project changes as well as an update on construction progress and an indication of the key Health Safety, Environmental and Social (HSES) sensitivities.
- Section 3 describes the HSES requirements to be met by the Project, including those of the Agency Lenders and relevant regulatory frameworks.
- Section 4 provides an overview of our approach including a description of the assessment criteria applied in evaluating the materiality and status of identified issues.
- Section 5 provides an overview of the HSES assessment and management process, including an overview opinion of the adequacy of SEIC's approach in relation to the Agency Lenders' requirements.
- Sections 6 to 10 provide detailed assessment of the project against relevant requirements. A separate section is dedicated to each of the following areas:
 - environmental impact
 - public consultation
 - social impact
 - health impact

- oil spills
- Section 11 provides a summary of the key findings.

The report is based on information available as of July 2007. The report also reflects comments and ongoing dialogue with Agency Lenders.

2 Project Description and Key Impacts

2.1 PROJECT DESCRIPTION

2.1.1 Introduction

The description provided in this section is based on AEA's understanding of the Project. It is based upon materials produced by SEIC and verified by AEA, including most notably the 2003 EIA, the subsequently updated project description provided in the EIA addenda and version 7 of the Basis of Design (BOD).

This section describes the main features of the Project, describes material design changes since BOD v5, explains how these are described in the EIA addenda, and then highlights any material changes that are not captured in the addenda.

2.1.2 Project Setting

Sakhalin Island lies approximately 20km east of the Russian mainland and 60km north of the Japanese island of Hokkaido. It is bordered by the Sea of Okhotsk to the east, the shallow Tartar Strait (a channel 100km wide for the most part but narrowing to 10km wide at the north of Sakhalin Island) to the west, which separates Sakhalin Island from the Russian mainland, and La Perouse Strait to the south, which separates it from Hokkaido Island.

The population of Sakhalin Island is around 591,000 (as of January 2000) with most of the population living in urban areas in the south. There is a diverse ethnic composition including Russians, Ukrainians, Koreans, Belarusians and Tatars. In addition, there is a small but important indigenous population (3,198 as of January 2000), just under half of whom live in rural areas. Formal housing is predominantly in the urban areas and this is being gradually privatised. The availability of housing (pre Project) is high in the smaller cities due to an increase in population migration to the capital Yuzhno-Sakhalinsk, to mainland Russia and abroad. In the urban areas over 90% of the population are served by water supplies, 84 % by sewerage systems and 83% by centralised heating systems. In the rural areas these figures drop by nearly half. Most of these systems require major improvements.

Over 65% of the population are of working age (reflecting the low birth rate on Sakhalin Island) of which 13% were unemployed (pre Project). The major industries for employment are fishing, oil extraction and electricity generation. In terms of manufacturing, the fuel industry is the most active, followed by the food industry, electricity generation, timber, wood processing and pulp and paper. Agriculture is a small but active sector with individual holdings being the most dominant in terms of output. The indigenous population in rural areas work in traditional industries such as reindeer herding, fishing, marine mammal hunting, national crafts and tailoring.

The environmental and ecological conditions found on and around Sakhalin Island vary considerably. Details of the existing environment around the various elements of the proposed Project are described briefly below.

Offshore Environment

Due to the climatic conditions, sea ice is a significant hazard around Sakhalin Island. The thickness and associated level of hazard increases from south to north. Consequently, sea traffic is severely restricted north-east of Sakhalin in the winter season. Near shore in this area, a phenomenon known as ice gouging occurs, which results from ice ridges that drag along the sea bottom. In the south coastal region, the ice thickness and volumes of mobile ice are much less.

Sakhalin Island has a severe climate, particularly in the northern offshore shelf region. The average annual temperature in this area is -1°C (average minimum in January of -20°C and in August of $+14^{\circ}\text{C}$). The absolute recorded range is -48°C to $+37^{\circ}\text{C}$. Precipitation in the region is moderate (600mm/year). Winds are persistent and strong with average wind speeds in December to January of 4 to 7 m/s, with peak wind speeds of 37 to 40 m/s. Fog occurs during more than about 80 days per year, mainly in summer. In addition, blizzards occur with high winds and snowfall typically lasting 8 to 10 hours, with atmospheric icing occurring, particularly at sea, peaking in December to January. High storm waves are experienced during autumn and winter storms around the whole of Sakhalin Island.

Sandstone and siltstone are the most relevant geological strata underlying Sakhalin Island and it is these rocks, especially immediately offshore, that house the oil and gas reserves at a depth of 1km to 3km subsurface within the Sakhalin II fields. Due to the faulted nature of its geology, the whole area offshore and onshore is subject to seismic events. The sandstone and siltstone strata are overlain offshore by gravel, sand and silts that are continuously shifted and eroded due to the prevalence of high currents.

The coastline varies from steep in the middle latitudes of Sakhalin Island, to flat in the north and highly undulating coastline in the south. The coastal strip and lagoons have many recognised important habitats with high densities of marine life including spawning fish, and migratory bird resting areas. Additionally, one of the “critically endangered¹¹” whale populations in the world, the Western Gray Whale (WGW), migrates north every summer to the Sea of Okhotsk to feed in the shallow waters close to the northern and eastern coast of Sakhalin Island.

Onshore Environment

Sakhalin Island is of mixed terrain with the northern area comprising flat to gently sloping river valleys and flat swampy coastal lowlands (the Sakhalin Shelf, which stretches offshore and is where the main oil and gas deposits lie, is part of this lowland area) and with low mountains in the south.

Many short length, small rivers and streams dissect Sakhalin Island. Water flow is dominated by the winter freeze, spring thaw and groundwater flows. Many of the rivers have salmon spawning grounds in their upper reaches. Water is abstracted for use by the urban centres along the lower reaches of some rivers. Groundwater is closely related to topography. In the mountains the water table is generally found at depths of greater than 5m below ground level. In the coastal and swampy areas, groundwater is near to or at surface level. Groundwater (less than 30m below the surface) from river valley alluvial deposits is used as a water supply in many parts of Sakhalin.

¹¹ IUCN Red List categorisation of threatened species

Onshore, the lower lying areas are overlain by sand, gravel, clay and peat. In northern and eastern parts of Sakhalin Island, there are extensive peat bogs and swamps. These ground conditions can result in significant soil erosion during the seasonal spring thaw when large water flows are generated for a period of several weeks. The spring thaw also creates small to medium landslides and debris flows in the lower mountain slopes and steeper slopes of the river valley areas.

Sakhalin Island has a high botanical diversity with nearly one third of registered plants being forestry species (both primary forests, i.e. natural forest, and secondary forests, i.e. those formed for logging or burning). The remainder comprise grassland of natural meadows and secondary grassland including bamboo and wetlands ranging from swamps, bogs, mires and fens. Many Red Data Book plant species exist especially in the south of Sakhalin Island.

Biologically, Sakhalin Island has many Red Data Book¹² listed fauna including insects (ground beetles and butterflies), inland birds (including species protected nationally and internationally with 12 species deemed to be threatened), fish and mammals. Sakhalin Island is also an important location for many migratory nesting and breeding inland and shore birds. There are a number of specially protected areas on Sakhalin Island, including 38 nature monuments and a number of nature reserves.

Sakhalin Island is subject to wild (forest) fires, which are essentially a natural phenomenon but human negligence is increasing their frequency. Such fires have a dramatic impact on the environment in general, destroying habitats, flora and fauna, and affecting the air quality across Sakhalin Island. Generally, there are only relatively low levels of atmospheric pollution, with peak levels only occurring in urban centres such as Yuzhno-Sakhalinsk and in the vicinity of coal-fired power stations. The strong winds usually assist rapid dispersion of atmospheric pollutants apart from occasions in both summer and winter when calm or inversion conditions occur.

Key potential sensitivities and impacts associated with the Project are described in Sections 6 to 10.

2.1.3 Project Description

Sakhalin II, Phase 1

The Phase 2 project builds on the existing Phase 1 Project, described briefly here as background to the Phase 2 description, and because of its relevance to the Phase 2 project.

The Phase 1 Project has been producing oil from the Piltun-Astokhskoye field since 1999. It consists of:

- The Molikpaq: a Caisson platform structure retrofitted to become Russia's first offshore oil production facility;
- The "Okha:" a new-build Floating Storage Offloading (FSO) unit; and
- A Single Anchor Leg Mooring (SALM): connected to the FSO with an associated flowline from the Molikpaq.

¹² The Red Data Book lists and categorises threatened species according to the IUCN categorisation scheme

The Molikpaq platform, originally designed for Beaufort Sea exploratory drilling operations and then modified for the Phase 1 Project, produces oil for approximately 6 months of the year outside of the winter ice season. Oil from the Molikpaq is temporarily stored on a floating storage and offloading (FSO) vessel anchored to a Single Anchor Leg Mooring (SALM) before being transferred to a shuttle tanker via a floating offloading hose. Upon completion of the Phase 2 Project, the FSO will be uncoupled from the Molikpaq and oil will be transported to shore via a new pipeline. Shuttle tankers will cease to be required. The Phase 1 operation is shown diagrammatically below.

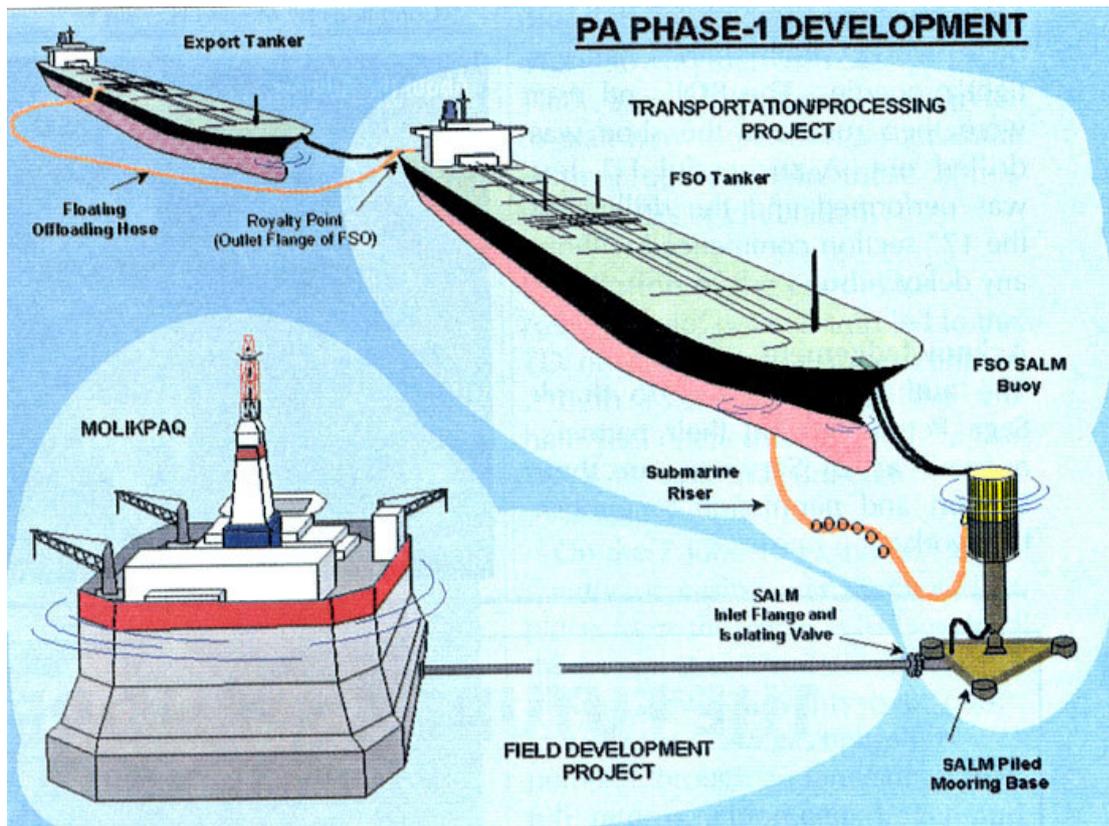


Figure 2-1 PA Phase 1 Development

Sakhalin II, Phase 2

The Phase 2 Project is an integrated oil and gas offshore and onshore development project to be operated by SEIC for the recovery, processing and export of oil and gas from the offshore Sakhalin fields of Piltun-Astokhskoye and Lunskeye that will operate 12 months of the year.

Onshore Project facilities on Sakhalin Island will include gas processing, pipeline transport to oil export facilities and gas liquefaction and export facilities. The Piltun-Ashtokhskoye field is predominantly an oil field (light oil of low sulphur content) but contains both associated and non-associated gas. The Lunskeye field is a gas condensate field, though this field also has a potentially exploitable oil rim.

The development of oil and gas fields onshore has taken place since 1928. Exploratory offshore drilling began in 1977 and about 25 wells were drilled. The Piltun-Astokhskoye and Lunskeye offshore fields were discovered around 1984.

Sakhalin Energy was formed in 1994 from the MMM Consortium (Marathon, McDermott, Mitsui), Shell and Mitsubishi for the express purpose of developing the Piltun-Astokhskoye and Lunskoye fields. Sakhalin Energy signed the Production Sharing Agreement (PSA) with the Russian Federation and the Sakhalin Oblast Administration in that year; this was the first PSA to be signed in Russia. The operating licences were received in May 1996. Following changes to the partnership since that time, Sakhalin Energy's shareholders (as of November 2006) consist of Shell (55%), Mitsui (25%) and Mitsubishi (20%). In Q1, 2007 a new ownership structure was agreed reflecting the introduction of OAO Gazprom, where Gazprom hold 50% plus one share, Shell 27.5%, Mitsui 12.5% and Mitsubishi 10%.

The Integrated Plan of Development for Sakhalin II, Phase 2 Project was approved in June 2001.

The Project will comprise:

- Three offshore platforms producing oil and gas:
 - The existing (Phase 1) PA-A Platform in the Piltun field with new export pipeline and treatment facilities.
 - An oil and gas drilling and production platform in the Piltun field (PA-B Platform).
 - A gas and condensate/oil rim drilling and production platform in the Lunskoye field (Lun-A).
- Pipelines:
 - Two 14" offshore oil pipelines including booster stations to gather oil produced from the PA-A and PA-B platforms that tie-in close to the Piltun landfall.
 - Two 14" offshore gas pipelines to gather gas from the PA-A and PA-B platforms that tie-in close to the Piltun landfall.
 - Two multiphase 30" pipelines (gas and condensate) from the Lun-A platform to the Onshore Processing Facility (OPF) extending 20.5km, of which 13.5km is offshore.
 - A 4.5" monoethylene glycol (MEG) return line from the OPF to Lun-A.
 - An onshore 20" oil pipeline system to transfer oil from the Piltun landfall to the OPF (approximately 160 km).
 - An onshore 20" gas pipeline to transfer gas from the Piltun landfall to the OPF (approximately 160 km) via the Boatasyn Gas Terminal.
 - A 24" onshore oil pipeline system to transfer oil from the OPF to the Oil Export Terminal (OET) (approximately 614 km)¹³.
 - A 48" onshore gas pipeline system to transfer gas from the OPF to the LNG plant (approximately 614 km)³. The gas pipeline contains 2 off-take points to facilitate delivery of gas to the domestic market
 - A 30" loading pipeline from the OET to the Tanker Loading Unit (TLU), which is approximately 4.5 km.
- An OPF that treats gas and associated liquid production from the Lunskoye field.
- An oil booster and gas compressor station at the OPF (BCS1).
- An oil booster and gas compression station (BCS2) near Gastello, midway along the pipeline route from the OPF to the LNG plant.

¹³ It is noted that the gas and oil pipelines will utilise the same right-of-way (RoW).

- An OET including a TLU at Prigorodnoye.
- A phased two-train LNG plant at Prigorodnoye.
- Necessary infrastructure work to support project execution, which include airport, road, bridge and culvert upgrades and a Materials Offloading Facility (MOF) jetty at the LNG/OET site.
- Shore Based Supply Camps, accommodation and Company Headquarters.

The locations of most of these facilities are shown in Figure 2-2.

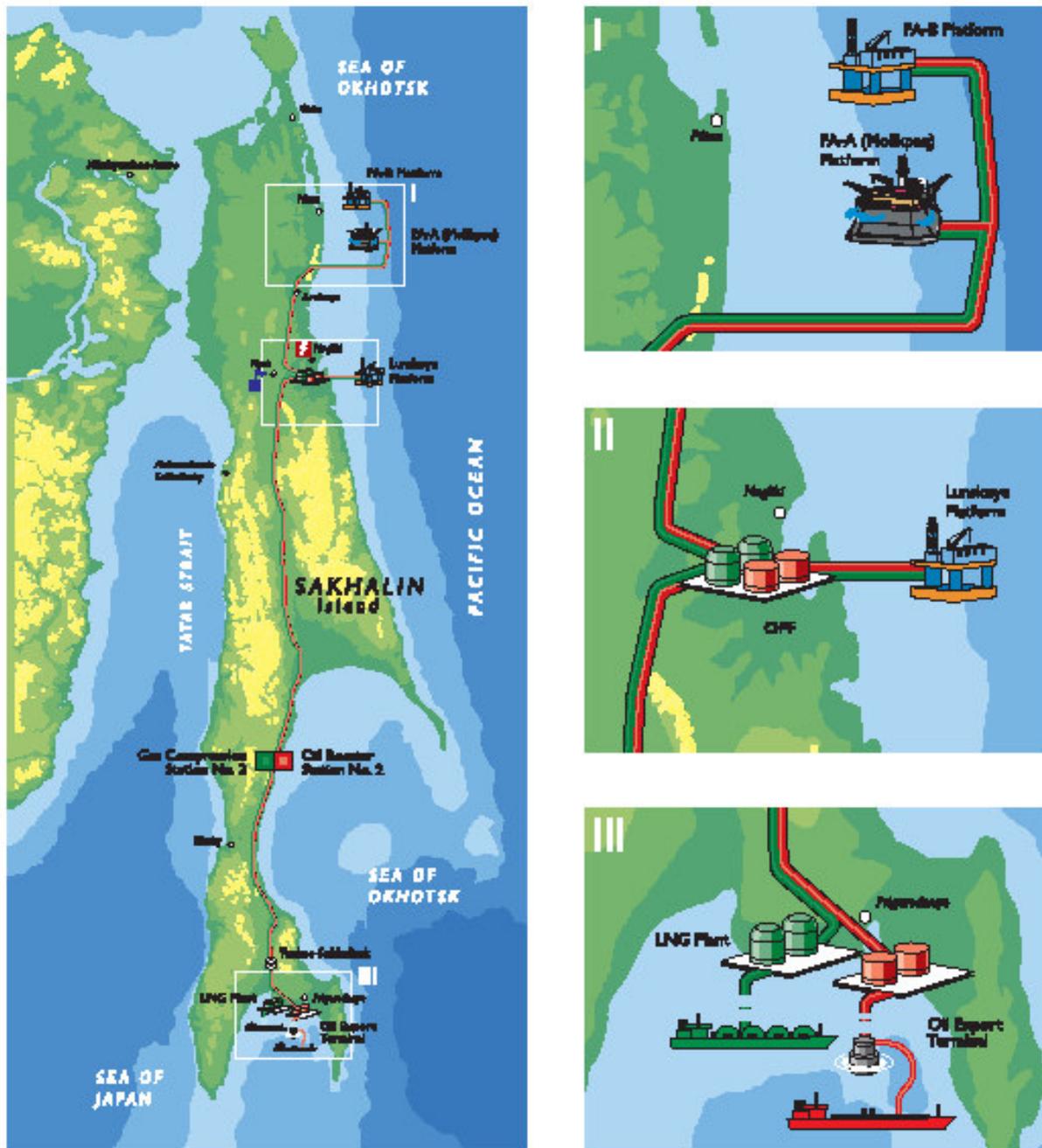


Figure 2-2 Location of Major Pipelines and Facilities

The Project facilities are described and reviewed in detail in the Independent Technical Review Reports produced by the ITC. Detailed descriptions can also be found in Section 2 of each of the 2003 EIA volumes. Further detail for the main facilities is provided below. Section 2.1.4 highlights the main changes since submission of the original TEOC and the 2003 ESHIA materials.

Offshore Platforms and Pipelines

The offshore platforms and offshore pipelines will all be located on the Sakhalin Shelf off the north east of Sakhalin Island. This area is complex in terms of the sea state, the seabed, the climate and the marine fauna and these conditions need to be allowed for in the design of the offshore facilities.

The three platforms will comprise the following facilities:

<p>PA- A platform</p>	<p>The existing Vityaz Production Complex will be modified to enable integration with the new facilities (pipeline tie-in and new oil and gas treatment/export facilities) and also to allow year-round production (production is currently restricted to a six month period due to ice conditions). The Vityaz Production Complex currently comprises a manned drilling, production and processing platform (for 133 personnel) for the production of oil and gas and the Okha Floating, Storage and Offloading (FSO) vessel (moored to a single anchor leg mooring buoy (SALM)). The dewatered oil is transferred via a sub-sea pipeline to the FSO for off loading to tankers. Excess gas that cannot be reinjected is currently flared. Under the Phase 2 Project the PA-A platform will be integrated into the overall development. The existing pipeline from the platform to the SALM will be decommissioned involving cleaning it of oil, cutting off at sea level and end plugging. The dewatered oil will then be transported via sub-sea pipeline to Piltun landfall. The dry gas will be transferred via a second sub-sea pipeline to landfall. The SALM buoy will be decommissioned via cleaning of lines, cutting anchor lines free at sea bed and towing the buoy for sale or scrapping. The FSO will leave the PA field. The flaring of excess gas will cease. During the construction phase of these changes an additional temporary accommodation block will be required.</p>
<p>PA-B platform</p>	<p>This will be a manned production and drilling platform (for 100 permanent and 40 temporary persons) with first production currently scheduled for Q3, 2008. It will produce, process and transfer oil and associated gas via a sub-sea pipeline via (but not tied into) PA-A. As with the PA-A platform the gas will be dehydrated and dew point controlled and the oil dehydrated and stabilised before transfer via sub-sea pipeline to Piltun landfall.</p>
<p>Lun-A platform</p>	<p>This will be a manned drilling, production and primary separation platform (for 90 permanent and 36 temporary personnel) with first production currently scheduled for Q3, 2008. The wet gas and condensate will be transferred by sub-sea pipelines to Lunskeye landfall. Power supply for Lun-A will be supplied from the OPF.</p>

All three platforms will consist of a drilling rig and process modules, water reinjection facilities, relief flares, wastewater treatment, warehouse and bunker facilities. A cuttings re-injection system will also be provided at the platforms if this is identified following tests to be technically feasible.

The pipelines will be laid in trenches via a continuous process using specialised pipe laying vessels, and the trenches then backfilled. This will be performed during the ice-free season and work will be halted during adverse weather, sea or ice conditions. The depth of trench has been determined based on the results of studies on seabed movement, ice gouging and sediment movement at landfall locations.

Onshore Pipelines

The pipelines are being constructed using a 'spread technique' involving a moving assembly line approach with sequential activity aiming to maintaining a constant rate of progress. The spread technique involves the following progression of activity:

- Preparation of the RoW (clearing and grading)
- Pipe Trench excavation
- Trench preparation
- Line pipe stringing
- Field bending of pipes
- Welding
- X-ray and inspection
- Field joint coating
- Lowering and laying pipe
- Backfilling of trench
- Hydrotesting
- Reinstatement and restoration.

Several pipeline spread teams are operation at all times during pipeline construction, and progress is thus disjointed and variable along the RoW due to the occurrence of priority areas and environmental constraints.

Onshore Processing Facility (OPF)

The proposed OPF will treat gas and liquid production from the Lun-A platform. The OPF is to be sited at a remote location 7km inland from the Lunskeye pipeline landfall and will cover an area of 25.5 ha. Produced gas and hydrocarbon liquid from the Lunskeye field is received at the OPF and further processed for pipeline transportation. The Lunskeye field will produce primarily gas condensate but also oil from an oil rim in the field. As the produced gas is saturated (wet), condensed water is also received along with recycled monoethylene glycol (MEG) that is injected offshore for hydrate prevention. The OPF will comprise inlet vessels, three-phase separation, condensate stabilisation, condensate storage, gas dehydration and dew point control, flare and flash gas compression. It will also include BCS1 within the fence line, which incorporates a gas pipeline compressor system and oil pipeline booster pumps.

Both the gas compressor system and the oil booster pumps will be gas turbine driven. As the Lunkoye field production pressure decreases over time, inlet booster compressors will be required. These are scheduled for addition in 2021 (high pressure) and 2030 (low pressure).

The OPF is a standalone facility and therefore will have the following utilities:

- Electrical power generation for the OPF and LUN-A platform (from gas turbines).
- Water provision (including potable water).
- Waste water treatment (comprising a process effluent treatment system, sewage treatment facilities and a tertiary treatment system to support the MEG and sewage treatment activities) that will be subsequently routed to a deep disposal well.
- Fuel gas.
- Instrument air.
- All necessary plant support facilities such as roads, accommodation and office buildings, a helipad, warehouse, maintenance, fire station building and central control building.

Booster Compression Station 2

The Booster Compression Station Number 2 (BCS2)¹⁴ will be located near Gastello, midway along the pipeline route from the OPF to the OET (about 319km South of the OPF). It will comprise both a compressor station for the gas pipeline and a pump station for the oil pipeline and is due to be commissioned in 2008.

Oil Export Terminal (OET), Tanker Loading Unit (TLU) and LNG Facility

The OET, TLU and LNG plant are to be based in the south of Sakhalin Island. In the southern onshore area the temperatures are slightly higher than in the north (average annual being 2°C to 3°C with an absolute recorded range of -39°C to +34°C). This southern area also has higher precipitation but lower wind speeds and lower frequency of fog conditions. Blizzards still occur with some atmospheric icing, although the occurrence is much lower than in the northern areas. However, the south of Sakhalin Island is affected by Tsunamis and Cyclones.

The OET will be located close to Prigorodnoye, approximately 18km east of Korsakov. The OET will have 2 crude oil storage tanks, which will provide a capacity of five to six days of pipeline throughput plus the working capacity storage for one tanker volume. The tanks will be open floating roof tanks with double seals, with inter tank transfer systems, mixing facilities, overfill protection systems and leak detection systems in place. Fire protection will be provided by both fixed and semi-fixed equipment. The OET will also comprise pipework with associated relief valves and meters, booster and loading pumps, control facilities, utilities including wastewater treatment systems, potable water and utility systems, firewater distribution systems, power distribution systems, sanitary systems, and primary treatment facilities. The items not included at the OET include ballast water receiving and treating facilities, bunkering facilities and vapour recovery systems. The OET will be operated as a common entity with the LNG plant and the LNG/OET complex will be permanently manned.

¹⁴ The design requirements for the BCS-2 were only finalised in 2007 and differ from that described in the EIA Addenda, where it was considered possible that only a gas compressor would be required.

The OET will have an associated Tanker Loading Unit (TLU) situated in Aniva Bay, which will be served by a sub-sea pipeline from the OET. The TLU will be located 4.5km offshore to enable year-round loading of crude oil tankers. The TLU will consist of a single buoy mooring (SBM) structure to allow tankers to move according to the combined influences of the wind, current, waves and ice. The tankers will connect to the TLU via mooring lines and loading hoses. Tanker traffic will depend on the oil production rates but is anticipated to be one tanker (80,000 to 105,000 dry weight tonne) every four days with mooring and tankering taking between 18 and 24 hours. All tankers will have to comply with the requirements of the Russian Federation, local regulations and the International Maritime Organisation (IMO) amongst others and a ship approval system will be initiated. All loading operations will be managed and co-ordinated by the LNG/OET Marine Operations Master who will direct pilotage and loading operations plus icebreaker support as required. Support vessels such as icebreakers and tugs will be provided and these will also act as fire fighting and spill response units.

The LNG facility will comprise a two-train LNG plant based on the Shell Double Mixed Refrigerant (Shell DMR) liquefaction process as well as two LNG storage tanks, an LNG loading jetty (extending 850m into Aniva Bay) incorporating two parallel loading lines, a flare stack and a pressure relief and liquid disposal system. Common facilities with the OET include a fire water system, utilities, electricity generation and distribution system, administration and control/ service buildings, and a helipad. The marine facilities will be designed to accommodate LNG carriers of 20,000 to 145,000m³ and approximately 160 LNG carriers (LNGC) will be loaded per year. The jetty area will require dredging to ensure sufficient depth (14m) and an approach channel and turning basin will also require dredging. The LNGC will be required to comply with the requirements of the Russian Federation, local regulations and International Maritime Organisation (IMO) requirements amongst others and a ship approval system will be initiated. Loading of the LNGC will be with fixed loading arms connected to the midship manifold on the LNGC. There will be a linked ship/shore emergency shutdown system to allow either the ship or the terminal to activate a shut down in an emergency event. The construction of the OET is occurring together with the LNG facility.

A Material Offloading Facility (MOF) jetty is also required to enable vessels to offload equipment and other materials at the LNG/OET site. The MOF was originally intended as a temporary structure but SEIC has subsequently decided the MOF jetty will be permanent.

Necessary Infrastructure Work to Support Project Execution

The current infrastructure available on Sakhalin Island is limited but effective on a local level. Ports and railway hubs are concentrated in the south of Sakhalin Island. There is a major north to south road (connecting Korsakov to Nogliki), which is paved in the southern section and serves as the main land-route across Sakhalin Island. Mainly unpaved roads link to this main road serving other areas on Sakhalin Island. There are two railway connections, one runs along the eastern coast from Korsakov to Nogliki and the other runs along the western coast from Gornozavodsk to Ilyinsky. A further two railways cross Sakhalin Island to connect these lines. A smaller gauge rail exists between Nogliki and Okha.

Regular air traffic flies between major cities and international locations from Yuzhno-Sakhalinsk but freight is transported by sea between Sakhalin Island's ports as well as internationally. A ferry crossing exists between Kholmsk and the main land of Russia.

Major oil and gas developments need significant infrastructure to support construction and operation. The Project therefore required significant improvements to the previous infrastructure and these were undertaken as part of the Infrastructure Upgrade Project (IUP). Certain elements of the IUP work were to be undertaken by the Sakhalin Oblast and hence Sakhalin Energy did not have direct control over the undertaking of these activities. However, Sakhalin Energy did provide technical assistance to the Oblast, including provision of baseline surveys and design guidelines.

The elements of the IUP included:

- Upgrade and repair of the existing transport and logistics facilities of Sakhalin Island consisting of:
 - Upgrade of Kholmsk Port to allow vessels to dock and be unloaded and loaded. Works included the levelling of the quayside and the dredging of the harbour and harbour entrance to a depth of 10m.
 - Railway bridges and lines – proposed works include repair of a number of railway bridges and tunnels; upgrade of servicing and maintenance facilities; upgrade of train crew facilities; upgrading of some sections of the main railroads; and installation of signalling in six locations¹⁵.
 - Federal and Municipal roads and road bridges – upgrading of the road system with the replacement of 12 bridges, repair of 47 road bridges, upgrading/replacement of 232 culverts, upgrade of 184km of existing road.
- New transport infrastructure consisting of:
 - Access roads – included the beach access road (BAR), Southern Access Road (SAR) and the temporary beach access via Kaigon and involves construction of 45km of new road; 78km of road repair; replacement/repair of bridges and culverts on 245km of temporary access roads.
 - Road bridges – construction of 16 new road bridges.
 - Rail sidings and/or loops – includes new sidings at or near nine laydown areas; passing loops at two locations.
- Temporary infrastructure specifically to support the construction phase included:
 - Lunskeye Beach Laydown Area – consists of a 1.1ha temporary works area at the beach, which had to be cleared, graded and levelled.
 - Development of existing and/or new quarries clearance works at the OPF site.
 - Clearance of the LNG/OET site – includes clearance of unexploded ordinance (UXO); clearance/relocation of artefacts; relocation/replacement of the Border Guards Post at Aniva; tree clearance; and relocation/replacement of Russian Pacific Fleet Navigation Polygons.
- Air and sea operations support traffic consisting of:
 - Supply and support shipping – including tugs, which also act as offshore facility inspection and maintenance vessels, emergency support vessels such as oil pollution response and fire fighting, offshore support vessels that will act as the main transport routes for personnel, equipment and stores from logistics bases to the platforms.

¹⁵ Items dedicated to the Project will be funded by SEIC. Other items, including upgrade to locomotives, rolling stock and maintenance facilities will be funded by the State Rail organisation.

- Air transport – including transport of passengers to Sakhalin Island, flights from Yuzhno to Nogliki, helicopter personnel transport to and from the platforms, helicopter freight and passengers to various land locations on a rare and *ad hoc* basis, helicopter medivac from the Nogliki base and other locations, helicopter support during offshore construction; helicopter or light aircraft pipeline inspection flights and light aircraft whale surveys.

Decommissioning

Decommissioning of the operating assets following completion of the operating lifecycle is considered likely to be required after 40 years. At present there are no specific procedures or considerations for decommissioning. However, it is appreciated that well abandonment will be necessary and that if platforms cannot be reused they will require decommissioning; the offshore structures have therefore been designed to facilitate dismantling and removal.

2.1.4 Summary of Changes Since the 2003 EIA

The main changes are listed below.

Project Asset	Project description stated in EIA (2003)	Change in Project description since EIA 2003 captured in EIA Addenda
Offshore Pipelines		
Offshore pipelines (Piltun)	In the EIA (2003) the offshore pipeline route from the Piltun platforms were routed through the southern end of the WGW feeding grounds.	The pipeline route for the Piltun field was subject to assessment and significant re-routing. This is described in more detail in Section 2.13.
Booster Compressor Station 2 (BCS2)		
BCS2	The EIA (2003) stated that BCS2 was to be located 19.5 km to the south-west of Poronaisk.	The siting for BCS2 has been moved from a position 1.5km South of Gastello to 1.2km North of Gastello due to minor onshore pipeline route changes and the avoidance of potential seismic hazards. At the time of EIA addenda the final design requirements of the BCS2 in terms of the need for both gas compression and oil pump stations had not been determined. It has since been determined that both stations will be required at the BCS2. This will require further assessment of the environmental impacts.

Project Asset	Project description stated in EIA (2003)	Change in Project description since EIA 2003 captured in EIA Addenda
Liquefied Natural Gas Facility (LNG)		
LNG Dredging	<i>EIA Volume 5: Chapters 2.3.3 and 3.11.2</i> The initial estimated volume of dredge material was 1,238,000m ³ from the construction of the LNG Jetty and MOF.	The revised volume of dredged material is: <ul style="list-style-type: none"> • LNG Jetty: 1,300,000m³; • MOF: 145,000m³; • Total: 1,445,000m³
MOF	The Materials Offloading Facility was originally described in the EIA as a temporary and of a pier-type construction.	The design of the MOF was changed to a solid construction ¹⁶ .
LNG	<i>EIA Volume 5, Chapter 3.12.1</i> Disturbance to birds (particularly by noise from construction plant and by movement of construction personnel) will be minimized by strict adherence to good construction practice. If necessary, this will include the installation of screens between sensitive locations (for example, Mereya Lake to the west of the site) and any activities, which have the potential to cause significant disturbance.	The use of screens around Mereya Lake was not required due to the distances of construction activities from sensitive receptors.
Oil Export Terminal		
OET	<i>EIA Volume 5; Chapters 2.4.3</i> The EIA described that the OET would have three crude oil storage tanks.	The number of OET oil storage tanks has been reduced from 3 to 2.
OET	<i>EIA Volume 5; Chapters 2.4.3</i> The EIA described that the oil tank roof design would incorporate a geodesic dome internal floating roof tanks with single seals on the single Glass Reinforced Epoxy (GRE) deck roof.	The previously obtained approval for a domed roof design was withdrawn after incidents with similar roofs in Russia, and therefore the design has been changed to a conventional floating roof.

¹⁶ SEIC has also subsequently decided to treat the MOF as a permanent structure. Some additional land take for siting an emergency response facility is also required. This change postdates the EIA Addenda and is therefore not addressed in the EIA materials.

Project Asset	Project description stated in EIA (2003)	Change in Project description since EIA 2003 captured in EIA Addenda
Onshore pipeline		
OP Reroutes to avoid river crossings	<i>EIA Volume 2, Chapter 2.3.1</i> The original pipeline route crossed 1103 watercourses	<p>With the implementation of the Big Northern Nysh Bypass (BNNB) and the Big Southern Nysh Bypass (BSNB) reroutes, the number of watercourse crossings has been reduced by 19, down to 1084.</p> <ul style="list-style-type: none"> • The BNNB has reduced the pipeline length by just under 27kms from the Piltun landfall to the OPF. The new route length is approximately 33km running through relatively flat and dry country, accessible from the existing forest road. • The BSNB re route has reduced pipeline length by approximately 22km including the Small Southern Nysh Bypass (SSNB).
OP Reroutes associated with the Alternative 1 reroute onshore.	<i>EIA Volume 2, Chapter 2.3.1</i> The project has set out to avoid sensitive areas wherever practicable to do so.	<p>In March 2005, the Company made a decision to move the onshore and offshore pipeline route at Piltun in order to avoid a known western gray whale feeding area. The new routing is known as Alternative 1.</p> <p>In addition, the recommendations made during combined archaeological, ornithological and technical surveys carried out in June 2005 in the selection of the Alternative 1 pipeline reroute onshore resulted in four route changes to avoid potential impacts to birds and heritage sites:</p> <ol style="list-style-type: none"> 1) Deviation in the section from the landfall to the pig trap site (at kilometer point (KP) 1) in order to avoid crossing the largest lake near the landfall, which provides an important duck nesting habitat; 2) Deviation in section pig trap site to HDD pull in point (between KP 3 & 5), in order to avoid archaeological sites and to avoid larch forest; 3) Deviation northwards (between KP 8.9 and 10.5) in order to be further away from Greenshank habitat and eagle nests, and avoidance of archaeological sites;

Project Asset	Project description stated in EIA (2003)	Change in Project description since EIA 2003 captured in EIA Addenda
		<p>4) Onshore pipelines and the main facilities layout are to share the RoW to minimise environmental impact and move this northwards to avoid spotted greenshank habitat.</p> <p>5) The footprint of the project has been reduced by decreasing the RoW width and choosing block valve sites and the pig trap sites at strategic locations, such as the sharing of Sakhalin I land at the ENL OPF site for the siting of block valve sites and some of the RoW.</p> <p>Approximately 54 minor reroutes have been made to avoid sensitive seismic hazards, some of up to 2km. Reroutes are presented in Chapter 8 of the EIA Addendum.</p>
<p>OP Watercourses</p>	<p><i>EIA 2003, Volume 4, Chapter 2.3.7</i></p> <p>The following approach was originally envisaged for watercourse crossings</p> <ul style="list-style-type: none"> • All 995 watercourses in Group I were to be crossed using wet open cut trenching. • 45 watercourses in Group II were to be crossed using wet open cut trenching. Irkir River to be investigated for suitability for HDD. • 55 watercourses in Group III were to be crossed using wet open cut trenching. • Any Group II or III watercourses with fish farms downstream of the crossing location would be constructed using HDD. • Turbidity curtains to be installed downstream where wet ditch method is used. 	<p>Total of 153 watercourses that belong to the revised Highest Fish Category and are within categories of high and medium ecological sensitivity (as defined in section 5 of the River Crossings Strategy Report (RCR)) will be crossed in winter.</p> <p>Turbidity curtains have not been practical in many cases. Other forms of sedimentation control and mitigation have been adopted.</p> <p>Eight rivers will be crossed using the HDD technique. The Buyuklinka did not have suitable geology and will be treated as highly sensitive and crossed using wet cut during the winter.</p> <p>The details of river crossing methods will be set out in the 2006 Execution Plan which will specify for each river crossing, based on site-specific data, the details of construction techniques together with the planned mitigation measures and the supervisory and monitoring approaches to be used.</p> <p>Further detail on crossing strategy and methodology is provided in the RCR.</p>

Project Asset	Project description stated in EIA (2003)	Change in Project description since EIA 2003 captured in EIA Addenda
OP Camps and construction workers	<i>EIA Volume 4, Chapter 2.1.1</i> The EIA described that the onshore pipeline construction would entail ten camp locations, with a capacity of accommodation ranging from 500 to 1000 contractor construction workers and 50 SEIC specialists.	The actual number of camps is 14 housing a total of some 6000 contractor and sub contractor staff and some 75 SEIC staff.
Platforms		
Platforms	<i>EIA Volume 2, Chapter 2.2.5</i> The early design of the LUN-A platform was equipped with 32 well slots, all of which were to be exploitable.	The number of well slots for Lun-A has been reduced from 32 to 27
Platforms (and marine/coastal activities in general)	<i>EIA Volume 2, Chapter 2.3.3</i> The EIA identified that some dredging of the PA-B site would be required during which approx. 7,500m ³ of spoil would be relocated east of the platform site.	During the detailed design of the PA-B platform, it was identified that no dredging was necessary at the PA-B site, only localized leveling of the seabed. No leveling or dredging work was required prior to the installation of the LUN-A platform.
Schedule Changes		
Project Milestones	As of Q4 2006, the schedule for the remaining key Project milestones are found in the adjacent column:	First year-round oil (first cargo from OET) is expected in Q4 2007 (and from PA-B in Q3 2008). First delivery of LNG is expected in Q3 2008.

2.1.5 The Piltun Offshore Pipeline Re-Route (Alternative 1)

The coastal waters off north-east Sakhalin provide the only known foraging grounds for the remaining population of western gray whales (WGW), numbering about 130 animals. The population is listed by the World Conservation Union (IUCN) as critically endangered and has been the focus of concern by the International Whaling Commission (IWC) and the 3rd World Conservation Congress.

SEIC has undertaken a number of environmental impact assessments and underlying studies that consider potential impacts on the WGW. These studies concluded that potential impacts could result from, among other things, noise, disturbance associated with dredging and installation of sub-sea pipelines, oil spills, and collision with vessels.

The original route proposed for the pipeline system to the landfall south of Piltun Bay passed through the southern end of the WGW feeding area (the base case), see Figure 2-3. This route formed the basis on which Russian Government approvals were obtained.

In 2003 additional seabed surveys were conducted as part of the final detailed engineering design process. These surveys indicated that the required burial depth for a section of the offshore pipeline should be deeper than originally designed to add an additional margin of safety associated with ice scouring and seabed mobility. During 2003 and 2004, SEIC implemented an acoustics monitoring programme to acquire source noise level measurements for the specific vessels and equipment that would be used for offshore pipeline construction at Piltun. In some cases the measured levels were higher than originally anticipated.

SEIC postponed construction work in the PA field during the 2004 summer season to enable the implementation of an integrated environmental and engineering work programme designed to re-evaluate noise and other impacts and also to evaluate other possible route options should the base case no longer be acceptable in terms of potential impact to the WGWS.

Two alternative pipeline routes were investigated with the most southerly option (Alternative 1) being selected on the grounds that this provided the greatest spatial separation from the WGWS feeding grounds.

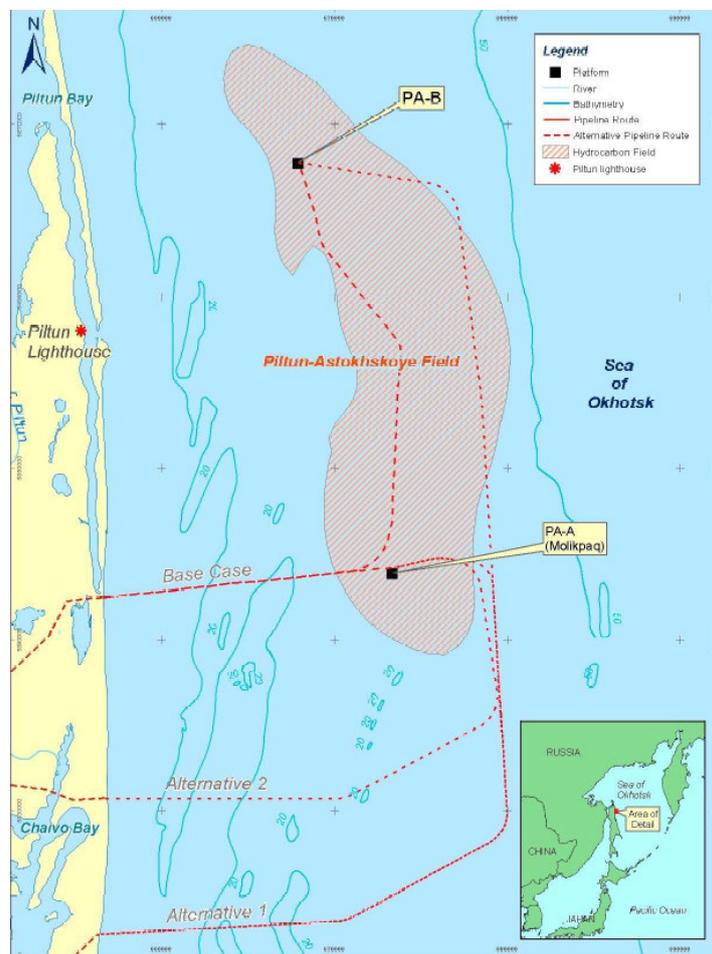


Figure 2-3 Proposed Offshore Pipeline Routes

The offshore re-route also necessitates a more southerly landfall. Consequently the four 14” offshore oil and gas pipelines from PA-A and PA-B will come ashore at the Chaivo spit (a

sensitive wetland area) and will then tie in with two 20 inch pipelines (a gas line and oil line) at a pig launcher/receiver site located 2.4 km from the landfall. From the pig station the 20" pipelines head west across the Chaivo lagoon for approximately 24km and then southwards following the original pipeline route.

2.1.6 Sakhalin II Phase 2 Project Construction Status

The following provides a very brief status of the Project's construction milestones at the time of writing this report.

Offshore Projects

- In July 2005 the concrete gravity base substructure (CGBS) for the Lun-A platform was successfully installed. The Lun-A topside was installed in June 2006 and the drilling of the first well (the cuttings re-injection (CRI) well) commenced in the first week of July 2007.
- The PA-B CGBS was installed in July 2005. The topside construction was completed in late 2006 and installed on the CGBS in the first week of July 2007.
- Tie-in Units A&B were installed on the Molikpaq platform in July 2006.

Onshore Processing Facility (OPF)

- The drilling of two onshore processed water disposal wells was completed in September 2006.
- Two Gas Turbine Generators were commissioned and load tested at the end of October 2006 and OPF has provided power to Lunskeye since March 2007.
- As of June 2007, progress on the OPF was nearing completion.

Onshore and Offshore Pipelines

Onshore oil and gas pipelines will run from the landfall at Chaivo Spit via the Onshore Processing Facility (OPF) to Prigorodnoye, in the south. The two pipeline systems (one for oil and one for gas) share a single 800km RoW.

- As of April 2007, physical progress comprised 1,540km mainline welding completed, and 1,509km of pipelines backfilled (cumulative gas and oil pipeline) with remaining work primarily related to onshore fault crossings.
- All sensitive (winter) river crossings (see Section 6.5) have been completed.
- All HDD river crossings have been completed.
- All offshore pipelines have been installed with remaining work primarily related to platform tie-ins and commissioning.

Liquefied Natural Gas (LNG) plant/Oil Export Terminal (OET)

- The TLU rotating head was installed on the Piled Substructure (PSS) in Aniva Bay in August 2006.
- The LNG buildings and associated utilities have been transferred to the operating asset.

- In July 2007 a commissioning cargo of LNG was delivered to the LNG plant and successfully unloaded.

Booster Compression Station 2

- Site preparation has been completed and construction is well advanced.

The overall project progress by July 2007 was 86%.

2.2 KEY POTENTIAL IMPACTS/ISSUES

The project is large even by oil and gas standards. Its significance relates not only to the finances involved, but to the onshore and offshore spatial coverage, the magnitude of construction activity and the ecological and socio-economic sensitivities. There are therefore numerous significant potential impacts associated with the Project's footprint. The most significant topic areas are listed below:

- **Western Gray Whales** – a critically endangered population of whales known to feed in close proximity to the Project's activities.
- **River crossings** – onshore pipelines to cross over 1000 waters courses including many that have either commercial or ecological value.
- **Oil spill response** – an essential requirement of any oil and gas development, these plans are required prior to first oil and must address response strategies in icy conditions.
- **Onshore biodiversity** (Steller's sea eagle, wetlands, Chaivo Spit) – the island is rich in flora and fauna, and is host to many red data book species which should be afforded special protection measures.
- **Dredging and disposal** – the Project requires significant dredging to accommodate visiting LNG carriers at the LNG site in Aniva Bay. The area is also a valuable fishery resource, and the potential impacts of dredging and disposal operations has generated considerable stakeholder interest.
- **Geohazards** – the Project is being built on a seismically active area. A detailed understanding of the underlying geohazards is required to inform design
- **Soil erosion control** – the prevention of soil erosion assists in the reinstatement of the pipeline Right of way and helps reduce sediment loading of sensitive rivers.
- **Waste management** – Prior to the Project the island had a very poor waste infrastructure. Responsible waste management requires development of waste facilities and disposal routes.
- **Indigenous Peoples** – the project has the potential to have a direct impact on some of the islands indigenous people, notably reindeer herders.
- **Korsakov residents** – Korsakov is the nearest major town to the LNG plant, and as such, will be at the front line of many socio-economic impacts.
- **Dacha community** – the nearest community to the LNG site likely to be subject to direct impacts

- **Commercial fisheries** – related primarily to onshore salmon industry and commercial fishing activity in Aniva Bay, both which will be impacted by the residual impacts of construction activities.

In addition to these impacts a major cross cutting issue is the number of main contractors that in turn employ numerous sub-contractors, which comprise the vast majority of the construction work force. The dissemination of SEIC plans and procedures and working practices to several thousand contractors and enforcement of such working practices is challenging.

Detailed evaluation of Sakhalin Energy's approach to management of these potential impacts is provided in Sections 6 to 10.

3 Regulatory and Other Requirements

3.1 INTRODUCTION

The minimum requirements for SEIC to proceed with construction are compliance with RF legislation and the terms of the Production Sharing Agreement (PSA). The Company has also committed to execute its project activities, where possible, in accordance with:

- Industry best practice.
- SEIC's own environmental standards and business principles.
- The requirements of its shareholders and Agency Lenders.
- Guidelines and safeguard policy requirements of the World Bank/IFC.
- The requirements of international treaties and conventions.

The specific commitments needed to comply with these additional requirements are made in the HSESAP and will be binding in the event of financing (see Section 3.6.3).

An overview of RF environment related laws and the relevant standards/guidelines, are provided in Sections 3.3, 3.5 and 3.6 respectively. The RF legislation is implemented through a regulatory approvals and permitting process and a description of this process is provided in Section 3.3. SEIC manage relevant legal information via a Legal Information System, described in Section 3.4.

As far as the regulatory aspects are concerned, in this report AEA comment on the potential risk associated with environmental and social matters, and when considered appropriate, have referred certain issues to the ILA for consideration. AEA does not offer any legal advice in relation to potential regulatory issues.

3.2 RUSSIAN REGULATORY REGIME

The RF legislative system is complex and rigorous and this section provides AEA's interpretation of this system. The Sakhalin Oblast also has its own regional legislation. Where applicable, such legislation builds upon the federal legislation. However, little if any additional regional legislation has been produced regarding EIA requirements and it is therefore the requirements outlined by federal legislation that should be considered.

A summary of significant RF environmental laws, regulations and guidance are included in the Final EIA, with details of Sakhalin Oblast legislation and regulations. Detailed RF requirements are included in the Russian TEOC.

Whilst the requirements for EIA studies as prescribed in RF legislation are broadly in alignment with international requirements, a number of discrepancies have been identified. These are discussed in the main body of the report where applicable.

3.3 RUSSIAN REGULATORY APPROVAL

3.3.1 The TEOC Process

This section outlines the principles of the Russian approvals and permitting process through which the RF environmental legislation is implemented. It also summarises the systems that SEIC are developing and implementing to manage regulatory compliance requirements.

RF law requires that for any major industrial construction undertaking, a TEOC document must be produced for submission and approval by the relevant RF authorities. The TEOC incorporates the results of key previous surveys and design work and associated documentation.

The TEOC is subject to the following key reviews and approvals.

1. Industrial safety expert review by the GosGorTechNadzor (GGTN).
2. State expert review by the GlavGosExpertisa (GGE).
3. State Ecological Expert Review by the Ministry of Natural Resources (MNR).
4. Review by the Ministry of Emergencies (MChS).
5. Review by the Ministry of Labour.

The TEOC documentation must be made publicly available.

TEOC 'approval' comes in the form of a 'positive conclusion'. It is normal for a significant number of conditions to be imposed as part of the approval. These conditions can be technical, safety-related or environmental. Many conditions will require the submission of additional drawings or documents. Once the TEOC 'positive conclusions' have been issued, the Company can proceed with the Final Land Acquisition (FLA) and the Water Usage Licence(s) (WUL); further details on the FLA and WUL are provided in the following subsections.

The TEOC materials for Phase 2 were submitted in July 2002. A mandatory element of this submission are separate Environmental Protection Books (EPBs) for each Project facility that provide detailed assessment of the environmental impacts, including proposed MPE and MPD limits. In addition, SEIC also submitted a TEOC EIA as a discretionary supplement, which provides an overview summary of the EPBs. The positive TEOC conclusion was issued in 2003, which included a number of recommendations following the State Environmental Expertisa Review (SEER).

The main SEER¹⁷ (ref #600) for the Project was issued by the Ministry of Natural Resources in July 2003. The expert commission concludes that the environmental impact is acceptable, subject to the approval by the relevant government supervision and inspection agencies. The SEER also makes numerous recommendations, suggestions and requests for additional documentation that SEIC should address. AEA has studied these recommendations and suggestions and ensured that SEIC have mechanisms in place to adhere to the requirements. The recommendations and suggestions (including both environmental and technical

¹⁷ Elements of the SEER have been resubmitted or supplemental SEER have been required for major design changes.

considerations) are sometimes vague and thus open to interpretation. It is not possible to confirm compliance with all these recommendations because of the ambiguous nature of some of the requirements, although we can confirm that SEIC appears to have addressed/be addressing all material environmental requirements set forth in the SEER.

An additional TEOC submission was subsequently required for the Alternative 1 pipeline re-route, for which a positive conclusion was reached in 2005.

The Russian process for setting environmental limits is based on maximum permissible concentrations, rather than emission concentrations. The general approach is described in 3.3.2 to 3.3.4.

3.3.2 Process of Setting Environmental Limits

The Sanitary Protection Zone (SPZ)

The SPZ is defined as a minimum zone around facilities and pipelines where certain activities must not take place in order to protect towns and other residential areas. Protection of towns and other public areas through the presence of an SPZ is required in order to safeguard the health of people and the environment from the possible impacts of the activities taking place within the SPZ.

The size of the SPZ is fixed by reference to the type of activity at the site and is determined by the regulatory authorities. In particular, the SPZ is defined according to emission limits set out in Russian legislation and will be subject to verification and approvals by the State Sanitary and Epidemiology agencies and other controlling agencies.

Within the SPZ it is prohibited to locate the following:

- Public or individual country houses including dachas and gardens.
- Food processing facilities and associated industry including kitchen utensils manufacture, manufacture of packaging or other food industry equipment, warehouses for food products and facilities for the production and storage of drinking water.
- Sports facilities, parks for recreation and educational and medical facilities.
- Any type of residential area.

The following can be located within an SPZ:

- Arable agriculture for industrial crops (not food crops).
- Facilities and their associated buildings that are of a less hazardous nature than the facilities subject to the SPZ. (This, however, must not lead to emission limits at the boundary of the SPZ being exceeded.)
- Services which support the operation of the facility requiring the SPZ including fire departments, public baths, garages, individual parking lots, petrol stations, offices, schools, shops, medical centres and research laboratories.
- Sports and recreational facilities for employees of the facility subject to the SPZ.
- Non-living areas for standby emergency personnel and security guards, garages, local and transit utilities, overhead lines, power substations, oil and gas pipelines.

- Artesian water wells for process water supplies, water coolers for process water preparation, sewage pumping stations and return water supply facilities.
- Seed-nurseries for landscaping at the production site and SPZ facilities.

Air Emission Limits

Russian air emission limits take the form of Maximum Permissible Emissions (MPEs). These limits are set for each site as a whole (*i.e.* they are aggregated over all emission sources at that site). The MPEs are set by reference to the SPZ for that site and the Maximum Permissible Concentrations (MPCs) of the substances emitted, such that airborne concentration levels should not exceed the MPC at a control point set at the boundary of the SPZ. The MPC are typically standard limits that are specified for a wide range of chemical atmospheric pollutants.

To apply for the necessary permits, the site operator must first commission licensed Russian subcontractors to calculate the SPZ and MPE for each site based on the MPCs. Such MPEs are developed in consultation with local regulators and must then be approved as part of the TEO–C process. However, the methodology for undertaking these calculations is set by regulation and is both conservative and complicated. Air emissions at the boundary of the SPZ must not exceed the MPC. MPEs are modelled by calculating back from the boundary reading to the emission source on the site. Particular difficulties can arise where an MPC for a particular pollutant is set at a concentration below the background levels of that substance in the locality. The constraints set by the MPC/SPZ process can require variations to the siting of a facility and can involve the imposition of MPEs that are technically impossible to achieve.

The stages of the approvals process for an existing facility may be summarised as follows:

- An MPE report is produced.
- An MPE report is submitted for review to the Local Committee for Sanitation and Epidemiology and the Local Committee for Natural Resources.
- If a ‘positive conclusion’ is drawn from both review bodies, an Air Emission Permit will be issued by the Local Committee for Natural Resources.

The approvals process for atmospheric emissions from a new facility is the same as for existing facilities except the MPE report is submitted in parallel to: i) the Local Committee for Sanitation and Epidemiology, ii) the Local Committee for Natural Resources, and iii) as part of the TEOC. Approvals are required from all the reviewing bodies involved.

Liquid Discharge Limits

The Maximum Permissible Discharge (MPD) in liquid form is calculated using the same principles used for the MPE, although the SPZ is effectively replaced by a Mixing Zone. Concentrations should not exceed MPCs at the edge of the Mixing Zone, which, for example is often fixed at a distance of 250 metres for discharges to the marine environment. Discharge limits are then back calculated using standard modelling techniques.

The approvals process for MPDs is similar to that for the MPEs except approvals are required from central and local fisheries committees in addition to those from the Local Committee for Sanitation and Epidemiology and the Local Committee for Natural Resources.

The final goal of the MPD approvals process is to obtain the WUL. A WUL is required for any activity that impacts upon water resources and is applicable to onshore and offshore activities including both discharge to and abstraction from any water body. The process for a new facility is as follows:

- Data on design is collected from the FEED engineers.
- A licensed sub-contractor prepares an MPD report.
- MPD report is submitted to:
 - State Committee EEE.
 - Central Fisheries Expert.
 - Local Sanitary Committee.
 - Local Committee for Natural Resources.
 - Local Fisheries Agency.
 - SakhHYDROMET (this is not a requirement but is rather submitted as a courtesy).

If the MPD is given a ‘positive conclusion’ a summary of the MPD report will be submitted with the TEOC. Following ‘positive conclusion’ by the Expertisa, the final submission for the WUL is sent to the Ministry for Natural Resources for formal approval.

Finally, even after approval of TEOC and ‘in principle’ approval of the conceptual monitoring programme, discussions will be held with the local authorities to discuss the detail of the monitoring programme (*e.g.* identification of which laboratories will be used, the frequency of sampling *etc.*).

AEA has reviewed the TEOC submissions in relation to the SPZ, MPE limits and MPD limits and this is discussed in Section 5.

3.3.3 Water Use Licence Approvals

Application Procedure for a Water Use License (WUL)

The use of water resources, including abstraction or discharge, is regulated by the issue of a WUL by the Ministry of Natural Resources (territorial sea is covered by the Federal MNR, whilst the Sakhalin Committee for Natural Resources is responsible for all freshwater bodies).

There are several normative acts detailing the procedure to obtain a WUL, but the key piece of legislation is the RF Water Code. The following paragraphs detail the process required to obtain a WUL.

The main basis for obtaining a WUL is the ‘positive conclusion’ for the TEOC (*i.e.* approval is granted) issued by the RF Ecological Expert Examination (EEE). If a ‘positive conclusion’ is not issued, then the project cannot proceed (RF Law: ‘On the State Ecological Expert Examination’).

For a successful WUL application the documentation submitted to the EEE as part of the TEOC package should initially be sent to the relevant Federal and Local Authorities and concurrences should be sought from each of the key authorities. The key authorities are:

- Federation Authorities:
 - RF State EEE, MNR.
 - Central Fisheries Expert Commission (OTsUREN), State Fisheries Committee.
- Local Authorities:
 - Sakhalin Committee for Natural Resources (responsible for environmental protection).
 - Sakhalin Committee for Fisheries.
 - Sakhalin Committee for Sanitation and Epidemiology.
 - Sakhalin Committee for Hydrometeorology and Monitoring of Environment.

Once approvals have been agreed with the above authorities, all documentation is submitted (including the conclusions from the different authorities) by SEIC to the EEE.

The EEE comprises several experts (chairman, executive secretaries, technical and ecological specialists) and for a 'positive conclusion' a majority of two thirds must grant approvals for the TEOC.

Once approvals have been granted by the EEE, the expert conclusion for the TEOC will be approved by the Minister of the RF MNR. This step is a formality because the RF MNR has no legal powers to change the decision of the EEE. After receiving the 'positive conclusion', MNR, based on the WUL applications, will prepare the Draft WULs and arrange the inter ministerial approvals process. It could take up to 30 days for the application review and signing of the WULs by the Minister. SEIC may only apply for the WULs required for the Project following successful conclusion of the TEOC.

3.3.4 RF Water Classification

Under RF law, there is provision for inland and coastal waters to be classified according to their environmental sensitivity. This classification is undertaken essentially on the basis of the relative importance of the waters for aquatic biology and fish stocks in particular. The criteria for determining whether waters should be categorised as highly sensitive are principally based on whether the waters:

- Support endangered or protected species.
- Provide fish (e.g. salmon) spawning grounds.
- Constitute a significant public amenity.

Implementation of the classification system for both inland and coastal waters requires extensive data collection on these and other issues. Partly because the process is complex, most waters in and around RF territory, including Sakhalin Island, have not yet been classified. In the absence of such classification, all the coastal water bodies on the Project licence areas are temporarily classified, under the RF Classification system, as belonging to Group 2, which is the medium sensitivity classification. There is a decree by the federal fishery authorities which requires the leading fishery institute VNIRO to develop criteria for the water body classification and requires local fishery authorities on Sakhalin to initiate a re-classification of all the water bodies within the oil and gas licence area on Sakhalin Island.

The relevant legislation specifies what are allowable activities on and near classified water bodies. The legislation imposes duties on the local regulatory authorities to monitor and

protect those waters falling within each category and water classification is an important determinant in the assessment of the acceptability of the impacts of industrial activities on water bodies. As such, industrial developments affecting waters classified as high sensitivity are subject to control/limitation and this includes provision for the obligatory payment of compensation in the event of anticipated impacts on fish stocks under such circumstances (the compensation process is further discussed in Section 3.5).

Russian legislation establishes **water protection zones** and **bank protection belts** adjacent to water bodies (such as rivers and lakes). Within those zones the legislation imposes restrictions on certain types of commercial activity (such as construction and excavation works) and prohibits certain other activities (such as the storage of toxic chemicals and waste).

According to the Water Code, water protection zones are established to protect surface waters.¹⁸ A water protection zone is a land area adjacent to water to which a special regime of use and protection of natural resources and conduct of commercial activities applies. Within water protection zones certain types of activities are prohibited. The Water Code sets out the types of activities that are prohibited.

Under the Water Code, bank protection belts are established over certain parts of water protection zones. The width of the bank protection belt varies from 30 to 200 meters, depending on the type of the adjacent land plots and the incline of the bank. The width of the bank protection belts near particularly valuable parts of water bodies (including spawning areas) is always 200 meters. The bank protection belts regime imposes certain other restrictions in addition to the restrictions imposed within water protection zones.

The restrictions associated with WPZs and BPBs that applied under the legislation in force prior to the introduction of the new Water Code are described in more detail within Section 6.13.2.

3.4 LEGAL INFORMATION SYSTEM

Access to, interpretation and communication of HSE legislative and other requirements is an important part of SEIC's HSE-MS. A procedure for legislative compliance has been issued (appointing Gate Keepers and Licence Keepers) in line with good practice and a HSE Legal Information System (HSE LIS) with connections to databases containing information on relevant legislation (e.g. 'ConformIT') has been developed for SEIC. ConformIT sits within SEIC's HSE search tool (the front end software for all SEIC's HSE databases) and is therefore readily made available to those requiring access.

Conform IT is considered as the industry standard database, but as with all other databases it does have information gaps due to the enormity of Russian legal materials. In 2005 we noted that it did not provide automatic legal updates and there was no mechanism in Russia to subscribe directly with federal/local legislators. In the absence of a mechanism to provide automatic updates and to guarantee 100% coverage of relevant HSE and Social legislation, updates depend upon working relationships with appropriate authorities. We noted that SEIC was also looking to pool resources with other operators in Russia and whilst considering additional organisations for the provision of legal updates and a gap analysis.

¹⁸ The Water Code of the Russian Federation, of 3 June 2006, No. 74-FZ ("Water Code").

Following further discussions during the April 2007 visit, it is understood that the Legal Information System has been significantly improved both in terms of content and search functionality. For example, the system now has dual language search functionality (i.e. a search using English key word will produce all relevant English and Russian documents and vice versa). To minimise previous information gaps the LIS now provides access to the content of five legal information sources.

3.5 RUSSIAN COMPENSATION/PAYMENTS

Under RF law, there is an obligation to make compensation payments calculable pursuant to prescribed methods for fish damage, land take, resettlement, forestry damage and for emissions and discharges. These obligations have been discussed with the SEIC Approvals Team and are outlined as follows:

Fish Damage Compensation Calculation

The Fish Damage Compensation (FDC) calculation is a prescribed method for determining compensation payments based on the concentration of chemical components and baseline data of fish stocks. The FDC must be determined by Russian contractors and then submitted for approval by local Fisheries Committees and Central Fisheries Expert Committee (TSUREN, the State expert on fisheries). The value for Fish Damage compensation is currently being recalculated due to non-simultaneous river crossings of oil and gas pipelines.

Compensation for Involuntary Resettlement

Compensation payments for involuntary resettlement have been calculated using prescribed methodologies during the FLA stage of the land acquisition process.

The RF constitution aims to protect the rights of small communities of indigenous peoples. However, RF land allocation regulations do not include specific requirements for indigenous people and the official registration of their traditional lands. Compensation for indigenous people who can demonstrate damage or loss is available through the SEIC's Supplemental Assistance Programme (see Section 8 for further details).

Similarly, any Project Affected Person (PAP) can be eligible for supplementary assistance. This is also discussed in more detail within Section 8.3.3 under Resettlement.

Water Use Licence

The use of water resources, including both abstraction and discharge to water bodies is permitted under conditions agreed in the WUL's. Charges are calculated using methodologies set by the MNR to comply with various Russian statutes and byelaws such as Federal Statute No. 71, 6th June 1998: Charges for Utilisation of Water Bodies. Licences are issued by the Sakhalin Oblast Department of Water Resources.

The WUL also defines Water Protection Zones, outlines construction techniques and various conditions for use and activities that are prohibited within such WPZs (see Section 6.13.2).

Air Emission Permit

Payments are also made to MNR for air emission permits, based on the type and magnitude of the emission.

3.6 OTHER STANDARDS, GUIDELINES AND REQUIREMENTS

3.6.1 International Standards

In addition to RF law, SEIC has committed through the HSESAP, where practical for a private organisation, to also address other international standards, guidelines and requirements. These include:

- IFC/World Bank guidelines and safeguard policies.
- Applicable policies, procedures and guidelines of the Agency Lenders
- Selected international conventions and treaties.

AEA has assessed the Project against the following relevant conventions, standards, policies and guidelines as listed in detail below. This list, based on the guidelines/standards applicable shortly after AEA's engagement as the IEC, was fixed for the duration of the Project with the Agency Lenders' agreement.

A comparison of Project standards against pertinent guidelines and standards is also provided in Annex B of the HSESAP, including identification and justification for any areas where the Project will not fully meet all aspects of the standards.

List of international conventions and treaties

Convention ¹⁹	Date	Status in RF
Air Quality		
Convention for the Protection of the Ozone Layer	Vienna, 1985	Accepted
Convention on Long-Range Transboundary Air Pollution	Geneva, 1979	Ratified
United Nations Framework Convention on Climate Change (including Kyoto Protocol)	New York, 1992	Ratified
Habitats, Biological Diversity and Heritage		
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)	Washington, 1973	Adopted
Convention concerning the Protection of the World Cultural and Natural Heritage	Paris, 1972	Ratified
United Nations Framework Convention on Biological Diversity	Rio de Janeiro, 1992	Ratified
Convention on Wetlands of International Importance especially as Waterfowl Habitat	1971	Ratified
International Plant Protection Convention	Rome, 1951	Acceded
Convention on the Conservation of Migratory Species of Wild Animals (CMS) (The Bonn Convention 1979) and agreement (Birds mammals and their habitats, 1994)	1979/1983	Signatory to a MOU

¹⁹ Including relevant amendments and protocols (not specified in the list)

Convention¹⁹	Date	Status in RF
Protection of Water Resources		
International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties	Brussels, 1969	Acceded
International Convention for the Prevention of Pollution from Ships (MARPOL)	London, 1973	Party
The International convention for the control and management of ships' ballast water and sediments	Adopted London 2004 (not ratified)	N/A
Shipping (safety)		
International Loadline convention, 1966	1966	Acceded
International Convention on Standards of Training Certification and Watchkeeping for Seafarers (STEW)	London, 1978	Signatory
United Nations Convention on the Law of the Sea	Montego Bay, 1982	Ratified
International Convention on Civil Liability for Oil Pollution Damage	Brussels, 1969	Acceded
Protocol to the International Convention on the Establishment of an International Fund of Compensation for Oil Pollution Damage	London, 1976	Acceded
Convention on the International Regulations for Preventing Collisions at Sea, (COLREGs)	1972	Acceded
International Convention on the Control of Harmful Anti-fouling Systems on Ships, October 2001	2001	Not ratified
International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC),	1990	Not ratified
International Safety Guide for Oil Tankers and Terminals (ISGOTT), Fourth Edition	1996	N/A (guidance)
Oil Company International Marine Forum (OCIMF) Guidelines	1975	N/A (guidance)
Waste		
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	Basel, 1989	Ratified
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention)	London, 1972	Ratified
Social/ Consultation		
ILO Forced Labour Convention, No 29	1930	Ratified
ILO Abolition of Forced Labour Convention, No 105	1957	Ratified
ILO Freedom of association and Protection of the right to organise convention. No. 87.	1948	Ratified
ILO Right to Organise and Collective Bargaining Convention. No. 98.	1949	Ratified
ILO Equal Remuneration Convention. No. 100	1951	Ratified
ILO Discrimination (Employment and Occupation) Convention, No. 111	1958	Ratified
ILO Minimum Age Convention, No.138	1973	Ratified
ILO Worst forms of Child Labour Convention, No. 182	1999	Ratified

Convention¹⁹	Date	Status in RF
UN International Covenant on Economic, Social and Cultural Rights	1966	Ratified
UN International Covenant on Civil and political Rights	1966	Ratified
UN International Convention on the Elimination of Racial Discrimination	1966	Ratified
UN Convention on the Elimination of Discrimination against Women	1979	Ratified
UN Convention Against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment	1984	Ratified
UN Convention on the Rights of the Child	1989	Signatory
Aarhus Convention on the Access to Environmental Information and Public Participation in Environmental Decision Making,	June 1998	Not ratified
ILO convention concerning Indigenous and Tribal Peoples in Independent Countries,	1989	Not ratified
International Convention on liability and compensation for damage in connection with the carriage of the hazardous and noxious substances by sea.	1996	Acceded
Other		
Convention on Environmental Impact Assessment in a Transboundary Context (Espoo)	Espoo, 1991	Signatory
UN ADR Agreement on the international carriage of dangerous goods by road, as amended	Geneva, 1957	Acceded
Convention on Transboundary Effects of Industrial Accidents	Helsinki, 1992	Acceded

List of Bi-Lateral Agreements

Bi lateral agreements	Date	Status in RF
MOU between SEIC and Japan concerning oil spill response arrangements	1998 / 99	N/A
Russia - Japan Migratory Bird Treaty	1988	Ratified

List of WB Group and other standards/guideline requirements

Standard/Guideline	Date
World Bank	
Indigenous Peoples OD 4.20	Sep '91
Management of Cultural Property in Bank Financed Projects OPN 11.03	Sep '86
Involuntary Resettlement OD 4.30	Jun '90
Sourcebook Update No.18 Health Aspects of Environmental Assessment	1997
Pollution Prevention and Abatement Handbook (PPAH) (Includes the Oil and Gas Development (Onshore).	1998
IFC	
Environmental Assessment OP 4.01	Oct '98
Natural Habitats OP 4.04	Nov '98

Standard/Guideline	Date
Environmental, Health and Safety Guidelines: General Health and Safety Guidelines	Jul '98
Environmental, Health and Safety Guidelines: Hazardous Materials Management Guidelines	Dec '01
IFC Environmental and Social Guidelines for Occupational Health and Safety	Jun '03
Environmental, Health and Safety Guidelines: Health Care Facilities	Jan '02
Environmental, Health and Safety Guidelines for Port and Harbour Facilities	Jul '98
Environmental, Health and Safety Guidelines for Waste Management Facilities	Jul '98
Environmental, Health and Safety Guidelines for Wildland Management	No date
IFC Environment, Health and Safety Guidelines: Oil and Gas Development (Offshore)	Dec '00
ESRP: Guidance Note A – Checklist of potential Issues for Environmental Assessment	Dec '98
ESRP: Guidance Note B – Content of an Environmental Impact Assessment	Dec '98
ESRP: Guidance Note C - Outline of an Environmental Action Plan (EAP)	Dec '98
ESRP: Guidance Note E - Outline of a Project Specific Major Hazard Assessment	Dec '98
ESRP: Guidance Note F - Guidance for Preparation of a Public Consultation and Disclosure Plan	Dec '98

List of Agency Lenders' Policies and Procedures

Standard/Guideline	Date
US EX-IM	
US EXIM Environmental Procedures and Guidelines (Annex A, Tables 1, 5 & 10, and Annex D & E)	July '04
EBRD	
Environmental Policy	Apr '03
Public Information Policy	July '03

List of EU Directives

EU Directives²⁰
Council directive 92/43/EEC (1992) on the Conservation of Natural Habitats and of Wild Flora and Fauna (Natura 2000) – The Habitats Directive
Council Directive 78/659/EEC of 18 July on the quality of fresh waters needing protection or improvement in order to support fish life
Council Directive 79/409/EEC of 2 April 1979 on conservation of wild birds
Directive 2000/59/EC on Port Reception Facilities for Ship Generated Wastes and Cargo Residues
Directive 2000/76/EC on the Incineration of Waste and (94/67/EC) Incineration of Hazardous Waste, (89/369/EEC) New Incineration Plant
Directive 1999/31/EC (as updated by 2003/33/EC) on the Landfill of Waste
91/689/EEC (amended by 94/31/EEC) controlled management of hazardous wastes.
Directive 75/439/EEC (amended by 91/692/EEC) waste oil disposal
Directive 2000/76/EC on the Incineration of Waste

²⁰ All amendments and updates to the above standards also apply

EU Directives²⁰
Directive 96/61/EC on Integrated Pollution Prevention and Control (IPPC)
Directive 80/68/EEC of 17 December 1979 on the protection of groundwater against pollution caused by certain dangerous substances
The EIA Directive (85/337/EEC & 97/11/EC)
Council Directive 2001/80/EC on the limitation of certain pollutants into the air for large combustion plants
96/62/EC Framework Directive on Ambient Air Quality Assessment and Management (and Daughter Directives 99/30/EC (NO _x , SO ₂ , Pb and PM ₁₀), 00/69/EC (benzene, CO), 02/3/EC:Ozone).
EC Regulation 2037/2000 on substances that deplete the ozone layer.
SEVESO II Directive - on the Control of Major Accident Hazards (96/82/EC)
Council Directive 67/548/EEC (1967) on the Classification, Packaging and Labelling of Dangerous Substances, as amended
98/24/EC Chemical Agents Directive
99/92/EC Explosive Atmospheres Directive (ATEX)
94/55/EC ADR Framework Directive as amended
Biocidal Products Directive 98/8/EC
Urban Wastewater Directive 91/27/EEC as amended by 98/15/EC

List of Other Guidelines

FERC Guidelines
Federal Energy Regulatory Commission (FERC). Upland erosion control, re-vegetation and maintenance plan
Federal Energy Regulatory Commission (FERC). Wetland and waterbody construction and mitigation procedures

3.6.2 SEIC Company Requirements

Sakhalin Energy has developed its own set of HSE standards, which are based on Shell standards and largely incorporate the requirements of the various international standards listed in Section 3.6.1. These include:

- Waste management and Minimisation Standard
- Aqueous Discharges to land and water Standards
- Biodiversity Standard
- Environmental Management of Land Standard
- Air Emissions and Flaring Standard
- Use of Company Vehicles Standard
- Permit to Work Standard
- Occupational Health Standard
- Drug and Alcohol Standard
- Cranes and Equipment Lifting Standard
- Personal Protective Equipment Standard

- Hazardous Work Standard
- Land Transport Vehicles Standard
- Chemicals Management Standard
- HSE Training Standard
- Hazards and Effect Management Process Standard
- Medical Conditions of Contractors Standard
- Medical Fitness Standard
- Security Standard
- Road Transport HSE Management Standard
- Minimum Health Management Standard

3.6.3 Requirements under the Common Terms Agreement and the HSESAP

The Common Terms Agreement, negotiated between SEIC and the Agency Lenders, sets out environmental (including Health, Safety and Social) provisions for the Project. These include the environmental representations, warranties and covenants made by the Company covering project expansions, environmental law, incident notification, reporting and audit rights of the Agency Lenders. The Company also covenants that it shall comply in all material respects with the HSESAP.

The HSESAP consists of two parts and a series of Annexes. Part 1 describes SEIC's HSE management system, including its audit process, the management of social issues, contractor management, agreements for the reporting to and audit by Agency Lenders, a methodology for classifying HSE and social breaches/incidents and a procedure for notification of project expansions.

Part 2 includes all the Company's commitments associated with the management of HSE and Social matters. These are set forth in a series of topic based tables (e.g. onshore biodiversity) and detail the mitigation measures and actions specified in the ESHIA materials and elsewhere.

The Annexes describe the requirements of those World Bank/IFC policies and guidelines, EU Directives and Lender policies applicable to the Project as agreed with the Agency Lenders, and highlights any Project exceptions/deviations. Applicable international treaties and conventions and environmental monitoring commitments are also included in the Annexes.

The HSESAP was published on the Company's website in December 2005. Since its release, SEIC has been undertaking a roll-out of the HSESAP to all SEIC staff and contractors, and in doing so, they have identified a number of areas where amendments are required. Changes to the HSESAP were discussed and a way forward agreed between SEIC and Agency Lenders in September 2006. At the time of writing (June 2007) the revisions to the HSESAP have been made and sent to the Agency Lenders for review. The Agency Lenders have confirmed acceptance of the changes and the revised HSESAP tables are expected to be released on the SEIC web site in September 2007.

AEA confirms that the HSESAP is both comprehensive and detailed, and provides a good framework for the implementation of the required mitigation measures and monitoring programmes. The HSESAP also provides a demonstration that the Project meets most emission, discharge and social compensation standards required under the relevant guidelines and standards; where any aspects of such standards will not be fully met by the Project, these have been highlighted and suitably justified in the HSESAP.

4 Independent Environmental Consultant's Approach

4.1 ASSESSMENT PROCESS

As part of the IEC's role, AEA has:

- reviewed the adequacy of the Project's assessments, mitigation measures and plans against relevant Agency Lenders' requirements.
- monitored of the extent to which implementation of the Project, and principally construction activities, has met the requirements of the Project's mitigation measures and plans. To date this has entailed a number of monitoring field visits, and the presence of a continuous environmental monitor through the 2005/2006 winter river crossing period. Details of site visits and continuous on island monitoring since our engagement are provided in Section 4.5.

4.2 ASSESSMENT OF SIGNIFICANCE

It is important that the criteria used to assess the significance of issues allows for the development of the Project over time. The system used therefore employs two dimensions, namely the **materiality** of an issue and the **status**, including any work underway to address it.

4.2.1 Materiality

For materiality, a simple classification system has been developed, based loosely on a combination of Hazards and Effects Management Process (HEMP) and COMAH²¹ Environmental Risk Assessment criteria²². Materiality is assessed against impact categories (shown in the Table 4-1 below) and then classed as either: **High, Moderate** or **Low**. In some instances the level of materiality is uncertain either because the issue relates to (i) a future risk, the possible consequences of which are variable in extent, or (ii) an historical impact for which additional monitoring is required to accurately assess the level of materiality. In these cases the *potential* level of materiality has been estimated and is marked as such in the materiality tables. Where necessary, our categorisation of specific issues as either High, Moderate or Low is explained within the significance tables.

The materiality of many issues was initially assessed in the early stages of the Project prior to the start of construction activities. In many cases, issues have retained their original materiality even though additional mitigation measures may be proposed (although the 'status' may have changed, see Section 4.2.2). However, in some instances the materiality has been amended when the assessment of potential severity is reassessed in the light of new information (e.g. where the design of a facility changes thereby significantly changing the potential impact).

²¹ COMAH refers to Control of Major Accident Hazards regulation 1999, that are used in the UK to implement the SEVESO II Directive [96/082/EEC] on the control of major-accident hazards involving dangerous substances

²² Guidance on the Interpretation of Major Accident to the Environment for the Purposes of COMAH Regulations, DETR, June 1999.

Table 4-1 Materiality Criteria Definition

Category	Level 1 (High)	Level 2 (Moderate)	Level 3 (Low)
Environment	<ul style="list-style-type: none"> • Knock-on threats to human health • Affects large areas of designated conservation areas¹ • Persistent impact and/or inhibits regeneration • Severe long-term damage to eco-system² • Extended/ongoing breach well in excess of statutory or prescribed limit 	<ul style="list-style-type: none"> • Affects moderate areas of designated conservation areas³ • Moderate long-term or severe short-term damage to eco-systems⁴ • Repeated breach of statutory or prescribed limit 	<ul style="list-style-type: none"> • Minor detrimental impacts • Single, minor breach of statutory or prescribed limit
Health	<ul style="list-style-type: none"> • Probable multiple significant morbidity/illness • Possible mortality 	<ul style="list-style-type: none"> • Possible multiple morbidity/illness 	<ul style="list-style-type: none"> • Minor detrimental impacts
Social	<ul style="list-style-type: none"> • Permanent loss of significant local culture, amenity • Significant loss/reduction of livelihood • Significant disruption to the community/ indigenous people (e.g. resettlement) 	<ul style="list-style-type: none"> • Permanent loss of moderate amenity • Moderate loss/reduction of livelihood • Moderate disruption to the community/indigenous people (boom factor) 	<ul style="list-style-type: none"> • Minor detrimental impacts
Safety	<ul style="list-style-type: none"> • Fatality or multiple injury 	<ul style="list-style-type: none"> • Major serious injury affecting work performance at a single facility 	<ul style="list-style-type: none"> • Reportable minor effects e.g. slight injury and loss time incidents
Best Practice/ Procedure	<ul style="list-style-type: none"> • Clear and persistent breach of key Company requirements/procedures 	<ul style="list-style-type: none"> • Breach of non-mandatory guidelines/shareholder requirements • Persistent breach of non mandatory best practice/procedures 	<ul style="list-style-type: none"> • Minor breach of agreed procedures
Regulatory/ Legal ⁵	Potential regulatory issue		
Property Damage	<ul style="list-style-type: none"> • Substantial or total loss of operation 	<ul style="list-style-type: none"> • Partial shutdown 	<ul style="list-style-type: none"> • No disruption to operation
Economic	<ul style="list-style-type: none"> • Economic impact greater than US\$ 20 million • Major inflation increase 	<ul style="list-style-type: none"> • Economic impact greater than US\$ 2 million • Moderate inflation increase 	<ul style="list-style-type: none"> • Economic impact less than US\$ 2 million
Project delays	<ul style="list-style-type: none"> • > 6 months 	<ul style="list-style-type: none"> • 1 to 6 months 	<ul style="list-style-type: none"> • < 1 month
Reputation (Risk to Lenders and SEIC)	<ul style="list-style-type: none"> • International NGO adverse publicity • Regional concern influencing regional policies, planning or permitting bodies 	<ul style="list-style-type: none"> • NGO/pressure group concerns likely to lead to medium-term local adverse publicity • Significant local concern 	<ul style="list-style-type: none"> • Limited local concern
Other sensitivities ⁶	<ul style="list-style-type: none"> • Issue of international concern 	<ul style="list-style-type: none"> • Issue of regional concern 	<ul style="list-style-type: none"> • Issue of local concern

¹ >10% or 0.5 ha of designated conservation area, sensitive flora and fauna

² Any loss of an individual from a Red Data Book species or >5% of common species

³ >1% of designated conservation area, sensitive flora and fauna

⁴ >1% of common species population.

⁵ AEA has identified material potential regulatory/legal issues (e.g. conflicts with permit conditions or RF law) relating to the Project. Certain of these have been referred to the ILA for consideration.

⁶ Issues of particular interest to affected parties which may not necessarily have a significant environmental/social or health effect e.g. swans at LNG site.

4.2.2 Status

The status of an identified issue is classified as follows:

- Closed** Assessment and proposed management of the issue are adequate to maintain impacts to an acceptable level and are as developed as necessary at the current stage of the project. Closed issues are highlighted in green in the significance tables (see below).
- Historical** Any historical instance where relevant standards have not been met. This includes instances where previous construction activities have not met the required project plans and mitigation measures, including where this has led to environmental impacts or other legacy issues. Historical issues are highlighted in blue in the significance tables.
- Pending** There is insufficient evidence to demonstrate that the assessment and proposed management procedures are presently complete and adequate **but** any deficiencies are understood by SEIC and programmes for rectification are in place. Pending issues are highlighted in amber in the significance tables.
- Unresolved** Either: (i) there is insufficient evidence to demonstrate that the assessment and proposed management procedures are presently complete and adequate, or (ii) previous/ongoing construction practice falls short of the requirements of the Project plans **and further** in either case there is also insufficient evidence to demonstrate that adequate programmes for rectification are in place. Unresolved issues are highlighted in red in the significance tables.

4.3 SIGNIFICANCE TABLES

The assessment of significance, based on the above two dimensions of materiality and status, is used to characterise the key issues highlighted at the end of Sections 6, 7, 8, 9 and 10. In addition to significance, the nature of the issue is described (assessment of plans or implementation of plans) along with relevant applicable guidelines/standards. Examples are provided below.

Example significance tables

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
e.g.1	<p>A potential issue that closed in a timely manner.</p> <p>Note, the initial assessment of potential materiality remains the same but is no longer relevant and has been greyed out. In such cases, potential impacts have not materialised/have been minimal.</p>	Potential regulatory issue	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed
e.g.2	An issue that has been closed or superseded part way through construction with the result that some historical adverse impacts have been caused.	Environment M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Historical
e.g.3	<p>Deficiencies in the assessment or management procedures have been identified, but these are understood by SEIC and reasonable programmes for rectification are in place. Provided such programmes are fully implemented the status should be moved to ‘closed’ and materiality become no longer applicable.</p>	Environment H	OP 4.01 Annex B	Adequacy of Assessments & Plans	Pending
e.g.4	<p>An issue where assessment and plans are adequate, but there is a failure to implement the plans e.g. a current non compliance against the HSESAP</p> <p>In this example, the initial evaluation of materiality has been reassessed, for example, following the availability of new information. The original evaluation is retained for consistency with earlier assessments but is greyed out.</p>	<p>Social H (superseded)</p> <p>Social L</p>	HSESAP (T2.10)	Implementation of plans	Unresolved

4.4 SITE VISITS AND ON ISLAND MONITORING

AEA has undertaken the following site visits and on island monitoring reconnaissance missions since our engagement as the IEC.

Date	Description	Project Facilities/Island Groups Visited
October 2001	Kick-off visit	Project appreciation and site visit (pre construction)
December 2001	Public Hearings (observer)	Yuzhno, Korsakov
July 2002	Pre-construction visit	OPF (initial site clearance) LNG Prospective RoW camps Piltun & Lunskiye landfills
May 2003	IUP construction visit	IUP (access roads etc)
July 2003	Initial construction phase	OPF (initial site clearance) LNG (initial site clearance) Onshore pipeline RoW (initial clearance)
March 2004	Construction monitoring	OPF Korsakov CLO office LNG RoW camps Kholmsk port
June 2004	Construction monitoring	Nogliki (citizen meeting, landfill and hospital upgrade) Nogliki landfill LNG site and dacha community Onshore pipelines (RoW and camps) OPF
October 2004	Construction monitoring	LNG Onshore pipelines (RoW and camps) Kholmsk (Christophe Columbo spill site)
February 2005	Construction monitoring	Onshore pipelines RoW
April 2005	Social monitoring	IP groups CLOs LNG Dacha groups and resettled families
May 2005	Construction monitoring	Onshore pipelines (RoW and camps)
July 2005	Construction monitoring	Onshore pipelines (RoW and camps) Landfills (Korsakov, Smirnyk & Makarov)
August 2005	Chaivo bird survey review	Chaivo Bay
September 2005	Construction monitoring	Onshore pipelines (RoW and camps)
December 2005 to present	Continuous on island monitoring	River crossings and erosion control
January 2006	Construction monitoring	Onshore pipelines (RoW and camps)
March 2006	EBRD Public Meetings	Public meetings (Nogliki, Yuzhno, Korsakov) Onshore pipelines (RoW and camps) Nogliki landfill

Date	Description	Project Facilities/Island Groups Visited
May 2006	Construction monitoring	OPF Landfills (Nogliki, Smirnyk, Korsakov) Onshore pipelines (RoW and camps) LNG Chaivo Bay IP groups Local enterprises (Oeserskse fishing, Korsakov port) Project affected people (Sovetskoye, Korsakov) CLOs
July 2006	Construction monitoring	Onshore pipelines (RoW and camps)
July 2006	Management of social issues	Corporate (social management teams)
August 2006	Chaivo Bay	Pipeline construction and impact assessment
September 2006	Social due diligence	Verification of the management of social issues and PAP engagement primarily along the pipeline route north of Yuzhno
November 2006 – May 2007	Construction monitoring	Onshore pipelines (RoW)
April 2007	Social and environmental due diligence	Communities along the pipeline route
May 2007	Environmental due diligence – construction monitoring	Onshore pipelines (RoW)

5 HSE Assessment Process

5.1 OVERVIEW

An Environmental Impact Assessment (EIA) is required under RF legislation and regulation (e.g. Federal Law # 174-Φ3 “Environmental Project Validation Act”) and international standards for any industrial or economic development. The purpose of the EIA is to demonstrate that the impacts of the project development on the environment are:

- Understood and compliant with appropriate standards.
- Appropriately managed to minimise their impact.
- Justified from a cost benefit perspective.

The basic principles of the EIA under the RF regulation are broadly consistent with international standards, such as IFC/World Bank guidelines. Nonetheless, differences in both detail and style do exist. In general such differences are readily managed. However, two key areas require greater consideration in order to provide consistency across both international and RF requirements:

- The process of setting environmental limits, such as air quality standards (e.g. discrepancies between RF and international practice in both the standards to be achieved and also the modelling methods by which compliance is predicted).
- The process of balancing overall environmental benefits and costs.

The general approach taken by SEIC to overcome discrepancies in the environmental standards is to adopt the most stringent of the applicable standards (typically, the RF standards are more stringent than international standards). The Russian standards and modelling methods must be used for the environmental documentation submissions required for regulatory approval, under the RF TEOC process for industrial developments (see Section 5.3 for further details).

However, the style and approach to environmental standards required for the TEOC submission are significantly different from the presentational style and methods typically adopted under an international style ESHIA. Additionally, under the RF legislative system, environmental impacts are required to be assessed and compared with standards separately for the various types of impacts, making the process of balancing the *overall* environmental costs and benefits difficult to undertake. Such cost-benefit assessment is typically required under an international style EIA. In recognition of these differences and to provide clarity to a wider audience regarding the compliance of the Project with international standards, SEIC produced an “International Style” EIA (in 2003) in addition to environmental documentation required under the RF regulation.

In addition to the ESHIA, international standards require that the socio-economic impacts of the development be assessed. Furthermore, it is also international best practice for health impacts to be addressed. SEIC has stated its commitment to managing the environmental, social and health impacts of the Phase 2 Project as an integral part of the management of the Company. SEIC has undertaken a separate social impact assessment and also, although not

specifically required under RF legislation, a health impact assessment in parallel with the EIA.

5.2 SCOPE

The scope of the ESHIA process for the Phase 2 Project is wide and includes work undertaken from the feasibility studies (TEO-I), the FEED stage of the project (TEOC environmental materials, including the Preliminary EIA (PEIA), the TEOC EIA, and the Environmental Protection Books (EPBs)) and more recently work as part of the International ESHIA (2003) and the associated addenda (2005).

The TEOC materials received a positive conclusion in June 2003 following technical review by the Expertisa. The scope includes details on the impacts of the key facilities:

- PA-B Platform.
- Lun-A Platform.
- Onshore Processing Facility.
- Oil Pipeline System
- Gas Pipeline System.
- Oil Export Terminal.
- Tanker loading unit.
- LNG Plant.

The 2003 Environmental, Social and Health Impact Assessments incorporate information from the TEOC EIA, the PEIA and associated EPBs, and are structured as follows:

Environmental Impact Assessment (2003)

Volume 1	Legislation and Project Standards The EIA Process Environmental Consultation Development of Project Alternatives HSE Management
Volume 2	Platforms Offshore Pipelines and Landfalls
Volume 3	Onshore Processing Facility
Volume 4	Pipeline Transportation System Gas Disposition Terminal Gas Compression Station 2
Volume 5	LNG Oil Export Terminal LNG Jetty Tanker Loading Unit
Volume 6	Infrastructure Upgrade Project
Volume 7	Residual Impacts and Information Gaps Cumulative and Trans-boundary Impacts Managing the Impacts

Social Impact Assessment (2003)

Section 1	Introduction and Scope of SIA ²³
Section 2	Methodology
Section 3	Steps in the Scoping and Assessment Process
Section 4	Sakhalin Region & Potentially Affected Districts
Section 5	Potentially Affected Communities
Section 6	Indigenous peoples' consultation programme
Section 7	Project Land Needs
Section 8	Compensation Gap Analysis
Section 9	Assessment of impacts
Section 10	Economic impacts
Section 11	Russian Content, employment and business opportunities
Section 12	Impacts on Sakhalin communities
Section 13	Heritage resources
Section 14	Uilta reindeer herding
Section 15	Cumulative impacts
Section 16	Construction contractors and management of social issues
Section 17	Social Impact management and monitoring

Health Impact Assessment (2003)

Sections 1&2	Executive Summary and Introduction
Section 3	Description of Project
Section 4	Scope of the HIA ²⁴ for SEIC Phase 2 development
Section 5	Model for HIA
Section 6	Stakeholder identification and consultation
Section 7	Data sources and studies
Section 8	Baseline Data
Section 9	Health issues and impacts
Section 10	Assessment of health impacts associated with the construction activity (2002 –2006)
Section 11	Assessment of operation activity
Section 12	Assessment of health impacts associated with operation activity (post 2007)
Section 13	Mitigation
Section 14	Management plan for health infrastructure
Section 15	Summary of health issues on Sakhalin Island
Section 16	Conclusions and recommendations

²³ The scope of the SIA includes initial scoping and consultation studies, consultation related to the TEO-C 2001, community consultation, consultation focused on indigenous peoples, programme of supplemental compensation and assistance, assessment of the impact of the Project and mitigation measures and ongoing public consultation related to these measures, social management and monitoring plans.

²⁴ The HIA reviewed the on-shore geographical scope of Phase 2 to assess the impacts on health (IUP, OPF, GDT, pipelines, LNG/OET, TLU) and focuses predominately on construction activity, commissioning and operation phases 'outside the fence'. Occupational health issues are addressed via the HSE-MS.

The findings from the separate impact studies are drawn together in an overview document prepared by SEIC. The concept behind the overview was to highlight the key issues, interactions and cross-linkages between the studies.

5.3 PROCESS

The development of the ESHIA is a process that runs throughout the lifecycle of the Project. Nonetheless, a number of milestones within this process have been identified, including:

1. **Preliminary EIA (PEIA).** The PEIA is a public document required under RF regulations that must be made available to the public prior to the statutory Public Hearing meetings.
2. **Revised PEIA.** The Revised PEIA is an internal SEIC document that essentially updates the PEIA in the light of comments on the PEIA and Project design developments.
3. **TEOC EIA.** The TEOC EIA follows the PEIA (in line with RF requirements) and was included by SEIC in its TEOC submission (Volume 7). It is a mandatory requirement of the TEOC submission to contain Environmental Protection Books (EPB) that provide detailed assessment of environmental emissions, including proposed Maximum Permissible Emission (MPE) and Maximum Permissible Discharge (MPD) limits. The TEOC EIA is a discretionary supplement that SEIC submitted in order to provide an overview of the detailed assessments contained within the EPB. Additionally, the TEOC EIA also provides a useful tool for dissemination of outputs from the statutory Public Hearings
4. **Final EIA, Health Impact Assessment (HIA) and Social Impact Assessment (SIA).** The Final EIA is an international style EIA that has been produced primarily to satisfy the requirements of stakeholders other than the RF. A formal scoping document for the EIA was not prepared, although considered best practice under IFC guidelines as SEIC argue that the PEIA effectively formed the role of the scoping document. While AEA generally concurs that the PEIA has fulfilled much of the role of a scoping document, a number of deficiencies such as limited information on the IUP were identified. The Final EIA was made publicly available and aimed to reflect the differences in style and content that exist between the Russian TEOC EIA and a conventional international style EIA. The Final EIA also addressed the potential impacts of the IUP. In parallel with the Final EIA, SEIC has also produced separate HIA and SIA documents, which cover health and socio-economic issues not addressed in the TEOC EIA or other RF regulatory submissions.
5. **EIA and SIA Addenda.** AEA and Agency Lender review of the EIA and SIA identified a significant number of areas where additional information was required to fully assess the potential environmental and social impacts of the Project in line with Agency Lenders' policy requirements. In response to this, SEIC undertook further surveys and assessments, culminating in the production of the following addenda and associated documentation which were finalised in 2005:
 - Chapter 1 Executive Summary
 - Chapter 2 Oil Spill Response
 - Chapter 3 Pipeline Construction in Wetland Areas
 - Chapter 4 Baseline Steller's Sea Eagle
 - Chapter 5 Marine Mammals (Other than Western Gray Whales)
 - Chapter 6 Benthic Communities
 - Chapter 7 Marine and Coastal Commercial Fisheries

- Chapter 8 Geological Hazards in the Project Area
 - Chapter 9 Air Quality, Noise, Water Quality and Groundwater
 - Chapter 10 Solid Waste Management
 - Chapter 11 Protected Areas
 - Chapter 12 Dredging and Disposal in Aniva Bay
 - Chapter 13 Material Project Changes since the 2003 EIA
 - Chapter 14 Beach Landing Facility at the Onshore Processing Facility
 - Chapter 15 Red Data Book and Migratory Birds
 - River Crossing Strategy (RCS)
 - SIA Addenda
 - Resettlement Action Plan (RAP)
 - Sakhalin Indigenous Minorities Development Plan (SIMDP)
6. **HSE and Social Action Plan (HSESAP).** The HSESAP provides a covenanted framework for the implementation of the mitigation measures, plans and monitoring programmes derived from the ESHIA process. The HSESAP also provides an overview of the HSES standards that the Project will comply with. The HSESAP was finalised in December 2005. However, the HSESAP is a living document and will evolve as the Project progresses. Changes to the HSESAP can only be made with the agreement of the Agency Lenders in line with the Common Terms Agreement (CTA)²⁵.
7. **Other Key Documentation.** In addition to the above documentation a number of other key HSES plans and assessments have been produced by SEIC. These have been primarily developed to meet SEIC's own standards and lender requirements rather than being RF requirements, and include:
- Comparative Environmental Assessment Report
 - Marine Mammal Protection Plan (MMPP)²⁶
 - Chaivo EIA²⁷
 - Chaivo SIA
 - Social Compliance Monitoring Handbook
 - Public Consultation and Disclosure Plan (PCDP)

5.4 ASSESSMENT OF ESHIA APPROACH

5.4.1 Scope of assessment and plans

Following completion of the addenda and the RCS listed in Section 5.3 that were produced in order to provide additional information, some deficiencies in certain assessments remained (e.g. limitations in baseline characterisation of salmon and taimen habitats, limitations in the quantitative assessment of impacts on river habitats from sediment release during river crossings, and quality of life indicators for the LNG Dacha community).

These issues are further described in later Sections of this report, where AEA concludes that many of these are either minor in nature, tempered by the adoption of precautionary

²⁵ The Common Terms Agreement is a legal binding agreement between lenders and SEIC's that comes into effect at financial close.

²⁶ Formerly known as the WGPP, this was expanded include wider marine mammal protection measures and renamed the MMPP.

²⁷ Submitted as part of the TEOC for Chaivo re-route

approaches, or else SEIC has plans in place for their resolution/mitigation that AEA considers reasonable.

Furthermore, the HSESAP has been reviewed in a similar manner to ensure it adequately captures the commitments to mitigation measures made in the 2003 ESHIA and 2005 addenda, although certain aspects of the HSESAP are still to be completed, such as monitoring plans for the commissioning and operation phases, which, according to the HSESAP (2005), were to be completed in Q4, 2006. Since this date was agreed, the construction schedule has slipped, and consequently the monitoring plans are not necessarily required in 2006. The intent of the commitment was to have plans in place in a timely manner relative to the start of commissioning/operational activities. Provided the monitoring plan is in place in good time prior to commissioning/operations, the intent will be met. The HSESAP should be amended to reflect the revised project schedule.

5.4.2 Timeliness of the assessments and plans

In some instances written plans and assessments were not completed within the required timescales. In particular, project construction activities commenced in 2003, prior to the finalisation of adequate impact assessments, the HSESAP and other relevant written plans (although preliminary versions of such assessments and plans were generally in place at the start of construction). In AEA's opinion the key areas of material importance in this regard relate to the following areas (further discussion on each of these areas, including timeline diagrams linking construction activities with the production of assessments and plans, is provided in the report sections identified):

- **Western Gray Whales** There have been occasions on which construction has taken place before relevant recommendations of the independent scientific panel have been fully considered, and/or where relevant analyses of the effects of previous construction on whale behaviour have been completed or submitted to the panel for review (see Section 6.4).
- **Onshore pipeline construction** Although earlier versions of the RCS were in place during the initial stages of pipeline construction, these strategies lacked important elements that were incorporated into the finalised RCS. These deficiencies affected sensitive river crossing undertaken prior to December 2005 (when the RCS was finalised). The possible impacts of these deficiencies are discussed in the later sections of the report. (see Sections 6.5 and 6.6).
- **Disposal of dredge material in Aniva Bay** A full analysis of options was undertaken retrospectively, and relevant information was only made public following completion of dredging activities (see Section 6.2).
- **SIMDP** The SIMDP was finalised in May 2006 well into the construction period, with the result that possible impacts to indigenous people could have remained unidentified and unmitigated.
- **RAP** The RAP was finalised in November 2005. Consequently some potentially affected people could have been unaware of their right to compensation.

6 Environmental Impact and Management

6.1 INTRODUCTION AND SCOPE

This section addresses the adequacy of the environmental assessment and plans undertaken as a part of the TEOC submission, 2003 ESHIA, the subsequent EIA addenda completed in December 2005, and various other documents addressing specific issues, such as river crossings and the Western Gray Whale. It also addresses the way in which plans have been implemented during construction to date.

The headings below broadly cover the contents of a standard EIA and focus particularly on the key environmental impacts of this project.

6.2 PROJECT ALTERNATIVES

A number of studies have been undertaken by SEIC and these formed the basis of the 'Analysis of Alternatives' chapter in the EIA. Since the EIA, additional analysis of alternatives has been undertaken or reported in the EIA addenda and notably the Comparative Environmental Analysis report (see section on Western Gray Whales). The analysis of alternatives was for the most part carried out at a high-level, e.g. onshore pipeline route versus offshore route, and at this level is adequate. However there are examples where more detailed analysis of alternatives would have been beneficial. These are highlighted below together with an assessment of whether the deficiencies are material.

Pipeline route

The pipeline will cross in excess of 1,000 watercourses of varying size and environmental sensitivity, of which approximately 180 have been classified as being ecologically sensitive rivers (denoted as Group II/III – see Section 6.5). Whereas the general selection of the onshore route is appropriate (in that it largely follows existing rail and road routes) there is little evidence that micro-alignment has taken place to avoid sensitive river areas (spawning grounds/over wintering pools). Spawning habitat is present within 50m upstream and 100m downstream of the crossing location at approximately 100 of the Group II/III rivers. The spawning habitat is considered to be of good condition in 41 of these rivers. This issue is to some extent tempered by the use of appropriate mitigation measures (HDD and water management controls), but avoidance should have been used in preference to mitigation where feasible.

Analysis of alternatives is also required under WB OD4.30 on involuntary resettlement. In this case Sakhalin Energy has instigated a number of pipeline routing decisions to reduce resettlement needs.

Aniva Bay spoil disposal site

The analysis of alternatives and selection of a preferred dredge spoil disposal site in Aniva Bay was not clearly explained in the 2003 EIA. Since that document, Sakhalin Energy has produced an addendum chapter on dredging, including the disposal site selection process. The chapter highlights 3 possible sites and provides reasonable justification for the preferred site. However, much of this has been undertaken retrospectively in order to demonstrate the

site was appropriate, rather than as a comprehensive analysis of alternatives prior to construction activities. AEA believes the site selected was appropriate but notes that the Project falls short of the requirements of WB OP4.01, notwithstanding the suitability of the selected site. The materiality of this issue is discussed further in Section 6.9.2.

LNG site selection

Analysis of alternative locations for the LNG/OET facilities was addressed in the EIA, including consideration of nine different sites around the island. Whereas strong reasons were demonstrated for a site in the predominantly ice-free Aniva Bay (as outlined in the LNG/OET site selection paper – on SEIC’s website), micro-positioning within Aniva Bay is less clearly demonstrated. Although this is a partial compliance issue when assessed against the letter of the EIA guidance, in practice the site location is reasonable, particularly in the light of resolution of the SPZ for the LNG, which determines the number of dachas affected.

‘Without Project’ Alternative

OP4.01 also requires an analysis of alternatives in which the EA ‘*Systematically compares feasible alternatives to the proposed project site, technology, design and operation – including the “without project” situation*’. The EIA did not explicitly address the ‘without project’ requirement, nor have the addenda to the original EIA. The benefits associated with the Project in terms of the development of a deprived area, the harnessing of a secure fuel supply for the world markets and the benefits of gas over other fossil fuels (in terms of GHG emissions) contribute to the case for the Project (some of these aspects are presented, for example, on the SEIC website). Our only comment is that the case should have been explicitly and comprehensively presented in the EIA and is therefore considered to have a Low to Moderate materiality rating against the best practice/procedure category.

PA-B site selection

The location of PA-B, and in particular consideration given to the siting of the platform further to the east away from the Piltun WGW feeding grounds, was addressed in the EIA, although not in sufficient detail. The ISRP²⁸ report²⁹ (February 2005) highlighted a lack of specificity needed in order to justify the positioning of PA - B thereby making it difficult for the panel to evaluate some of the decisions made in selecting the PA-B location. While the panel noted the potential advantages of moving the platform away from the feeding grounds they also acknowledged the information gaps but did not explicitly recommend the Platform be moved further to the east. Sakhalin Energy has since released supplementary information on the matter into the public domain that provides a technical justification for the platform location, highlighting the positioning constraints that faced the Company, including shallow gas hazards and load bearing capacity of the sea floor. The Agency Lenders’ Reserve Consultants concurred with SEIC’s justification and also produced a short report, made available to the independent scientists at the Vancouver-I meeting, to this effect.

The ISRP panel members have since been provided with more information on this issue, and the constraints on the site selection have been accepted.

²⁸ The ISRP was an Independent Scientific Research Panel comprising a group of renowned whale experts that was convened under the auspices of the IUCN primarily to review Sakhalin Energy’s offshore pipeline routing and protective measures for the WGW.

²⁹ Impacts of Sakhalin II Phase 2 project on Western North Pacific Gray Whales and Related Biodiversity

Pipeline burial

The EIA did not provide justification for the SEIC decision to bury the onshore pipeline. However in response to claims from NGOs and other stakeholders that an above ground pipeline would be preferable to a buried pipeline, Sakhalin Energy produced a position paper³⁰ in 2003 outlining the arguments for each option. AEA has considered the arguments for and against buried and surface pipelines and it is our view that on balance a buried pipeline provides the best option, predominantly because buried pipelines reduce the risk of third party interference thereby reducing the risk of an oil spill. This view is based on the understanding that the pipeline can be designed to withstand the geohazards e.g. earthquakes, fault movements and landslides. Furthermore we are aware that a robust inspection and maintenance programme, including surveillance and a leak detection system that meet the internationally recognised Alaskan standard for leak sensitivity (Alaskan Administrative Code Title 18 Chapter 75 – Regulation of pipeline leak detection systems), will be implemented. Of note, several NGO groups have raised this issue on a number of separate occasions often referring to the above ground Trans-Alaskan pipeline. Agency Lenders should be aware that the Trans-Alaskan pipeline is above ground (for part of its length) because it crosses over areas of permafrost. The Sakhalin II pipeline does not traverse permafrost.

Public consultation on alternatives

During the early stages of the Project there was little evidence that feedback from public consultation was used in development of alternatives (see Section 7). However, for the Piltun offshore pipeline route the design options were re-opened following detailed design work and the need to increase the burial depth of the pipeline. Based on 3 possible offshore routes proposed by Sakhalin Energy, the Independent Scientific Review Panel (ISRP) expressed a preference for the most southerly option on the basis that overall this 'appeared to be the safest' when considering the risks posed to the WGW. The WGW issue is discussed in more detail in the Environmental Impacts section below.

Several useful reports discussing analysis of alternatives are posted on the Sakhalin Energy website. These include:

- PA-B platform site selection report: project alternatives
- Lunskeye site selection report: project alternatives
- OPF site selection report: project alternatives
- Offshore and Onshore pipelines: route selection report
- Sakhalin-II & The Trans Alaskan Pipeline (TAPS)
- LNG / OET site selection.

³⁰ Offshore and Onshore Pipelines: Route Selection report

Table 6-1 Summary of Key Issues in Assessment of Project Alternatives

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.1	<p>A full analysis of alternatives for the location of the LNG/OET site is not provided in the EIA nor any subsequent supplemental information. Whereas there are strong reasons for a site in the predominantly ice-free Aniva Bay, micro-positioning within Aniva Bay is omitted. Where as this is arguably a partial compliance when assessed against the letter of the WB guidance, in practice, the site location is reasonable, particularly as our earlier concerns were based on the possible resettlement of the entire dacha community. It should also be noted that 9 other potential sites (away from Aniva Bay) were also considered.</p>	Best practice/ procedure M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Historical
	<p>From an environmental perspective we believe the siting of the plant is acceptable and have therefore ‘closed’ the environmental concern. However, the approach did not represent best practice and the close proximity of the site to the nearby dacha community has resulted in social impacts (see Section 8)</p>	Environment L	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed
		Social L (Potentially)	OP 4.01 Annex B	Adequacy of Assessments & Plans	Historical
6.2	<p>The ‘No Project Alternative’. Clear justification for the Project to proceed (as opposed to the no project alternative) is implied rather than clearly demonstrated.</p>	Best practice/ procedure L-M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Historical
6.3	<p>In terms of the onshore pipeline route selection, there is little evidence that micro-alignment has taken place to avoid sensitive river areas (spawning grounds/over wintering pools). It is unclear whether micro alignments would have resulted in avoidance of sensitive area and furthermore the extent of impact is unclear in the absence of robust monitoring data at this stage. We have therefore assigned this with a potentially moderate materiality. Of note, impacts will be offset by SEIC’s commitment to no net loss of spawning grounds.</p> <p>Note. Elsewhere micro alignments have taken place e.g. at fault crossings, Chaivo spit.</p>	Environmental Potentially M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Historical

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.4	<p>During earlier phase of due diligence, a recommendation not to use HDD at the Lunskeye and Piltun landfalls was apparently based on technical considerations (Final EIA Volume 1 Section 5), rather than environmental. AEA expressed concern at the lack of environmental consideration in the EIA.</p> <p>However, HDD has a number of environmental consequences relating to additional footprint, transportation of heavy equipment and the duration of the operation that makes the net environmental benefit of HDD debatable. In particular HDD activities in sensitive locations such as Chaivo Bay (and which would have to be undertaken during the summer months) is likely to cause more damage than the selected use of coffer dams and conventional pull-in. Thus, on the basis of the above considerations we consider the adopted approach to landfall construction (<i>i.e.</i> pipeline pulling without the use of HDD) to be satisfactory and the issue to be closed.</p>	Environmental M	OP4.01	Adequacy of Assessments & Plans	Closed

6.3 CHARACTERISATION OF THE EXISTING ENVIRONMENT

Following review of the 2003 ESHIA, gaps in the baseline data were identified, either through omission or time delays associated with the reporting of results. Since the 2003 ESHIA, additional data have been collected, reported and presented within the EIA Addenda. Specific details on the improvements made and remaining outstanding issues with baseline characterisation are discussed through reference to specific environmental/Project aspects in the other sub-sections of this Section. Notwithstanding these specific issues, the overall characterisation of the existing environmental baseline is much improved in the EIA Addenda.

Most of the gaps have been filled with the following exceptions:

- Previous industrial activities including exploratory drilling at the OPF – status unknown
- Soil contamination at Brownfield sites – this work has not been undertaken and represents a potential liability for SEIC. SEIC have indicated a Risk Based Corrective Action (RBCA)³¹ approach to site clean-up.

In AEA's opinion these omissions do not represent a major concern, but do note the potential that the Project may be held responsible for clean up of contamination that was not caused by the Company.

Information gaps, relating specifically to river crossings and social baseline data are addressed later in Section 6.5 and Section 8.

³¹ The term Risk-Based Corrective Action (RBCA) refers to a consistent decision-making process used to assess actual or likely human and/or environmental risk of exposure to a potentially contaminated area and determine appropriate remedial actions in response to such risks.

Table 6-2 Summary of Key Issues in Characterisation of the Existing Environment

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.5	<p>Deficiencies were identified in the baseline characterisation presented in the 2003 EIA. Additional surveys were subsequently carried out, and existing data have been reported in the EIA addenda and associated document such as the RCS. We note, for example, that the approach and effort afforded to bird surveys is considered appropriate. Existing data on non WGW marine mammals has been properly utilised and summarised in the EIA addenda. Pipeline surveys, for ecological sensitivities and geohazards, have been undertaken. Further and more specific details on progress in this regard is provided elsewhere in this report.</p> <p>See also Section 8 for social baseline characterisation.</p>	<p>Environment L-H (Materiality varies by specific issues, and is addressed separately in subsequent sections)</p>	<p>OP 4.01 Annex B</p>	<p>Adequacy of Assessments & Plans</p>	<p>See specific items in following tables</p>

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.6	<p>Earlier in the due diligence process AEA noted that the precise details of these surveys were not available for review and ongoing review was required to ensure that these adequately addressed the currently identified limitations, including:</p> <ul style="list-style-type: none"> Limited air quality data, especially at the GCS2 and the LNG. Uncertainties in the extent to which monitoring of certain contaminants has been undertaken at the precise locations of the other facilities (e.g. pollutant levels in the vicinity of the offshore pipelines). Details of previous industrial activities at the OPF (we note that SEIC is currently preparing an abandonment plan, which covers the existing exploratory well that is located on the OPF site). Soil contamination surveys at brownfield sites, especially in relation to the pipeline RoW and construction camps. Data on abstraction wells in the vicinity of the pipeline RoW. Hydrodynamical data around the OPF beach landing site (we understand that this is an area of ongoing study and assessment by SEIC). Deep strata data at the OPF for assessment of deep well disposal of produced waters (SEIC are committed to perform detailed studies.) <p>We have subsequently revisited each of the issues and confirm that these have been addressed as described below</p> <ul style="list-style-type: none"> Limited air quality data. Data remains poor but can be reasonably assumed to be close to background because of its coastal location and distance from existing large scale emission sources. Key is the commitment to meet air quality standards during construction/operations. Pollutant levels around facilities – reasonable data for key facilities has been obtained. Data on abstraction wells. 10 wells identified within the pipeline SPZ with only one with groundwater flow from the pipeline route. A network of 100 plus monitoring wells will be used to identify groundwater contamination. Hydrodynamic data at the OPF beach landing – this issue superseded following decision not to construct a jetty Assessment of deep strata at the OPF have been undertaken to confirm their suitability for wasterwater disposal wells. <p>Exceptions are provided in the issue 6.7 below</p>	Environment M/H	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.7	Outstanding environmental quality/baseline gaps <ul style="list-style-type: none"> • Previous industrial activities including exploratory drilling at the OPF – status unknown • Soil contamination at Brownfield sites – this work has not been undertaken and represents a potential liability for SEIC. SEIC have indicated a RBCA approach to site clean-up. 	Environment L Economic L/M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Unresolved (future liability)

6.4 WESTERN GRAY WHALES

6.4.1 Background

The western stock of Gray whales was designated as a ‘critically endangered’ population by the World Conservation Union (IUCN) in 2000³². The current population size is assessed to be around 123 individuals³³, of which approximately 23 are thought to be females of breeding capacity. The Western Gray Whale (WGW) is thought to breed in winter in the South China Sea, before migrating to its feeding grounds off the north-eastern coast of Sakhalin during a feeding season that extends from the late spring to autumn. It is thought that little to no feeding occurs during the breeding and migration periods and so the WGW obtain the great majority of their annual calorific intake during the feeding season off Sakhalin (and possibly a few other as yet unknown areas). The WGW predominantly feed on pelagic (free swimming) mysids (small crustaceans) and benthos (generic term for organisms that live on or within bottom sediments) and the only two known main feeding grounds lie near to the Sakhalin II Phase 2 offshore Piltun production platforms (PA-A and PA-B) as follows:

- A primary feeding area in the shallow coastal waters off Piltun Lagoon. The PA-A and PA-B offshore platforms are located approximately 12km and 7km respectively eastward of the offshore side of the southern portion of the feeding ground (see Figure 6-1³⁴).
- A secondary offshore feeding area in the Chaivo region, some 20 to 30km south of PA-A.

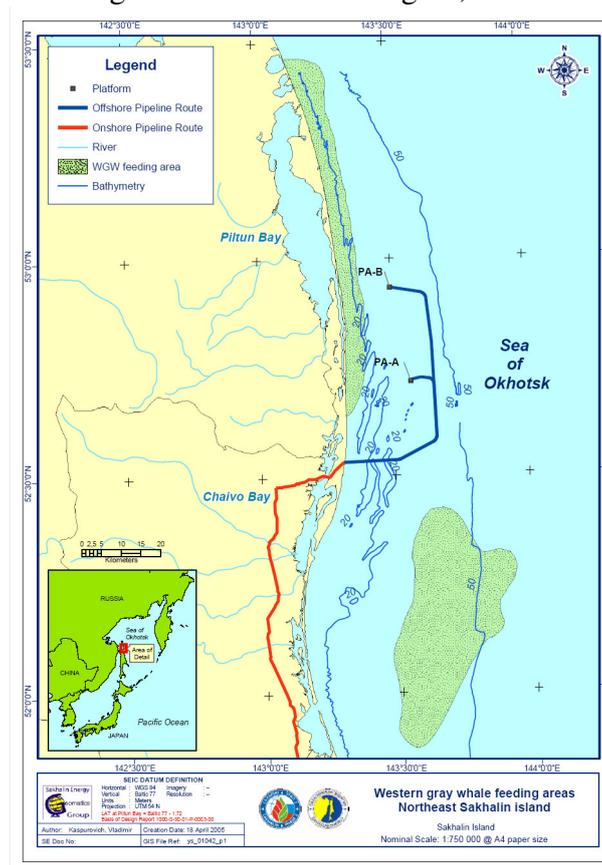


Figure 6-1 Location of the WGW Feeding Areas, Platforms and Pipeline Route

³² For further details see the IUCN Red List website at www.iucn.org/themes/ssc/red_list_2004/2004home.htm

³³ Report of the Western Gray Whale Advisory Panel at its First Meeting, WGWAP 1/Report, 9-11 November 2006 available at <http://www.iucn.org/themes/marine/sakhalin/meetings.html>

³⁴ Figure provided by SEIC.

Research over recent years has revealed that the precise location feeding areas utilised by the WGW varies between and within seasons. During the latter half of the 2006 season a noticeable shift was detected in the distribution of feeding WGW to the more southerly coastal region around the Chaivo landfall, south of the primary feeding ground. This behaviour had not been identified previously³⁵.

The proximity of the feeding areas, and most specifically the primary Piltun feeding area, to the SEIC offshore activities in the Piltun field pose a number of potential threats to the WGW, the most important of which are³⁶:

- **Noise disturbance** potentially leading to reduced feeding/displacement of whales from the feeding areas. Primary risks are from construction related activities such as platform installation and pipeline laying.
- **Risk of collision** with vessels (such collisions can be fatal). These risks are largely in the Piltun region and associated with offshore construction vessels (during construction) and the crew change vessels for the platforms (during operation). Other collision risks are associated with increased tanker traffic in the south of the island, possibly around the WGW migration routes.
- **Oil spill risks.** Oil spills may impact the WGW by direct contamination or, potentially more significantly, through contamination or loss of benthic prey.
- **Cumulative impacts.** Cumulative impacts on the WGW are associated with both other oil and gas developments offshore of Sakhalin (*e.g.* Sakhalin I and V) and also range-wide threats such as entanglement in fishing nets.

6.4.2 Current Population Data

Data from the 2006 research season generated by both the SEIC and Russian-US teams provided the most up to date observations on the WGW population:

- Photo ID work by the SEIC research team identified 120 individual WGW in 2006, with a further 6 possible individuals recorded. This is the largest number of individual WGW identified in a single season and helps to raise lower population estimates.
- The number of calves identified in 2006 was relatively low (four were identified by the Russia-US team), although caution is needed when drawing conclusions regarding calving/calf survival rates from these data as the number of days where field work was possible for this particular type of survey was relatively low in 2006.
- The proportion of WGWs identified by the SEIC research team as having poor body condition (so-called ‘skinny whales’) increased from 8.84% in 2005 to 15.9% in 2006. However, the proportion of WGW in the worst body condition categories decreased. (The SEIC research team classifies the body condition of individual WGW on a five-point scale from 0 (good condition) to 4 (most emaciated condition). WGW with a body condition of 2 to 4 are classified as skinny/emaciated. In 2006, although 20 individuals were classified as skinny, no whales were identified as having body condition ‘4’; this

³⁵ The reason for this shift in distribution is unknown, although it may be related to an apparent drop in benthic biomass in the northerly portions of the historical feeding grounds in the later half of the feeding season (the reasons for the decrease in biomass density is itself unknown – see WGWAP-2 report at <http://www.iucn.org/themes/marine/sakhalin/meetings.html> for further details).

³⁶ See report on the WGW Workshop, Vancouver, 17-19 September 2005 (available at <http://www.iucn.org/themes/marine/sakhalin/history.html>).

compares with 2005 when 10 whales were classified as skinny, including 3 classed with body condition 4.) It was also noted that whales seen as skinny earlier in the season have improved their body condition within the same feeding season or by a subsequent feeding season.

- A female western gray whale is known to have died in January 2007 after being trapped in fishing gear off the Japanese coast. This, together with the known loss of three females during migration in winter 2005/06, draws into focus the pressures faced by the WGW population outside of the summer feeding grounds off Sakhalin.

6.4.3 Evolution of the Issue

SEIC announced postponement of its offshore activities in 2004 in order to re-evaluate the offshore pipeline route in the Piltun region. The original (‘Base Case’) route included a landfall within the southern portion of the primary WGW feeding ground. The need to re-evaluate the pipeline route options was stated by SEIC to be in response to new ice scour data that meant the near-shore trenching of the pipeline would need to be deeper than originally anticipated and hence the potential to be noisier and of longer duration with increased risk of impact on the WGW. Three pipeline route options were developed (these are shown in Figure 6-2) and the option analysis was presented in the Comparative Environmental Analysis Report (CEAR) which SEIC published in January 2005.

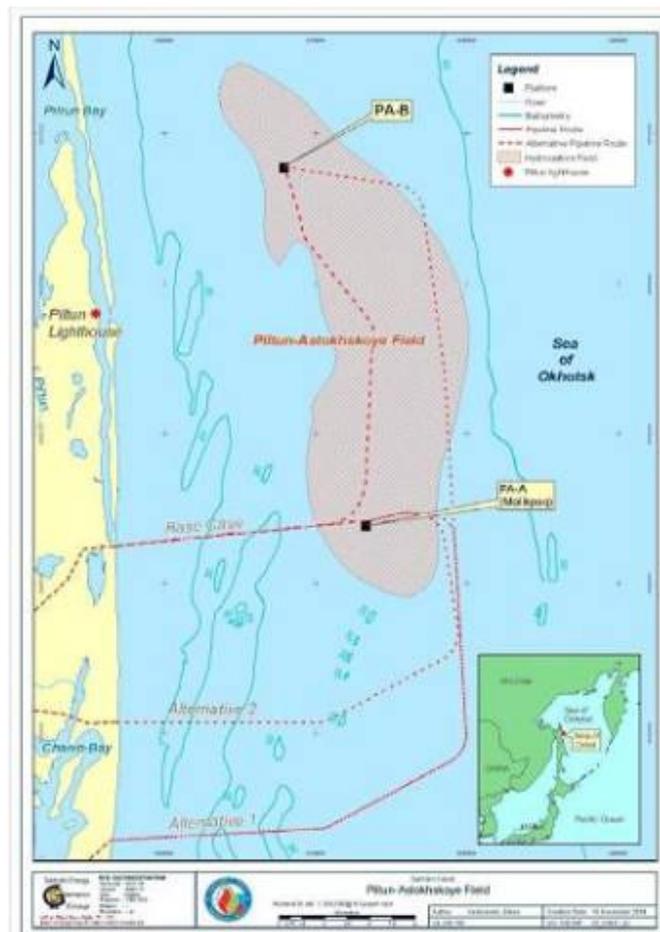


Figure 6-2 Offshore Pipeline Route Alternatives

In addition, SEIC announced that the pipeline route options (amongst other WGW-related aspects) would be subject to review by an independent scientific whale panel. To this end, SEIC commissioned IUCN to convene a panel of international experts, and the Independent Scientific Review Panel (ISRP) was formed in November 2004. AEA considers the adoption of this independent expert review process to be both laudable and novel. The ISRP produced its findings in a public document in February 2005³⁷.

One of the key findings of the ISRP identified the pipeline route 'Alternative 1' as the broadly preferred option from the WGW perspective. This provides the greatest spatial separation from the feeding areas, albeit at the cost of a longer pipeline route with associated incremental increase in risk of oil leaks. SEIC subsequently announced that it had selected Alternative 1 for its pipeline route.

The ISRP report also identified a number of "*important information gaps*" that "*left considerable uncertainty over many aspects of risk evaluation and the efficacy of proposed mitigation measures*". Such issues included noise assessment & mitigation, oil spill risks, cumulative impacts, collision impacts, range-wide impacts and conservation, research issues, etc. In order to discuss these outstanding issues, a meeting was arranged by IUCN in Gland in May 2005 between SEIC, former members of the ISRP, Agency Lenders and NGOs. The Gland meeting acted more to identify issues requiring attention, rather to resolve them, and it was agreed that three working groups be set up to take this forward:

- (i) A short-term group to assess noise modelling, impact and mitigation (prior to offshore construction activities in the summer of 2005³⁸).
- (ii) A short-term group to assess collision risks.
- (iii) A steering group to develop the framework for a long-term WGW independent oversight panel.

Another concern raised by stakeholders was the close proximity of the PA-B platform location relative to the primary WGW feeding grounds. This issue was assessed by the Independent Reserves Consultant (IRC), who identified that the location for the platform is constrained by technical limitations in drilling reach and the presence of shallow gas, shallow faults and clay-filled channels. In the light of these constraints, the IRC concluded that "*the ...site selected for the PA-B platform is a technically sound location.*"

In light of the remaining significant issues, AEA was requested by Agency Lenders to convene a workshop meeting of SEIC and WGW scientists to discuss outstanding issues, to close-out issues where possible or else to identify acceptable ways forward. This workshop took place in September 2005 in Vancouver ('Vancouver-I')³⁹. It was agreed at Vancouver-I that a long-term independent WGW Advisory Panel (WGWAP) would be formed and that this would be convened by IUCN. In AEA's opinion this long-term support of an independent panel of world-renown experts is highly commendable and has the potential to play an important role in the protection of this population. As part of the HSESAP, SEIC has

³⁷ Available from www.iucn.org/themes/marine/sakhalin/isrp/index.htm

³⁸ The offshore construction activities in 2005 essentially comprised the installation of the CGBS for the LUN-A platform (June 2005) and the PA-B Platform (July/August 2005). The main offshore construction activities (*i.e.* laying the offshore pipelines) were undertaken between June and October/November 2006.

³⁹ The scientists report from this workshop is available from the IUCN website at www.iucn.org/themes/marine/sakhalin/ISRP_Followup/lenders_wkshop.htm

made the following commitment to the WGWAP process (HSESAP Part 2 Table 2.4 Item 35).

SEIC shall support the Western Gray Whale Advisory Panel (WGWAP).

The Company shall implement all reasonable recommendations from the WGWAP in its Annual Work Programme and Budgets, provided that they comply with Russian law, and to seek support for these recommendations from shareholders, Russian Party and joint industry partners as appropriate. Issues that are deferred by the Vancouver Report to the WGWAP shall be addressed by the Company as appropriate. In particular:

- 1. SEIC shall in conjunction with a suitable independent convener ensure that the WGWAP will be formed. SEIC shall make best efforts to ensure that the WGWAP operates in line with the agreed framework in conjunction with a suitable independent convener.*
- 2. SEIC will make best efforts to ensure that the WGWAP is formed and provided with all relevant information and data in good time to enable the WGWAP to consider and address the 'immediate priority' issues as identified in the scientists report on the September 2005 Vancouver workshop prior to commencement of offshore construction activities in 2006.*
- 3. SEIC shall provide funding for the WGWAP to undertake its activities in line with its agreed framework for lifetime of the PSA.*
- 4. SEIC will keep the WGWAP informed of its ongoing plans and construction and operational schedules on a regular basis in order that all future priority issues can be identified and reviewed in a timely fashion.*

Should the WGWAP cease to operate at any time during the lifetime of the PSA due to circumstances beyond the control of SEIC, SEIC shall make reasonable endeavours to instigate an equivalent advisory body. The new body would be convened and operated to the satisfaction of the entities that make up the new body. The Company shall consult with the Senior Lenders throughout this process.

Vancouver-I identified a number of priority issues for the WGWAP to address, prior to commencement of 2006 offshore construction activities, including:

- Noise and collision assessment/mitigation.
- Review of 2005 research data to inform the design of monitoring/research requirements for 2006 field season.

This included (priority issue 4 of the Vancouver-I report) collation of all WGW distribution, behaviour and acoustic data from 2005 and analysis of these data to identify any shifts that may be correlated with industrial activity. All other outstanding issues (*e.g.* oil spill risks, longer term conservation, cumulative impacts of other developments *etc.*) were to be addressed by the WGWAP in the longer term.

Figure 6-3 provides a summary timeline of the production of key Project assessments and plans, together with milestones in the independent review process against the offshore construction schedule.

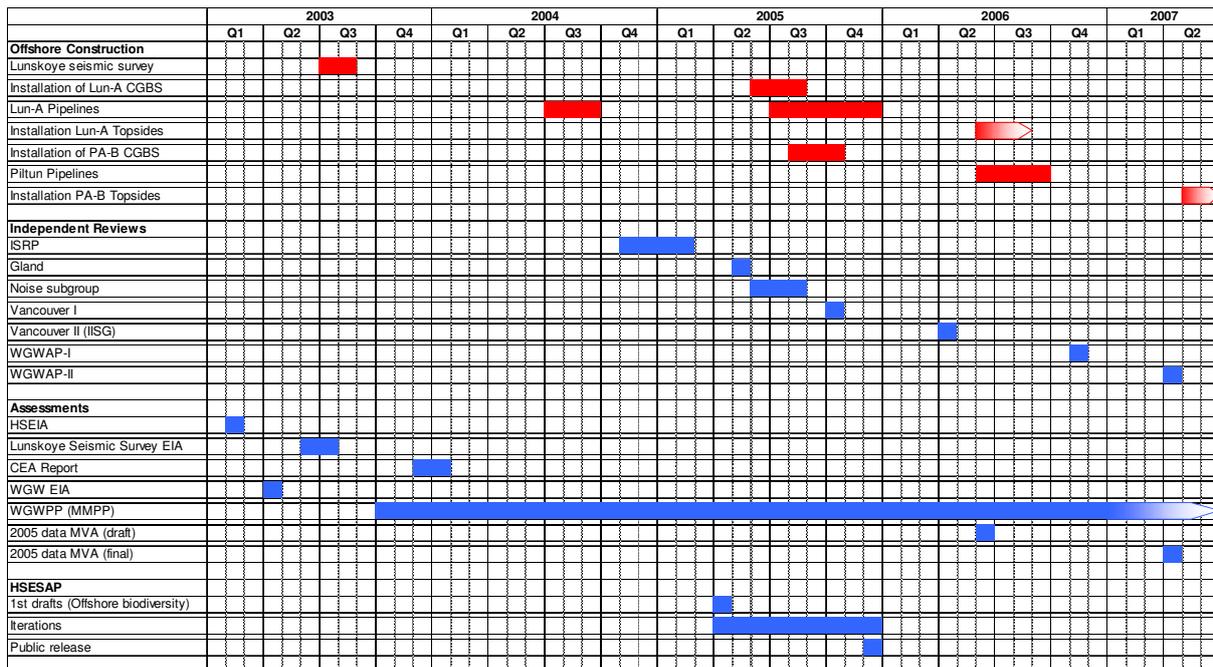


Figure 6-3 Timeline of WGW Assessments, Plans and Reviews Against Project Offshore Construction Schedule

The planned offshore construction activities for 2007 are as follows:

- PA-B GBS preparation (mid-May to mid-June)
- Float-out of topsides (duration 8 to 10 days with anticipated completion late June)
- Pipeline tie-ins (non-continuous work activity between June and August)
- Hook-up and commissioning Flotel (July to October)
- Scour protection (duration approximately 12 days in late September).

6.4.4 Current Status and Compliance

Timeliness and Development of the WGWAP

Timely establishment of an effective WGWAP and implementation of the Panel’s recommendations by SEIC is an important aspect in the Project’s management of WGW issues. The formation of the WGWAP was announced by IUCN in early October 2006 and includes panel members from Canada, Russia, the United Kingdom, Germany and the United States. The panel is established for a period of five years and the first meeting (WGWAP-1) was held in Prangins, Switzerland on the 9th to 11th of November 2006.

Due to the delays in forming the WGWAP (such delays were largely outside the control of SEIC), an Interim Independent Scientific Group (IISG), comprising many of the former ISRP members, was convened by IUCN to review the priority issues as well as overall progress and mitigation measures to be put in place before the 2006 construction in the Piltun field, which

commenced in June. The IISG met in Vancouver in April 2006 ('Vancouver-II') and its findings were publicly reported via the IUCN website⁴⁰.

WGWAP-1 took place shortly after completion of the 2006 offshore construction activities. Following WGWAP-1, it was decided that a subset of the Panel would attend an inter-session briefing with SEIC in Vladivostok in February 2007. This inter-session briefing was timed to immediately follow SEIC's annual meeting with its contract researchers and co-funders so that the outcome of this meeting could be presented to the Panel in good time before the second WGWAP meeting (WGWAP-2) that was held April 2007 in St Petersburg (WGWAP-2 was timed to be before commencement of 2007 offshore construction activities). As a result of the Vladivostok briefing the Panel developed a series of recommendations⁴¹, many relating to the type and nature of materials that SEIC were requested to produce in time for discussion and review at WGWAP-2. The formal report of the WGWAP-2 meeting was released on the IUCN website in mid-May 2007⁴².

Observers are invited to attend the WGWAP meetings (but not the inter-session meeting in Vladivostok) and AEA has attended both WGWAP-1 and WGWAP-2 in this capacity on behalf on Agency Lenders. The form and structure of WGWAP-2 varied from the previous meeting in that a number of discussions on detailed technical topics were undertaken in small working groups. These technical workgroups were held outside of the main plenary sessions and were not open to observers (including AEA).

Implementation of IISG/WGWAP Recommendations

During Vancouver-II the IISG indicated many areas where SEIC had made good progress (*e.g.* scheduling of noisy construction activities to minimise impacts) as well as making several recommendations for improvement. The IISG also made a number of recommendations, including many that pertained to 2006 construction activities. SEIC's formal response to Vancouver-II indicated that it would implement the great majority of these recommendations, but it also identified a number areas where it wished to further discuss with the WGWAP the form and validity of some recommendations (this response document is available via the IUCN website⁴⁰).

Recommendations of particular note on which SEIC suggested additional discussion included noise intervention criteria⁴³, commencement of shore-based observation stations and vessel speed limits. However, the WGWAP did not meet until after 2006 construction activities were complete and hence agreement on these recommendations was not reached in time to affect the 2006 construction programme. Despite further discussions at WGWAP-2 in April 2007, the issue of agreement on the Panel's noise action criteria also remained unresolved prior to the 2007 offshore construction. The nature and environmental/biological significance of these issues is discussed below in Section 6.4.5.

In addition to the biological significance, appropriate implementation of the recommendations of the independent scientists is important in ensuring the ongoing success of the WGWAP

⁴⁰ www.iucn.org/themes/marine/sakhalin/ISRP_Followup/IISG%20April%2006.htm

⁴¹ The panel recommendations following the Vladivostok briefing are available at www.iucn.org/themes/marine/sakhalin/index.htm.

⁴² <http://www.iucn.org/themes/marine/sakhalin/meetings.html>

⁴³ IISG recommended an intervention threshold when continuous received levels at monitoring buoy(s) located on the perimeter of the feeding ground exceed 120 dB re 1 μ Pa for four continuous hours or more. See Section 6.4.5.1, Noise Mitigation Measures.

process. The reports of the WGWAP meetings present the Panel's views on implementation of IISG/WGWAP recommendations, including expressed concerns over some aspects of implementation, and these are also summarised in Section 6.4.5. Failure to fully implement the independent scientists' recommendations poses a potential risk to the ongoing WGWAP process.

Provision of Data to Panel

Timely provision to the WGWAP by SEIC of all relevant materials and analyses has been an ongoing issue throughout the IISG/WGWAP process. SEIC has provided the WGWAP with advance notice of some plans (for example notification at WGWAP-2 of the Company's plans for future seismic surveys – see Section 6.4.5.1 below). Nonetheless, this remains an area of general concern following WGWAP-2 in April 2007 where a number of requested documents were not made available prior to the meeting, but were rather only provided at the meeting itself. Such documents included construction schedules for 2007 (the WGWAP has expressed its extreme disappointment at the situation regarding provision of information on work schedules by SEIC to the Panel) and the scope of work for the 2006 Multi Variate Analysis (MVA – see Section 6.4.5.1). Other assessments (*e.g.* noise footprint data) were provided later, either during or after the WGWAP-2 meeting. Furthermore, the Panel was only made aware of noise transmission loss experiments undertaken near to the WGW feeding grounds in 2006 at WGWAP-2.

The great majority of the SEIC-authored documents provided to the Panel at WGWAP-2 were marked as confidential. Although copies of all confidential documents are available to Panel members, observers only received hardcopies, which had to be returned to IUCN at the end of the WGWAP-2 meeting. In this regard we note that the WGWAP TOR states:

*“All documents submitted to the WGWAP will **normally** be made publicly available by the time the WGWAP issues its WGWAP Report, except for information that is designated confidential. Whether information is confidential or not will be determined by IUCN in consultation with the entity or individual providing the information. **Confidentiality will be an exception rather than the rule**, and therefore as much information as possible will be made available to the public.”* [Bold added]

AEA acknowledges that confidentiality of certain documents is problematic, not least due to the shared ownership of some materials with other oil and gas operators in Sakhalin. However, in order to improve transparency, greater consultation with IUCN is required in the determination of the need for confidentiality of such materials. Wherever possible all documents provided to the WGWAP should be made publicly available.

SEIC has acknowledged this issue and agrees that a more efficient, two way communication process must be established to ensure that all information requests by the Panel are properly understood and acted on.

3rd Party Involvement in the WGWAP

It was reported by IUCN at WGWAP-2 that efforts to engage other stakeholders, such as other oil and gas operators active offshore of Sakhalin and national states adjacent to the WGW migration routes and breeding areas, in the WGWAP process have as yet not been successful. Given the importance to the survival of the WGW population of managing cumulative and range-wide impacts, this is disappointing. However, we stress that this is outside of SEIC's control.

Self Assessment of the GWAP Process

IUCN presented the results of a self-assessment of the GWAP process at GWAP-2. The assessment took the form of a confidential questionnaire sent to a selection of Panel members and SEIC personnel seeking views on how well they feel the GWAP has functioned to date. The presentation of the results of the assessment indicate a clear perception divide between the panel and SEIC on a number aspects, including:

- the efficiency with which SEIC provides data and documentation to the panel
- the adequacy with which SEIC implements panel recommendations
- the general clarity and ease of implementation of the Panel's recommendations.

Due to the small sample size the results of the self-assessment need to be interpreted with caution. Nonetheless these results generally reinforce the concerns that the GWAP process must be seen by both participants and external observers to function transparently according to its terms of reference if the process itself is not to be jeopardised.

6.4.5 Assessment of Impacts and Risks

6.4.5.1 Noise-Related Impacts and Risks

Noise Criteria

Noise acceptability criteria are set out by SEIC in the CEAR and MMPP. These acceptability criteria are defined in terms the numbers of GWG and/or the proportion of the feeding ground ensonified to certain noise levels and durations. Predictive noise modelling has been used in designing construction activities to ensure that the acceptability criteria can be met.

Due to the nature of the acceptability criteria it is not possible to *directly* monitor whether they are met during actual construction. Rather, noise levels are monitored by sonar-buoys located along the perimeter of the feeding ground. These monitoring data can then be analysed post-construction in conjunction with the noise model to estimate the actual noise footprints and durations in order to assess whether the acceptability criteria were met.

In addition to these pre- and post-construction assessments, real-time noise monitoring is also required during construction. The noise levels recorded by the perimeter sonar-buoys are monitored and compared with noise *intervention* criteria in real-time. If these criteria are breached then intervention actions are initiated including, if necessary, cessation of construction activities. The noise *intervention* criteria effectively act as measurable surrogates for helping to ensure that the noise *acceptability* criteria are met.

Development of the Noise Model

Underwater noise generated during offshore construction in the Piltun region has the potential to affect the GWG feeding grounds (the Lun-A platform is situated sufficiently far south to ensure that construction noise generated in that field will not affect the GWG feeding grounds). Noise generation and propagation during offshore construction activities was assessed by SEIC through the development and implementation of an underwater noise model. Before the model was applied to construction activities in the Piltun field, it was first tested and developed by application to the earlier installation of the Lun-A platform Concrete Gravity Base Structure (CGBS), which commenced in June 2005. Following completion of

the installation of the Lun-A CGBS, the model predictions were compared/validated against the actual noise levels monitored during installation. On the basis of the results of this comparison, a number of model and assessment refinements were made in order to improve the predictive accuracy of the model before it was then used to predict noise levels at around the WGW feeding ground that would result from the installation of the PA-B CGBS later that year.

The model predictions for the PA-B CGBS installation were again subsequently compared and validated against the noise levels monitored by an array of acoustic sonar buoys that were deployed around the eastern perimeter of the WGW feeding ground during the installation activities. The model was then used to predict noise levels in the WGW feeding grounds that would result from construction activities in the Piltun during 2006 (e.g. pipelaying). In all cases the modelling assessments predicted that the noise **acceptability criteria** set out in the CEAR would be met during construction (further commentary on the adequacy of post-construction analysis of monitoring results to assess compliance with the CEAR criteria is provided below).

AEA finds that the overall approach to the development of the noise model to be appropriate and in particular the initial development and testing of the model during construction in the Lunskeye field before application to construction in the more sensitive Piltun region is good practice. The noise model used by SEIC was reviewed in detail at Vancouver-I, where the scientists identified the model as a valuable tool and encouraged its continued use for any activity involving noise generation. The scientists acknowledged the good predictive capabilities of the model at higher frequency ranges (>200Hz), although also noted that further validation was necessary at lower frequencies, which may also be important in assessing potential impacts on WGW.

Noise Mitigation Measures

A short-term working group of acoustic scientists was convened following the Gland whale scientist meeting in May 2005 to assess noise modelling, impact and mitigation prior to offshore construction activities in the summer of 2005. A key topic for discussion by this group was the design and implementation of noise-based intervention/shutdown criteria. Such criteria were developed by SEIC and discussed with the scientific group, who also discussed an alternative set of criteria proposed by one of the scientists. These alternative intervention criteria comprised both noise-based criteria for perimeter noise levels of 140dB and 130dB and also an outline for real-time behavioural change criteria that apply at lower noise levels (down to 120dB). These alternative criteria were suggested as trigger levels for diagnostic halts to construction activities. However, the PA-B CGBS was installed prior to full agreement with the independent scientists on these **intervention criteria**⁴⁴ (see Figure 6-3) and hence 2005 construction was undertaken using SEIC's own criteria that were in effect a less stringent modified version of the alternative criteria.

This issue was further examined following the installation of the PA-B CGBS at Vancouver- I, where the scientists reported that:

“The advice provided by the experts during the [acoustic scientists’ working group] teleconferences was either not heeded or altered significantly.”

⁴⁴ See item 35 in the Vancouver-I workshop report September 2005.

Nonetheless, AEA considers that the significance of this issue is reduced because SEIC post-analysis indicates that the noise **acceptability criteria** defined in the CEAR were met (although, the IISG noted some limitations in this analysis which are discussed below under ‘Analysis of Construction Noise Level Monitoring’).

For the 2006 construction programme, SEIC proposed an extended suite of noise intervention criteria based on the criteria previously suggested by one the independent scientists⁴⁵. These criteria were further discussed by the IISG at Vancouver-II in April 2006 who recommended a revised set of five intervention criteria for use in 2006. These criteria were based on a noise-dosage structure, whereby each of the five criteria is defined in terms of a noise level and an exposure duration such that the noise ‘dose’ of each criterion is equivalent (in other words a higher noise level for a short period time is taken as equivalent to a lower noise level for a longer period of time). The method used to determine noise-dose equivalence involves identification of a noise ‘exchange’ level, Q , such that for every increase in noise level by Q dB, the allowed exposure time is reduced by half. The identification of suitable values of Q is complex and its value may need to vary at different noise levels as the relationship between permitted noise level and the exposure period is not necessarily linear; at low noise levels (e.g. 125-130 dB) a higher Q value is more conservative, while a lower Q is more conservative for higher levels (e.g. 140-150 dB).

SEIC scientists have agreed the dosage-based structure as the generally accepted method. However, SEIC scientists have suggested different exchange (Q) values to that proposed by the Panel. In particular, while SEIC accepted most of the criteria proposed by the Panel for the 2006 construction season, the lower noise-level threshold criterion⁴⁶ was not adopted and this reduced set of criteria (which was therefore less conservative in nature than the full set of criteria recommended by the IISG) was used during the 2006 construction season. In addition to technical disagreement with the Panel over the lower noise intervention criterion, SEIC has also stated that the adoption of the Panel’s criteria in 2006 would have severely impacted the construction program in the Piltun area and would have pushed the construction activities over more construction seasons.

This issue was further reviewed at both GWAP-1 and GWAP-2. At GWAP-2 the Panel concluded that:

“Which [value of] Q to use may be debatable, but the use of non-linear criteria is not practical for implementation in the field with real-time monitoring. For the current situation, namely providing protection to western gray whales on the Sakhalin Shelf in relation to Sakhalin Energy’s construction activities, the Panel recommends a relatively high Q value due to the expected range of continuous noise levels produced by those activities. Therefore, the Panel recommends that Sakhalin Energy adopts the criteria as presented in GWAP 2/INF 15” [i.e. exposure criteria based on the noise-dose principle, and building upon previous recommendations made by the IISG].

⁴⁵ The revised SEIC criteria were identical to the criteria suggested by the independent scientist but with two exceptions. Firstly SEIC’s criteria did not include real-time behavioural monitoring criteria for lower noise levels (such criteria are difficult to define and realistically implement), and secondly, the actions triggered (if noise-based intervention levels were exceeded) were immediate action to alter the operation rather than the suggested diagnostic halts (as it is not feasible to immediately halt).

⁴⁶ The first IISG criterion required that corrective actions should be triggered when continuous received levels at monitoring buoy(s) located on the perimeter of the feeding ground exceed 120 dB re 1 μ Pa for four continuous hours or more.

In its formal response to WGWAP-2 SEIC has stated that it did not plan to fully implement the WGWAP's recommended criteria during 2007 construction activities:

“SEIC have planned all 2007 work based on the criteria successfully used in 2006. SEIC considers that it is not technically feasible to implement the proposed criteria.”

Under the HSESAP, SEIC has committed to implement all “*reasonable recommendations from the WGWAP*”. In this instance, assessment of whether SEIC's rejection of the lower noise intervention criteria represents a non-compliance with the HSESAP commitment comes down to a determination of whether the WGWAP's proposed criteria are ‘reasonable’. The WGWAP is essentially proposing more cautious criteria for low noise levels than those implemented by SEIC and the adoption of a cautious approach is generally commensurate with the critically endangered status of the WGW. SEIC argues that there is insufficient evidence to fully substantiate either set of criteria (the Panel concurs that this is indeed debatable), but that its current criteria were successful in 2006 in not resulting in any discernible adverse impacts on the WGW and hence they do not need to be revised. However, we find that this determination of success is difficult to conclusively demonstrate at this time given the current uncertainties in the assessment of potential impacts on the WGW during 2005 and more particularly 2006 (see discussion below on Noise Impact Assessment and MVA).

SEIC has further argued that the Panel's proposed criteria were not technically feasible to implement (*i.e.* construction activities would have exceeded the lower noise criterion too frequently to allow construction to be completed in a single season). However, to date detailed information/arguments regarding technical feasibility have not been presented to the WGWAP for consideration. As such, this statement needs to be substantiated to show that construction activities in 2006 and 2007 could not have been re-organised and planned in such a way that the WGWAP's criteria could have been adopted without causing excessive construction delays, given that the panel first raised this issue in 2005. We understand from SEIC that they undertook such an analysis prior to 2007 construction that demonstrated that the WGWAP criteria could not be met during that year's construction. At the time of writing this analysis had not been shared with the WGWAP, although we understand that SEIC intends to do so prior to WGWAP-3.

Overall, AEA considers that the Panel is only in a position to fully judge the reasonableness of its recommendations if it is provided with all relevant information, including technical and logistical aspects. To date this has not been the case on this issue. We therefore consider that SEIC needs to seek alignment with the WGWAP on this issue through discussion of all biological, technical and logistical aspects. Although we note that this will not affect main offshore construction activities, which have largely been completed, it is important in relation to both any future activities and, importantly, ensuring the longer-term functioning of the WGWAP.

Analysis of Construction Noise Level Monitoring

SEIC's post-construction analysis of noise monitoring data from 2005 indicates that the noise acceptability criteria defined in the CEAR were met during its construction activities in 2005. However, the strength of these conclusions is tempered by the findings of the IISG review of this issue, which identified several limitations in the post-analysis undertaken to calculate the

acoustic footprint of the construction activities (as required to assess compliance with the CEAR criteria), including: sole use of the 90th percentile levels⁴⁷, the lack of consideration of transient noise and the use of only one acoustic monitoring site. The IISG made recommendations for improvements to post-analysis of monitoring data that included a larger set of statistical properties.

Of all the Project's offshore construction seasons in the Piltun region, the noise sources associated with construction during 2006 are of greatest potential significance in terms of duration, spatial extent and, potentially, source level. Full analysis of noise monitoring data from the 2006 season was not ready in time for submission prior to WGWAP-2 (missing analyses included comparison of the noise footprint with both population density maps and with the feeding ground), although some further analysis was provided during and after the meeting. While the WGWAP acknowledged that the efforts of SEIC and the IISG/WGWAP had reduced the noise footprint during 2006 construction activities, the Panel also expressed their disappointment that critical documents had not been delivered to the Panel in a timely fashion. Furthermore, from preliminary review of the available data, the Panel noted that:

“the data provided for WGWAP-2 indicate that the exposure criteria agreed by the Company were probably violated on some occasions.”⁴⁸

Further review of all relevant data is required before this can be confirmed (this issue will be addressed again at the next WGWAP meeting⁴⁹). It is therefore uncertain at the time of writing whether full compliance with the Company's own noise exposure acceptability criteria was maintained during all stages of construction during 2006.

Noise Impact Analysis (Multi-Variate Analysis)

In addition to assessing noise levels, it is also important to identify whether any actual impacts on WGW, including shifts in WGW distribution, have occurred as a result of construction activities (this is particularly important to assess directly because of the uncertainties in knowledge of WGW response to noise stimuli and this was identified as a priority issue at Vancouver-I). The results of such analyses are also important in furthering the understanding of the WGW response to noise stimuli, refining mitigation measures and designing future research/monitoring programmes. This type of assessment requires a **multivariate** analysis (MVA) of *inter alia*: noise levels, WGW distribution and behavioural characteristics, construction parameters and other environmental parameters.

In the first instance, this type of MVA was required to assess potential impacts during the 2005 construction season. This was necessary as part of a precautionary approach to assess whether any impacts resulted from the relatively short 2005 construction activities before embarking on the longer duration construction activities scheduled for 2006. This analysis of 2005 construction was also necessary in order to meet HSESAP commitment 35 of Table 2.4, which requires SEIC and the WGWAP to address all priority issues identified at Vancouver-I.

⁴⁷ Although SEIC provided a wider set of statistical data, only the 90th percentile was used for the specific task of re-calculating the acoustic footprint.

⁴⁸ Based on this superficial review, the WGWAP reported that it appears the exposure criteria described in Sakhalin Energy's 2006 MMPP (these are the same presented in the CEAR) were exceeded. Specifically, the levels measured at the 10 m bathymetric contour indicate that >10% of the feeding area was ensonified at >120 dB for > 7 days

⁴⁹ As of July 2007 the date for the next WGWAP meeting has not been set, although it is likely to be scheduled for autumn/winter 2007.

Following the 2005 construction season, two documents were reviewed by the IISG at Vancouver-II in April 2006, that purported to assess behavioural changes of WGW during the PA-B CGBS installation; namely Vancouver-II document 13c (produced on behalf of SEIC and which identified no effects on whale behaviour) and a WWF/IFAW paper produced by Dyachenko *et al*⁵⁰ (which concluded that the PA-B CGBS installation had resulted in disturbance of WGW in their feeding grounds to the extent that the CEAR acceptability criteria were exceeded). However, both of these analyses were **univariate** in nature and the IISG concluded that neither assessment could be regarded as definitive or conclusive. An MVA of the required nature for the 2005 monitoring data was commissioned by SEIC at the end of 2005, but this was not ready in time for review at Vancouver-II and further delays resulted from additional analysis recommendations made during discussions at Vancouver-II. The lack of such an assessment at Vancouver-II was described by the IISG as:

“particularly regrettable considering that the most active SEIC construction season to date is stated to begin in....early June [2006]”

The 2005 MVA was not completed prior to commencement of the 2006 construction activities in Piltun, hence limiting the potential for the findings of the study to influence the 2006 construction and monitoring programmes, although a draft of the study was available to SEIC shortly before commencement of construction. A draft of the 2005 MVA report was also provided to AEA in late June 2006 (*i.e.* shortly after commencement of the 2006 construction season) for review and was subsequently reviewed by the WGAP at WGAP-1 in November 2006.

The draft 2005 MVA did not identify any large-scale effects on WGW behaviour resultant from the parameters measured during the installation of the CGBS. While it can be inferred from this that such large-scale behavioural effects are unlikely to have occurred, they cannot be entirely ruled out due to limitations in the size of monitoring dataset (for example due to poor visibility in foggy conditions during portions of the construction period) and the analysis methodology, most specifically the absence of estimation of confidence limits.

Small-scale behavioural effects were indicated by the draft 2005 MVA and, in particular, the analysis suggests that WGW were observed further offshore when noise exposure was higher. Although the identified effects on behaviour were small (about 6% increased WGW distance from shore for each 10dB increase in noise) this does not necessarily mean that they had a low biological significance (*e.g.* whether prey biomass levels are significantly lower at the further offshore distances) and the draft 2005 MVA did not address the potential biological significance of this apparent effect. Furthermore, it was not clear from the analysis presented in the draft 2005 MVA whether this relationship between sound levels and WGW distance from shore was a causal effect and even if it were whether the behavioural change was related to research vessel activity (either SEIC or non-SEIC funded research vessels) or construction activity.

The 2005 MVA was subsequently finalised in early 2007, in time for review at WGAP-2. The finalised study was revised from the previously reviewed earlier drafts to include:

- A qualitative discussion of biological significance;

⁵⁰ Available at <http://www.iucn.org/themes/marine/sakhalin/>

- Investigation into the cause of the apparent correlation of noise level with movement of WGW further from the shore (*i.e.* was the apparent increased WGW distance from shore effect related to noise from small whale research vessels (zodiacs) or construction vessels).

The above extensions to the 2005 MVA aimed to resolve some of the more readily addressed (*i.e.* not requiring major re-analysis of statistical data) concerns previously raised by both AEA and the WGWAP (see WGWAP-1 report). Unfortunately, as is recognised in the finalised 2005 MVA report, neither of these additional studies proved to be entirely conclusive, although the new analyses do provide some supporting evidence to suggest that the apparent shift of WGW further offshore could be a result of research vessel activity rather than construction-related noise disturbance. Following review of the finalised 2005 MVA, the WGWAP concluded at WGWAP-2 that:

“The results to date do not provide strong evidence of impact by industrial activity. However, those results remain somewhat ambiguous due to the confounding of potentially important variables such as proximity to construction, natural patterns of gray whale distribution and the possible effects of other sound sources including research vessels.”

SEIC provided a draft scope of work for the performance of an MVA of the 2006 construction season data at WGWAP-2, although a copy was not provided in advance of the meeting. The draft scope of work already included a number of the detailed technical improvements to the MVA methodology previously recommended by AEA and the WGWAP. The Panel further suggested a number of additional considerations and assessments that might be incorporated into the 2006 MVA (or associated analyses). The SoW will be further developed by SEIC with input from the Panel. We note that SEIC does not anticipate completion of the 2006 data MVA until early 2008.

In summary, we find the 2005 MVA represents a laudable effort to assess whether impacts on WGW occurred during the installation of the CGBS. However, while the results of the 2005 MVA are broadly encouraging in suggesting that the installation of the PA-B did not lead to significant impacts on the WGW, such impacts can still not be conclusively ruled out. Furthermore, delays in the completion of the 2005 MVA limited the extent to which its findings could be fully incorporated into the design of subsequent construction seasons as part of a precautionary approach. This is particularly important in respect to the completion of the 2005 MVA as the nature and duration of offshore construction activities in 2006 mean that this is the construction season with the greatest potential to lead to noise-related disturbance of WGW.

SEIC has stated that the protracted timescale for the finalisation of the 2005 MVA was due to the complexity of the analysis, the identification of improvements by the IISG/WGWAP in May 2006 and time constraints on key scientists (who mobilised into the field for the 2006 monitoring season). However, although there are technical challenges involved in these assessments and other time delays inherent in their development, these assessments could have been completed within significantly shorter timeframes, with earlier planning and appropriate levels of resource (for example much of the time-intensive analysis is undertaken by statisticians, who will not have been directly involved in the 2006 field monitoring).

Completion of the 2006 MVA is now of greatest importance in order to determine whether construction noise has had any significant impact on WGW behaviour at a biologically significant level. The pending status of the 2006 MVA, therefore, represents an important uncertainty in understanding whether SEIC's offshore 2006 construction activities have resulted in any detectable or significant impact on the WGW.

Behavioural Monitoring in 2006

Following discussions with the IISG at Vancouver-II, SEIC initiated 2006 construction activities as early as possible (*i.e.* shortly after the sea became ice-free in early June) as fewer WGW were expected to be present at this time (although some WGW will be present off north Sakhalin at this time). The IISG also recommended that shore-based behavioural monitoring commence at or before the start of offshore construction in 2006. However, while offshore construction works near the Chaivo landfall commenced in early June 2006, the shore-based monitoring did not start until approximately two weeks later in mid/late June. As noise level monitoring also did not start until mid/late June (this is as outlined in the MMPP), this means that the only form of monitoring undertaken by SEIC during approximately the first two weeks of construction was the Marine Mammal Observers (MMOs) on the construction vessels (although an independent NGO observation team was also present during this time). Using the earliest start date possible for construction was meant to provide real benefit by reducing potential impacts and, as such, was commendable. Nonetheless, the WGWAP expressed its concerns over the late commencement of monitoring:

“Sakhalin Energy chose not to initiate monitoring at the same time [as commencement of construction], in spite of the fact that the IISG emphasised the importance of obtaining data on whale behaviour and distribution for the pre-construction period. Without such baseline data, analyses are less likely to detect potentially significant effects if they occur. The Panel was advised [by SEIC] that the observation teams had been unable to reach their observation stations due to road conditions, but it is questioned why other means (e.g. helicopters) had not been used to transport the teams to their study sites. Furthermore, it is not clear why acoustic recording buoys were not deployed and real-time acoustic data received until 10 and 21 days, respectively, after construction was initiated in the same area.”

In order to monitor WGW distribution in close to real time, and thereby provide a basis for initiating remedial actions when needed, the IISG recommended that:

“Distribution data should be analysed as quickly as possible during the 2006 season so as to detect potential changes in WGW distribution in response to noise from Sakhalin Energy activities”

However, at the November 2006 meeting of the WGWAP, the Panel reported that the information provided by SEIC indicated that such real time monitoring had not been accomplished. SEIC did subsequently (*i.e.* after the end of the construction season) generate population density distribution data for review at WGWAP-2 (although further work was still required to enable comparison of the distribution data with monitored noise levels). Close to real time monitoring is technically challenging and it may not necessarily be possible to detect significant changes in distribution over short timescales, but the absence of such analysis until after the construction season means that the full intent of the IISG recommendation was not met.

Seismic Surveys

At WGWAP-1 the Panel requested that SEIC prepare a schedule of its future work including all anticipated or likely events, such as seismic surveys. Following this request, SEIC confirmed at WGWAP-2 that it plans to undertake repeat (so-called '4-D') seismic testing of the Piltun-Ashtokhskoye reservoirs approximately every 3 years in order to analyse production induced changes to the reservoirs, commencing with a survey of the southern portion of the field (being exploited by the PA-A platform) in 2008. It is anticipated that the first survey will be completed in a maximum of two weeks, with actual seismic firing activities expected for 3 to 5 days. The use of 4-D seismic surveying is becoming increasingly common in the industry as it can help improve the efficiency of reservoir development. In particular, by providing up-to-date characterisation of the reservoir, the number of new wellheads required to fully exploit the oil and gas reserves can be optimised.

SEIC's current proposal is to perform the seismic surveys during ice-free conditions (*i.e.* coinciding the WGW feeding season) as this will enable ready comparison with previous seismic surveys of the reservoirs. The possibility of conducting on-ice seismic surveys when the WGW are absent was discussed at WGWAP-2. SEIC considered such surveys unlikely for safety reasons and because they would not give results comparable to previous surveys of the reservoirs. During the WGWAP-2 meeting the suggestion was made to explore the possibility of conducting both an on-ice survey (if safe and feasible) and an open-water survey in 2008 to calibrate the two methods and provide a new reference for future surveys. The Panel recommended that the feasibility of this comparative approach be evaluated.

If on-ice seismic surveys are not possible, then the timing of the surveys should be designed to avoid the peak WGW feeding season to the extent possible and this is clearly being considered by SEIC as part of its planning process. A further key mitigation is survey minimisation and in this regard the cumulative aspects of multiple surveys need to be considered, particularly:

- The need to coordinate the surveys of the Piltun-Ashtokhskoye reservoirs (*i.e.* the reservoirs being exploited by the PA-A and PA-B platforms respectively) in order that only one survey is required every third year – the possibility of undertaking joint surveys was discussed at WGWAP-2 but the feasibility of this could not be confirmed by SEIC at the time.
- Consideration of how the potential cumulative impacts associated with seismic surveys undertaken by other offshore operators in the region can be best minimised (for example to try and avoid the situation where seismic surveys are undertaken around the WGW feeding ground in consecutive seasons over several years)

Noise generated by seismic surveys differs in nature from that typically generated by offshore Project construction activities in a number of significant ways, including source level and frequency, transience (pulse *cf* quasi-constant) and spatial distribution (vessel transects over survey area *cf* for example linear pipe-laying activities). As such, the nature of the required impact assessments, monitoring, and mitigation measures (including shutdown criteria) will need to differ from those reviewed to date by the WGWAP. (Although seismic surveys have previously been undertaken in the Piltun region, the associated assessments and mitigation measures undertaken have not been reviewed.) In line with HSESAP commitments (Table 2.4, row 35) SEIC has therefore committed to producing an EIA for the 2008 seismic survey and the WGWAP agreed to form a dedicated task force to both review and provide input into

the development of EIA and other aspects relating to future seismic surveys. This EIA will need to address the issue of cumulative impacts, although it is recognised that the intentions of other offshore operators may not be fully known to SEIC. While SEIC has no direct control over seismic surveys undertaken by other operators in the region, the Company's intention to develop its seismic programme with input from the WGWAP has the potential to create a standard of good practice.

SEIC anticipates that the seismic survey EIA will be completed by August 2007, thus enabling discussion at WGWAP-3 in time for any recommendations of the Panel to be addressed prior to the surveys being undertaken.

Significance of Noise-Related Issues

The actual environmental/biological significance of the noise-related issues identified above can only be fully assessed through analysis of monitoring data. The MVA are important assessments in understanding the likely scale of such impacts. However, while the 2005 MVA is broadly encouraging in suggesting that significant impacts on the WGW did not occur during the 2005 construction season (*i.e.* impacts were **low**), definitive conclusions cannot be drawn due to limitations in the assessment identified above. Furthermore, the 2006 MVA has not yet been undertaken and important aspects of noise data assessments (including assessment against CEAR criteria) were not completed in time for review by the WGWAP, although preliminary review of available data by the WGWAP indicates that these criteria may have been exceeded on some occasions. As a result of these uncertainties the potential for significant (**high**) biological impacts both during the installation of the CGBS and during the longer duration construction activities in 2006 cannot be entirely ruled out.

The proposed seismic survey programme in the Piltun region is a pending issue of **high** potential environmental materiality until the EIA and associated mitigation and monitoring measures have been completed, and the acceptability of the seismic surveys has been confirmed (including review by the WGWAP).

6.4.5.2 Non-Noise Related Impacts and Risks

Oil spill risks

In relation to oil spill risks, based on Qualitative Risk Assessment (QRA) data provided by SEIC, the ISRP estimated a 24% probability of a pipeline spill and a 3% likelihood of a platform blowout over the Project's 40-year lifecycle. (AEA reviewed the QRA documents and we confirm that the spill size/frequency estimates were adequately assessed and based on suitable historical data.) However, it is important to recognise that these spill frequencies include all spill sizes (including very small spills that dominate the overall spill frequencies).

In order to better understand the actual risks to the WGW from oil spill events, SEIC undertook a screening assessment of such risks for review by the independent scientists at Vancouver-I. This screening study concluded that the risk of such effects on the WGW occurring was very low, based on the characteristics of the oil and the credible oil spill scenarios (including consideration of the frequency of different spill sizes occurring)⁵¹. The

⁵¹ The screening assessment estimated that under certain worst-case assumptions 0.3% of the WGW feeding ground could be affected by a release of 5,000m³ of oil. The lifetime probability (based on a 40 year project lifecycle) of an oil release of this size or larger occurring concurrent with environmental conditions (*e.g.* wind and tide directions) that would lead to oil contact with the feeding ground is estimated by SEIC at 1 in a thousand (*i.e.* 0.1% probability).

independent scientists concluded at Vancouver-I that the screening study provided a useful initial study and preliminary estimate of the residual risk, although they did identify the need for additional future review by the WGWAP of some more detailed aspects of the assessment, including demonstration/confirmation of the precautionary nature of certain assumptions.

AEA concurs with the Vancouver-I review findings and we consider that without further demonstration the actual risks to the WGW feeding grounds from oil spills may be slightly higher than predicted in the SEIC screening study, but are still low.

The status of the development of the oil spill response plans (OSRP) is discussed in Section 10. The OSRP for the offshore facilities, and most importantly for the Piltun platforms/pipelines, will need to be clearly defined in relation to WGW. The IISG/WGWAP has previously expressed the view that dispersants should not be used in areas where they may affect WGWs and, particularly, their habitat. It is therefore good to note that the Piltun OSRP reviewed by AEA clearly states that dispersants should be avoided in the vicinity of WGW or WGW feeding areas and the dispersant use guidelines in the plan have a statement to avoid dispersants if the dispersed oils will impact WGW.

The OSRPs will be reviewed by the WGWAP in the context of WGW protection. The WGWAP will only receive the OSRPs following approval by the RF authorities. Concerns were raised by Panel members and NGO observers at WGWAP-2 that this may limit review input into improving plans. However, it has been stated by SEIC's oil spill team that the plans can be amended after approval. A WGWAP taskforce will be developed to review the OSRP.

Collision risks

Quantified estimation of collision risks between WGW and vessels is problematic. While it is possible to predict the frequency of 'proximity' incidents (*i.e.* how often WGW are likely to come into close proximity of vessels) based on estimated whale and vessel densities in certain locations, insufficient information is available to estimate the proportion of these events that would lead to actual collisions because avoidance behaviour of the WGW is ill-understood. However, the independent scientists concluded in their Vancouver-I report that:

“Indirect evidence, such as the apparently low rate of collisions in eastern gray whales as a fraction of population size (with the caveat that many incidents might go unreported) and the likelihood that project traffic represents a low fraction of the total vessel traffic to which WGWs are exposed on their migration routes and calving grounds (with the caveat that these are largely unknown), suggests that the number of actual collisions arising from project traffic is likely low.” [bold added]

Mitigation of collision risks nonetheless remains important. As such the IISG made several recommendations in relation to mitigation measures, such as some changes in existing vessel speed limits and specified vessel lanes for crew change boats, which SEIC agreed to incorporate into its MMPP.

The highest residual collision risk is considered to be that associated with the platform crew change vessel that is routed between the two WGW feeding areas. These risks will increase over existing (Phase 1) operations during Phase 2 operations when the frequency of crew

vessel trips will increase. SEIC has agreed to undertake ongoing review with the WGWAP of methods by which collision risks associated with this vessel can be further reduced.

Non-Project related risks

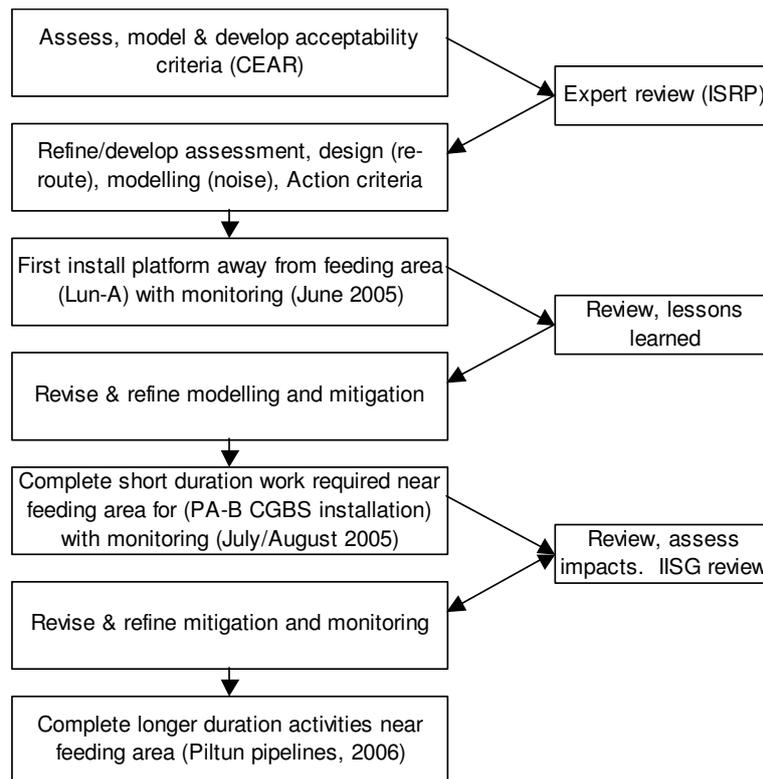
In addition to project-related risks, the WGW also faces other external pressures and, for example, three female gray whales are known to have been killed following entanglement in fishing nets in 2005 off Japan and a further female in January 2007. Such external pressures may potentially result in adverse population trends. It is important to appreciate that should the WGW population decline, it may be difficult to determine the nature of the primary causes. Given the range of pressures on the WGW population and its critically endangered status, the long-term and range-wide protection of the WGW is important to its future viability. In this regard, the commitment of SEIC to support the formation of the WGWAP has the potential to play an important role in the protection of this population.

At the first WGWAP meeting in November 2006, the Panel discussed issues surrounding satellite-monitored radio tagging, which could be effective in identifying many of the range-wide habitat issues (summer feeding areas, migration routes and winter breeding habitats). It is of credit to SEIC that it has already invested in this technology by co-funding (with Exxonmobil and the British Broadcasting Corporation) the tagging of eastern gray whales to demonstrate the efficacy of the technology⁵².

6.4.6 Summary and Discussion

AEA considers SEIC's overall **planned approach** to the management of WGW issues to be acceptable and, in particular, the involvement of independent scientists is considered to be both novel and best practice. The outline process to be followed by the Project for the offshore construction phase is shown schematically below; this planned approach is generally cautious in nature.

⁵² In one experiment, mother eastern gray whales were tagged up to 320 days from their Baja Mexico calving grounds to Chukchi feeding areas and then south to central California. In another, eastern gray whales were tagged off of Chukotka in the autumn of 2006, demonstrating that importation of the tags and tagging permits in Russia is possible.



However, difficulties in **implementation** of this approach have been identified, specifically in relation to having all relevant information available to reviewers and timely completion of all reviews and assessments prior to commencement of the different construction phases. In particular:

- There has been a lack of timely agreement on certain recommendations of the independent scientists and most particularly in relation to noise intervention criteria for implementation during 2005, 2006 and, potentially, 2007 construction activities.
- The WGWAP/IISG also expressed concerns that some of its other recommendations (*e.g.* commencement of monitoring activities and rapid analysis of WGW distribution data real time) were not fully implemented during the 2006 construction season.
- The WGWAP/IISG has expressed its disappointment over the timely development of certain key assessments, and in particular the MVA. The 2005 MVA was not produced in time for review by the IISG prior to the 2006 construction season, hence limiting the ability of the independent scientists to use the findings of this study to influence the construction and monitoring programmes for that year⁵³. Similarly, the 2006 MVA is not expected to be complete until early 2008. Although there are significant technical challenges involved in these assessments and other time delays inherent in their development (including incorporation of certain review comments), with appropriate levels of resource these assessments could have been completed within significantly shorter timeframes.

The environmental significance of the above issues is difficult to quantify and also needs to be placed in the context of the non-Project related range-wide threats to the population, which

⁵³ AEA notes that some of the latter delays in the production of the MVA resulted from recommendations made at Vancouver-II and were hence outside of the control of SEIC.

have been brought into focus by the known loss of four female whales in fishing nets over the last two years. Some indication of the potential for impact on the WGW during construction is provided by the MVA. The 2005 MVA does not identify any large-scale effects on WGW behaviour during the 2005 construction period (although some small-scale behavioural changes are identified). However, while these findings are broadly encouraging in suggesting that impacts are minimal (low), definitive conclusions on whether WGW were significantly impacted are difficult to derive due to limitations in both the available data and the assessment methodology. Furthermore, the potential impacts resulting from construction noise exposure in 2006 remain an area of uncertainty, as the 2006 MVA has not yet been undertaken and important aspects of noise data analysis (including assessment against CEAR criteria) have not yet been fully completed or reviewed by the WGWAP. As such, the possibility that impacts on the WGW are **high**, cannot be entirely ruled out.

In addition to the environmental significance, failure, for whatever reason, for the recommendations of the independent scientists to be agreed and implemented in a timely fashion also poses a risk to the overall WGWAP process, which must be seen by both participants and external observers to function transparently according to its terms of reference. The WGWAP has expressed concerns over the adequate implementation of several IISG/WGWAP recommendations and also the timely provision of key documents, assessments and information. These have represented technical non-compliances with the requirements of the HSESAP (Table 2.4, commitment 35), although further consideration of the 'reasonableness' of the main area of contention, namely noise intervention criteria, is required. SEIC needs to seek alignment with the WGWAP on these recommendations, although we note that it is too late for this to be undertaken in time to affect 2007 construction. Given the importance of the WGWAP process, we consider the risk to be potentially **high** (reputation/procedural).

The main issues in relation to WGW are summarised in Table 6-3 below.

Table 6-3 Summary of Key Issues Relating to WGW

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.8	A number of longer-term issues have been deferred for consideration by the WGWAP. The WGWAP was formed in early October 2006, with its inaugural meeting held in November 2006. Ongoing review is required of the operation of the WGWAP as well as the implementation of its recommendations by SEIC in order to ensure compliance with the HSESAP commitments. The importance of this issue reflects the critically endangered status of the WGW.	Environment Potentially H	OP 4.01 Annex C	Adequacy of Assessments & Plans	Closed
6.9	The suitability of the PA-B platform location has been questioned by some stakeholders due to its proximity to the primary WGW feeding ground. This issue was assessed by the Independent Reserves Consultant (IRC), who identified that the location for the platform is constrained by technical limitations in drilling reach and the presence of shallow gas, shallow faults and clay-filled channels. In the light of these constraints, the IRC concluded that <i>“the ...site selected for the PA-B platform is a technically sound location.”</i>	Environment Potentially H	OP 4.01 Annex C	Adequacy of Assessments & Plans	Closed

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.10	<p>Timely establishment of an effective WGWAP and implementation of the Panel’s recommendations by SEIC is an important aspect in SEIC’s management of WGW protection. Ongoing review is therefore required in order to ensure compliance with the HSESAP commitments. The priority issues for the 2006 construction activities were discussed by an interim independent panel (the IISG) in April 2006, following which recommendations were made by the scientists. SEIC’s formal response included a number of areas where it wished to further discuss the form and validity of the recommendations with the WGWAP, including lower noise threshold criteria and commencement of monitoring activities. However, as the IISG disbanded in April 2006 and the WGWAP was not formed until October 2006 (<i>i.e.</i> after the 2006 construction season had been completed) further discussion and agreement on these recommendations did not take place. In its inaugural meeting in November 2006 the WGWAP subsequently expressed concerns over the adequate implementation of certain IISG recommendations during the 2006 construction season and this represents a non-compliance with the HSESAP commitments (Table 2.4 Commitment 35). The specific issue of agreement on noise intervention criteria is discussed in Row 6.12 below.</p> <p>The adequate functioning of the WGWAP also requires that the Panel be provided with all relevant information and assessments in a timely manner. The Panel has expressed concerns that this has not always been the case.</p> <p>The environmental significance of this issue is potentially high due the status of the WGW; although the 2005 MVA (see below) did not identify actual significant impacts during 2005 construction, the analysis provided to date is not fully conclusive. In addition to the environmental significance, failure, for whatever reason, for the recommendations of the independent scientists to be agreed and implemented in a timely fashion also poses a risk to the overall WGWAP process.</p>	<p>Environment Potentially H (although linked to results of MVA – see below)</p>	<p>OP 4.01 Annex C</p>	<p>Adequacy of Assessments & Plans</p>	<p>Historical (2006)</p>
		<p>Reputation/ Procedural H</p>			<p>Unresolved (2007 onwards)</p>

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.11	<p>One of the priority issues raised in Vancouver-I, namely assessment of any impacts on WGW from the 2005 construction works (through a multivariate analysis or ‘MVA’), was not undertaken in time for review by the IISG at Vancouver-II, hence limiting the potential for the findings of the 2005 MVA study to be used by the scientists to influence the 2006 construction and monitoring programmes (although a draft of the 2005 MVA was available internally to SEIC shortly before commencement of 2006 construction). The 2005 MVA was completed in April 2007 in time for review at GWAP-2, and represents a laudable effort to assess whether impacts on WGW occurred during installation of the PA-B CGBS. The 2005 MVA does not identify any large-scale effects on WGW behaviour during the 2005 construction period, although some small-scale behavioural changes are identified; most particularly the study shows that WGW were observed further offshore when noise exposure was higher. While these findings are broadly encouraging, <i>definitive</i> conclusions on whether WGW were significantly impacted are difficult to derive due to:</p> <ul style="list-style-type: none"> • Limitations in the available data (e.g. limited visual observations due to low visibility conditions) and analysis methods (e.g. lack of consideration of confidence limits) • A lack of investigation into the biological significance of the small-scale behavioural changes identified • Difficulties in distinguishing between effects from construction activities and (SEIC and non-SEIC funded) research vessels (although some evidence is provided to indicate that the identified small-scale behavioural changes were in response to research vessels). <p>An MVA is also being undertaken on the monitoring data from the longer duration and more spatial extensive 2006 construction activities. The 2006 MVA will include a number of improvements in the analysis recommended by the GWAP and AEA, but it is not anticipated that this will be completed until early 2008. The pending status of the 2006 MVA currently represents an uncertainty in understanding whether SEIC’s offshore construction activities have resulted in any detectable or significant impact on the WGW.</p>	<p>Environment Potentially H (due to limited influence of MVA results on following years’ schedule and the residual uncertainties and taking into account the status of the WGW)</p> <p>Reputation/ Procedural H</p>	<p>OP 4.01 Annex C</p> <p>HSESAP Table 2.4</p>	<p>Adequacy of Assessments & Plans</p>	<p>Historical (2005 MVA)</p> <p>Pending (2006 MVA)</p>

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.12	<p>The installation of the CGBS for PA-B during 2005 was undertaken using noise-based intervention criteria that had not been fully agreed with the relevant independent scientists. The significance of this issue is reduced because as SEIC post-analysis indicates that the noise criteria defined in the CEAR were met. However, this is tempered by the findings of the IISG review of this issue, which noted several limitations in the post-analysis (see also discussion above on MVA of impacts during installation of the CGBS). The IISG has made recommendations for improvements to post-analysis of monitoring data that include a larger set of statistical properties and without this the significance of the impacts remains uncertain (see above issue).</p> <p>The issue of noise intervention criteria for 2006 construction was discussed by the IISG who recommended a set of five intervention criteria. SEIC accepted these criteria with the exception of the lower noise criteria, which it did not agree with, and hence SEIC implemented a reduced (and hence less restrictive) set of criteria during 2006 construction. The issue was further discussed at GWAP-1 and GWAP-2, but a consensus between SEIC and the Panel has still not been reached; the Panel still recommend adoption of the IISG criteria (with refinements), while SEIC used its reduced set of criteria during 2007 construction. Under the HSESAP, SEIC has committed to implement all “reasonable recommendations from the GWAP”. In this instance, assessment of whether SEIC’s rejection of the lower noise intervention criteria represents a non-compliance with the HSESAP commitment comes down to a determination of whether the GWAP’s proposed criteria are ‘reasonable’. However, the Panel is only in a position to fully judge the reasonableness of its recommendations if it is provided with all relevant information, including technical and logistical aspects which to date have not been presented by SEIC to the Panel. We therefore consider that SEIC needs to seek alignment with the GWAP on this issue through discussion of all biological, technical and logistical aspects.</p>	<p>Environment</p> <p>Potentially H</p> <p>Reputation/Procedural H</p>	<p>OP 4.01 Annex B & C</p>	<p>Adequacy of Assessments & Plans</p>	<p>Historical (2005 and 2006)</p> <p>Unresolved (2007 onwards)</p>
6.13	<p>In 2003 the seismic survey programme appeared to have been developed on the assumption that WGW feeding grounds are not present in the Lunskeye area. However, AEA notes that survey and other sightings in 2001, 2002 and 2003 indicate the possibility that WGW may indeed feed in the near vicinity of the Lunskeye licence area. It was our opinion that further assessment was required to identify the most suitable mitigation measures in the light of these sightings, particularly in relation to the designation of an effective surveillance within safety zones for WGW.</p> <p>The Piltun and Chaivo feeding grounds remain the only known main feeding areas. A dedicated EIA was produced and seismic surveys in Lunskeye were completed in 2003.</p>	<p>Environment H</p>	<p>OP 4.01</p>	<p>Adequacy of Assessments & Plans</p>	<p>Closed</p>

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.14	<p>The status of the development of the oil spill response plans (OSRP) are currently under development, and these are discussed in Section 10. The OSRP will need to be clearly defined in relation to WGW and will be reviewed by the WGWAP in this regard. The WGWAP will only receive the OSRPs following approval by the RF authorities. Concerns were raised by Panel members and NGO observers at WGWAP-2 that this may limit review input into improving plans. However, we have been informed by SEIC’s oil spill team that the plans can be amended after approval. A WGWAP taskforce will be developed to review the OSRP.</p>	<p>Environment Potentially H</p>	<p>IFC guideline offshore Oil and Gas</p>	<p>Adequacy of Assessments & Plans</p>	<p>Pending</p>
6.15	<p>SEIC has confirmed that it plans to undertake 4-D seismic testing of the Piltun-Ashtokhskoye field approximately every 3 years in order to analyse production induced changes to the reservoirs, commencing with a survey of the southern portion of the field in 2008.</p> <p>Noise generated by seismic surveys differs in nature from that typically generated by offshore Project construction activities and as such the nature of the required impact assessments, monitoring, and mitigation measures (including shutdown criteria) will need to differ from those reviewed to date by the WGWAP. SEIC will therefore produce an EIA for 2008 seismic survey and the WGWAP agreed to form a dedicated task force to both review and provide input into the development of the EIA and other associated aspects relating to future seismic surveys. This EIA will need to address the issue of cumulative impacts (from both other operators and coordination of SEIC’s surveys of northern and southern portions of the PA field), although it is recognised that the intentions of other offshore operators may not be fully known to SEIC. While SEIC has no direct control over seismic surveys undertaken by other operators in the region, the Company’s intention to develop its seismic programme with input from the WGWAP has the potential to create a standard of good practice.</p>	<p>Environment Potentially H</p>	<p>OP 4.01 Annex B & C</p>	<p>Adequacy of Assessments & Plans</p>	<p>Pending</p>

6.5 RIVER CROSSINGS

6.5.1 Background

The onshore pipeline RoW crosses over 1,000 watercourses. Many of these watercourses are small and environmentally are relatively non-sensitive streams or, in some cases, drainage dykes. Nearly 180 of these rivers have however been identified as environmentally sensitive due to the presence of salmon or protected freshwater species such as the Sakhalin taimen. The laying of pipelines across such rivers can cause direct physical disturbance at the crossing location and the release of sediment into the rivers. This can lead to:

- Raised turbidity and suspended sediment levels⁵⁴ in the river water, which can cause physiological harm (e.g. gill damage) and also deter fish from spawning.
- Subsequent deposition of sediments on the riverbed, for example potentially smothering gravel redds (spawning nests) used by developing salmonid eggs/alevins.

The main techniques used in the construction of pipelines across rivers include:

- **Horizontal Directional Drilling (HDD)** - here the pipeline is pulled through holes drilled under the river, to avoid any direct disturbance to the river. This option is expensive and has some technical constraints.
- **Dry cut techniques** - using dry cuts the watercourse is temporarily diverted, for example through flume pipes, while the trench for the oil/gas pipeline across the river is excavated and subsequently backfilled. This method minimises the amount of sediment released to the river and is widely regarded as best practice, although it is only applicable for smaller rivers where the volume of river flow is low enough to be controlled through the flume(s). Other dry cut techniques include a dam and pump method and a diversion channel method.
- **Wet cut construction methods** - where the pipeline trench is excavated across the river while the river water is still flowing. This technique tends to result in higher sediment release to the river. This method was preferred by the RF authorities over dry cuts on the Sakhalin project until SEIC monitoring data was used to demonstrate the effectiveness of flume pipe dry cuts to the authorities in early 2006.

Impacts can be further minimised by:

- **Back-to-back construction of both oil and gas pipelines through each river** - in order to reduce the timescale of the overall impact. It is particularly important to avoid multi-season construction activities in order to minimise the overall duration of impacts and recovery times and also to avoid multiple impacts on the same receptors (including both odd and even year populations for those salmon species with a two-year spawning cycle).
- **Timing of the construction activities** - to avoid the most sensitive environmental seasons e.g. spawning.

6.5.2 Evolution of the Issue

Since the ESHIA was produced, AEA and the Agency Lenders have undertaken a number of iterative reviews of SEIC's river crossing assessments and plans.

⁵⁴ Turbidity and suspended sediment levels are related but different concepts. Turbidity is a unit of measurement quantifying the degree to which light travelling through a water column is scattered by the suspended particles. The extent to which the light is scattered depends not only on the amount of suspended sediment but also on the characteristics of the sediments (size, shape *etc.*)

Key issues raised during these reviews included the adequacy of baseline characterisation, the classification of rivers and the impact assessment. Many of these concerns were tempered by the proposed use of HDD for the largest rivers and dry cut construction techniques for the sensitive rivers (denoted as Group 2 for moderately sensitive rivers and Group 3 for the most sensitive rivers⁵⁵).

In May 2005 it became apparent that the use of dry cut techniques might not be permitted by the local Russian fishing authority (SakhRybvod), and this was finally confirmed in September 2005. This, together with concerns about ongoing river construction works identified during field visits by Agency Lenders and AEA in late 2004 and early 2005, highlighted the necessity for amendment and improvement to SEIC's approach to river crossings.

With detailed input from AEA, Agency Lenders and specialists from the University of Birmingham (UoB), SEIC produced a much-revised final RCS in December 2005. The final RCS incorporated many improvements to:

- **Baseline characterisation.** Significant improvements were made to the characterisation of salmon spawning grounds and, in particular, site-specific surveys were undertaken subsequent to the original EIA. Nonetheless, there are still limitations in the baseline data relating to the spatial extent of the site-specific surveys and identification of wintering grounds for certain species (such as the Sakhalin taimen, which is red data book listed).

The RCS does, however, identify those rivers that may potentially support Sakhalin taimen. These have been classified as Group 3 rivers and are thus afforded a greater level of mitigation control. Furthermore, in recognition of the lack of information on the ecology of the Sakhalin taimen, SEIC has committed to supporting a research project in this respect and is currently engaging with the Wild Salmon Centre on its development⁵⁶. Progress with this research project should be regularly reviewed.

The hydrological information in the original EIA was also identified as being insufficient for the development of an effective river crossing strategy. The hydrological data within the RCS were thus expanded and assessment sheets were produced by SEIC for each individual Group 2 and Group 3 river, although the quality of this information is variable with only regional or generic (as opposed to river-specific) data for some parameters being available for many rivers.

- **River classification.** AEA had previously raised concerns regarding the adequacy of the river classification strategy in the original versions of the RCS (as utilised during initial river crossings) in terms of:

⁵⁵ Group 3 rivers are defined as those that meet one of the following criteria: (i) >10,000m² of spawning habitat, (ii) spawning habitat at the crossing location and >30% downstream of the crossing, (iii) Sakhalin taimen present in the river and/or potential spawning grounds present at the crossing location, (iv) high biodiversity value. Group 2 rivers are defined as those with (i) <10,000m² of spawning habitat and (ii) medium-high biodiversity value. Group 1 rivers are defined having (i) no salmon spawning and (ii) low-medium biodiversity value.

⁵⁶ The project, managed by SEIC, is expected to involve Russian, Japanese and other international scientists, and aims to increase knowledge of the biology and ecology of Sakhalin taimen through peer review of reports and articles and field surveys. The information gained from this study will be used to identify measures that could be implemented to ensure that future Sakhalin II project activities do not adversely affect this species and also identify potential conservation management measures that could be adopted by all relevant parties to ensure that populations and habitats are sustained. The work is expected to last until Q2 2007, with fieldwork being undertaken between Q2 2006 and Q1 2007.

- classification criteria (most specifically the lack of consideration of non-commercial species);
- the use of regional (as opposed to river-specific) data;
- the absence of a river basin approach when assigning river classes.

The revised classification criteria in the finalised RCS include consideration of non-commercial species and, for example, any river with either known or potential spawning grounds for taimen is assigned to the highest sensitivity classification (*i.e.* Group 3). The RCS also incorporates a river basin approach, such that any Group 1 tributary that flows into a Group 2 or 3 river, and which has been assessed as having a high-medium susceptibility for disturbance with respect to the receiving rivers, will be constructed as if it were a Group 2 or Group 3 river. (Implementation of the river-basin analysis was not completed until mid-2006. 55 tributaries were identified for ‘upgrade’ to sensitive status, but all of these tributaries had already been crossed by at least one pipeline while they were still treated as Group 1 rivers. This issue is further discussed later in this section.)

- **Assessment of impacts.** Assessment of river crossing impacts in the EIA and earlier versions of the RCS had not adequately addressed all important impact types. In particular, the effects of sedimentation and smothering of the riverbed had not been considered; this is most important for winter construction when eggs and alevins of certain salmonid species will be developing in redds and over-wintering pools. This deficiency was addressed in the revised RCS.

Although there are limitations in the detailed sediment transport and deposition modelling presented in the finalised RCS, these are largely alleviated by (i) the utilisation of a precautionary assessment of the upper limit of spawning habitat loss (based on the proportion of spawning grounds that are thought to be located downstream of the crossing points, which is estimated by SEIC to be 23%⁵⁷) and (ii) commitments to adaptive management in the RCS, which states:

“In the light of the uncertainties in predicting potential zones of effect, the river crossing strategy places an important emphasis on monitoring in assessing the actual extent of impact. In particular, monitoring undertaken during the construction of the earlier river crossing this winter will be used to verify the initial impact assessments/classifications (e.g. susceptibility to disturbance classification) of later (and more sensitive) rivers in an adaptive mitigation management process.”

- **Construction and mitigation methods.** Key commitments were made in the revised RCS in relation to construction methods, timing and mitigation. In particular the RCS commits to:
 - HDD of seven of the most sensitive river crossings. Using spawning habitat data provided by SEIC, AEA estimates that these seven rivers represent well over one third of the total salmon spawning grounds contained in all Group 2 and Group 3 rivers to be crossed by the pipelines.
 - The use of “water management controls” (*i.e.* dry cuts with flume pipes), where feasible, for all Group 2 and Group 3 rivers. Exceptions included those rivers to be crossed using HDD and other rivers where flume pipes were not technically

⁵⁷ Based on the river data provided by SEIC, AEA finds these to be a reasonable estimate.

- feasible. (Prior to the finalisation of the RCS SEIC did not require the use of dry cut techniques in its construction plans.)
- Group 3 rivers with a high or medium susceptibility to disturbance, or where water management control is not possible, will be constructed in mid-winter (nominally, January-February).
 - All other Group 2 and Group 3 rivers will be constructed during the December-April period. Such rivers may also possibly be constructed during periods of low flow in October-November provided it can be demonstrated for each river concerned that this time period is outside the salmon spawning season (for species relevant to the river).
 - Plan activities such that the period between the installation of each pipeline crossing is minimised and that, in any event, the two river crossings will be undertaken in the same winter season. (SakhRybvod requires ‘simultaneous’ crossing of both the oil and gas pipelines⁵⁸. Although actual simultaneous crossing of rivers is unrealistic on technical grounds, the intent of the requirement is to minimise the duration of impact and thus it is reasonable to assume crossings in individual rivers should be performed as near to back-to-back as possible.)
 - Minimise construction times within watercourses⁵⁹, and implement temporary and/or permanent reinstatement measures promptly.
- **Monitoring and observation.** The revised RCS outlines the environmental monitoring required prior to construction, during construction and post construction. A number of HSESAP commitments relate to monitoring during construction, and these include the requirement for high frequency turbidity monitoring at sample locations 50m upstream and downstream to 500m of the crossing location (and further downstream if results indicate its necessity). In addition, SEIC committed to independent observation of pipeline construction in Group 2 and Group 3 rivers. (Golders and Associates undertook this for both the 2005/2006 and 2006/07 winter construction periods and the Golders’ checklist reports are available on the SEIC website⁶⁰.)

Figure 6-4 provides a summary timeline of the production of key Project impact assessments and plans related to the onshore pipeline construction, against the construction schedule to date. It can be seen from this figure that 64 Group 2 and 3 rivers were crossed by at least one pipeline prior to the finalisation of the RCS, although drafts of the RCS were in place earlier.

⁵⁸ Approval of the Sakhalin-2 Project pipelines water bodies crossing design documentation (Nogliki and Tymovsk districts), FGU SakhRybvod, Ref. 17-4540, dated 11/10/2004.

⁵⁹ SEIC has committed under HSESAP Table 2.5 Commitments 23 and 24 to FERC standards whereby crossings of minor rivers (width <3m) are undertaken in less than 24 hours and other rivers (>3m width) in less than 48 hours.

⁶⁰ The Golders’ river crossings checklist reports are available at www.sakhalinenergy.com/en/project.asp?p=river_crossing_performance

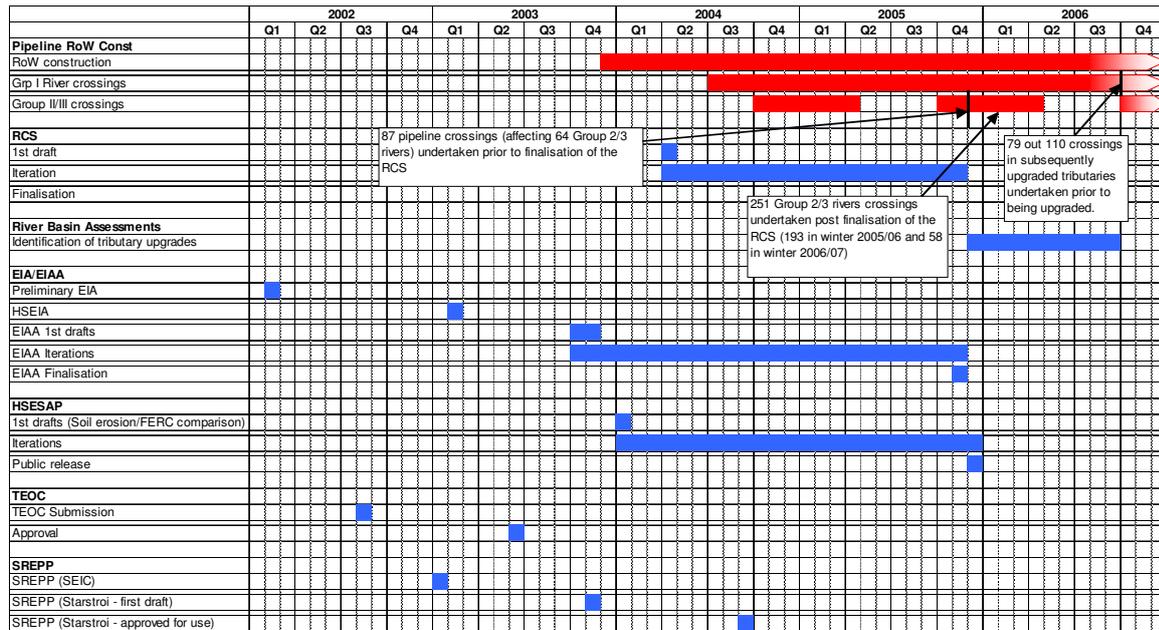


Figure 6-4 Timeline of Onshore Pipeline Impact Assessments and Plans Against Construction Schedule

6.5.3 Status and Compliance

This section provides an overview of the Project status and discusses the level of compliance with the RCS and HSESAP of river crossings throughout the winter construction seasons. AEA provided continuous on island monitoring personnel on behalf of the Agency Lenders from December 2005.

Materiality assessments are best made cumulatively (as opposed to consideration of the materiality of individual non-compliances). The materiality of the non-compliances during river crossings is therefore discussed in Section 6.5.4.

6.5.3.1 Crossings prior to finalisation of the River Crossing Strategy

The RCS was finalised in December 2005, by which time 64 of the sensitive Group 2 and Group 3 rivers had already been crossed by at least one pipeline⁶¹. Although earlier versions of the strategy were in place (see Figure 6-4) at the time of these crossings these strategies lacked important elements that were included in the final strategy and in particular:

- During the initial stages of river crossing construction (e.g. winter 2004/05) conformance with the requirement for back-to-back installation of the oil and gas pipeline was low (41 of the Group 2/3 rivers crossed prior to December 2005 had only had one pipeline installed). This issue was formally raised with SEIC by SakhRybvod⁶².
- Several rivers crossed in the winter of 2004/05 that, under the final RCS, should have been dry cut were in fact crossed using wet cuts. The extent to which such rivers could have been dry cut in reality is a moot point as the RF authorities made their objection to dry cut techniques later in 2005 (and if SEIC had first attempted dry cuts in the winter of 2004/05,

⁶¹ This is a total of 87 individual pipeline crossings of which 64 were oil lines and 23 were gas pipelines.

⁶² FGU SakhRybvod Letter to SEIC and Starstroi, Ref. 17-1848, dated 19/4/2005.

rather than the following winter, agreement on the use of flume with the authorities may have been achieved earlier).

- Insufficient river monitoring was undertaken during winter 2004/2005 river crossings and this reduces SEIC's ability to assess the level of impact incurred during the earlier river crossings.

Significant areas of substandard construction practice were also identified by AEA during field trips undertaken between October 2004 and September 2005, including practices that did not meet international good practice (*e.g.* FERC) or the standards that were subsequently incorporated into the HSESAP. These include issues related to bank reinstatement, alteration of river channels and lack of environmental monitoring during construction.

The risk posed by the legacy of these historical issues is difficult to gauge at this time, primarily due to inadequacies in the environmental monitoring undertaken both during and post construction (for example limited suspended sediment monitoring during construction activities only appears to have been undertaken for 12 out of the 62 Group 2/3 river crossings undertaken during the winter of 2004/2005). However, the majority (about 69%) of the rivers crossed prior to the finalisation of the RCS were the less sensitive Group 2 rivers. The significance of the overall legacy is discussed in Section 6.5.4.

6.5.3.2 Upgraded Tributaries

Following finalisation of the RCS, SEIC undertook a river basin assessment in order to identify any Group 1 rivers (*i.e.* rivers of low ecological sensitivity in themselves) in which sediments released during pipeline construction may have led to impacts on more sensitive receiving rivers downstream. This assessment identified 55 such tributaries and, under the RCS, these tributaries were to be treated as being of the same sensitivity as the Group 2 or 3 rivers into which they flow. However, this re-assessment of tributaries was not completed until mid-2006, by which time all 55 'upgraded' tributaries had already been crossed by at least one pipeline. These tributaries were still being crossed as Group 1 rivers, and hence afforded a lower level of environmental protection, as late as September 2006⁶³. A total of 28 upgraded tributary crossings (affecting 24 streams) were constructed outside of winter (winter being defined in the RCS as between October to April) before the upgrading came into effect, thus leading to the potential to impact spawning salmon in the receiving sensitive rivers (which include major salmon spawning rivers and rivers that support taimen, such as the Nabil and Tym rivers).

6.5.3.3 Summary of crossings undertaken prior to winter 2006/07

Based on the data available on the SEIC website⁶⁴ and tributary data provided during November 2006, progress with the Group 2/3 river and tributary crossings prior to winter 2006/07 is summarised below (this table excludes the seven HDD river crossings).

⁶³ Four crossings of upgraded tributaries were undertaken in September 2006 while they were still treated as Group 1 rivers

⁶⁴ Data on the SEIC website as of 02/08/06

Section	Both crossings complete			Only one crossing complete			Not crossed by either pipeline		
	Grp 2/3	Tribs	Total	Grp 2/3	Tribs	Total	Grp 2/3	Tribs	Total
1A	7	0	7	0	0	0	0	0	0
1B	14	0	14	0	0	0	0	0	0
1C	12	8	20	0	9	9	1	0	1
2A	12	5	17	0	3	0	1	0	1
2B	12	0	12	11	4	15	1	0	1
3A	10	5	15	4	7	11	1	0	1
3B	8	1	9	0	3	3	14	0	14
3C	7	0	7	1	3	4	1	0	1
4	50	5	55	0	2	2	2	0	2
Total	132	24	156	16	31	47	21	0	21

Of particular interest is the use of dry cut crossings. Dry cut (e.g. flume) crossing techniques are seen as international best practice when constructing pipelines across rivers, and are an important aspect of the revised RCS (where it is referred to as “water management control”). Based on data available to AEA we understand that dry crossing techniques have been utilised at approximately 20%⁶⁵ of the 280 individual pipeline crossings undertaken prior to winter 2006/07 in Group 2 and Group 3 rivers.

During December 2005 flume crossings were undertaken at a number of rivers to generally good effect. However, in January 2006 the local RF authorities determined that the use of flumes was outside the permit conditions and fines were imposed in a number of cases where such construction methods had been employed.

Following discussions between SEIC and Sakhryvod (the local fisheries authority) it was determined, in late January 2006, that flumes could only be used for rivers of width less than 1.5m. Only three of the sensitive Group 2/3 rivers fell within this criterion and as a consequence wet cut techniques were used for the vast majority of rivers crossed during the remainder of the 2006 winter period. The significance of this is discussed in Section 6.5.4.

SEIC continued its discussions with the authorities and, in April 2006, gained approval for flume crossings at an additional 39 Group 2/3 rivers. We understand that the comparison of monitoring data for dry versus wet cut crossings previously undertaken played an influential part in gaining approval for dry cut crossings (see below). This agreement was reached too late to influence the construction in many rivers in winter 2005/06. However, this was an important step to minimising the impacts during construction works in winter 2006/07 where 17 of the remaining 37 Group 2/3 rivers that require further pipeline crossings were approved for flume crossings in winter 2006/07 (see also Section 6.5.3.4).

6.5.3.4 Summary of crossings undertaken in winter 2006/07

All remaining sensitive river crossings required for the onshore pipelines construction project were completed during winter 2006/07. The scope of work for the river crossings schedule in winter 2006/07 comprised 88 individual pipeline crossings affecting 68 rivers as follows.

⁶⁵ These are mainly dry cuts effected with flumes, but a number of other methods have been utilised at a small number of crossings, including dam and pump, augering and diversion.

River Class	1 pipeline to be installed	2 pipelines to be installed	Total Rivers	Total Crossings
Group 3	10	7	17	24
Group 2	6	14	20	34
Tributary	31*	0	31*	30
Total	47	21	68	88

* Stream at KP426.1 was crossed in November 2006 but not considered by the Section to be an upgraded stream at that time.

The above crossings were completed between September 2006 and mid-April 2007. This progress was achieved by SEIC despite the suspension of a number of water use licenses by the Amur Water Basin Committee for a 3-week period during December 2006 (5th December to 28th December) following identification of license violations (see Appendix 1).

Although all the group 2 and 3 river crossings were installed by the end of winter 2006/07, the following in-stream works are still to be undertaken:

- Permanent stabilisation of riverbanks, including installation of hard reinstatement engineering works (e.g. Reno mattresses and gabion walls) for many of the sensitive rivers. This is discussed further below.
- Between the two crossings of the R. Pulka in Section 3B, the stream meanders parallel to the RoW, often encroaching into the RoW on the oil pipeline side. The pipelines have not yet been installed in this stretch of the RoW (except for the river crossings themselves). In order to install the oil pipeline the R. Pulka will need to be permanently diverted to the edge of the RoW over a length of some 1000m. It is currently planned to undertake these works in summer 2007. This is discussed further below.

A key issue identified by AEA in relation to previous construction of pipeline crossings in sensitive rivers was the limited utilisation of dry crossing methods. As described in Section 6.5.3.3, in April 2006, SEIC gained approval for the use of flume crossings in certain rivers, including 17 of the group 2/3 rivers to be crossed in winter 2006/07. During the latter half of the winter 2006/07 construction period SEIC and its contractor Starstroi, in agreement with local inspectors, also implemented a different form of dry crossing, namely a modified form of dam and pump, at a number of rivers. AEA considers the modified dam and pump construction technique to be a practical and effective dry cut technique that affords significantly greater environmental protection than wet cuts and, furthermore, has some advantages over flume-based crossings.

The river crossing construction methods utilised in winter 2006/07 are summarised in the table below.

Construction Method		Number of Crossings	Percent of winter 2006/07 crossings
Unknown		3	3.4%
Wet		16 *	18.2%
Dry	No flow in river	11	12.5%
	Dam and pump	39 **	44.3%
	Flume	19	21.6%
	Sub-Total Dry	69	78.4%

* Includes Tumannaya River (gas) and Vostochnaya River (gas), where flumed construction was unsuccessful and the river was ultimately crossed as a wet cut

** Includes Veba River (gas), which was crossed with a combination of pumps and flume

It can be seen that in total almost 80% of all sensitive river crossings performed in winter 2006/07 were effected as dry cuts. Furthermore, after mid-January 2007, when the modified dam and pump technique was first implemented, the proportion of crossings utilising dry cut methods had increased to approximately 90% (dry cuts were not technically feasible at all the crossings undertaken after this time due to size of certain rivers).

The cumulative proportion of all Group 2/3 river crossings undertaken using dry cuts since commencement of construction (*i.e.* since winter 2004/05 through to the end of winter 2006/07) is almost 30%⁶⁶. Flume pipe crossing methods are most technically suitable for narrow rivers with flow rates less than about 4m³/s⁶⁷. The flows of rivers on Sakhalin vary dramatically (data from SEIC suggest that in some rivers the peak flow rates are over 50 times greater than the annual average flows) and hence the total number of rivers that may be deemed technically suitable for flume crossings is dependent on scheduling of crossings during low flows. We estimate from a purely technical perspective that the majority of the Group 2/3 rivers could have been crossed using flumes or dam & pump methods. Nonetheless, the increase in dry cut crossings in winter 2006/07 represented a good improvement in construction practice.

6.5.3.5 Standard of construction in 2005/2006

Through review of our Continuous Monitors' reports and also the Independent Observers' (Golders) reports, AEA found that overall river construction practices during the 2005/2006 winter period were much improved when compared to earlier river construction works. The Golders' compliance checklists are available on the SEIC website and therefore available to all stakeholders. Key improvements included better timing of river crossings and an improvement in general construction methods, especially where flume pipes had been used to affect dry cut crossings. Several areas of non-compliance with HSESAP and RCS commitments continued during winter 2005/06 construction. The individual non-compliances are of varying materiality, although many are minor in nature. These are summarised in the table below, followed by further commentary on the main aspects.

⁶⁶ This figure is based on Group 2/3 rivers only and therefore excludes upgraded tributaries.

⁶⁷ Pipeline Stream Crossing Installations: Best Management Practices, Wild Salmon Centre White Paper, 2002

Aspect	Issue	HSESAP Ref	Resolution/Status
Monitoring	Lack of equipment (turbidity meters)	Annex C RCS	Resolved end of January 2006
	Frequency/adequacy of monitoring	Pt 2, Table 2.5, row 141	Ongoing in winter 2005/06
	Monitors not present during construction	Pt 2, Table 2.5, row 141 RCS	Resolved end of January 2006
Sediment Control	Lack of silt fencing on bridges	Pt 2, Table 2.5, row 26	Ongoing in winter 2005/06
	Silt fencing along riverbank not replaced	Pt 2, Table 2.5, row 69, 74, 76	Ongoing in winter 2005/06
Spoil Management	Containment too near rivers	Pt 2, Table 2.5, row 73	Ongoing in winter 2005/06
	Containment off RoW	Pt 2, Table 2.5, row 51, 70	Ongoing in winter 2005/06
	No spoil/topsoil segregation	Pt 2, Table 2.5, row 51, 70	Some improvement noted but further efforts required
Construction Method	Extended trenching operations	RCS	Ongoing in winter 2005/06
	Long strings at crossing	RCS, Pt 2, Table 2.5, row 17, 36	Ongoing in winter 2005/06
	Poor excavator work	RCS, Pt 2, Table 2.5, row 17, 36	Ongoing in winter 2005/06
	River drying out (below crossing point)	Pt 2, Table 2.5, row 72d	Ongoing in winter 2005/06
	Construction time exceeded specified duration	Pt 2, Table 2.5, row 23, 24	Ongoing in winter 2005/06
	Construction time was not minimised	Pt 2, Table 2.5, row 17	Ongoing in winter 2005/06
River crossing timing	Crossings outside 'optimal timing'	RCS Table 5-4	Ongoing in winter 2005/06
	Non-consecutive crossings	RCS Pt 2, Table 2.5, row 18	Significant improvement but delays of > 2 weeks still identified
Restoration	Poor shaping beyond immediate bank	Pt 2, Table 2.5, row 74	Ongoing in winter 2005/06
	Bank/bed restoration outside of 48hr period	Pt 2, Table 2.5, row 120	Improvements identified
	Poor gravel/riprap	Pt 2, Table 2.5, row 76	Some improvement but quality of bed gravels remain a concern

- **Monitoring**

Environmental monitoring plays a vital role in implementing the RCS and is particularly important in the adaptive management approach committed to in the RCS in the absence of detailed predictive impact modelling. The HSESAP Table 2.5 Commitment 141 requires "high frequency" turbidity monitoring to be undertaken during river crossing construction. However, turbidity meters were not available on island for use until the end of January 2006 (the requirement for turbidity monitoring was only formalised in the final RCS in December 2005 after which turbidity meters had to be ordered and brought to Sakhalin). In total the Golders' observers identified a lack of adequate monitoring equipment at 83 crossings (46% of crossings witnessed) during the winter 2005/06 season. This situation was effectively resolved when the monitoring equipment arrived on island and training in its use undertaken, and only four of these instances occurred after mid-February 2006. Even when turbidity meters became available, many instances were identified during AEA site visits where an insufficient number of turbidity readings were taken from each sample point during construction (*e.g.* only once or twice). This limited monitoring is in contradiction to Commitment 141 (HSESAP Part 2, Table 2.5 row 141), and peak sediment

concentrations may not have been recorded. This is particularly important for rivers with tidal influences for which predictions of travel time are especially difficult.

The limitations of the monitoring, together with delays in obtaining Total Suspended Solid (TSS) results (associated with slow laboratory turnaround), have significantly hindered the use of such monitoring in the development of the adaptive management processes required by the RCS, particularly during the early winter 2005/06 winter crossings. However the presentation of monitoring data played an important part in demonstrating the benefits of flume pipe construction techniques when SEIC finally gained approval for such methods from the RF authorities (see above).

- **Sediment Control**

Examples were identified in winter 2005/06 where sediment controls around rivers did not meet HSESAP commitments and were insufficient to prevent sediment laden run-off entering rivers (some form of inadequacy in erosion control within the WPZ was identified in 27% of the Golders' observation reports). Key compliance issues included inadequate maintenance or a lack of adequate sediment controls on RoW bridges and inadequate silt fencing adjacent to rivers post-construction.

- **Spoil Management**

Concerns were identified regarding the management of spoil excavated during in-river trenching (non-compliances were identified by the Golders observers in approximately one third of all crossings reports available on the SEIC website). These relate to:

- Location of the spoil piles either too close to the river or else outside of the RoW. Examples were highlighted, most prevalently in sections 3B and 4, where subsoil/spoil has been stored outside of the RoW, potentially damaging the topsoil it covers (although in winter surface covering of snow/ice may provide some protection). However, good practice was identified in section 1A/B.
- No or insufficient spoil/subsoil and topsoil/bed gravel segregation during riverbed trenching in most sections.

- **Construction Methods**

Trenching operations at around half of the 16 Group 2/3 river crossing operations observed by the AEA continuous monitors were deemed to take longer than necessary and hence increasing the time over which the river is exposed to construction-related impacts (reasons for these delays were varied and examples are identified below). In 30 instances (17% of crossings) the Golders observers reported that the pipeline installation took longer than the specified duration required under Commitments 23 and 24 of HSESAP Table 2.5. Further breakdown of these instances based on the reports provided on the SEIC website is provided below.

Duration of exceedence of allocated crossing time*	Number of crossings
Up to 6 hours	5 #
6-12 hours	6
12-24 hours	1
Greater than 24 hours	7
Unknown (not specified or no report available)	11

* Allocated crossing time assumed from river width quoted on SEIC website (<3 m = 24 hours, >3 m = 48 hours)

Includes the Zheleznyak River, which took >2 hours longer than the assumed 48 hours allocated.

Observed reasons for the trenches being open for longer than specified during winter 2005/06 included:

- Long pipe strings (in relation to the floodplain width), resulting in lowering-in problems and backfill delay.
- Pipe string not sufficiently weighted.
- Insufficient trench depth such that further excavation work was needed after partial lowering-in of the pipe to increase burial depth.
- Pipe string not ready to be lowered in.
- Unexpected bedrock being encountered.

In the case of wet cut trenching techniques for low flow rivers, the extended duration of open trenches can result in the drying out of the river downstream if the upstream flow of water is insufficient to fill the excavated trench. This situation is exacerbated if the trench is long (which was witnessed in several locations). Reports available from the Independent Observers show that 24 incidents (affecting 7 Group 3 rivers and 14 Group 2 rivers) of channel dewatering were reported⁶⁸ in winter 2005/06, predominantly in sections 2B and 4 during March 2006. These incidents are detailed below.

⁶⁸ The dewatering scenarios were reported as Environmental Management Incidents to SEIC.

Section	River	Spawning Habitat (m ²)**		Taimen Habitat	Ecological Sensitivity	Approximate duration of dewatering incident*	Distance over which river dried out
		Total	Down-stream				
1B	Spokoiny Stream	690	0	Y	3	2 hours (O)	Unknown
1C	Berezovka River	2400	2400	N	2	11½ hours (G)	Unknown
2B	Borisovka River	27000	9990	N	3	8 hours (O) 9 hours (G)	Unknown 10m
2B	Mal. Gnilusha	24000	0	N	2	29 hours (O)	Unknown
2B	Alla River	3700	1702	N	2	7½ hours (O)	Unknown
2B	Shumniy Stream	2500	2000	Y	3	9 hours (G)	Unknown
2B	Barachniy Stream	500	150	N	2	>5 days (O)	150m****
2B	El'naya	83200	57408	N	3	1 hour	Unknown
2B	Porochnaya River	3000	2500	N	2	25 hours (G)	Unknown
4	Slavnaya River	720	520	N	2	5 hours (G)	Unknown
4	Primorskaya River	1180	330	N	2	7 hours (G)	Unknown
4	Nizh.Kamyshovka River	250	175	N	2	5 hours (O) 6 hours (G)	Unknown Unknown
4	Mal. Podlesnaya River	2000	1400	N	2	4½ hours (G)	1.6km (estimated)
4	Lebed' River	300	210	N	2	8 hours (G)	Unknown
4	Sennaya River	500	100	N	2	5½ hours (G)	Unknown
4	Berezovka River	500	0	N	2	4 hours (G)	Unknown
4	Lebyazhiya River***	48000	4800	N	2	6 hours & "several hours" (O) 25 hours (G)	Unknown (both) Unknown
4	Imanovka River	1000	500	N	2	4½ hours (O) 6½ hours (G)	Unknown
4	Mitsulevka River	14600	4964	N	3	4 hours (G)	Unknown
	Total	239340	99329				

* O = oil pipeline, G = gas pipeline

** Data based on SEIC river fish classification assessments

*** Two separate dewatering incidents are reported during the installation of the oil pipeline

**** River was blocked by ice, the river flowed around the block by forming a channel which re-entered the main channel 150m downstream

Many of the above rivers were dewatered for significant distances downstream (although in the majority of cases the actual extent of dewatering is not known) and for prolonged time periods. Examples include the Barachniy Stream (which was disturbed to 150m), and the Sennaya River (which was dewatered further than 500m downstream). Typically the problems of dewatering could have been avoided if flume crossings had been utilised (at the time of most of the above crossings the use of flume crossings was not allowed by the authorities). Where flume crossings were not allowed under permit conditions, greater consideration should have been given to identifying the most appropriate flow conditions under which to construct the pipeline crossings.

Environmental monitoring of these dewatered rivers will be essential to better understand the impacts of these dewatering events. However, the worst-case potential impacts can be

put into context by consideration of the estimated total downstream spawning areas in the affected rivers. Based on data available from SEIC, we estimate that the total downstream spawning habitat in all Group 2/3 rivers crossed by the pipeline RoW (including those rivers which are crossed by HDD) is approximately 12 million m². The downstream spawning habitat areas in the rivers affected by drying out incidents during winter 2005/06 are therefore estimated to represent less than 1% of the overall total in rivers crossed by the pipeline. Only a fraction of these habitats will have been affected by river drying events as the extent of drying out is limited by a number of factors including the finite duration over which the rivers flows were interrupted and the likelihood that ground and surface water recharges will typically be present downstream in the rivers.

Two of the affected rivers, Spokoiny and Shuminy, support taimen. Additional information, such as the length of the dewatered river sections, is not available and without this it is not possible to determine whether taimen may have been affected. Although flow rates at the time of the crossings were likely to have been relatively low, the possibility of the presence of juvenile taimen within the reach of these rivers cannot be entirely ruled out.

- **River Crossing Timing (consecutive crossings)**

A key aspect of the revised RCS is the commitment to minimise the time between the construction of oil and gas pipelines in individual rivers. A breakdown of the time periods between the construction of the two pipelines in Group 2/3 rivers and upgraded tributaries prior to the winter 2006/07 construction season is provided below.

Days between crossings	Number of Rivers	
	Group 2/3	Tributaries
0-14	50	0
15-28	16	0
29-60	11	1
61-150	20	3
151-200	1	0
201+	34	20
Only one crossing prior to winter 2006/07	16	31
Both crossings due winter 2006/07	21	0

As noted previously, SakhRybvod formally raised this issue with SEIC in April 2005. Overall, the level of near back-to-back construction of both pipelines in Group 2/3 rivers improved markedly following the finalisation of the RCS in December 2005 (in over 50% of cases between December 2005 and April 2006 inclusive the oil and gas pipelines were installed in Group 2/3 rivers within 14 days of one-another). At the end of the 2005/06 winter period, 16 Group 2/3 rivers had been crossed by just one pipeline, with the second crossing not undertaken until winter 2006/07. These rivers were thus subject to crossing impacts in two successive years, which contravenes the commitment 18 in HSESAP Table 2.5; 13 of these Group 2/3 rivers fall under the RCS classification of rivers for which consecutive crossings is “critical”⁶⁹. 27 of the Group 2/3 rivers crossed by both pipelines

⁶⁹ Ten of these are Group III rivers of high or medium susceptibility to disturbance and three are Group II rivers of high susceptibility to disturbance.

during the 2005/06 winter period had delays of more than two weeks between the installation of the two pipelines.

- **River Crossing Timing (optimal timing)**

Between the issue of the final RCS and the end of the winter 2005/06 construction season, 40 crossings in Group 3 rivers with high or medium susceptibility to disturbance were crossed outside of the 'optimal timing' period of mid-winter, nominally January-February. In reality the flow regimes and ecological sensitivities in March are generally similar to those encountered in January/February, hence often reducing the significance of this issue. Of more significance in terms of increased risk of potential environmental impact are those rivers crossed in April, and most particularly late April, as (i) hydrographs made available by SEIC show that in most portions of the island spring high flows initiate around mid-April and (ii) this period starts to abut the sensitive salmon & taimen seasons⁷⁰. In total seven Group 3H/M rivers were crossed in the second half of April in 2005 and 2006, including 3 rivers that support or potentially support taimen.

The construction methods utilised during non-mid-winter crossings is also important. 36 of the 40 crossings were undertaken using wet cut construction methods. These include four rivers that suffered downstream dewatering when crossed by wet cut methods in March 2006.

The final RCS requires that all sensitive rivers be crossed between October and April. Prior to the finalisation of the RCS, 17 Group 2/3 rivers were crossed outside of this winter period (this includes one river that potentially supports taimen), although some of these rivers were classed as Group 1 rivers at the time they were crossed and were only subsequently upgraded to Group 2 or 3 upon implementation of the finalised RCS.

- **Restoration**

Temporary restoration of riverbanks improved during winter 2005/06. Good efforts were made to reshape the riverbanks, although AEA's continuous monitors identified the need for further shaping work at approximately 30% of the 62 Group 2/3 river crossing sites visited after pipeline installation during winter 2005/06.

During site visits by AEA in the thaw period of May 2006, bank erosion was identified at several locations where the thaw had revealed the restored riverbanks had been inadequately stabilised. Typical causes of this instability were inadequate compaction of the banks, inadequate riprap protection and, in some instances, re-contouring of riverbanks on top of ice that collapsed as the underlying ice melted. Problems with bank erosion during the thaw were seen to be most significant where rivers had been crossed at meander points, contrary to commitment 72 of HSESAP Table 2.5, and this is most evident at braided streams. Concerns were also identified with the quality of gravels used to restore the riverbed, with blast gravels being used in many rivers rather than natural ground gravels as required under the HSESAP.

During the July 2006 site visit the status of the riverbanks was found to be much improved, both as a result of natural river effects and maintenance by SEIC in line with HSESAP requirements. Identified improvements included:

⁷⁰ Fry emergence for many salmon species occurs in April and taimen spawning runs from late April until early June.

- provision of larger riprap on outer river bends to reduce erosion;
- bio-remediation in the form of both seeding and willow staking;
- well-installed sediment control at riverbanks and bridges;
- greater presence of natural gravels (as opposed to imported blast gravel) in the previously disturbed portions of the riverbeds.

6.5.3.6 Standard of construction in 2006/2007

This section describes the level of compliance with relevant standards and HSESAP commitments during winter 2006/07 sensitive river crossings.

- **Monitoring**

Commitments relating to monitoring and oversight were generally met during the winter 2006/07 river crossings. A significant exception was the R. Kissa, which was crossed by the subcontractor without adherence to the proper communications and approval channels with either the main onshore pipelines contractor, Starstroi (STS) or SEIC. This meant that the river was crossed against STS's written instruction while the WUL was suspended and without the required oversight by SEIC and Golders, nor the river monitoring by Averina. However, this total absence of appropriate oversight appears to have been an isolated incident. A small number of other examples have been identified by AEA's continuous monitors where not all oversight personnel were present throughout the *entire* construction activities (e.g. crossings at the R. Gar and R. Krinka). However, such partial non-compliances are of lower significance in relation to appropriate environmental protection.

- **Erosion Control Around Rivers (Surface Runoff)**

Sediment control from surface run-off around rivers was generally adequate in winter 2006/07. Risks associated with surface runoff from the RoW are minimal during the winter due to the frozen conditions. However, it is important that the sediment controls are reinstated prior to the spring thaw. Visual inspections undertaken by the continuous monitors and during an AEA/Agency Lender field trip in May 2007 found that application of silt fences around rivers was generally good. The main exceptions to this were:

- Silt fencing had not been replaced at a number of group 2/3 rivers immediately post construction (8 out of 29 inspections of river crossings in winter 2006/07 by AEA's monitors identified this as an issue) or else where permanent bank stabilisation measures (for example Reno mattresses) had recently been installed. This later issue was particularly prevalent in Section 4 during the May 2007 site visit, reflecting the fact that this section had made most progress on installation of permanent riverbank engineering structures. We have been informed that a dedicated team is tasked with re-installing silt fences at these rivers.
- Temporary erosion (and other temporary restoration) measures were not installed at a number of minor (*i.e.* non-upgraded) tributaries that were crossed during winter 2006/07. Particular examples were noted on the gas pipeline installation in Section 2 (e.g. region around KP 122 to 124) and Section 3B (e.g. region between KP 372.5 and 373.7).

During winter 2006/07 the AEA continuous monitors found that protection of trench dewatering outfalls was generally good both in terms of location and protection (energy dissipation and filtering).

- **Spoil/Trench Water Management**

Deficiencies in spoil management were identified at a significant proportion of the 2006/07 winter river crossings by both the Golders' observers (40 out of 86 crossings at which the observers were present) and AEA's continuous monitors (15 out of 26 rivers visited during actual crossing construction). Overall, spoil management practices in winter 2006/07 had not improved on previous years, especially in Section 2B.

Aspects of spoil management practices that were non-compliant with HSESAP commitments include:

- improper spoil removal techniques;
- spoil storage poorly protected and/or located too close to the river (this can lead to sediment-laden runoff into the river channel as witnessed, for example, at the R. Nabil and R. Zamyslovataya);
- spoil storage off the RoW;
- no spoil/topsoil segregation (this can diminish the effectiveness of bank and bed restoration to pre-existing conditions).

- **Construction Methods**

As noted in Section 6.5.3.4, the proportion of river crossings using dry cut methods increased markedly during winter 2006/07, particularly after the introduction of a modified dam and pump construction approach from mid-January 2007. The use of dry cut construction techniques represents best international practice and significantly reduces the potential impacts on rivers. The implementation of the modified dam and pump method was effective. Implementation of flume-based crossing was also generally effective, although a small number of exceptions were identified by the continuous monitors where the seals on the flume were inadequately installed leading to sediment release to the river (*e.g.* R. Gar) and, in the case of the R. Vostochnaya, flow interruption.

During winter 2006/07, 11⁷¹ incidents of flow interruption downstream of the crossings were reported to have occurred and these are summarised in the table below. These incidents were largely associated with wet cut crossings (9 of the 11 crossings) and, hence, mainly occurred prior to mid-January (after which time dry cuts became the predominant construction technique).

⁷¹ This includes one upgraded tributary that was crossed with neither the External Observer nor the SEIC winter crossing leader present. However, the Golders's report for this stream states that the wet cut crossing technique used here was "*likely to have resulted in a flow interruption and drying out of downstream habitat*".

River	Classification	Flow interruption	
		Duration	Distance affected
Pyataya Rechka	3H	7 hours	Unknown
Devyataya Rechka	2M	8 hours	Unknown
Shumniy	3M	5 hours	Unknown
Verkhnyaya	Trib (3H)	6.5 hours	Unknown
Unnamed stream (KP86)	Trib (3H)	1.5 hours	Unknown
Tretia Rechka	Trib (3M)	5 hours	Unknown
Tikhmenevka	Trib (3H)	5 hours	Unknown
Tumannaya	3M	8 hours	Unknown
Unnamed stream (KP 287.37)*	Trib (3H)	Unknown	Unknown
Pulka (1 st crossing)	2H	10 hours	200-300m
Vostochnaya	3M	2 hours	Unknown

* Subcontractor executed the crossing without notifying SEIC, and as a result, neither the External Observer nor the SEIC winter crossing leader were present during the crossing. However, the Golders's report states that the wet cut crossing technique used here was "likely to have resulted in a flow interruption and drying out of downstream habitat".

Although the duration of the flow interruptions are recorded, the spatial extent of the downstream river that was affected is typically unknown (the exception to this is the R. Pulka, where Golders report that the length over which the river channel dried out was limited to 200-300m by natural recharge of the river by a downstream tributary⁷²).

A number of the affected rivers contain downstream spawning grounds, the most significant of which are the Pyataya Rechka, Tumannaya, Vostochnaya and Shumniy which together are estimated to contain over 50,000m² of spawning ground habitat downstream of the crossing locations (this is <0.5% of the total spawning grounds in all rivers crossed by the RoW). When considering the potential significance of the impact it is important to recognise that only a fraction of these habitats will have been affected by dry out as the spatial extent is limited by a number of factors including natural recharge downstream (e.g. upwellings and confluences with other streams).

- **Spill Management**

In general, the management of spills (including preventative and control measures) was found to be good during winter 2006/07. The Golders' observers reported that spill kits and drip trays were available on site and that oil containment booms were deployed. Corrective actions were taken in most cases when non-compliances were brought to the Contractors' attention. Water Protection Zones (WPZ) were generally well respected, although some minor non-compliances were identified.

Prolonged river crossing activities were found to contribute to some of the spill management non-compliances, for example, refuelling of side booms within the WPZ due to prolonged activities, and a lubricant spill from a water pump that was operating for longer than planned. The latter example resulted in the only known oil contamination of the watercourse. The extent of the oil slick is not reported by the Golders observer, but the source of pollution was apparently soil contaminated with lubricant oil used for maintaining the water pump and hence the volume of oil entering the stream is likely to have been limited. The Contractor reportedly contained and dealt with the spill appropriately.

⁷² AEA confirms that a number of small tributaries are present downstream of the first R. Pulka crossings that will act to recharge the river channel.

- **Simultaneous crossings**

Both the oil and the gas pipelines were installed in winter 2006/07 for a total of 21 sensitive rivers (six Group 3 and 15 Group 2 rivers). A breakdown of the time period between the installations of the two pipelines in these rivers is provided below.

Days Between Crossings	Number of Group 2/3 Rivers (both pipelines)	Percent of Rivers (both pipelines)
0 – 14	9	43%
15 – 28	3	14%
29 – 60	6	29%
61 – 150	3	14%

In over half of the cases, the period between the installations of the two pipelines exceeded 14 days. This includes 10 rivers that fall under the RCS and HSESAP classification of rivers for which consecutive crossings is “critical”.

- **Crossing duration**

The construction of river crossings in winter 2006/07 was generally completed within the specified time durations (as prescribed in Commitments 23 and 24 of HSESAP Table 2.5). Nonetheless the Golders’ reports identify 13 crossings (15%) where the construction activities took longer than specified. The table below shows the duration, construction method (flume, pumps or wet) and reasons for each crossing that exceeded the prescribed time limit in winter 2006/07, as recorded in the Golders reports.

River	Oil/Gas	Crossing Duration	Construction Method	Reasons for Delay (taken from Golders reports)
Mostovaya River	O	33 hours	Pumps	Requirement to install trench drainage system
Tikhaya River	O	170 hours	Flume	Crossing compounded with adjacent railroad crossing
Vstrechnyi Stream	G	~ 3 days	Flume	Limited access along riverbank *
Stream KP53.58	G	> 6 days	No flow	Groundwater seepage into trench
Stream KP53.64	G	> 6 days	No flow	Groundwater seepage into trench
Mal. Tym River	G	8 days	Wet	Unstable soil (approach trenches) and deep trench depth required
Melkaya River	G	~ 12 days	Flume	Tie-in welding, coating and testing activities
Dorozhnaya River	G	~ 6 days	Flume	Unknown – Golders not onsite during crossing
Devyataya Rechka River	G	49 hours	Wet	Problems installing flume, complications arising from long pipe string. Allowed time 24 hrs
Stream KP182	G	11 days	No flow	Challenging terrain (ravine)
Stream KP274	G	55 hrs	Pumps	Insufficient trench depth, long pipe string, and subcontractor crew leaving site early
Khvoynaya River	G	33 hours	Flume	Unknown
Zubatka River	G	2 days	Flume	Unknown – Golders not onsite during crossing. Long pipe string may have contributed

* The steep terrain and limited working area along the riverbank meant spoil and excavated material had to be moved up the steep hillside and well away from the crossing area before the sidebooms could be brought in. While the crossing did not meet the winter crossing strategy requirements, the use of a flume pipe enabled flow to be maintained to downstream areas and minimised sediment introduction during the prolonged construction period.

The proportion of crossings that took longer than specified to complete was similar in winter 2006/07 to that in winter 2005/06. However, it is important to recognise that in many cases the potential impacts on the rivers will have been significantly reduced in winter 2006/07 by the effective use of flume pipes and dam and pump techniques, which enable flow to be maintained during in-stream works. The above table also shows that the majority of delays were primarily due to challenging terrain and groundwater conditions rather than poor technique and management of the crossing. The primary causes of the delays at the Dorozhnaya, Khvoynaya and Zubatka rivers could not be confirmed from Golders' reports (Golders' observers were not present during the crossing of the Dorozhnaya or Zubatka).

- **Winter Crossings**

The RCS allows for Group 2 rivers and less susceptible Group 3 rivers⁷³ to be crossed prior to winter in October-November provided that the following criteria are met:

- low flow rates similar to those that would be likely to occur during winter months;
- no observed salmon spawning activity within and downstream of the crossing area and this is agreed with the local Sakhrybvod officer;
- water management control measures are effectively implemented and used during construction.

However, two Group 2 rivers (R. Zubatka and R. Khvoynaya) were crossed in September.⁷⁴ According to SEIC baseline survey data, both these rivers contain small areas of spawning habitat at and downstream of the crossing locations. However culverts under the Federal Highway and downstream of the RoW are designed such that they prevent migration upstream from lower reaches of the river preventing use of this habitat by salmon.

Three other Group 2 rivers and five upgraded tributaries were crossed between October and November 2006 (*i.e.* prior to winter). Justifications for these crossings were developed by SEIC and all these crossings were undertaken as dry cuts using flumes. For each early crossing the justifications were reviewed by the AEA and the Agency Lenders prior to construction; the exception to this was the R. Melkaya (an upgraded tributary), which was crossed in November without prior notification to the Agency Lenders.

Under the RCS all Group 3 rivers of High or Medium susceptibility to disturbance are to be crossed during mid-winter, nominally January-February. Following suspension of river crossing licenses in December 2006 (see also Appendix 1) delays in the overall river crossing schedule were encountered. Due to this schedule slippage, eight Group 3H/M rivers were not completed prior to the end of February 2007 and SEIC provided formal notification and justification to Agency Lenders to undertake a number of crossings in the period March-April 2007 on the understanding that flow conditions remained comparable with the mid-winter flow. AEA concluded that flow conditions for these crossings were indeed comparable with the lowest mid-winter flow conditions.

The Group 3H/M rivers crossed after February 2007 are summarised in the table below.

⁷³ Defined as group 3 river low susceptibility to disturbance

⁷⁴ In addition, as discussed in Section 6.5.3.2, four upgraded tributaries were also crossed in September prior to implementation of upgrading and were thus treated as Group 1 rivers during construction.

River	Taimen	Spawning area (m ²)		Date Crossed		Method	
		Total	Downstream	Oil	Gas	Oil	Gas
Nabil River	Y	372000	1800	01/04/07	08/04/07	Wet	Wet
Mal. Tym River	Y	232000	0	29/03/07	08/03/07	Wet	Wet
Desyataya Rechka River		60200	30702	03/03/07	07/04/07	Flume	Flume
Zamyslovataya River		55500	39960	(01/04/05)	12/04/07	(Wet)	No Flow
Leonidovka River	Y	118000	30000	(29/04/06)	21/03/07	(Wet)	Pump
Lesnaya River (3 X's)		103000	62000	21/03/07	16/03/07	Pump	Pump
Lazovaya River (1 X's)	Y	220000	220000	13/02/07	04/03/07	Pump	Pump
Vostochnaya River		15000	8000	27/01/07	13/04/07	Pump	Wet

The use of dry cuts, either effected with flumes or the modified dam and pump method, will have provided good environmental protection during many of these crossings. The R. Nabil and M. Tym are worthy of specific consideration as they are both large rivers that support both significant salmon habitat and taimen, and the flow rates in these rivers are such that dry cut methods were not technically possible. SEIC provided Agency Lenders with detailed a justification for these crossings, including consideration of the potential presence of taimen. AEA is comfortable that the timings of these crossings were such that it is unlikely that any resulting impacts would differ from the impacts of a mid-winter crossing on the basis that the main spawning areas are upstream of the crossing location and activities occurred before the main salmon migration. However, in relation to the R Nabil, the construction involved blasting of both the approach slopes and the riverbed. This specific issue is discussed below.

- **River Nabil Crossing**

The R. Nabil was deemed to be a special case due to the hardness of the rock in the area and the fact that blasting of the nearby approaches had to be conducted to enable the trenching works to take place. During a site visit on the 17th March 2007 AEA noted that preparation works were taking place in the river for blasting. The need for blasting of the riverbed was not envisaged within the ESHIA and the HSESAP, and hence this represents a deviation from the originally anticipated construction methods. However, no prior notification of the intention to blast in-river had been communicated to Agency Lenders. At this point the environmental impact assessment and work methodology for the in-river blasting was requested. At the time of the crossing, the only assessment that was communicated was the fish damage calculation.

Based on the outcome of this calculation it was concluded that the kill zone of the explosion was about 100m in both directions. SakhNIRO used these figures to calculate the total damage to fish stocks. To compensate for the damages to the fish stock, in accordance with legal requirements, funds will be allocated for construction or reconstruction of aquaculture facilities. As agreed with Sakrybvod, compensatory funds will be earmarked for reconstruction of a Sakhalin salmon fish farm.

Blasting for both the gas and oil line trenches occurred on 27th March 2007. The oil line crossing took place on 29th-30th March 2007 with the gas line on the 6th April 2007. The crossings were carried with the minimum of non-compliances. The site was revisited on the 28th April 2007 and it was noted that the temporary erosion control measures were in place, where appropriate.

- **Restoration**

AEA's continuous monitors found the adequacy of temporary riverbank reinstatement/stabilisation undertaken immediately after river crossings to be mixed. Deficiencies in stabilisation were identified after construction in around 40% of the crossings witnessed by AEA's monitors, although a general improvement was identified in the quality of riprap (*i.e.* cleaner and better sized) applied to riverbanks. Visual inspection of a range of rivers by AEA in a field trip in May 2007 revealed that the riverbanks had generally held up reasonably well to the spring thaw. This is due to improvements in construction practice (most importantly temporary riverbank protection was not placed on top of ice), although this is also likely to have been further aided in many portions of the RoW by relatively low volumes of thaw waters experienced in spring 2007 following generally low snowfall in the winter.

Under the river crossing licences and following review by SEIC's geotechnical team, permanent riverbank reinstatement at many rivers will be effected using hard engineered solutions, such as Reno mattresses and gabion walls. These are required particularly on eroding riverbanks. Elsewhere, final reinstatement of riverbanks will be achieved through the use of riprap and re-vegetation (*i.e.* grass seeding).

By the end of winter 2006/07 permanent reinstatement had only been undertaken at a limited numbers of rivers (except in Section 4, where final reinstatement had been implemented at the majority of rivers). To overcome this issue, SEIC has gained approval with RPN to undertake the installation of gabions, Reno mattresses and riprap after the spring floods under the following conditions:

- dates for these activities are approved by the local authorities (Sakhalin Oblast Rosselkhoznador Department);
- monthly reports of completed activities are submitted to RPN;
- waterbodies are protected from pollution, littering and decay.

Reno mattresses and gabions need to be appropriately toed-in to the riverbeds in order to prevent scouring under the structures. Therefore installation requires some element of work, and hence disturbance, within the river channel. The precise timing of the installation of such permanent erosion controls outside of winter therefore requires careful planning to avoid associated safety risks during high flow regimes (*i.e.* during the spring flow periods) and potential disturbance to the rivers during salmon spawning.

During AEA's May 2007 site visit a small number of rivers in Sections 2, 3 and 4 were inspected where Reno mattresses had already been installed. At a number of sites there appeared to be deficiencies in the installation of the Renos (e.g. toe-in above the riverbed, installation directly onto unconsolidated saturated soils, mattresses not sufficiently embedded and anchored into the riverbanks). The apparent deficiencies were most

prevalent in Section 3 and, to a lesser extent, northern portions of Section 4, while in southern portions of Section 4 installation of Reno mattresses appeared to be good. SEIC has recently increased the size of its specialist geotechnical team, including experts working in the different pipeline Sections, and this represents an important capability enhancement. In AEA's opinion the geotechnical specialists need to review the design and installation of riverbank engineering, including previously installed Reno mattresses. In Section 3 for example, such reviews are being undertaken and Non-Conformance Reports (NCRs) have been issued by SEIC for all Reno mattresses previously installed in that Section and all of these will be replaced. In addition, a specialist contractor (Vladmostroy) has been engaged to undertake the installation of riverbank engineering solutions in Section 3. At the time of the Lenders' May 2007 site visit Vladmostroy were in process of installing Reno mattresses at their first river (R. Madera) and inspection of these ongoing works showed the quality of work to be good.

- **Minor (non-upgraded) Tributaries**

During AEA's May 2007 site visit poor management of minor (non-upgraded) tributaries was identified. In particular, in two stretches of RoW (around KP 372.5-373.7 and KP 122-124), the channels of a number of small streams were blocked by soil/mud or else inadequately shaped and protected following construction activities undertaken in winter 2006/07. While recognising the low environmental sensitivity of these tributaries, they nonetheless still require appropriate management, not least as they provide important mechanisms for removal of water off the RoW. Visually, poor construction in these tributaries also represents a reputation risk to the Project.

6.5.3.7 Equipment Bridges

Temporary equipment bridges have been installed on many rivers to facilitate construction activities along the RoW. Issues relating to the adequacy of the bridge construction and maintenance in terms of sediment control are discussed above. In addition, a number of other issues has been identified since commencement of construction by AEA, regulators (RPN) and third-party stakeholders:

- In a few cases the design and construction of temporary bridges have been inadequate to allow for high flow river conditions. For many temporary bridges the permit conditions require bridge removal prior to the spring floods, but in winter 2005/06 some bridges were permitted to remain in place during the spring, and were washed away by the high water flows due to inadequate design/construction. An example of this is a bridge over the R. Makarovka that was washed away in May 2006. Such incidents can block the river and release sediment and other debris. Such impacts can be locally severe, although typically of short duration provided suitable remedial actions are undertaken (*e.g.* removal of bridge debris, as occurred following the R. Makarovka incident).
- During audits undertaken in 2006, RPN also identified deficiencies in the design and use of culverts in streams in Section 3, leading to Prescription orders for improvement (these issues, including remedial actions undertaken to date, are discussed in Appendix 1).
- In winter 2006/07, third parties also raised concerns that inadequate bridge design may have resulted in blockage at a number of streams in Section 3. In these cases ice build-up on the upstream side of the equipment bridges was visible during the winter period. The exact causes of the ice build-up are uncertain, although (partial) blockage under the bridges is possible in some cases. In AEA's opinion, it is unlikely that total flow interruption (including substrate flows) downstream of the bridges will have occurred.

- Under permit conditions, most temporary bridges must be single span in order to avoid disturbance to the river flows. A small number of bridges had centre supports (contrary to permit conditions) or had bank supports that encroached into the river, visibly affecting the river flows.

During AEA's May 2007 site visit, it was evident that many of the equipment bridges had been removed prior to the spring thaw to avoid the risks of diversion of river flows over/beyond bridges and bridges being washed away. Those bridges still in situ during the May 2007 site visit were found to be in generally good order and providing adequate clearance for the spring flows. Culverts at a small number of rivers inspected in May 2007, such as non-graded tributaries, were, however, identified as being blocked or poorly installed.

SEIC is currently considering whether it would be beneficial for longer-term pipeline maintenance/inspection accessibility if some of the temporary bridges constructed over rivers became permanent. This would require additional permit approvals and, if undertaken, bridge designs would need to be adequate to account for year-round flow conditions. Decisions on whether to leave bridges in place post-construction will need to take into account issues of induced access and the associated risks of poaching on salmon rivers. In this regard we note that SEIC is working with the WSC on methods to minimise induced access impacts.

6.5.4 Assessment of Impacts and Materiality of Non-Compliances

An important and commendable aspect of the RCS is a commitment to ensuring "No Net Loss⁷⁵" of salmon habitat. To achieve this, besides undertaking remedial measures at each of the river crossings (*e.g.* placement of gravels), SEIC will initiate a river restoration project, in association with relevant authorities and other stakeholders. It is proposed that this project will aim to restore degraded habitat within selected river catchments on the island to achieve no net loss of this habitat overall as a result of pipeline construction activities. The focus will be on the restoration of salmon spawning habitat through the use of appropriate management measures, such as limiting fine sediment inputs from sources adjacent to watercourses and/or the creation of new in-channel habitat. The recently launched Sakhalin Salmon Initiative (SSI) has a number of projects aimed at achieving its objectives, including the Sakhalin Salmon Restoration Project. These might include, for example, the restoration of previously degraded watersheds (from earlier industrial activity), although firm plans for actual restoration activities are not yet detailed.

To assess the negative impact caused by river crossings, and hence what must be done to ensure no net loss of habitat, monitoring data are clearly required. In the sections below we discuss available monitoring data, together with uncertainties and apparent inconsistencies. In view of these uncertainties and inconsistencies, we provide upper estimates of the impact.

⁷⁵ Post construction monitoring of sensitive rivers will give a good indication of the extent of habitat loss. Areas for habitat restoration will be selected under the Sakhalin Salmon Initiative, on the basis of their potential for improvement, and will not necessarily be within rivers adversely affected by the Project. The restoration project will take place irrespective of actual Project related damage.

6.5.4.1 Monitoring Results

Monitoring of total suspended solids (TSS) and turbidity were undertaken during construction, although as discussed above, there were limitations in the effectiveness and implementation of the monitoring programme. Nonetheless, SEIC has begun analysis of the available results. Those river crossings for which TSS and turbidity monitoring results were made available to AEA in time for inclusion in this report are summarised below⁷⁶ (at some rivers no TSS sampling could be undertaken as there was no flow in the river). From the incomplete data set below it is clear that samples have been taken across all sections.

Section	Number of crossings TSS data		Number of crossings turbidity data	
	Oil	Gas	Oil	Gas
1A	0	1	0	0
1B	9	9	3	2
1C	7	9	3	2
2A	2	10	0	1
2B	11	6	4	4
3A	7	7	1	3
3B	8	8	5	3
3C	5	8	3	1
4	16	34	8	15
Total:	65	92	27	31

To enable a satisfactory assessment of the level of impact further work is required by SEIC in analysing the monitoring data as it becomes available. This must also be supplemented by post-construction surveys of the rivers, in line with the HSESAP and RCS requirements. The overall analysis should also include consideration of impacts from sediment runoff from RoW slopes (see Section 6.6) and from material breaches of HSESAP commitments during construction, including dewatering incidents and significant breaches in timing constraints on crossings (see above). Ongoing review of the success of the river restoration project will be required.

We provide below a brief overview of monitoring results made available to date. Analysis of the available data by SEIC indicates that, as expected, flume crossings typically result in lower levels of TSS and turbidity increase than wet cut crossings. Inspection of the available data shows that the increased suspended sediment levels during in-stream construction activities can be very extensive; for example at 500m downstream TSS values in excess of 1,000mg/l were recorded at 46 crossings. 19 of these crossings were for Group 3 rivers. The table below shows the number of crossings within various TSS bands at the construction point (0m) and 500m downstream. (Note that no data were available at two crossings at 500m.).

⁷⁶ TSS data from the remainder of the Group 2/3 river crossings was not received by AEA in time to undertake analysis for inclusion in this report.

TSS data range (mg/l)	50m Upstream	0m Downstream	500m Downstream
0-250	153	21	78
250-500	3	16	14
500-1000	0	15	17
1000-2000	0	29	30
2000+	0	76	16 (includes 8 Group 3 rivers)

The monitored TSS data presented in the table above may be compared with measured TSS data from other pipeline construction projects provided in the RCS, which indicates TSS levels of the order of 500 to 2,000mg/l within the range of 10 to 300m downstream of the crossing location. The measured TSS levels for the Sakhalin II river crossings are generally consistent this range, although higher TSS levels are recorded at certain rivers. Of note are the high TSS values at the oil crossing of the Group 2 Mal. Podlesnaya River in December 2005. TSS values were consistently high at all monitoring points, with a value of 4,476mg/l recorded 500m downstream. This was reportedly a flumed crossing, although we understand that the seal for the flume was made from soil rather than sandbags. The gas crossing data from February 2006 yielded comparatively low TSS values of 1,486mg/l and 17.3mg/l recorded at 250m and 500m respectively. Particularly high TSS values were also observed at the gas crossing of the Group 3 Spokoiny Stream (KP 3.2) in March 2006 (this was a wet cut crossing). In this river, consistently high TSS values were seen at all monitoring points, with values of 21,422mg/l, 11,568mg/l and 9,194mg/l seen at 20, 150 and 500m downstream respectively.

Apparent anomalies in the TSS data, principally a number of rivers for which the TSS levels do not decrease monotonically with downstream distance, render detailed analysis of sedimentation rates problematic and subject to significant uncertainties. Nonetheless, following analysis of the available data, we tentatively estimate that on average approximately two thirds of released sediments typically deposit on to the riverbed within 500m downstream from the crossing location (although this may vary significantly between rivers and will strongly depend on several factors, including flow rates in individual rivers).

Turbidity data are available for fewer crossings than TSS data, and usually up to 500m downstream. However, two crossings had data available to 1,000m downstream. The highest value measured at 1,000m was 4,340 NTU at the R. Buyuklinka oil pipeline crossing. The next highest was 2,508 NTU, measured at the R. Orlovka gas pipeline crossing. At both crossings the upstream turbidity readings are reported as zero⁷⁷.

Sediment particle size distribution analysis has also been undertaken. The number of samples available to date is limited and values are only available for 36 individual pipeline crossings. Inspection of the data identifies many rivers where the mass of sediment in the various particle

⁷⁷ The significance of raised turbidity and suspended solid levels is dependent on the duration and the presence of sensitive species in water column. During winter river crossings the duration of the raised turbidity levels should be short-term and most salmon species will not be present in the water column. However, salmon eggs will be present in the gravel redds and can be impacted by sediment that settles on to the redds. Furthermore, certain species, most notably taimen, may be present in certain rivers over winter. Should such species be subject to high turbidity levels (*e.g.* several thousand NTU) for short periods of several hours or a few days, then the fish will show some temporary signs of distress, possibly including avoidance behaviour, increased respiration and coughing.

ranges does not decrease monotonically with distance downstream, indicating that the samples at the different downstream locations were taken at different phases of the passage of the sediment plume. This means that reliable estimation of the absolute sedimentation rates of different particle sizes cannot be made from the available data. However, the data can be used to estimate the relative rates at which different particle sizes deposit. In particular, analysis of the data suggests that the portion of particle mass in the most harmful size range for embedding into salmon redds (0.1 to 1mm diameter), typically appears to halve by 500m. Assuming that total TSS levels decrease on average by 66% at 500m downstream (see above), we crudely estimate that on average over 80% of particles in size range 0.1-1mm will typically settle out at 500m downstream. Furthermore, the available data suggests that the proportion of sediments released during river crossings that are within the size range of 0.1-1mm ranges from 0% to 15% and on average is less than about 2%. These results are encouraging in suggesting that sedimentation effects are spatially relatively restricted, although the *concentration* of deposited sediments on/in the riverbed (which determines the spatial extent over which downstream spawning habitats are actually impaired) cannot be estimated from the available data.

Post-construction riverbed sampling can provide a better indication of the likely resultant impacts of increased sediment release on salmon spawning in 2005, 2006 and 2007. The riverbed sampling programme is described in the RCS and, in AEA's opinion, forms a reasonable basis for assessing the extent of impacts on riverbeds. We understand from SEIC that Averina has undertaken the required survey work for 2006 but that data analysis is ongoing at the time of writing. Understanding of the extent of damage to spawning habitat is an important element if SEIC is to demonstrably meet its commitment to No Net Loss of spawning habitat and progress on this issue will require ongoing monitoring.

As identified earlier, a number of incidents occurred where rivers had dried out downstream of the crossing location during construction. The spatial extent of the drying out incidents is unknown in all but four instances, this is either because the rivers dried out beyond the furthest sampling location (typically 500m downstream) or else information is otherwise not provided in the available crossing reports. This, combined with limited survey data on spawning ground locations further downstream of the crossing points, means that it is difficult to quantify the level of environmental impact incurred. As such, detailed riverbed/spawning habitat surveys are required to estimate the extent (if any) of spawning habitats affected by drying out.

6.5.4.2 Estimated Impact on Natural Habitats Supporting Salmonids

Overall, the impacts of the breaches of HSESAP and RCS commitments described in this section cannot be fully assessed until the above monitoring and survey works have been undertaken. In this section we therefore provide credible upper estimates of the potential materiality of these non-compliances. The most significant breaches are those related to:

- Drying out of rivers
- Multi-season crossings
- Crossings undertaken outside of winter
- Late winter crossings of some of the most sensitive rivers and in particular Group 3H/M rivers crossed in late April (hence coinciding with more sensitive salmon and taimen seasons)
- Long duration in-stream construction (in excess of specified HSESAP requirements)

- An historical lack of use of dry cut (*e.g.* flumes) techniques. Initially due to the absence of a requirement for dry cuts in early versions of the RCS and later due to restrictions imposed by the RF authorities. However, in winter 2006/07, and most especially after the adoption of a modified form of the dam and pump dry crossing technique, the proportion of crossing undertaken as dry cuts markedly increased (80% of crossing undertaken in winter 2006/07 were effected with dry cuts). The use of dry cuts not only minimises the release of sediments to rivers, but also contributed significantly to reduction in the number (and significance) of non-compliances during winter 2006/07 construction.

The table below shows the spawning habitat estimated to be at and downstream of the crossing location, and whether the river is thought to potentially support taimen. Figures for spawning habitat are presented below in terms of area (million m²) and as a percentage of the total spawning habitat estimated to be contained in all the Group 2/3 rivers crossed by the pipeline RoW (including those rivers to be crossed by HDD this is estimated to be approximately 12 million m²).

Nature of breach	Number of rivers affected ⁺		Downstream salmon spawning habitat area (million m ²)
	Total	Potential taimen rivers	
Drying out*	25	2	0.15 (1.3%)
Multi-season (>200days between pipeline installation)	50	7	0.46 (3.7%)
Crossing outside of winter	18	1	0.02 (0.2%)
Long duration*	33	5	0.15 (1.3%)
3 H/M Rivers crossed in late April [#]	7	3	0.08 (0.7%)
Rivers affected by one or more of the above breaches	88	14	0.69 (5.7%)

⁺ The figures are provided only Group 2/3 rivers and do not include upgraded tributaries.

* Incidents are based on reports from AEA's continuous monitors and Golders' observers since December 2005. Data are not available on any incidents that have may have occurred during crossings undertaken prior to this time.

[#] Defined as crossings undertaken after 15th April

Approximately half of the Group 2/3 rivers crossed by the pipeline have been exposed to the potential of significantly higher impact levels than would have been the case had these crossings been undertaken in full compliance with the HSESAP and international best practice. The table above shows that the proportion of the spawning grounds exposed to the risk of higher impacts is ~6% of the spawning habitat of all rivers crossed by the project (in the case of dewatering incidents, long-term physical damage to the habitat is less likely to have occurred, but any eggs/alevins present in the affected area will have been killed). However, not all of the 6% of spawning habitat exposed to increased risk will have incurred actual damage. Indeed, evaluation of available monitoring data suggests that in the case of sedimentation effects, the majority of the released sediment typically deposits on the riverbed over the first few hundred metres downstream of the crossing location and on this basis the area of actual damage is likely to be significantly less than 6% although this needs to be confirmed by SEIC's ongoing monitoring and analysis.

The extent of harm resulting from the non-compliances identified in the above table depends on:

- the distance downstream affected (including consideration of re-suspension of initially deposited sediments)

- the degree of damage incurred by raised sediment levels (including consideration of embedment of sediments within gravels)
- the mortality rates caused by river dry outs.

The above table does not take account of upgraded tributaries as independent monitors were not present at such crossings prior to winter 2006/07 and some Group 2/3 rivers will most likely have been subjected to some level of additional influx of sediments from crossing of their tributaries. Twenty-eight crossings of subsequently upgraded tributaries were constructed outside of winter, thus leading to the potential to impact spawning salmon in the receiving sensitive rivers (which include major salmon spawning rivers and rivers that support taimen, such as the Nabil and Tym rivers). It is likely that such impacts will have been reduced due to dilution effects where the tributaries meet the receiving sensitive river and the significance of actual impacts will vary according to a number of site-specific factors, including distance to the mother river. Nonetheless, the release of sediments during these crossings is likely to have resulted in minor sub-lethal impacts (for example temporary avoidance behaviour) on salmon and (if present) taimen in some rivers. It is also possible that in more extreme scenarios sediment releases may have led to more significant sub-lethal effects such as impaired or delayed spawning.

In addition to the above non-compliances, blasting operations were undertaken at the R. Nabil both in the riverbed and on the adjacent hillside approaches. In assessing the potential environmental impacts of these blasting activities, we make the following observations:

- The presence and abundance of fish species was not determined ahead of the blasting event. In particular, the absence of juvenile taimen was not confirmed and there is therefore the risk that this red data book species may have been adversely impacted.
- Environmental assessments undertaken prior to the Nabil crossing focussed on the determination of a fish kill zone, in order that fish damage could be calculated and compensation payments made. Insufficient consideration was given to protection measures e.g. attempts to move fish from the kill zone had fish been identified during pre-blast monitoring. This is tempered by retrospective assessment that indicates relatively fast flowing and shallow waters at the crossing location rather than the slow flowing deep water over-wintering pools favoured by taimen in order to conserve energy. This would suggest juvenile taimen were unlikely to be present at the time of blasting.
- The wider potential impacts associated with blasting both in-stream and in the hillside approaches were not considered, for example, impacts on hibernating animals.

In terms of impacts on salmon, and based on the numbers and sensitivity of the rivers involved in the above non-compliances and the potential for significant short-term impacts within the rivers (including consideration of likely recovery times – see Section 6.5.5 below), we estimate that the overall environmental materiality of non-compliances during river crossings is potentially **moderate**. Some of the identified non-compliances relate to persistent breaches of regulatory requirements, most notably multi-season crossings of the oil and gas pipelines in individual rivers. Due to the number of these events we consider these breaches to represent a potential regulatory issue.

As far as taimen are concerned, under Article 24 of the Federal law No 52-FZ “on wildlife” April 1995, activities that cause death, reduction in population or disturb the natural habitats of

rare or endangered species, which includes taimen, are prohibited. AEA sought SEIC's position on this issue during the early stages of construction. At that time, the risks of death, reduction in population or disturbance to habitats of rare or endangered species was considered unlikely provided the river crossing strategy was fully implemented. AEA has continued to monitor this issue and following significant non-compliance of the HSESAP commitments pertaining to river crossings (as discussed above) and soil erosion control (discussed in Section 6.6), we now consider this to be a potential risk. We make this comment based on i) the unknown extent of any damage caused by the non-compliances, and ii) the current level of uncertainty surrounding the distribution of taimen within those rivers where significant non-compliances have occurred. On this basis we consider this to be a potential regulatory issue.

Given the uncertainty surrounding the presence/location of taimen there is the possibility that the poor construction practices may have harmed this red data book species. Where such environmental impacts may have occurred these are most likely to be **moderate** in nature, involving sub-lethal effects on fish and impaired spawning habitat, although loss of taimen (*i.e.* a **high** environmental impact) cannot be entirely ruled out due to the uncertainties discussed above.

In order to resolve this uncertainty, the damage caused by non-compliant river crossings should be evaluated through monitoring (see Section 6.5.5) and taimen survey work should be carried out to confirm taimen are not present within the disturbance zone of crossed rivers.

6.5.4.3 Future Construction Activities

Between the two crossings of the R. Pulka in Section 3B, the stream meanders parallel to the RoW, often encroaching into the RoW on the oil pipeline side. At the time of writing, the pipelines have not yet been installed in this stretch of the RoW (except for the river crossings themselves). In order to install the oil pipeline the Pulka will need to be permanently diverted to the edge of the RoW over a length of some 1000m. It is currently planned to undertake these works in summer 2007. As the R. Pulka is a group 2 river containing salmon spawning habitat within the potentially affected stretch, this is an issue of potentially **moderate** environmental materiality.

6.5.5 Recoverability and Remediation

The recoverability of actual impacts, and the efforts required to achieve such remediation, depend on the nature and severity of the impacts (*e.g.* the spatial and temporal extent of the impacts, the extent that sediments are embedded in gravel redds and the sensitivity/susceptibility of affected environmental receptors). Judgements on recoverability are especially problematic for complex ecosystems, which will often require monitoring over prolonged periods to assess both the long-term impacts and the effectiveness of remedial actions (such monitoring is defined in the HSESAP).

Nonetheless, for the significant issues identified recovery is possible provided that suitable remedial measures are implemented. The RCS indicates that habitat recovery from sedimentation released during river crossings will typically occur within 2 years. AEA broadly concurs with this assessment, although recovery times may be more prolonged where sediment release levels are especially high and/or where high proportions of the sediment particles are within the size range most prone to embedding in gravel redds (0.1 to 1mm). The limited

available data on particle size distribution within suspended sediments indicates that the proportion of sediments in this range is variable between rivers, but typically low⁷⁸.

Overall recovery times are also linked to soil erosion controls applied to adjacent portions of the RoW and improvements in erosion controls are required to ensure future sediment runoff from the RoW into rivers is prevented. Permanent and temporary stabilisation of steep slopes prior to winter 2006/07 is important in this regard (historically only limited progress in surface stabilisation of these slopes was made prior to previous winter periods and hence improved performance is required). Actual recovery times will need to be monitored over several years following construction, and provisions for this type of monitoring are included in the HSESAP and RCS.

Although rivers systems are expected to recover, there has been a prolonged duration of impact for some rivers during the construction period due to ongoing poor erosion control and multi-season river crossings, and in these cases the overall period of impairment prior to recovery could extend over several years. On the basis of this we assess the overall environmental materiality of these breaches to be **moderate**.

In order to address non-compliances that may have had an impact on rivers, SEIC is developing a River Habitats section within a wider Remedial Action Plan (RemAP) that will also address wetlands and soil erosion and reinstatement. As all the sensitive river crossings were completed by mid-April 2007, the River Habitats section of the RemAP will focus on remediation of river habitats (and, where appropriate, offsets). In the first instance, the River Habitats section of the RemAP needs to define the monitoring programmes necessary to characterise, to the extent possible, the nature of construction impacts on rivers, with a particular focus on the most sensitive rivers and those affected by significant non-compliances during pipeline construction. While appropriate remedial actions and offset options cannot be detailed until the results of monitoring programmes are available, the RemAP should outline the nature of the actions/options that will be considered.

The key issues identified in relation to river crossings are summarised in Table 6-4 below.

⁷⁸ The available data indicates that the proportion of sediments in this size range can vary considerably between approximately 0% and 15% with an average value of about 2%.

Table 6-4 Summary of Key Issues Relating to River Crossings

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.16	Additional monitoring plans are required in order to establish the location of taimen, as part of the taimen research project and the No Net Loss project	Environmental M	WB OP 4.01 Annex C	Adequacy of Assessments & Plans	Pending
6.17	Significant deficiencies were identified in the baseline characterisation of ecological characteristics of rivers in both the EIA and initial versions of the RCS, although significant improvements were gained through additional survey work. Limitations are still noted in regard to the spatial extent of site-specific surveys and identification of wintering grounds for certain species, such as taimen, even though taimen rivers have been identified and classified as Group 3. SEIC is supporting a taimen research programme; this research programme has the <i>potential</i> to offset, at least to some extent, any historical impacts on taimen that may have occurred by enhancing the long-term sustainability of this species. Only high-level objectives for the programme have so far been made available and hence overall ability of the programme to provide such offset cannot be confirmed at this time.	Environment M	WB OP 4.01 Annex B	Adequacy of Assessments & Plans	Historical (Pending for taimen research programme)
6.18	Based on the unknown extent of any damage caused by the river crossing non-compliances and the current level of uncertainty surrounding the distribution of taimen within those rivers where significant non-compliances have occurred, there is the potential for impact to taimen or taimen supporting habitat. Where such impacts may have occurred these are most likely to involve sub-lethal effects on fish and impaired spawning habitat. Actual fish loss is unlikely, although cannot be entirely ruled out due to the uncertainties. Given the uncertainty surrounding the presence/location of taimen there is the possibility that the poor construction practices may have harmed this red data book species. On this basis we consider this to be a potential regulatory issue.	Environmental Potentially M (although potential for H cannot be entirely ruled out) Potential regulatory issue (referred to the ILA)	Lender Policies	Adequacy of Assessments & Implementation of Plans	Unresolved
6.19	There are limitations in the overall impact assessment presented in the final RCS, and in particular the absence of detailed sediment transport and deposition modelling. These concerns are alleviated by (i) the utilisation of a precautionary assessment of the upper limit of spawning habitat loss (based on the proportion of spawning grounds that are thought to be located downstream of the crossing points) and (ii) commitments to adaptive management (although significant deficiencies in monitoring were identified during the first half of the winter 2005/2006 construction period limiting the ability to apply adaptive management measures).	Best practice/ Environment M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.20	<p>Dry cuts effected with flume pipes are regarded as an international best practice approach to river crossing where technically feasible and form a central part of the RCS (where they are referred to as “water management control”). However, dry cuts with flume pipes had not been not required by SEIC prior to finalisation of the RCS and so several rivers which, under the final RCS would have been dry cut, were crossed by wet cut techniques in winter 2004/2005.</p> <p>A second issue occurred after the finalisation of the RCS, when the RF authorities initially determined that the use of flume was outside of the permit conditions and a number of fines were imposed in early 2006 where flumes had been utilised. Following protracted discussions between SEIC and the authorities, agreement for the use of flume pipes for a total of 45 rivers was reached in April 2006. During the latter half of the 2006/07 construction period SEIC, in agreement with local authority inspectors implemented a different form of dry crossing, namely a modified form of dam & pump, to good effect at a number of river crossings. In total nearly 80% of crossing undertaken in winter 2006/07 were effected as dry cuts. The cumulative proportion of all group 2/3 river crossings undertaken as dry cuts since the commencement of construction (<i>i.e.</i> since winter 2004 through to winter 2006/07) is nearly 30%.</p> <p>In terms of remediating/offsetting impacts resulting from historical non-compliances, at the time of writing (July 2007) SEIC is developing a River Habitats RemAP section and this is further discussed in row 6.26 below.</p>	Environment Potentially M	OP 4.01 Annex C	Implementation of Plans	Historical (resolved for latter winter 2006/07 activities)
		Potential regulatory issue	OP 4.01 Annex C	Implementation of Plans	Historical

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
6.21	<p>Since the commencement of river crossings in 2004, construction practices have been identified that do not meet HSESAP commitments, including: non-consecutive crossings in individual rivers (i.e. multi-season, contrary to regulatory requirements), river drying incidents, long duration of in-stream construction activities, crossing of sensitive rivers outside of mid winter without use of dry cut methods (including some crossings outside of the wider winter period). Principally due to the adoption of the modified dam & pump construction, performance of river crossings undertaken after mid-January 2007 significantly improved. Nonetheless, in total approximately half of the group 2/3 river crossings were affected by one or more of the above breaches and hence exposed to potentially significantly higher impact levels than would have been the case had these crossings been undertaken in full compliance with the HSESAP and international best practice. The proportion of the spawning grounds exposed to the risk of higher impacts is approximately 6% of the spawning habitat of all rivers crossed by the project. However, not all of the 6% of spawning habitat exposed to increased risk will have incurred actual damage. Evaluation of available monitoring data suggests that in the case of sedimentation effects, the majority of the released sediment typically deposits on the riverbed over the first few hundred metres downstream of the crossing location, and the actual damage to spawning habitat is likely to be significantly less than 6% although this needs to be confirmed by SEIC's ongoing monitoring and analysis.</p>	Environment Potentially H/M	OP 4.01 Annex B & C	Adequacy of Assessments & Plans	Closed
	<p>Some of the identified non-compliances relate to persistent breaches of regulatory requirements, most notably multi-season crossings of the oil and gas pipelines in individual rivers contrary to the requirements of SakhRybvod. Due to the high proportion of these events we consider this to be a potential regulatory issue.</p> <p>Natural recovery of river habitats following construction is assessed in the RCS as typically occurring within 2 years. AEA broadly concurs with this assessment, although recovery times may be more prolonged where sediment release levels are especially high and/or where high proportions of the sediment particles are within the size range most prone to embedding in gravel redds (0.1 to 1mm). Recovery times will need to be monitored over several years following construction, and provisions for this type of monitoring are included in the HSESAP and RCS. On the basis of these potential impacts the overall environmental materiality of these breaches is likely to be moderate, although monitoring is essential to confirm the actual impact. In terms of remediating/offsetting impacts resulting from historical non-compliances, at the time of writing SEIC is developing a River Habitats section of a wider RemAP and this is further discussed in row 6.26 below.</p>	Environment Potentially M Potential regulatory issue	OP 4.01 Annex C HSESAP (T2.5)	Implementation of Plans	Historical (resolved for latter winter 2006/07 activities)

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.22	<p>In line with the RCS, SEIC undertook a river basin assessment in order to identify any Group I rivers (<i>i.e.</i> rivers of low ecological sensitivity in themselves) in which sediments released during pipeline construction may lead to impacts on more sensitive receiving rivers downstream. This assessment identified 55 such tributaries and, under the RCS, these tributaries were to be treated as being of the same sensitivity as the Group 2 or 3 rivers into which they flow. However, this re-assessment of tributaries was not completed until mid-2006, by which time all 55 ‘upgraded’ tributaries had already been crossed by at least one pipeline and furthermore these tributaries were still being crossed as Group 1 rivers, and hence afforded a lower level of environmental protection, as late as September 2006 . In particular, a total of 28 upgraded tributary crossings (affecting 24 streams) were constructed outside of winter (winter being defined in the RCS as between October to April) before the upgrading came into affect, thus leading to the potential to impact spawning salmon in the receiving sensitive rivers (which include major salmon spawning rivers and rivers that support taimen, such as the Nabil and Tym rivers).</p> <p>In terms of impacts on spawning salmon, and based on the numbers and sensitivity of the receiving rivers involved and the potential for severe short-term impacts within the receiving waters, we estimate that the overall materiality of the tributary crossings is likely to be moderate. The potential materiality in terms of effects on taimen rivers is discussed separately above.</p>	Environment Potentially H/M	OP 4.01 Annex B & C	Adequacy of Assessments & Plans	Closed
		Environment Potentially M	OP 4.01 Annex C	Implementation of Plans	Historical
6.23	<p>Limitations in the environmental monitoring during the 2005/2006 construction period in terms of a lack of relevant equipment (turbidity meters were not available until January 2006) and inadequate frequency of sampling during construction in contradiction with HSESAP Table 2.5 Commitment 141 which requires high frequency turbidity monitoring. The limitations in the monitoring have hindered the use of such monitoring in the development of adaptive management processes as required by the RCS. The presentation of monitoring data did however play an important part in demonstrating the benefits of flume pipe construction techniques when SEIC finally gained approval for such methods from the RF authorities. During winter 2006/07 monitoring was identified as being adequate.</p>	Environmental Potentially M	OP 4.01 Annex C HSESAP (T2.5, R141)	Implementation of Plans	Historical (resolved for winter 2006/07)

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status	
6.24	<p>AEA, regulators and third-party stakeholders have identified a number of issues with the construction of temporary equipment/access bridges:</p> <ul style="list-style-type: none"> A few examples have historically been identified where the design and construction of temporary bridges appear inadequate to allow for high flow river conditions, or else pose a risk of ice build-up in winter conditions. Audits undertaken by RPN in 2006 identified deficiencies in the design and use of culverts in streams in Section 3. This and other issues raised during RPN audits are being addressed by SEIC through an Environmental Action Plan (EAP - see Appendix 1). Under permit conditions, most temporary bridges must be single span in order to avoid disturbance to the river flows. A small number of bridges have been identified where centre supports within the rivers have been used (contrary to permit conditions) or else where the bank supports encroach into the river, visibly affecting the river flows. Inadequate sediment controls on bridges. <p>During AEA's May 2007 site visit, it was evident that many of the equipment bridges had been removed prior to the spring thaw to avoid the risks associated with high spring floods in previous years. SEIC is currently still considering the need/benefit for retaining some equipment bridges during the operation phase of the Project for maintenance/inspection purposes.</p>	<p>Environmental L (although impacts may be locally more severe)</p>	<p>OP 4.01 Annex C</p>	<p>Implementation of Plans</p>	<p>Historical/Pending (e.g. close-out of EAP and decisions on retention of equipment bridges)</p>	
<p>Potential regulatory issue</p>	6.25	<p>The Nabil river was deemed to be a special case due to the hardness of the rock in the area and the fact that blasting of the nearby approaches had to be conducted to enable the trenching works to take place. During a site visit on the 17th March it was noted that preparation works were taking place in the river for blasting. No prior notification of the intention to blast in-river had been communicated to Agency Lenders. At this point the environmental impact assessment and work methodology for the in-river blasting was requested.</p> <p>SEIC provided a briefing note on the crossing. This detailed the method, approvals sought from Rosselhoznadzor and conditions complied with. The monitoring details were also included along with a fish damage calculation (rather than an environmental impact assessment) to allow compensation to be reached. However, in the absence of a more comprehensive environmental assessment, addressing both the aquatic and terrestrial impacts of the blasting activities, and the potential presence of taimen we consider this issue to be a potential regulatory issue (see also issue 6.18).</p>				<p>Environmental Potentially M</p> <p>Procedure H</p> <p>Potential regulatory issue</p>

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.26	<p>In order to address historical non-compliances that may have had an impact on rivers, SEIC is developing a River Habitats section within a wider Remedial Action Plan (RemAP). As all the sensitive river crossings were completed by mid-April 2007, the River Habitats RemAP section will focus on remediation of river habitats (and, where appropriate, offsets) rather than improvements in construction activities that have effectively been completed. It is important to note that although the RemAP was not developed prior to the winter 2006/07 river crossing season, as was originally intended, AEA concluded that overall river crossing performance during winter 2006/07 was, nonetheless, markedly improved on previous years.</p>	Environmental Potentially M	Lender requirement	Implementation of Plans	Pending
6.27	<p>Between the two crossings of the R. Pulka in Section 3B, the stream meanders parallel to the RoW, often encroaching into the RoW on the oil pipeline side. The pipelines have not yet been installed in this stretch of the RoW (except for the river crossings themselves). In order to install the oil pipeline the Pulka will need to be permanently diverted to the edge of the RoW over a length of some 1000m. It is currently planned to undertake these works in summer 2007. As the R. Pulka is a group 2 river containing salmon spawning habitat within the potentially affected stretch, this is an issue of potentially moderate materiality.</p>	Environmental Potentially M	OP 4.01 Annex C	Implementation of Plans	Pending

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.28	<p>By the end of winter 2006/07 permanent reinstatement had only been undertaken at a limited numbers of rivers (except in Section 4, where final reinstatement had been implemented at the majority of rivers). To overcome this issue SEIC has gained approval with RPN to undertake the installation of gabions, Reno mattresses and rip-rap after the spring floods.</p> <p>Installation of Renos and gabions requires some element of work, and hence disturbance, within the river channel. The precise timing of the installation of such permanent erosion controls outside of winter therefore requires careful planning to avoid safety risks associated during high flow regimes and potential disturbance to the rivers during salmon spawning. During AEA’s May site visit a small number of rivers were inspected where Reno mattresses had already been installed. In most cases there appeared to be deficiencies in the installation of the Renos. We note that SEIC has recently increased the size of its specialist geotechnical team, including experts working in the different pipeline Sections, and this represents an important capability enhancement. In AEA’s opinion the geotechnical specialists need to review the design and installation of riverbank engineering, including previously installed Reno mattresses. In this regard it is reassuring to note that, in Section 3 for example, such reviews are being undertaken and Non-Conformance Reports (NCRs) have been issued for all Reno mattresses previously installed in that Section and all of these will be replaced. In addition, it is good to note that a specialist contractor (Vladmostroy) has been recently engaged to undertake the installation of riverbank engineering solutions. At the time of the Lenders’ May 2007 site visit Vladmostroy were in process of installing Reno mattresses at their first river (R. Madera) and inspection of these ongoing works was most encouraging.</p> <p>Given the number of rivers still requiring hard engineering stabilisation, the materiality of this pending issue is potentially Moderate.</p>	Environmental Potentially M	OP 4.01 Annex C	Implementation of Plans	Pending

6.6 SOIL EROSION

6.6.1 Background

De-vegetation of land during construction activities exposes bare soils to the risk of erosion by weathering. This can lead to mass movement of surface soils, including the possibility of high sediment loads entering adjacent rivers. On Sakhalin such risks are particularly prevalent on certain portions of the onshore pipeline Right of Way (RoW), such as the Makarov region, where steep slopes and especially erodible soil layers (mudstones) are found together with adjacent sensitive salmon rivers.

Key methods for managing soil erosion are, broadly in order of importance:

- **Minimisation of exposure time**, *i.e.* minimising the time for which bare soil is left exposed, for example by rapid implementation of temporary erosion controls, permanent reinstatement as necessary and back-to-back construction of the oil and gas pipelines in each section of the RoW.
- **Surface stabilisation** to reduce the risk of surface soils becoming mobilised. Temporary stabilisation methods include mulching, geotextile protection and temporary re-seeding. Permanent stabilisation requires final re-vegetation/reinstatement.
- **Drainage control** to remove precipitation water from the RoW in order to prevent erosion, rill/gully formation and sediment-laden runoff waters entering watercourses. Key drainage controls include slope breakers (small berms usually made of soil) that run diagonally across slopes in order to direct water off the RoW and towards adjacent undisturbed vegetated areas. In addition, the RoW frequently intercepts and captures surface water flow from surrounding areas. The captured flow increases the overall runoff on the RoW and hence erosion. This flow needs to be channelled across the RoW in contoured and stabilised channels.
- **Sediment control** to filter-out sediments from runoff waters before they enter sensitive environments, such as watercourses. A principal form of sediment control is silt fencing.

The level of erosion risk is also a function of climatic conditions, principally the amount of precipitation water on the exposed surface and runoff from surrounding areas. Key risk periods are high rainfall seasons and, more importantly, the spring melt season (typically during April to May).

In addition, successful final reinstatement of disturbed areas may be much more effectively undertaken when original topsoil is re-used. This of course requires segregation and storage of topsoil during construction for later replacement. Even where topsoil layers are thin, considerable efforts should be made to maximise the amount of topsoil salvaged for later reinstatement.

As part of its management of erosion risks and reinstatement, SEIC has committed to implement the relevant elements of FERC standards. These standards represent international good practice and have been incorporated into Table 2.5 of the HSESAP.

6.6.2 Evolution of the Issue

Concerns over the standard of erosion control on the project were first raised by AEA during the early stages of RoW construction in October 2004, including concerns relating to the

prolonged time period over which the RoW was left de-vegetated and unprotected. Follow-up visits by AEA focusing specifically on soil erosion along the pipeline RoW were subsequently undertaken in 2005 (May, July and September), 2006 (May, July and November) and 2007 (May). In addition AEA has provided continuous monitors on island since December 2005 focusing on pipeline construction.

Following a site visit in May 2006, significant deficiencies were identified in all aspects of erosion control, including material breaches of several HSESAP commitments (see below)⁷⁹. SEIC subsequently implemented an enhanced erosion control campaign in 2006. This included identification of key risk areas and associated mitigation measures and a revised management structure for implementation and monitoring. Under the new management structure SEIC and contractor (Starstroi) environmental teams in the sections were integrated in order to improve efficiency of communications lines and responsibilities. SEIC has also instigated incentive schemes whereby (sub)contractors receive financial benefits based on successful completion of erosion control targets.

SEIC further developed a range of key remedial action targets in relation to surface stabilisation and reinstatement activities required prior to the onset of winter 2006/2007. Follow-up monitoring visits were undertaken in July 2006, November 2006 and May 2007 in order to assess progress made against these targets as well as general performance with respect to erosion control. The results of the site visits identified many areas of progress (integration of management structures in the field and the contractor incentives schemes appear to have played a significant role in achieving these improvements), although shortfalls against the Company's remediation targets remain and these are discussed in Section 6.6.3. Ongoing review is also required in order to monitor future progress on bringing the Project into compliance with HSESAP commitments.

6.6.3 Current Status and Compliance

This section provides an overview of the Project status and describes the level of compliance with the HSESAP. The materiality of identified non-compliances is assessed cumulatively in Section 6.6.4.

Although each field trip revealed improvements in certain aspects of erosion control (*e.g.* implementation of silt fencing and drainage controls were seen to be improved) significant concerns and areas of non-compliance with the HSESAP remain at the time of writing. These are discussed below in relation to compliance with the relevant commitments of HSESAP Part 2 Table 2.5.

6.6.3.1 Temporary Surface Stabilisation

Under HSESAP Commitment 68, slopes that remain disturbed for more than 14 days should be track-walked to provide temporary surface stabilisation and if any construction area remains undisturbed for more than 21 days it shall be track-walked or disked/tilled on the contour, temporarily seeded and/or mulched. To date, such stabilisation has generally not been undertaken even though approximately 800km of RoW have now been opened up and around 1,500km of pipeline has been laid and backfilled (representing 94% of the overall scope). Furthermore, HSESAP Commitment 64 requires that temporary surface stabilisation

⁷⁹ Although the HSESAP was not finalised until December 2005, by which time significant construction on the RoW had already been undertaken, draft commitments pertaining to erosion control, including reference to FERC standards were in place, as were SEIC and subcontractor (Starstroi) SREPPS.

measures shall be applied to all bare soil on slopes along the RoW prior to the onset on winter. This commitment was not met prior to winter 2005/2006 at the greater proportion of the RoW, including the majority of sloped areas adjacent to sensitive rivers. During a site visit in May 2006, AEA identified significant shortfalls in erosion controls and in particular surface stabilisation of steep slopes. Inspections by RF authorities in 2006 also raised concerns regarding adequate stabilisation of spoil areas⁸⁰ (this topic is discussed in Section 6.6.3.6). AEA also noted in May 2006 that insufficient equipment and materials for temporary and final reinstatement of disturbed areas were in place prior to spring 2006 (as was required under HSESAP Commitments 57 and 58) raising concerns over SEIC's ability to rectify the identified erosion control deficiencies in good time. Key materials and equipment deficiencies identified at the time included: seed, mulch, hydroseeders, seed broadcasting equipment and biodegradable geojute/geomat.

As discussed above, in order to rectify these problems SEIC initiated a concerted erosion control improvement campaign. In the summer of 2006 SEIC set targets for improved surface stabilisation of the RoW in terms of completion before the onset of winter 2006/2007 of:

1. hydroseeding of steep slopes⁸¹ (steep slopes on the RoW cover a total of 47km).
2. conventional seeding of other available areas of the RoW ('available' being defined as those areas where pipelines have been trenched and backfilling completed - by summer 2006 approximately 400km of RoW were identified as being available).

These targets are summarised in the table below, together with the stated progress achieved by the end of November 2006 (*i.e.* onset of winter).

Section	Conventional Seeding				Hydroseeding (steep slopes)	
	Oil line		Gas line		Target (km)	Progress
	Target (km)	Progress	Target (km)	Progress		
Chaivo	11.7	103%	11.7	103%	0.5	0%
1A/B	72.2	60%	72.2	60%	3.0	16.7%
1C	11.5	199%	11.5	199%	2.8	31.8%
2	32.1	158%	32.1	202%	2.9	2.3%
3	37.6	96%	37.6	88%	12.9	19.1%
4	84.9	30%	84.9	30%	12.9	21.3%
Total	250	76%	250	81%	35	7.3%

The table above shows that only slow progress was made on the hydroseeding of steep slopes (which are the most significant risk areas for soil erosion) prior to winter. SEIC invested significantly in improving its equipment capacity for hydroseeding during 2006, but prioritisation of the use of these hydroseeders to date has not been optimal. While only 3km of steep slopes have been hydroseeded (7.3% of SEIC's target), over 30km of less sensitive flat areas of RoW have been hydroseeded (although efforts have also correctly been focused on hydroseeding spoil areas). Visual inspection in May 2007 of some of the limited areas that had been hydroseeded identified good re-vegetation results (*e.g.* the slope adjacent to R. Pegas).

⁸⁰ Spoil generated from regrading of the RoW is removed to designated spoil areas adjacent to the RoW. Such areas require stabilisation, especially when they are located on hillsides/steep slopes.

⁸¹ SEIC has defined steep slopes as those greater than 10° and AEA considers that this represents a reasonable definition in defining priority slopes.

In some areas, principally Section 3, conventional seeding of many steep slopes was performed instead, including the use of aerial seeding. In line with the requirements of the local authorities the conventional seeding was undertaken without the application of mulch or fertiliser (addition of fertiliser and mulch to the application mix is permitted in hydroseeding operations). Visual inspection of the RoW during the May 2007 field trip revealed aerial seeding had produced limited results. Although germination of seed was identified in some areas, for example on the ridge approach to the Varvarka valley, this was spatially limited. In addition to difficulties in even seeding density and the absence of mulch/fertiliser, the success of aerial seeding was also compromised by inadequate surface preparation. In particular, the seeded areas of RoW inspected had not been prepared, for example by tilling, as per commitment 68 of HSESAP Table 2.5, and this resulted in seed wash-off, especially on slopes. The only areas where better growth rates were observed during the May 2007 trip were on flat areas or else in rills and slope breakers that retained seed.

SEIC intends to undertake a more detailed review of the relative success of the different seeding methods implemented prior to winter 2006/07 (aerial seeding, manual conventional seeding and hydroseeding) in order to evaluate the most effective methods for future erosion control/reinstatement. Nonetheless, the contrast in the success between hydroseeding and conventional seeding of steep slopes witnessed during the May 2007 site visit indicates the importance of SEIC optimising its future hydroseeding capability. This requires that best use be made of the two high-capacity hydroseeders purchased in 2006. In 2006 these hydroseeders were mounted on skids rather than wheeled vehicles and this reportedly reduced their mobility and also resulted in damage to the RoW. We have been informed that the two high-capacity hydroseeders will be mounted on tracked vehicles for use in 2007 and this should improve their effectiveness.

Surface stabilisation has been seen to be further compromised at several locations along the RoW during spring thaw periods where tie-in trenches have either been left open or not adequately stabilised (*e.g.* no trench breakers provided, poorly compacted) over the winter period and which have filled with snow/water or become saturated. Where this has occurred on gradients, the hydrostatic pressure has resulted in some locations with mass soil movement down the slope. In the case of open trenches this represents a safety as well as environmental risk, especially where the RoW is in close proximity to local residences. However, instances of open trenches were markedly reduced after spring 2006.

6.6.3.2 Temporary Drainage Control

Significant improvements were identified during the field trips in July and November 2006 in the application of drainage controls (principally slope breakers). Following the May 2007 site visit AEA continued to find the installation of drainage controls to be reasonable and in particular slope breakers had been installed to some degree on the majority of slopes viewed. Some problem areas persist and the main exceptions identified during the May 2007 site visit are:

- In some areas of the RoW, particularly where winter pipeline construction activities had taken place in winter 2006/07, drainage control such as slope breakers had not been installed/re-installed. In some locations, such as the slopes adjacent to the R. Krinka, the lack of drainage control had led to silt fences being overwhelmed and significant sediment flows entering the river from both the northern and southern slopes. At a small number of isolated locations, for example the slopes adjacent to the R. Pultovka, no slope

breakers of any kind were installed pre-winter even though all construction activity had been completed by that time.

- At various locations slopes breakers have been installed too sparsely and/or the slope breakers do not extend across the whole RoW. This latter issue is of particular concern where slope breakers do not extend across the running track which often then acts as a preferential conduit for surface flows directly to rivers located at the foot of the slope. This is exacerbated where crowns have been left over the buried pipeline. Good examples were, however, identified in some locations (*e.g.* in some portions of Section 2) where driveable slope breakers extended across the entire RoW.
- Special situations prevail at a small number of locations (*e.g.* near the R. Krasnaya and R. Pobedinka) where the presence of local springs renders drainage control on the RoW particularly complex. In such situations management of surface flows is extremely difficult prior to final reinstatement.
- In some areas on the RoW management of cross drainage of flows originating from areas adjacent to the RoW is inadequate and compounded by insufficient numbers of slope breakers. An example of this is at the R. Travanaya where a lack of control of natural drainage channels across the RoW has led to heavy rilling/erosion and direct silt-laden flows towards rivers, and this situation is compounded by limited installation of slope breakers.

Despite the above reservations, on the basis of the limited number of locations accessible during the May 2007 site visit, the temporary erosion controls installed appeared to have generally held up to the spring thaw with a reasonable level of success. This situation has been considerably aided by the relatively low melt-water volumes and precipitation rates (there have been no major spring rain-storms as of mid-May) in spring 2007. On this basis we estimate that the overall impact to date on receiving waterbodies (in terms of sediment loading from the exposed RoW) in spring 2007 is less than occurred in spring 2006. In making this assessment we note the caveat that late spring rain-storms may possibly lead to a deterioration in this situation, particularly on some of the more vulnerable steep slopes where inadequate drainage controls have been applied (this includes slopes where slope breakers do not extend across the entire RoW leaving the potential for surface waters to bypass the drainage controls by creating a preferred drainage path directly to the watercourse). These vulnerable high-risk slopes require immediate attention.

6.6.3.3 Temporary Sediment Control

Significant improvements in sediment control have been identified in the installation of silt fencing protection of sensitive waterbodies. In particular, the placement, shaping and construction of silt fencing is much improved. The Project now achieves a high degree of compliance with HSESAP commitments on sediment control (*e.g.* commitment 69).

6.6.3.4 Soil Segregation

Efforts to segregate topsoil on the Project have generally been inadequate to meet the requirements of HSESAP commitment 60. Although efforts were made following completion of the HSESAP to preserve topsoil during RoW clearance in 2006, topsoil preservation has not been undertaken during the majority of RoW works. The main onshore pipeline construction contractor estimates that topsoil has been preserved in just 212ha of RoW, out of a total of over 3,000ha cleared to date. This represents a material breach of commitment 60. Although the breach is largely historical, the actual impact will be felt during future efforts at

reinstatement, which will be significantly hampered. Re-vegetation will still be possible, but will require greater effort, time (potentially several years) and cost.

6.6.3.5 Permanent Reinstatement

Under HSESAP Table 2.5 commitment 113 final grading, topsoil replacement and installation of permanent erosion control structures should be completed within 20 days of backfilling the pipeline trench. Pipeline construction activities commenced in 2004 and by May 2007 over 90% of the pipeline had been installed and backfilled. However, with the exception of a few limited locations, no final reinstatement has been completed on the RoW (although in some agricultural areas in Section 4 with fertile soils natural recovery is seen to be occurring). It is recognised that not all the RoW in which the pipelines have been installed is available for final reinstatement due to the necessity to complete other surface operations such as construction of valve stations, installation of the FOC, tie-in of river crossings, *etc.* Nonetheless, permanent reinstatement could have commenced in many portions of the RoW; the lack of progress made to date represents a material and ongoing breach of commitment 113.

Final reinstatement also requires careful planning to enable coordination with pipeline hydrotesting activities (which are planned between July and November 2007) as once hydrotesting is complete heavy equipment should not be driven over the buried pipeline. This requires, for example, certain aspects of technical reinstatement (*e.g.* grading to contour) to be completed prior to hydrotesting. However, the final detailed technical and biological reinstatement plan is still in development (although a high-level Soil Remediation and Erosion Protection Plan (SREPP) was developed as part of the TEOC approval).

Reinstatement involves a number of sequential elements:

- Technical reinstatement, comprising:
 - Grade to contour⁸².
 - Installation of permanent drainage controls
- Biological reinstatement, comprising re-vegetation including both surface preparation (*e.g.* using tines) and seeding (including fertilisation/mulching where applicable)

This requires specialist personnel, materials and equipment. Dedicated reinstatement specialists started working in each of the pipeline sections in spring 2007. However, concerns remain over availability of necessary equipment and materials, especially small-scale excavators/bulldozers appropriate for technical reinstatement, agricultural equipment for surface preparation (as required under HSESAP commitments) and sufficient numbers of manual seed broadcasting equipment.

Stocks of seed available in the sections in May 2007 (30 tonnes) were reasonable for immediate requirements with another 100 tonnes on order. In total 1 million m² of geojute/coca-matting has been ordered and has started to arrive on island (this is sufficient to cover some 20km of RoW – *i.e.* sufficient for application to side-cuts and some portion of the 47km of steep slopes if required).

⁸² In this regard we note that within SEIC the policy on pipeline crown removal remains unclear. This needs to be confirmed in the reinstatement plans and we note that the HSESAP commits to levelling to grade (commitment 113 of table 2.5). In AEA's opinion removal of the pipeline crowns is important in order to prevent long-term difficulties with surface drainage on the RoW.

The detailed reinstatement plan will need to identify the necessary equipment and materials (and quantities) needed and their timely availability in the sections will be critical.

In many cases final biological reinstatement may be undertaken by landowners, such as farmers and the forestry agency. We understand from SEIC that discussions with the landowners on this issue are ongoing. Where landowners undertake biological reinstatement, SEIC must ensure that such reinstatement is completed in a timely fashion and to required standards. However, importantly SEIC has reached agreement with the forestry agency that SEIC will carry out biological reinstatement on the steep slopes, which are the greatest erosion risk areas.

The extensive lack of topsoil preservation during construction means that hydroseeding has a specific advantage in that the forestry agency has agreed that fertiliser and mulch can be applied in conjunction with this seeding method. In line with HSESAP commitments, SEIC has engaged local soil experts to develop seed additive requirements necessary to compensate for the loss of topsoil. However, agreement to apply the soil enhancement still needs to be confirmed with the landowners.

Detailed targets and timescales for permanent reinstatement are not available at the time of writing. We understand that in broad terms 50% of the total length of the RoW will be technically reinstated by the end of 2007 (except where ongoing activities prevent completion). The remaining technical and all biological reinstatement will be completed in 2008. It is anticipated that more rapid progress will be made in Sections 1 and 4. Progress in Sections 2 and 3 is expected to be slower as reinstatement in these sections is complicated by outstanding pipelaying activities and the number of tie-ins required following the winter 2006/07 river crossings. These timescales mean that full compliance with the HSESAP is not anticipated to be achieved until the end 2008.

6.6.3.6 Spoil Tips

In 2006 concerns over spoil tips, particularly in Section 3, were identified by both AEA and by the RF authorities (RPN) following inspection audits. These concerns included:

- Suitability of certain spoil tip locations (including permitting issues and the location of some spoil on steep slopes adjacent to rivers).
- Poor design of the tips in terms of drainage control and stabilisation.

By May 2007, SEIC had made some important progress on this issue. In particular:

- SEIC has increased its geotechnical expertise both in the central offices and in the field.
- The existing spoil tips and temporary piles have been surveyed across the entire RoW by the geotechnical teams. Locations and designs for permanent spoil tips are currently undergoing approval and review by geotechnical experts.
- As of mid-May 2007 a total of approximately 190,000m³ of stored spoil along the RoW had been identified for removal. Furthermore, SEIC anticipates that the construction of fault crossings in 2007 will generate nearly 2 million m³ of additional spoil. In order to provide permanent disposal sites for spoil that cannot be returned to the RoW during technical reinstatement, SEIC is currently pursuing the development and approval of approximately 26 spoil disposal sites outside of the RoW.

- In Section 3, where the main concerns have been raised in relation to spoil management, a total of 103 spoil tips and temporary spoil piles have been identified. 15 of these will remain as permanent spoil tips at approved sites with re-engineering to improve drainage and stability. The remaining spoil tips have been identified for removal.

Engineering designs are still under review between SEIC and the Russian authorities.

By mid-May 2007, three new spoil tips had been identified in Section 3. These included a flat area near the Lesnaya valley and quarry in Gornoe. We understand from SEIC personnel that outline approval for the use of these disposal locations has been provided but that approval of the final designs for these spoil tips is ongoing with the authorities. As of mid-May 2007 removal of five of the spoil tips had been largely completed.

6.6.3.7 Access Roads

RPN identified within their Summary and Recommendations of the Committee (State Inspector) letter dated 15th September 2006 the requirement for SEIC to carry out all activities to prevent surface runoff from access roads. Within the EAP developed by SEIC, they have agreed to identify and upgrade all permanent access roads with culverts over streams and adequate drainage, and further, to remove all temporary access roads. Temporary erosion controls will be superseded by full technical reinstatement by the end of 2008.

6.6.3.8 Vegetation Clearance

A number of instances have been identified where vegetation clearance has extended beyond the permitted boundaries of the RoW. We also note that some pipeline re-routes were made following initial clearance of original routes e.g. the original pipeline route north of the Chaivo landfall. These instances are localised in nature, but reinstatement will nonetheless be required, including tree planting where appropriate. In this regard, SEIC has made the commitment to reinstate all disturbed areas, including those outside of the ROW.

Some RoW clearing activities (logging) in the Makarov region were undertaken in advance of Final Land Allocation, although Preliminary Land Allocation was in place and compensation was requested by the authorities and duly paid. Permits were later issued to allow continuation of the works.

6.6.3.9 Remediation Action Plan

In order to address non-compliances specific to soil erosion and reinstatement SEIC is developing an Erosion Control and Reinstatement section within a wider RemAP. This RemAP section must address both final technical and biological reinstatement with clearly identified measurable and time-bound objectives, targets and success criteria. These should be phased as necessary and include interim targets to enable ongoing progress to be monitored in an effective and timely manner. Furthermore, the RemAP must describe what actions are required to meet all stated objectives and targets, and how these actions will be implemented, including identification of the associated resource requirements, responsibilities and sign-off authorisation. The RemAP must provide this information in sufficient detail to demonstrate the Company's capacity to effectively meet all objectives.

Until final reinstatement is complete, the Project will be out of compliance with HSESAP commitments and the potential for soil erosion risks will remain. The RemAP must therefore also address minimization of erosion risks prior to final reinstatement through the use of

temporary measures and most importantly improvements in surface stabilisation of steep slopes. In the interim, we understand that a temporary erosion control campaign was to be run from May to June 2007. We understand that a contractor incentive scheme has been put in place for erosion control and reinstatement activities that is due to run until the end of July, but with the possibility to be extended as appropriate.

6.6.4 Summary and Discussion of Impacts

Erosion control measures throughout the construction period have fallen short of the HSESAP requirements standards and this has resulted in environmental impacts, principally through the release of sediments into rivers and wetlands. Valuable improvements have been identified since the summer of 2006 in all aspects of erosion control. Nonetheless non-compliances with the HSESAP remain, especially in relation to surface stabilisation of steep slopes and progress on final reinstatement.

The cumulative significance of these historical and ongoing impacts is difficult to gauge without monitoring data. Furthermore, any such impacts must also be placed in the context of a natural environment where landslide/mudslide risks are prevalent in certain areas. These natural risks vary significantly from one drainage basin to another, and hence the incremental sediment loading due to runoff from the RoW is similarly variable. In addition, smaller volume, long duration sediment runoff events occurring outside of the common high flow periods have the potential to create greater impacts than might result from incrementally higher sediment loads that occur during periods where rivers naturally carry elevated sediment concentrations. Overall we estimate the environmental materiality of the impacts to be potentially **moderate** (although higher impacts may occur in the longer term if required improvements in performance are not achieved). This assessment is based on:

- the spatial and temporal extent of these impacts along the RoW (the vast majority of the RoW has been opened, and hence subject to erosion risks without adequate control measures being in place, for significant periods of time, in some cases over 2 years)
- the presence of sensitive rivers and wetlands adjacent to the exposed RoW
- the potential for incremental sediment loading over natural periods of raised sediment levels.

Furthermore, the prolonged and persistent breaches of SEIC's own requirements and HSESAP commitments are materially **high** from a procedural/best practice perspective.

In collecting monitoring data, survey work needs to assess both the extent of ongoing raised turbidity levels and the condition of the riverbeds of sensitive rivers downstream. Following the 2006 spring thaw SEIC undertook studies of turbidity levels; the programme entailed taking periodic upstream and downstream samples at the key sensitive river crossing locations to identify any areas where the RoW results in significant sediment load to the watercourse. The overall approach to this sampling programme was appropriate and included identification of rivers where turbidity levels downstream are either:

- greater than 10NTU higher than upstream levels, or
- less than 10NTU higher than upstream levels, but where the downstream value is greater than twice the upstream value.

Identification of rivers in this manner provides a valuable mechanism for prioritisation of SEIC's erosion control activities. Between May to July 2006, turbidity samples were undertaken at 157 sensitive rivers and results indicated that during this period downstream turbidity levels were over 10NTU higher than upstream levels on a least one sampling occasion for 61 (39%) of these rivers. This provides some indication of the cumulative nature of the deficiencies in erosion control across the most sensitive project-affected rivers at that time. However, by the end of June 2006 the proportion of rivers with raised downstream turbidity levels had significantly declined and this is likely to be as a result of both improved drainage and sedimentation control practices over this period and the end of spring thaw period. Nonetheless, the available data does indicate that downstream NTU levels in some rivers had been increased by more than 10NTU for several weeks, which may lead to some sub-lethal affects on salmon and taimen.

Reinstatement of the RoW to appropriate standards is achievable, but is likely to occur over several years and will require improved contractor performance to ensure that this occurs effectively (improvement has been noted since spring 2006, but this needs to be maintained). There have been delays in the production of the RemAP and the final technical and biological reinstatement plan. These plans will need to be reviewed by AEA in order to make judgements on SEIC's ability and preparedness to undertake adequate and timely reinstatement. While we can report that dedicated reinstatement specialists are now in place in the pipeline sections, concerns remain over the availability of necessary equipment and materials, especially small-scale excavators/bulldozers appropriate for technical reinstatement, agricultural equipment for surface preparation and seed broadcasting equipment.

SEIC's outline timescales for completion of final reinstatement of the RoW do not meet the HSESAP commitments and do not anticipate that full compliance will be achieved until the end 2008. Given the importance of timely and successful reinstatement in reducing medium-to-long term impacts on, for example, sensitive rivers and pipeline integrity, we consider this issue to be of **moderate** materiality.

In 2006 concerns were raised by both AEA and Russian authorities (RPN) in relation to the location, design and approval of spoil tips. By the time of writing (July 2007), SEIC has made some important progress on this issue and in particular locations and designs for appropriate permanent spoil disposal sites are currently undergoing approval and review by both regulatory authorities and SEIC's inhouse geotechnical experts. While the issue of spoil tips remains an issue of **moderate** materiality environmentally (due to the potential for release of significant volumes of spoil into sensitive rivers at several locations) and is a potential regulatory issue, it is now apparent that SEIC is implementing an appropriate management plan to resolve these concerns. Resolution of this issue is also to be addressed as part of the erosion control section of the RemAP.

The key issues in relation to soil erosion control are summarised in Table 6-5 below.

Table 6-5 Summary of Key Issues Relating to Soil Erosion

Issue ref.	Issue	Materiality	Ref	Nature of Issue	Status
6.29	<p>Material breaches have been identified in relation to temporary erosion control commitments in HSESAP Part 2 Table 2.5. These include:</p> <ul style="list-style-type: none"> • Lack of surface stabilisation measures, particularly prior to the onset of winter (commitments 22, 55, 64, 65 & 68) • Inadequate installation of drainage controls (commitments 22 and 67) • Lack of provision of adequate erosion control materials and equipment in good time (commitments 57 & 58) <p>These non-compliances are both historical and, despite recent improvements, to a lesser extent ongoing. In particular surface stabilisation of slopes remains an area of key concern. The cumulative significance of these impacts is difficult to gauge without monitoring data, but we estimate the environmental materiality of these impacts to be moderate (although may be high if required improvements in performance are not achieved during the 2007 growing season). This assessment is based on the spatial and temporal extent of these non-compliances along the RoW (the vast majority of the RoW has been opened, and hence subject to erosion risks without adequate control measures being in place, for significant periods of time, in some cases over 2 years) and the presence of sensitive rivers and wetlands adjacent to the exposed RoW. Furthermore, we consider that the prolonged and persistent breaches of SEIC's own requirements and HSESAP is materially high from a procedural/best practice perspective.</p> <p>SEIC is currently finalising an Erosion Control and Reinstatement section within a wider RemAP in order to rectify outstanding non-compliances and this will be reviewed by AEA. In the interim SEIC has instigated a temporary erosion control campaign to be run from May to June 2007 in order to effect immediate improvements and repairs.</p>	<p>Environment Potentially M</p> <p>Procedural/ Best Practice H (due to breach of key Company requirements)</p> <hr/> <p>Environment Potentially M (High if required improvements are not achieved)</p> <p>Procedural/ Best practice H</p>	<p>OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Adequacy of Assessments & Plans Implementation of Plans</p> <hr/> <p>Implementation of Plans</p>	<p>Historical</p> <hr/> <p>Pending RemAP</p>
6.30	<p>Efforts to segregate topsoil on the project have generally been inadequate to meet the requirements of HSESAP commitment 60. Although recent efforts to preserve of topsoil during RoW clearance in 2006 have been identified, topsoil preservation has not been undertaken during the majority of RoW works. Although the breach is largely historical, the actual impact will be felt during future efforts at reinstatement, which will be significantly hampered (re-vegetation will still be possible, but will require greater effort, time and cost to successfully establish). It is good to report that local experts have developed seed additives requirements to help overcome this issue, but confirmation is required that the authorities and landowners will permit this to be applied.</p>	<p>Environment Potentially M</p>	<p>OP 4.01 Annex C HSESAP Table 2.5</p>	<p>Implementation of Plans</p>	<p>Historical (although impacts felt in future)</p>

Issue ref.	Issue	Materiality	Ref	Nature of Issue	Status
6.31	<p>Under HSESAP commitment 113 final grading, topsoil replacement and installation of permanent erosion control structures should be completed within 20 days of backfilling the pipeline trench. Pipeline construction activities commenced in 2004 and by May 2007 over 90% of the pipeline had been installed and backfilled. However, despite the progress made on pipeline installation, with the exception of a few limited locations, final reinstatement has not typically been completed on the RoW (although significant temporary seeding has been undertaken we consider it unlikely that this will represent adequate final reinstatement). This represents a material and ongoing breach of commitment 113. Given the importance of timely and successful reinstatement in reducing medium-to-long term impacts on, for example, sensitive rivers and pipeline integrity, we consider this issue to be of moderate environmental materiality.</p> <p>Detailed targets and timescales for permanent reinstatement are not available at the time of writing. However, from discussions with SEIC personnel we understand that in broad terms 50% of the total length of the RoW will be technically reinstated by the end of 2007 (except where ongoing activities prevent completion). The remaining technical and all biological reinstatement will be completed by the end of 2008. These timescales mean that full compliance with the HSESAP is not anticipated to be achieved until the end 2008. SEIC is currently developing an erosion control and reinstatement section of a RemAP. This plan should provide phased reinstatement targets at key time intervals, such as prior to the onset of winter and also provide details of when full compliance will be restored. Once complete, this RemAP will need to be reviewed on behalf of the Agency Lenders.</p>	<p>Environment Potentially M</p> <p>Procedural/ best practice H (due to breach of key Company requirements)</p>	<p>OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Adequacy of Assessments & Plans Implementation of Plans</p>	<p>Historical</p>
		<p>Environment Potentially M</p> <p>Procedural/ Best practice H (due to breach of key Company requirements)</p>		<p>Implementation of Plans</p>	<p>Pending RemAP</p>

Issue ref.	Issue	Materiality	Ref	Nature of Issue	Status
6.32	<p>In 2006 concerns were raised by both AEA and Russian authorities (RPN) in relation to the location, design and approvals of spoil tips. At the time of writing (July 2007), SEIC has made some important progress on this issue. In particular, SEIC has:</p> <ul style="list-style-type: none"> • Increased its geotechnical expertise both in the central offices and in the field. • Completed a survey by geotechnical specialists of the existing spoil tips and temporary piles across the entire RoW. • Agreed an Environmental Action Plan with the authorities for rectification of issues raised in RPN audits that include a number of items specific to spoil tips. • Instigated review by the geotechnical specialists of the locations and designs for the required permanent spoil tips (is process is ongoing). • Initiated the process of permanent spoil tip location and design approval by Russian authorities. • Commenced removal of spoil tips as necessary (e.g. clearance operations are underway at 5 out of 25 spoil tips identified for removal in section 3). <p>While the issue of spoil tips mains an issue of moderate environmental materiality (due to the potential for release of significant volumes of spoil into sensitive rivers at several locations) and is a potential regulatory issue, it is now apparent SEIC is implementing an appropriate management plan to resolve these concerns.</p>	<p>Environment Potentially M</p> <p>Potential regulatory issue</p>	<p>OP 4.01 Annex B & C HSESAP Table 2.5</p>	<p>Adequacy of Assessments & Plans Implementation of Plans</p>	<p>Pending</p>

6.7 WETLANDS

6.7.1 Background

The pipeline RoW crosses several wetland areas and this section discusses the general aspects of SEIC's management of impacts on these environments. Aspects specifically related to wetland areas affected by the Chaivo Bay pipeline reroute are discussed separately in Section 6.8.

Wetland systems are classified in the RF according to their load bearing capacity and peat content as Type I, II or III (Type I having the highest load bearing capacity and Type III the lowest). According to the EIA addendum, in total the pipeline RoW crosses:

- 74km of Type I wetland (comprised of 26 separate areas)
- 42.4km of the Type II swamps (comprising 90 wetland areas).
- 1.9km of Type III swamps (103 areas in total).

Key potential impacts associated with construction activities in wetland areas may be summarised as:

- Changes to hydrological flow regimes flows
- Compaction of peat layers (with resultant loss of structure)
- Loss of wetland flora
- Impacts on fauna that utilise the wetland habitat (this includes fish and wading birds). In particular, the coastal wetlands of the north-east coast of Sakhalin contain breeding habitats for several rare species of coastal birds and this area is on the shadow list of Russian Federation sites for potential designation under the Ramsar Convention as a Wetland of International Importance. See also Section 6.8.

The assessment of impacts on wetlands has been addressed by SEIC in Chapter 3 of the EIA addenda and the main mitigation measures are outlined in tables 2.3 (onshore biodiversity) and 2.5 (land management) of the HSESAP. The main mitigation measures include:

- Avoidance/minimisation of Project activity and footprint in sensitive wetland areas
- Winter crossings to both reduce impacts on peat layers (compaction) and to avoid sensitive ecological periods, such as breeding seasons
- Appropriate construction of temporary access roads and suitable burial depth of the pipeline to minimise disturbance to hydrological flows

6.7.2 Current Status and Compliance

Overall, AEA considers that the potential environmental impacts associated with construction in wetland areas are adequately assessed in the EIA addenda. We also find that appropriate mitigation and management controls are defined in the HSESAP, although two areas of uncertainty within the plans are identified that will require ongoing monitoring as to their resolution:

- Construction timing. It was originally intended that all construction in Type II and III wetlands would be undertaken in the winter. However, in 2005 SEIC decided that construction in some areas of such wetlands may be undertaken outside of winter (as

allowed for under the HSESAP, Table 2.5, Row 43). The criteria to determine when non-winter construction is to be permissible and the extent of Type II/III wetlands affected remains unclear. With pipeline construction largely complete further information is required from SEIC regarding the areas and extent of construction that has taken place outside of winter, the reasoning behind any decision for non-winter crossings and for these areas, any failures to adhere to the HSESAP. These issues should be addressed via the wetlands RemAP (see Section 6.7.3)

- Access roads/RoW running track. It is stated in the EIA addenda that SEIC intends to remove all RoW-related roads, but that “*consideration will be being given to the longer term use of some sections of wetland roads during operation and maintenance, subject to agreement with RF authorities and taking into account SEIC policies and commitments with respect to managing access to previously undisturbed or ecologically important areas*”. Temporary roads in wetlands may also be retained (but upgraded as necessary) if the impact caused by removal of the road would likely be greater than leaving the road in-situ. The process for identifying which roads will be retained permanently will be defined in the wetlands section of the RemAP (see Section 6.7.3).

Site visits by AEA during construction have revealed reasonable levels of compliance with the wetland-related commitments in the HSESAP, although some breaches of relevant commitments have been identified as follows:

- During the May 2006 site visit by AEA two wetland locations (the area between KP 212-220 and the area around the R. Leonidovka) were identified where hydrological flows had been visibly interrupted by access roads and/or the RoW running track, resulting in noticeable flooding and drying of the wetlands either side of the road/RoW. In both instances drainage controls under the roads (e.g. flumes pipes) require enhancement and if this can be achieved before long-term detriment of the wetlands occurs the environmental impacts will be relatively low. However, technical issues may make short-term rectification difficult in some areas and so impacts may be potentially more significant.
- Inappropriate construction of access roads along the RoW has been identified in certain wetland areas. The most significant examples identified relate to the RoW running tracking through the Dolinsk wetland area and the wetland between KP 212 to 220. In both these instances the running track was partly constructed out of imported rubble and soil, and without suitable geotextile underlay in breach of Commitment 36 of HSESAP Table 2.5. These incidents took place prior to the finalisation of the HSESAP (although this practice was also in contradiction of Project construction standards in force at the time) and hence are historical in nature, although difficulties faced in reinstatement of the wetland are a future issue. Nonetheless, provided that restoration can be performed through removal of adequate amounts of the imported material the environmental impact of these two incidents should be relatively low. Efforts to remove the imported material following installation of the pipelines should be monitored.
- Poor segregation and replacement of surface vegetation during reinstatement of the RoW that will severely hinder biological reinstatement e.g. North of KP 212 in Section 2B.

AEA has been informed that material that was imported to the wetlands areas will be removed, although some material e.g. timber may be left to degrade if an environmental

assessment demonstrates there is an overall net environmental benefit associated with 'leave alone' option.

The overall impact of these breaches will only become fully apparent over the longer term, and following the results of post construction monitoring. However, based on the extent of wetland known to have been affected, and the timeframes associated with the natural recovery of wetland systems we would estimate a moderate environmental materiality. A more accurate evaluation can only be performed once the ecological sensitivity and feasibility of remedial actions for the affected areas is understood.

6.7.3 Wetlands RemAP

SEIC is currently developing a remedial action plan for wetlands within a wider RemAP. This plan should confirm SEIC's plans with respect to permanent access roads/RoW running tracks and provide phased remediation targets at key time intervals, such as the removal of imported materials and also provide details of when full compliance will be restored. More specifically the wetlands section of the RemAP should, to the extent possible:

- Confirm SEIC's intentions with respect to the removal of access roads and running track.
- Confirm the extent of non-winter wetland construction, and explain why non-winter construction was required.
- Identify non-compliances associated with winter and non-winter wetland construction.
- Specify remedial actions to restore compliance and remediate any impacts that resulted from the HSESAP non-compliances (within defined timeframes and against success criteria).

However, it should be noted that before detailed wetland remedial actions can be defined, it is first necessary that SEIC undertakes a more detailed evaluation of the ecological sensitivity (including identification of RDB species) of the wetland areas crossed by the RoW and furthermore assesses the nature and extent of physical and ecological impacts resulting from pipeline construction activities. Therefore, at this stage, the wetlands section of the RemAP must focus on the development and implementation of appropriate monitoring programmes, surveys and assessments. Although precise remedial actions and offset options can only be identified once these assessments have been undertaken, the RemAP should nonetheless outline potential options.

Once complete, the RemAP will need to be reviewed on behalf of the Agency Lenders.

Table 6-6 Summary of Key Issues Relating to Wetlands

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.33	<p>Overall AEA considers that the potential impacts associated with construction in wetland areas are adequately assessed in the EIA addenda and that appropriate mitigation and management control are identified in the HSESAP. The EIA addenda does however identify two areas of uncertainty in SEIC’s proposed plans/mitigation measures that will require ongoing review. These relate to the potential for SEIC to:</p> <ul style="list-style-type: none"> • Undertake construction in some Type II and III areas outside of winter (criteria for when this is to be allowed are unclear from the EIA addenda and HSESAP) • Make access roads in some wetland areas permanent (rather than temporary) <p>The materiality of the issues associated with the above uncertainties is difficult to determine at present and will be function of the extent to which they occur and the adequacy with which activities are managed and monitored by SEIC.</p>	Environmental Potentially M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Pending (receipt of RemAP)
6.34	<p>Inappropriate construction of access roads along the RoW has been identified in certain wetland areas during AEA’s site visits. The most significant examples identified relate to the RoW running tracking through the Dolinsk wetland area and the wetland between KP 212 to 220. In both these instances the running track was partly constructed out of imported rubble and soil, and without suitable geotextile underlay in breach of Commitment 36 of HSESAP Table 2.5. These incidents took place prior to the finalisation of the HSESAP (although this practice was also in contradiction of Project construction standards in force at the time) and hence are historical in nature, although difficulties faced in reinstatement of the wetland are a future issue. The ecological sensitivity and feasibility of remedial actions is to be assessed through implementation of the RemAP. On the basis of these unknowns (technical feasibility and ecological sensitivity) this issue is considered to have a potentially moderate environmental materiality.</p>	Environmental Potentially M	OP 4.01 Annex C HSESAP T2.5, R36	Implementation of Plans	Pending Remap
6.35	<p>During the May 2006 site visit by AEA two wetland locations (the area between KP 212-220 and the area around the R. Leonidovka) were identified where hydrological flows had been visibly interrupted by access roads and/or the RoW running track, resulting in noticeable flooding and drying of the wetlands either side of the road/RoW. In both instances drainage controls under the roads (e.g. flumes pipes) require enhancement and if this can be achieved before long-term detriment of the wetlands occurs the environmental impacts will be relatively low. However, technical issues may make short-term rectification difficult in some areas and so impacts may be potentially more significant.</p>	Environmental Potentially M	OP 4.01 Annex C	Implementation of Plans	Historical

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.36	Poor segregation and replacement of surface peat and vegetation during reinstatement of the RoW e.g. North of KP 212 in Section 2B.	Environmental Potentially M	OP 4.01 Annex C	Implementation of Plans	Historical

6.8 BIODIVERSITY

6.8.1 Background

Sakhalin Island is rich in flora and fauna, has numerous important habitat types, and is home to rare and endangered species. This section addresses SEIC's approach to the management of habitats and some individual species, and considers long term plans/projects in addition to the short term mitigation measures detailed in the EIA materials and HSESAP. It does not cover baseline survey work and environmental monitoring plans in any detail, which are discussed in Sections 6.3 and 6.18.the HSESAP. More specifically we discuss the adequacy of the earlier EIA materials with respect to biodiversity issues and also address more recent or ongoing issues, including the development of a biodiversity action plan (section 6.8.7) and construction activities on the Chaivo Spit (section 6.8.13).

6.8.2 Evolution of the Issue

The EIA materials assessed the Project's potential impacts on identified habitats/specific species. The measures described in the EIA are captured as a series of commitments in the HSESAP, primarily within the onshore biodiversity, offshore biodiversity and land management tables.

Key objectives stated in the HSESAP for the management of biodiversity require SEIC to:

- Consider biodiversity in all project planning to meet SEIC's biodiversity commitment and other biodiversity protocols (as listed in the HSESAP)
- Comply with legislation
- Minimise ecological impact
- Restore ecological processes where this can be technically achieved
- Minimise disturbance
- Undertake monitoring and undertake remedial measures
- Ensure that personnel engaged in Project activities are fully aware of commitments made by SEIC with respect to hunting, gathering and fishing
- Discourage illegal/increased access to previously inaccessible areas (induced access).⁸³

AEA reviewed the 2003 EIA, and concluded that a number of issues related to biodiversity required further detail. SEIC accepted the comments made in that review, and following a request from the Agency Lenders, provided additional information through a number of EIA addenda chapters. These included addenda for:

- Protected areas
- Red data book and migratory birds
- Steller's sea eagles.

These are discussed below.

⁸³ Induced access refers to an increased in access to previously inaccessible/difficult areas that has occurred as a result of the Project.

6.8.3 Protected Areas

There are a number of protected areas on the island, including two that are crossed by the pipelines, namely the Makarovsky and Izubrovsky Reserves. AEA discussed the nature of these reserves with SEIC and in particular explored the:

- historical background to their protected status
- environmental sensitivities
- potential impacts and their precise location
- restrictions imposed (through review of relevant government decrees)
- the appropriateness and adequacy of suggested mitigation measures.

Following a process of iterative review the EIA addendum chapter on protected areas accurately addresses the issues listed above.

Of note, both reserves were initially designated as hunting and forestry areas until 2000, when they were re-designated as biological reserves to protect rare and endangered species. AEA has reviewed the Russian decrees applicable to each reserve and note that whereas they specify a number of restrictions, they do permit the construction of pipelines within designated timeframes.

The pipelines will transect both reserves covering a distance of approximately 12km and 16km for the Makarovsky and Izubrovsky reserves respectively. The pipeline RoW was surveyed (100m either side of the RoW for flora and 2km either side of the RoW for fauna) to characterise the ecological settings and identify red data book species prior to construction. A number of rare and endangered plant species were identified. In addition to the earlier baseline surveys, further surveys were to be carried out during the spring/summer months on a further occasion during construction, again during commissioning and then on a longer-term basis. The operational monitoring programme, and therefore the details of the longer term monitoring, are not yet defined.

AEA understands that SEIC considered avoiding the reserves but, through a decision making process, concluded that the overall impact could be minimised by aligning the pipeline with existing linear infrastructure already crossing the reserves. Given the existence of RDB species outside of the reserves, and on the basis that pipeline construction is permitted under the conditions of the relevant RF/Sakhalin Oblast decrees, AEA views this approach to be reasonable. In addition to generic mitigation measures specified for the construction of the pipeline, construction is restricted to certain time periods and other activities, such as the siting of construction camps in the reserves, are prohibited. These measures, to construct and operate in accordance with relevant decrees and permit conditions, are captured in the HSESAP Table 2.3 rows 8 and 9.

AEA is not aware of any problems encountered by SEIC whilst adhering to these mitigation measures specified for protected areas.

6.8.4 Red Data Book and Migratory birds

The EIA addendum for red data book and migratory birds provides a good overview of the important bird species and habitats on Sakhalin Island. In this report we do not wish to

duplicate the content of the EIA addenda, although it is worth highlighting some key points to put in to context the importance of the island with respect to bird species.

The island is host to over 350 bird species, and 19 species are listed in the 'Red Data Book - Threatened Birds of Asia'. These species are unevenly distributed and generally exist in small populations that reflect the distinct and variable habitat types. The majority tend to inhabit the coastal lagoon/wetland areas on North East Sakhalin. Many of the bird species are migratory, using Sakhalin as a migratory bridge between Japan and mainland Russia. The importance of Sakhalin to these birds is reflected by the number that are included within the Japan-Russia Migratory Bird Treaty.

SEIC has commissioned numerous ornithological studies across the Project's footprint. These studies have provided broad temporal and spatial coverage and have been undertaken by a number of different organisations. Taken as a whole we believe they provide a good level of baseline data commensurate with the requirements of the EIA process. AEA has also met with some of the researchers undertaking survey work in the field, and can confirm the competency of these field staff and the appropriateness of the survey methods.

SEIC's approach to the protection of RDB birds is to minimise impact on the habitats upon which these birds depend (with the exception of Steller's sea eagles where additional nest-specific mitigation measures are employed). Thus the EIA addenda characterises the habitat types on Sakhalin and then further refines this characterisation to identify those habitats that are particularly important to RDB birds.

Mitigation measures for these important habitats include:

- avoidance of activities at the most sensitive times of the year (see section on 6.8.13 Chaivo Bay below)
- maintaining the functionality of supporting habitats avoiding/minimising the footprint on such areas where possible
- reinstatement of disturbed land, notably the RoW.

Nevertheless, some habitat loss at the permanent facilities is unavoidable, as is habitat modification e.g. loss of woodland along the RoW. SEIC has identified those areas where the RoW encroaches on important habitat types that are limited to confined areas. In practice this primarily includes forest ecotypes that are restricted to river valleys. For such areas, loss of habitat is minimised and loss of breeding sites (hollows in mature trees) is offset by an artificial nest scheme (see section 6.8.10).

AEA views the approach, the survey work undertaken and the proposed mitigation measures captured in the HSESAP, to be reasonable. However, issues remain regarding the implementation of these mitigation measures, and in particular the implementation of reinstatement along the RoW (see Section 6.6) and the timing of construction activities (see Chaivo Bay, Section 6.8.13).

6.8.5 Steller's Sea Eagles (*Haliaeetus pelagicus*)

The Steller's sea eagle (SSE) is included in IUCN red data book and classified as vulnerable. The eagles inhabit coastal areas of eastern Asia including the coastal habitats of north-east Sakhalin during the spring and summer months. This brings them into close proximity to the

Project's activities during their nesting period over the spring/summer. During the autumn they gradually migrate south and are known to inhabit Japan.

Following the release of the 2003 EIA, the Project's potential impact on the SSE received a lot of interest from Japanese stakeholders, including Japanese scientists who had been studying SSEs on Sakhalin. An addendum chapter dedicated to SSEs was prepared, in part to respond to the concerns expressed by stakeholders and further to specify more precisely a suite of mitigation measures.

The protection measures afforded to SSEs are described in the EIA addenda and also captured in the HSESAP (Table 2.3, rows 16 – 25, 42 and 45). In brief these include:

- Establishment of a 500m buffer zone around active nests within which no construction activity will be permitted during the nesting season.
- The cessation of vegetation clearance along the RoW in known nesting areas until after the nesting season.
- Avoiding the felling of trees used for nesting along the RoW.
- Scheduling work for rivers supporting significant fish (SSE food source) in the winter months.
- Restrictions on helicopters flights in the vicinity of nest sites to maintain vertical and horizontal separation, and to ensure landing sites will be at least 1 km from nesting areas.
- Monitoring of individual pairs of SSEs nesting in proximity of the Project's activities.

Based on available literature regarding the disturbance of nesting SSEs, the mitigation measures are appropriate to avoid an adverse impact on breeding SSEs and the rearing of chicks.

Some disagreement between scientists working on behalf of SEIC and other scientists has been expressed over the number and locations of SSE nests. It is unclear whether such differences actually exist, or whether they are the result of differing survey areas and reporting criteria. Although SEIC has its own team of ornithologists surveying SSE nesting sites, we are informed that SEIC would welcome additional information from other scientists to enhance the data set, although the precise locations of nest sites identified by other scientists were not forthcoming. Regardless of any disagreement over the numbers and location of nest sites in the general area, in terms of protecting the SSEs from direct project impacts, it is essential that the active nest sites in close proximity to the Project activities are identified and monitored, particularly as occupied nests will change from year to year. SEIC has done this on an ongoing basis and we have a good degree of confidence that the vulnerable nest sites have been identified.

Since the establishment of a 500m buffer zone in the 2005 HSESAP, there has been some refinement of nest specific exclusion zones with the establishment of an alternative 350m exclusion zone (supplemented by a 700m exclusion zone) in which various activities are prohibited in different periods of the nesting cycle. This allows for more stringent restrictions during the most sensitive part of the nesting cycle which can be relaxed during the less sensitive periods e.g. once the nest has been established and the chicks have hatched. These

refinements were defined by SEIC's SSE specialist and are in line with SEIC's commitment to develop nest specific mitigation measures where appropriate.

AEA has visited Project activities in close proximity to SSE nest sites. We have met with SSE monitors in the field, have witnessed the cessation of construction and erection of barriers with signage to prohibit access to the RoW and more broadly we are able to confirm that the mitigation measures detailed in the HSESAP are being implemented. Furthermore, site induction courses (e.g. at the OPF) have been given to AEA that inform new workers of SSE sensitivities and the rules applicable to protect nesting birds.

6.8.6 Sea Eagle Research Programme

The Sea Eagle Research Programme (SERP), which is carried out by Moscow State University and funded by SEIC for the duration of the construction period, aims to evaluate the abundance of white tailed and Steller's sea eagles in north-east Sakhalin and the health of the SSE. It is also hoped that an improved understanding of these factors will enable mitigation measures to be refined. In 2006, the research programme was expanded to include observation of food provided to chicks using remote cameras, a study into the extent of bear predation towards chicks and some field trials to determine methods to protect nest sites.

Following construction, the continuation of the SERP is likely to be incorporated within the long term Biodiversity Action Plan (see Section 6.8.7).

6.8.7 Biodiversity Action Plan

SEIC's intends to address some of the longer-term biodiversity issues, on an island-wide basis, through the development of a Biodiversity Action Plan (BAP) and makes a commitment to this effect in the HSESAP, Table 2.3, row 3. This plan is intended to take a longer-term coordinated approach to the management of biodiversity across the entire Project (at ecosystem level rather than asset level), whilst at the same time having a focus on research and sustainability for some specific habitats/species. The BAP will also provide a framework for the development of collaborative initiatives, the further enhancement of ecological protection measures and a means to promote stakeholder engagement. It is anticipated that much of the assessment work already undertaken during construction will be furthered under the umbrella of the BAP, and continued beyond the construction phase. AEA is informed that the BAP will take account of relevant international conventions and will be developed in consultation with relevant stakeholders.

The development of a BAP is not a requirement placed upon SEIC as a private organisation under RF Law or any of the standards or guidelines applicable to the Project. Instead it is a SEIC initiative that will assist in the understanding and sustainability of Sakhalin habitats and species, and represents a long-term commitment to the management of ecosystems beyond the initial impacts of the construction phase. On this basis we view SEIC's commitment to a BAP as laudable and representing best practice. A draft framework for the BAP has been provided to AEA, which provides reasonable aims and approach to the development of the BAP.

A significant amount of ecological data has been gathered through the baseline survey work undertaken to date, and many of the Island's environmental sensitivities are well understood. This information is likely to form the basis for priority species/habitat plans. SEIC has not

finalised the priority species and habitats although, on the basis of existing studies, Species/Habitat Action Plans are likely to include:

- sea eagles (as the Sea Eagle Research Programme is only scheduled to continue in its current form through to the end of construction activities)
- western gray whales
- Sakhalin taimen
- salmonids and riverine systems
- protected and migratory birds
- wetlands.

Although much of the work and understanding on which the BAP will be based has been initiated/completed, the BAP should bring a number of benefits beyond those of the EIA process, for example it:

- encourages participation of other bodies
- allows for better assessment of cumulative impacts
- helps form long term monitoring strategies
- provides a framework for future developments
- enhances stakeholder communications.

In relation to the above benefits, AEA has previously expressed concerns about SEIC's assessment of cumulative impacts. These still hold and it is therefore important that the BAP will assess and mitigate against longer term cumulative impacts.

In the absence of a detailed BAP there are a number of unknowns (which priority species/habitats, indicators, plans for engagement with stakeholders, resourcing, monitoring and reporting) and AEA is therefore not currently in position to comment fully on its adequacy.

Timeliness of BAP

The HSESAP (released December 2005) anticipated completion of the BAP by the end 2005 and therefore SEIC has not met this timeline. We understand the delay has resulted from an expansion of the BAP's original scope and SEIC's desire to engage with key organisations whilst developing the BAP.

The timeframes for development of the BAP have been discussed with the Agency Lenders and a revised wording agreed for the HSESAP, which removes reference to a precise date and links the BAP development to the operational phase of the Project. However, Agency Lenders requested that the implications of any delay beyond the original timeframes should be assessed.

In order to assess the significance of the delay, it is necessary to consider the key components and benefits brought by a BAP, those elements of a BAP that are already in progress (through the EIA process), and the significance in terms of loss of these benefits that occur because of the revised completion date.

The overall objective of any biodiversity action plan is to manage and enhance the species and habitats within an ecosystem. A typical BAP will be developed through some or all of the following steps:

1. Baseline characterisation
2. Prioritisation of key species and habitats
3. Assessment of threats to these species/habitats (not only resulting from the Project)
4. Measures to protect/enhance threatened species/habitats
5. Development of indicators
6. Long term monitoring plans
7. Reporting.

Through the environmental impact assessment and some species specific projects currently underway (e.g. for Steller's sea eagles and the western gray whale), SEIC have a good understanding of 1 to 4 above, with measures in place to address these throughout the construction phase and in some cases beyond. These steps, and 5 to 7 above, can reasonably be further developed within the revised timeframes for the BAP.

At the time of writing a process of data consolidation and stakeholder engagement is taking place prior to finalisation of the BAP by the end of 2007. Whereas the initial timeframes were preferable, such that the benefits of a good BAP could be realised more quickly, with the exception of the taimen issue detailed below, the revised timeframes should not result in significant adverse effects, particularly as the EIA process provides the primary environmental protection measures. However, AEA would stress the importance of finalising the BAP prior to the operation phase so that it can feed into the operational monitoring plans.

The one element of the BAP likely to suffer from a delay relates to taimen because of the unknown distribution of taimen in Project affected rivers, and the potential for impact⁸⁴ during pipeline crossings of taimen supporting rivers. Initially SEIC had plans to carry out a taimen survey independently of the BAP in early 2005, and then later to carry out the survey work within the BAP framework. This approach was reasonable whilst the BAP was scheduled for 2005 and thereby able to inform the river crossings strategy. However, as the timeframes for the BAP, and therefore the taimen survey were extended, the ability of the survey findings to inform the river crossing strategy diminished. Thus, whilst for the most part the extended timeframes the BAP did not present a significant concern, elements of the BAP relating to Taimen should have been accelerated outside of the BAP (see section 6.8.8).

Current Status of the BAP

The Agency Lenders formally requested a progress update in March 2007, including further information on:

- The approach to species and habitat specific protection including migratory birds
- Integration of existing programmes

⁸⁴ Article 24 of the Federal law No 52-FZ "on wildlife" April 1995 provides that activities that cause death, reduction in population or disturb the natural habitats of rare or endangered species are prohibited. In the event of adverse effects on taimen or their habitat, the Project could raise regulatory questions.

- The establishment of an expert group to provide input to the BAP process
- Anticipated timeframes.

The status of the BAP development was discussed during a visit to Sakhalin Island in April 2007. At that time SEIC was in the process of setting up an expert 'Biodiversity Group' and was talking with the Ecological Council of Sakhalin Oblast (an advisory body that includes local scientists, regional environmental protection agencies and local NGOs) with the intention of forming a sub group from the Council to then coordinate the Biodiversity Group (which may itself have sub groups addressing specific areas). SEIC has also invited others through the Ecological Council including:

- WWF Far East
- recognised bird and fish experts with an interest in Sakhalin's fauna from mainland Russia and Japan
- the Wild Salmon Centre (WSC). The BAP framework was presented at the Sakhalin Salmon Initiative launch and the WSC has agreed to be involved.
- the Moscow Academy of Science
- the Smithsonian Institute. The Smithsonian Institute will not be involved in the BAP development process but may be prepared to review the BAP.

In addition to the above participants SEIC will also have representation in the Biodiversity Group.

SEIC had an initial meeting with Ecological Council representatives in May 2007 where the mechanics of the biodiversity group and working relationship with the Ecological Council were discussed. SEIC will look to draw upon expertise within the Biodiversity Group, for advice/confirmation of the priority species specific and habitat actions plans. It is SEIC's intention that the advice and recommendations given by the Biodiversity Group will be dealt with in a constructive and inclusive manner to inform SEIC on the priority issues and assist in the development of a robust and appropriate BAP. However, the recommendations provided by the panel will be non-binding and therefore, unlike the WGW advisory panel, there is no formal requirement to accept all reasonable comments.

The composition of the Biodiversity Group was discussed further in a subsequent meeting chaired by the Ecological Council in which members were proposed in line with those invited by SEIC, with the notable exception of the WSC. The final composition of the Biodiversity Group was not fixed at the time of writing.

Current timeframes anticipate completion of a draft BAP in October 2007 and a finalised version in December 2007.

6.8.8 Taimen Survey

A draft scope of work for the 'Sakhalin taimen survey along the route of the onshore pipeline route' was reviewed by AEA. Specific goals and objectives include:

- Identification of taimen supporting river systems

- Establishment of a baseline for future scientific work and assessment of the impact of human activities (including estimated adult population numbers and the most important habitat types).

The scope of work specifies information gathering via discussions with local fishermen, literature searches, distribution and density surveys and possibly a study of genetic variability in selected rivers (if appropriate permits can be obtained). Two surveys were planned for 2007, including:

- a spring survey in which effort would focus on spawning areas and habitat types through a combination of techniques such as visual surveys from the bank (where possible), in-stream snorkelling surveys and catch and release surveys where tissue samples can be taken (subject to permits).
- a late summer survey, scheduled for late August to early October, in which the emphasis would be placed on juvenile densities using similar visual/catch and release techniques.

Approximately 7-9 rivers were to be selected along the pipeline routes to gain representative spatial coverage. For each river, ten reaches were selected and surveyed for habitat type and the presence of spawning fish.

The spring survey took place in late May/June as planned with reporting scheduled for January 2008.

6.8.9 No Net Loss Project

SEIC has committed to a 'no net loss' of salmon spawning habitat project. In order to implement a 'no net loss' project any loss of habitat must be quantified. To assess the extent of habitat damage SEIC plan to:

- confirm suitable material has been used to restore actual river crossings
- undertake post construction monitoring of spawning habitat (comparing results to baseline wherever possible)

and then initiate a river restoration project in 2007.

The river restoration project will take place irrespective of actual loss of spawning habitat attributable to the Project. As part of the river restoration work a reconnaissance survey was planned in June 2007 followed by workshops in late June to look at watershed enhancement with the Forestry Department. A Total Resource approach to the 'no net loss' commitment has been adopted. This means that loss of spawning habitat in the north of the island could be compensated for by the restoration of rivers in the south. The selection of river(s)/habitat(s) for restoration will be based on the extent to which restorative actions will yield enhanced habitat.

Currently SEIC is planning to work with the Wild Salmon Centre to enhance the habitat of the Dhzimdan River. The restoration programme may be expanded, particularly if the results of post construction monitoring indicate the need for further restoration in order to meet the no net loss commitment.

6.8.10 Artificial Nest Scheme

In line with Table 2.3 row 38 of the HSESAP, SEIC committed to *'The provision of artificial nesting sites for RDB bird species (e.g. owls, mandarin duck) at selected locations (e.g. river valleys, sections of dark coniferous forest) shall be investigated and implemented, if found to be appropriate'*. An initial nest scheme has given disappointing results. A possible reason for this is that nests are too new and positioned in sub-optimal locations. The artificial nest scheme remains a component of the BAP, although SEIC intends to monitor the existing nests for a further year before making any decisions on whether to reposition the nests.

6.8.11 Project Induced Access

Many areas of Sakhalin Island remain remote, with limited vehicular access, which has the advantage of minimising disturbance through human presence and limits the direct impacts from hunting and poaching. However, one of the major concerns threatening current ecosystems arises from Project related increased or 'induced' access that can result in impacts such as:

- Increased hunting and poaching (including salmon)
- Theft of rare bird eggs
- Increased interaction with wildlife (encouraging scavenging wildlife)
- Collection of rare artefacts
- Fragmentation of habitat.

The nature of the Project provides the potential to increase access to previously inaccessible locations, mainly through Project access roads and the pipeline RoW. Thus a number of commitments are made in the HSESAP to minimise induced access including a key objective to *'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'*, HSESAP Table 2.3, row 46.

The same row further states:

Illegal/increased access to previously inaccessible areas shall be discouraged through the appropriate use of fencing and measures such as barriers across roads. In order to limit the potential for poaching, new temporary access roads constructed by the Contractor or new extensions to pre-existing roads or tracks during the pipeline laying operations shall be removed and access to the RoW blocked when construction activities have been completed, unless the road is designated as a permanent access road. The number of permanent access roads left in place following construction shall be minimised as far as practically possible.

The areas most vulnerable to increased access are found along the pipeline RoW and the remote coastal areas close to the OPF and Chaivo Bay activities. New access roads close to Chaivo Bay are controlled by ENL, thereby reducing the effects of induced access. Similarly roads and RoW to the east of the OPF are controlled by security guards that prevent non-authorised access. There is access for SEIC staff and its contractors, and controls are placed on these individuals through SEIC's hunting, gathering and fishing policy (see Section 6.8.12).

Thus the main threat from induced access relates primarily to the pipeline RoW. At the time of writing, the majority of the RoW remains open, with access still required. Thus it is not possible to confirm that new/extended roads have been removed or blocked, however it is clear that existing forestry tracks have been used where possible. SEIC has confirmed that temporary access roads in wetland areas will be removed once no longer required for construction purposes, except where a net environmental benefit analysis indicates they should be left in place.

In the 2005 HSESAP, Commitment 46 in Table 2.3 of the HSESAP states *'The Company's Operations team will develop an anti-poaching plan during the course of 2006. The Company is committed to engaging with the Wild Salmon Centre and nominated experts in the development of this plan. The control of induced access will be key to the success of any anti-poaching plans.* The wording has been modified slightly in the updated 2007 HSESAP although the intent remains the same. SEIC will not produce the plan described in the 2005 HSESAP but rather will work with the Wild Salmon Centre as part of the Sakhalin Salmon Initiative (SSI), launched in October 2006. The SSI will promote the conservation of salmon and salmon supporting habitats through a number of programmes. This will include the identification of a network of priority rivers and river basins in which anti-poaching enforcement measures will be strengthened.

6.8.12 Management of Human Activity

SEIC has a 'no hunting, fishing or gathering policy' that applies to all SEIC and contractor staff, with an exception where an employee is local to Sakhalin and has a permit to hunt, gather or fish (see HSESAP Table 2.3 Row 44). Whereas it is not possible to comment on the effectiveness of this policy, AEA can confirm that SEIC and construction workers are made aware of this policy through inductions and signage. The policy is also incorporated within the camp management policies across the Project.

6.8.13 Chaivo Bay

The Chaivo Bay area is a coastal lagoon/wetland area inhabited by a diversity of wading birds, including a number of Red Data Book species. It is also an area nominated as a shadow Ramsar⁸⁵ site. On the southern portion of the Spit and to the west of the lagoon Exxon Neftegaz Limited (ENL) also has operations.

During the design phase/early construction of the Project, the Piltun Astokhskiye offshore pipelines were to come ashore to the North of the Chaivo spit resulting in little potential for impact at Chaivo from construction and operation of the Project, with the exception of possible impact in the event of an oil spill. However, following the decision in early 2005 to re-route the Piltun offshore pipeline south of the Piltun WGW feeding grounds (Alternative-1 – see also Section 6.4) a new landfall was required. The pipeline now comes ashore on the Chaivo spit, runs west across an area of sensitive wetland habitat and then south along the west coast of the Chaivo spit before crossing the Chaivo lagoon and again heading west until it meets the original pipeline route (see Project Description, Section 2 and Figure 6-5⁸⁶).

Of note, the pipeline is routed in this manner to minimise the amount of pipeline RoW on the most sensitive areas used by nesting birds (the area of diagonal purple shading shown in Figure 6-5). Nevertheless SEIC recognised that the pipeline runs either through or along the

⁸⁵ Ramsar sites are wetlands of international importance designated under the Ramsar Convention

⁸⁶ Figure reproduced from the Chaivo EIA

periphery of sensitive bird habitat and undertook a separate EIA in 2005 (and a SIA) for this pipeline re-route. This EIA has been posted on SEIC's website and was submitted for SEER approval which was subsequently received.

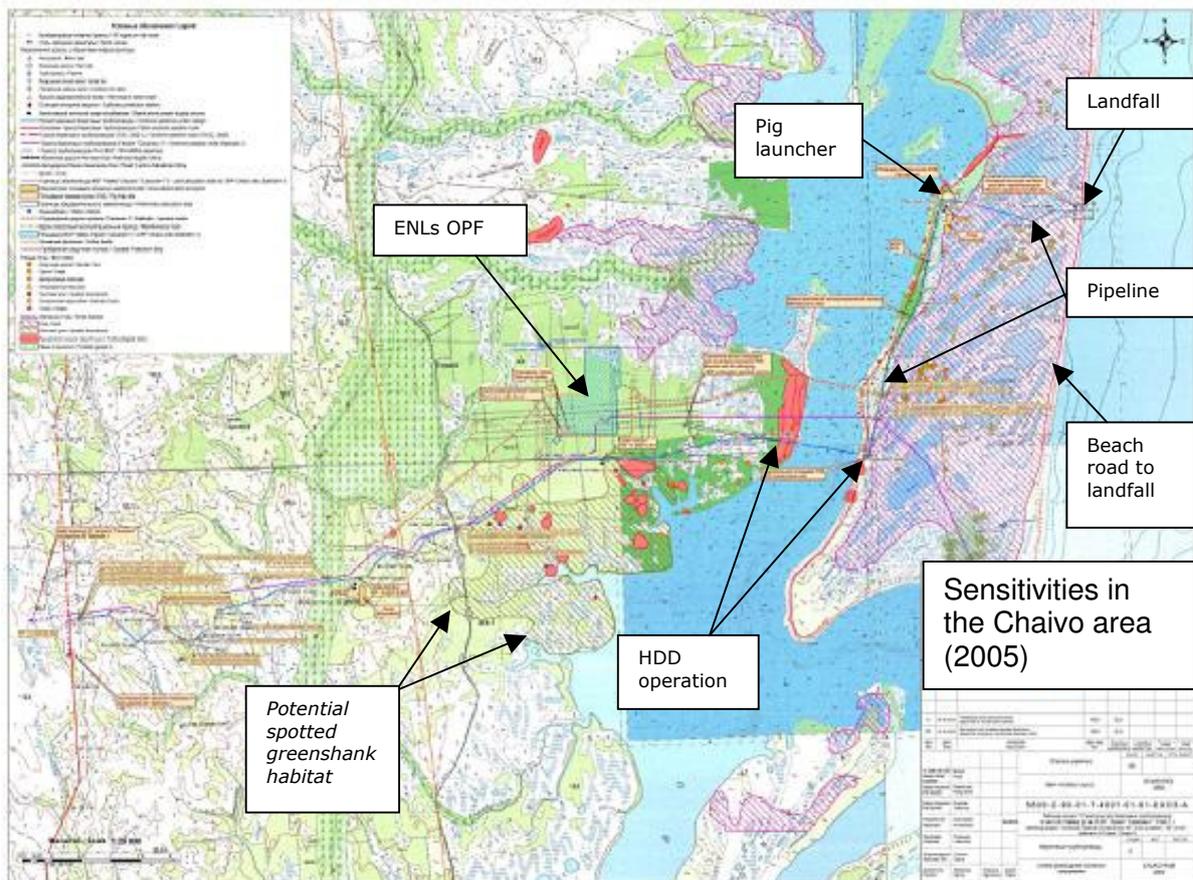


Figure 6-5 Chaivo Lagoon

The Chaivo EIA identifies 60 bird species on the Chaivo spit, the majority of which nest on the spit, including the following four protected species.

1. Steller's sea eagle (*Haliaeetus pelagicus*)
2. Spotted Greenshank (*Tringa guttifer*)⁸⁷
3. Sakhalin dunlin (*Calidris alpina actites*)
4. Aleutian tern (*Sterna aleutica*).

In order to minimise the impact on bird species and the supporting habitat the EIA recommended the following Chaivo specific mitigation measures:

- minimise transect of the habitat supporting Red Data Book bird species
- minimise the width of the RoW
- construction of pipelines during the winter period

⁸⁷ A small number of possible sightings was reported in 2005. Subsequent surveys been unable to confirm the presence of Spotted Greenshanks and there is some doubt whether they inhabit the area.

- to the extent possible, bypass the larch forest to minimise the number of trees that require felling
- Separation and storage of mineral topsoil and vegetation for later reinstatement of the RoW.

These recommendations of the EIA were mirrored by the commitments made in the 2005 HSESAP (on the SEIC website at the time of writing), which commits to:

“Winter working to avoid sensitive areas of wetland habitat used by breeding red data book bird species” (Table 2.3, Row 34).

and

“Where the pipeline is located within mineral soil, the mineral soil shall be replaced around the pipe, where practicable, and finally shall lift ice/sphagnum moss block (if present) back into trench in original position/orientation.” (Table 2.5, row 42)

The first of these commitments has since been amended and is scheduled for release in the SEIC website in an updated HSESAP during September 2007 (see below). The revised text was agreed in September 2006 although the public release was delayed in part due to changes in shareholder ownership.

6.8.13.1 Work outside of the winter period – spring/summer 2006

Following a site visit in May 2006, AEA confirmed that pipeline construction had been halted on the 1st May. However, related activities were continuing at the HDD site and beach landfall with the latter continuing for a number of weeks thereby overlapping with the most sensitive bird nesting period. At that time, Agency Lenders had not been informed of these activities, nor had the arrangements necessary to amend the HSESAP specified within the management of change procedure (HSESAP Part 1, Section 5.9) been implemented.

For the HDD operation, the arrival of the drilling rigs was delayed due to technical difficulties experienced at previous river crossing sites and thus the Chaivo lagoon crossing started later than originally planned. SEIC recognised that they had a limited window of opportunity to complete the HDD prior to the end of winter and therefore decided to run two HDD rigs in parallel in an attempt to accelerate the crossing. However, we were informed that electromagnetic interference between the two drill heads was thought to affect the directional drilling and the simultaneous drilling with two rigs had limited success. As a consequence of the delayed start, the technical difficulties in running two rigs, and because the HDD operation could not be halted and then restarted once in progress, HDD activities were not completed until early June 2006.

Construction activities at the beach landfall occupied a small area and were limited to the excavation of sand in preparation for the offshore pipeline pull-in. However vehicular access in 2006 was via a beach road (see Figure 6.5) that runs along the eastern side of Chaivo spit, flanking the sensitive habitat, thereby increasing the zone of disturbance. The actual pipeline pull-in took place in June/July, and would have resulted in an increased level of traffic/activity with the potential to displace any nearby breeding birds from their eggs/chicks present in the zone of disturbance. AEA accepts that the offshore pipelines must be laid in the summer months, but nevertheless considered it a breach of the agreement not to work outside of the winter period as defined in the December 2005 HSESAP (Table 2.3, row 34).

Given that the pull in of offshore pipelines in winter is technically unfeasible, the HSESAP has since been amended (with Agency Lenders' consent) to allow some work outside of the winter period, when red data book birds are not present. The revised text, to be released on the SEIC website in September 2007, states for the Alternative 1 re-route that '*In sensitive areas of wetland habitat used by breeding/migrating red data book bird species, construction work can proceed outside of the winter period provided that prior to construction observations confirm no breeding/migratory red data book birds are present in the potential zone of influence*'.

AEA was aware that SEIC also had to complete pipeline installation along the western side of the spit (where work stopped earlier than anticipated due to the arrival of Steller's sea eagles)⁸⁸ and had to construct a permanent access road to the pig launcher. In addition to the pipeline near the SSE nest, approximately 1km of a 14 inch line between the landfall and the pig station remained above ground. The timing of these additional works was under discussion with work outside of the winter period being considered. However, SEIC provided assurance that any further work outside of the winter period that would represent a breach of the HSESAP would not be undertaken without a sound environmental justification nor without the support of the Agency Lenders.

Due to the concerns highlighted above, AEA revisited the Chaivo spit in July 2006 in order to fully understand the precise construction schedule, and thereby gain a greater appreciation of the potential impacts. SEIC provided further information regarding the remaining construction activities and proposed a schedule for the remaining works. The results of the 2006 survey were also presented along with a proposed way forward, involving limited construction works outside the zone of influence, or outside the most sensitive breeding periods for RDB birds.

In AEA's opinion, the most precautionary approach would be to avoid all summer construction activity. However, given that the winter construction period fell behind schedule, we understand the rationale for wishing to deviate from the original HSESAP commitment, and also accept that some activity can be undertaken outside the winter period without material impact.

In August 2006, AEA again visited the Chaivo spit to:

- Confirm the extent of any construction activity and implementation of mitigation measures.
- Witness construction activities in close proximity to sensitive habitat/known nesting areas and assess extent of any impact.
- Meet with the survey team to discuss the methodology and results of 2006 survey work, and confirm the timing of the breeding cycle for 2006.
- Assess SEIC's plans for 2006 summer construction activities and confirm these would not result in adverse impacts.

Based on the findings of this visit AEA was able to confirm that, with the exception of the activities carried out at the landfall and the HDD sites earlier in the summer period, no

⁸⁸ Work stopped following the arrival and nesting of the SSEs in line with the commitments specifically developed for SSEs as set out in the HSESAP.

additional work had taken place on the spit. This means that no construction work took place in close proximity to the main nesting areas during sensitive times of the breeding cycle. Furthermore, a small number of possible nesting sites recorded in close proximity to the HDD and landfall sites were considered to be unsuitable for RDBs, and more likely to have been recorded sightings of birds in flight.

The limited construction activity in the early part of the summer was considered to have resulted in negligible impact. For the remainder of the 2006 summer period it was our view that additional construction could take place with minimal impact on RDBs provided that SEIC adhered to the additional mitigation measures listed below:

- Work on the landfall - Pig Trap section (KP 0-2.4) should proceed after the end of August, when all RDB birds should have left the area (although monitoring is required to confirm this is the case);
- Work on the Pig Trap site should take account of the presence of migratory waterfowl feeding area to the south of Arkutu Island, 750m from the site. In particular, encroachment onto the Bay shore and the use of boats to access the site should be avoided.

These additional mitigation measures were not breached.

6.8.13.2 SEER approval and permits

SEIC undertook additional environmental assessments for the Chaivo re-route which formed the basis for an environmental justification and was submitted to the Russian authorities for SEER approval⁸⁹. The EIA received a positive SEER conclusion and permits for construction were subsequently obtained by the Company in December 2005, with the second extending the permit validity through to 2008 including non-winter months.

The SEER makes several references to winter working and within the conclusions it states that *'The design documentation contains the environmental impact assessment materials which envisage nature protection measures and substantiate ecological permissibility of the planned activity'*. SEIC's position is that within this context, winter timing for construction activities represents a mitigation measure for minimising environmental impact, but it does not prohibit working outside of the winter period, particularly if alternative mitigation measures are in place.

The permits make reference to the design documentation (including the environmental assessments), procedures and the positive SEER conclusion. It is SEIC's interpretation that the statement included in the permit, that project documentation has a positive SEER conclusion, is given only in the descriptive part of the construction permits and does not translate into any type of condition on the permit. It is also the case that mandatory winter works are not mentioned under "special conditions" in the permits.

Whereas we understand SEIC's position as outlined above, we are unable to confirm in our role as the IEC the non-mandatory nature of Chaivo SEER provisions relating to winter works.

⁸⁹ Opinion of the Expert Examination Board for State Environmental Expertise Committee on the Design "Construction of Onshore Pipelines from 0.00km (Chaivo) to the 35th km. No 317, November 2005.

6.8.13.3 Work outside of the winter period – spring/summer 2007

Aleutian tern and Sakhalin dunlin

In April 2007 AEA was informed that some construction was scheduled to take place on the Chaivo spit at the piggings station located approximately 2 km west of the beach landfall and along the western access road. We understand it was SEIC's original intention to undertake these works outside of the spring/summer period but logistical problems, coupled with poor ground conditions, led to the decision to continue into spring/summer. The revised HSESAP text (Table 2.3, row 34 as amended for release in September 2007 - see above) does allow for some construction work outside of the winter period provided certain restrictions/conditions are met, including:

- Work to proceed outside of the winter period provided that prior to construction observations confirm no breeding/migratory red data book birds are present in the potential zone of influence.
- Adherence with any mitigation measures relating to the protection of SSEs.

However, these conditions were not met as described below.

In 2007, construction activities continued from the winter and were ongoing prior to the arrival of the birds and throughout the nesting period. It was SEIC's view that, based on bird nesting surveys undertaken in the area during summer periods in previous years (2004 to 2006), the location of activities scheduled for summer 2007 (including the pig-trap construction and associated use of the access road) were outside of the sensitive areas of wetland habitat used by RDB birds. However, the possibility that RDB birds might nest in close proximity to these construction areas could not be ruled out on the basis of the previous survey work. In our opinion observations were needed to confirm that RDB birds were outside of the zone of influence prior to construction (this would have required SEIC to stop works before the birds arrived and then undertake surveys to determine the location of the birds once they had selected their nest sites). However, this was not undertaken and therefore in AEA's opinion this represents a breach of the refined HSESAP (Table 2.3, row 34) commitment described earlier.

Survey work in 2007 was subsequently undertaken whilst construction activities were ongoing. The survey showed the majority of RDB bird nesting sites to be located away from the construction activities with only one RDB bird nest site (Sakhalin dunlin) to be in close proximity (150m) of the access road.

The environmental impacts resulting from this breach are unlikely to have been significant for the following reasons:

- Both the Aleutian terns and Sakhalin dunlin, with the exception of one pair of dunlin, have nested at distances in excess of 300m from the piggings station and access road i.e. outside of the zone of influence. Whereas it is possible that the birds were influenced by ongoing activities during their prospecting phase, it should also be acknowledged that the areas close to both the piggings station and access road do not provide optimal nesting habitat. Furthermore, previous surveys have shown the birds to select different areas from year to year suggesting that they are not habitat limited.

- The Aleutian tern is classified as ‘least concern’ by the IUCN with a global population of 30,000 to 35,000, and as category 3 (lowest category) in the Sakhalin RDB. The IUCN RDB classifies the dunlin (*Calidris alpina*) as ‘least concern’ but does not provide information on the Sakhalin sub-species. The sub-species of dunlin (*Calidris actites*) is given category 1 status (highest category) in the Sakhalin RDB. The number of Sakhalin dunlin inhabiting the island is unclear, but estimated to be a few hundred pairs. For both bird species the impacts from 2007 construction are not considered to represent a threat at the population level.

SEIC has continued construction activities in the area in the belief that their activities are not going to have a significant impact on breeding RDB birds. However they proposed a number of ongoing mitigation measures and further survey work for the remaining period of construction. AEA cannot determine the influence that construction activities may have had on birds during their nest prospecting phase, but on the basis of current survey data AEA concurs with the view that impacts will not be significant. Nevertheless, in failing to apply the precautionary principle the approach did not represent best practice and the approach was also a breach of the HSESAP.

Steller’s sea eagle

In spring 2007 a pair of Steller’s sea eagles inhabited a nest site in close proximity of the access road leading to the pigging station. Construction activities, albeit on a reduced scale, were ongoing on the Chaivo spit at the time of the eagles’ arrival, and involved the movement of vehicles along the access road to the pigging station in close proximity of the eagles’ nests (a cluster of four nests used by a single pair identified as CHV-33). This is contrary to a commitment in the HSESAP (Table 2.3, row 20) that requires “*Establishment of a buffer zone within which no construction activity shall be permitted during the nesting season (SEIC has ordered that the pipeline contractor maintain a buffer distance of 500m from any active Steller’s Sea-eagle nests).*” The HSESAP also allows for the development of nest-specific mitigation measures (Table 2.3, row 17) resulting in the use of 350m buffer zones as discussed in Section 6.8.5. Such nest-specific mitigation measures were prepared for the affected Chaivo nest site. Although these generally maintained the requirement to prohibit construction related activities in close proximity (i.e. within 350m) of the active nest site during the most sensitive period of the breeding cycle, these nest-specific mitigation measures did allow for controlled movements of limited numbers of light vehicles.

SEIC has informed AEA that nest-specific mitigation measures were in place and the number of vehicles passing through the SSE buffer zone decreased. However, traffic levels initially remained in excess of these mitigation measures and did not decrease soon enough following arrival of the eagles. (SEIC subsequently undertook an incident investigation and has defined tighter preventative measures to avoid a reoccurrence).

The eagles did not raise any chicks, although it should be noted there are a number of reasons why eagles might fail to breed (e.g. presence of bears, adverse weather, inexperience). However, it is possible that construction-related activities, in excess of that allowed in the nest specific mitigation measures, contributed to, or were directly responsible for, the failure to breed. On this basis we consider this issue to have an environmental materiality of ‘potentially moderate’.

6.8.13.4 Other issues

During a site visit of pipeline construction activities in 2006 the top layer of the soil column from the RoW (KP 0.0 – 2.4) had not been segregated for use during reinstatement. Although the ‘topsoil’ is very thin, consisting of a matted layer of lichen/moss, attempts to segregate this material is required according the HSESAP commitments. Reinstatement of the RoW in this sensitive wetland area is likely to be difficult without this material.

It is also noteworthy that there are cumulative impacts in the Chaivo Bay area because of the additional Exxon Neftegas Limited (ENL) year-round activities on the southern portion of the Spit and to the west of the lagoon.

6.8.13.5 Summary

In the spring/summer of 2006 SEIC undertook construction works outside of the winter months in breach of the 2005 HSESAP. Following a number of trips, including a visit by AEA’s ornithologist, we conclude that any adverse effects would have been negligible. We further believe that additional works can be carried out in the later part of the summer if the additional mitigation measures suggested above are put in place to protect feeding RDB birds and migratory waterfowl. Amendments to the HSESAP have also been made (although not publicly released at the time of writing), such that further protection measures are in place to minimise any activities during sensitive bird periods. However, in spring/summer 2007, construction activities took place during the most sensitive nesting period without prior confirmation that all birds were outside of the zone of influence. Although SEIC has provided rationale as to why they consider this to be acceptable, in AEA’s opinion these activities were in breach of the revised and agreed HSESAP. With respect to the pair of Steller’s sea eagles, it is possible that construction-related activities, in excess of that allowed in the nest specific mitigation measures, contributed to, or were directly responsible for, the failure to breed. Agency Lenders were not given prior notification of these activities.

Table 6-7 Summary of Key Issues Relating to Biodiversity

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
6.37	Some construction activities were undertaken in summer 2006 outside of the winter period on the Chaivo Spit, contrary to HSESAP (2005) commitments. However, the actual impact of the limited construction activity in the early part of the summer is considered to have been negligible.	Environment L	OP4.01	Implementation of plans	Historical
6.38	<p>During the spring and early summer of 2007 some construction work occurred at the pigging station and access road. The work commenced prior to the arrival of the birds and continued throughout the nesting period, but observations did not take place to confirm RDB birds (Aleutian tern and Sakhalin dunlin) were outside of the zone of influence. This represents a breach of the refined mitigation measures. Survey work undertaken during ongoing activities revealed only one RDB bird nest site to be within close proximity (150m) of construction activities, and thus an environmental materiality of ‘Low’, although the possibility that construction activities influenced the selection of nesting sites cannot be ruled out.</p> <p>The decision to continue construction in spring/summer 2007 resulted from logistical problems, coupled with poor ground conditions in the 2006/07 winter which removed any contingency from the construction schedule. Thus this breach would appear to have been driven by scheduling requirements and is assessed to have a high materiality against ‘procedure’ (breach of Company requirements) and ‘reputation’. Agency Lenders were not given prior notification of these activities.</p>	Environment L	OP4.01	Implementation of plans	Historical
		Reputation H			
		Best Practice/ Procedure H			
6.39	<p>In spring 2007 a pair of Steller’s sea eagles occupied nest sites in close proximity of the access road leading to the pigging station. The eagles did not raise any chicks, although it should be noted there are a number of reasons why eagles might fail to breed (e.g. presence of bears, adverse weather, inexperience). However, it is possible that construction-related activities, in excess of that allowed in the nest specific mitigation measures, contributed to, or were directly responsible for, the failure to breed. On this basis we consider this issue to have an environmental materiality of ‘potentially moderate’.</p> <p>See also Row 6.38 above regarding notification of Agency Lenders.</p>	Environment Potentially M	OP4.01	Implementation of plans	Historical
		Reputation H			
		Best Practice/ Procedure H			

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.40	The SEER makes several references to winter working and within the conclusions it states that <i>'The design documentation contains the environmental impact assessment materials which envisage nature protection measures and substantiate ecological permissibility of the planned activity'</i> . AEA has been informed by SEIC that construction permits making reference to the design documentation and associated positive SEER approval do not prohibit construction during the non-winter periods. AEA is unable to confirm the non-mandatory nature of the Chaivo SEER provisions relating to winter works.	Potential regulatory issue (referred to the ILA)	OP4.01	Implementation of plans	Unresolved

6.9 ANIVA BAY

6.9.1 Introduction

Aniva Bay has been subject to a number of construction activities associated with the crude oil and LNG export facilities. These activities include construction of the LNG Jetty and the Materials Offloading Facility (MOF) at Prigorodnoye, the Tanker Loading Unit (TLU) located 4.5 km south of the beach and a pipeline connecting the OET to the TLU. Dredging was required for both the MOF and the LNG Jetty, with the majority occurring at the jetty in order to provide sufficient turning circle depth for visiting LNG carriers.

In total 1.45million m³ of dredge spoil has been removed from the construction area. This has been already been disposed at a site located 25km south of Prigorodnoye in a water depth of 65m. There is further seabed disturbance associated with trenching for the 4.5km pipeline.

Aniva Bay is an area of commercial fishery for both fish and shellfish. A number of impacts from the above activities were considered likely, including:

- Permanent loss of habitat
- Smothering and mortality of fish eggs and immobile benthic organisms including shellfish
- Change of habitat
- Depletion of light and subsequent detrimental effects on seaweeds
- Physiological damage to fish due to high suspended sediment concentrations
- Physiological damage to fish organs from piling operations.

AEA had concern over the rationale behind the selection of the dredged spoil disposal site and the dredging techniques/mitigation measures used *vis-à-vis* those outlined in the 2003 EIA.

6.9.2 Site Selection Process

Stakeholders had a number of concerns over project construction activities in Aniva Bay, arguing that the disposal site selected by SEIC did not represent the best environmental option. AEA also expressed concern over the selection of the disposal site and specifically the adequacy of the analysis of alternatives prior to construction (see timelines in Figure 6-7 below). SEIC provided a justification for the selection of their preferred site via the EIA addenda, which was reviewed by AEA.



Figure 6-6 Aniva Bay

The 2003 EIA made reference to two potential disposal locations without detailed consideration of relative suitability of these sites. The EIA addenda (Chapter 12) gives much more consideration of the relative merits of three potential disposal sites. Sites 1 and 2⁹⁰ were suggested by the SakhNIRO (Oblast coastal fisheries authority) and site 3 by Sakhrybvod (Oblast freshwater fisheries authority) following baseline survey of sites 1 and 2. Site 3, also suggested by Sakhrybvod, is located considerably further from the dredging area in water exceeding 900m. On the basis of the distance, difficulties in gaining baseline data at site 3 and the likelihood that fine sediments would be spread over a greater distance during disposal, this option was dismissed. This then left 2 options, which are compared in the addenda section against a set of operational and environmental criteria. On the basis of this comparison Site 2 is the preferred site and AEA concurs with this conclusion. However, we expressed concern that only two sites were fully considered and that there may be other locations within reasonable distance of the dredge site where less damage would result from disposal activities. Such a situation might occur should Site 2 be found to be unique in nature or hosting rare or endangered benthic species.

In order to confirm that Site 2 was not unique we reviewed fisheries data collected over a number of years. During this review we focused on the distribution of commercial shellfish, and in particular the commercially valuable opilio crab which appeared to inhabit the area surrounding the disposal site and was cited by NGOs using the diagrammatic results of a trawl survey by SakhNIRO in 1998 to highlight the significance of the site.

⁹⁰ Figure is reproduced from the EIA addenda

During our review we examined the results of trawl surveys and found that distribution maps had been produced that were often based on extrapolation of very few samples. Such extrapolation was apparent for the opilio crab and the information used by NGOs to support their claim. However, additional surveys by SakhNiro in later years revealed a different distribution. These differences may result from seasonal fluctuations or may be due to the methods used to interpret the results. Regardless, we found that this crab species was not dependent on the limited area close to the disposal site and, more generally, that there are no special features that would render the zone within 50 to 100m of the disposal site a unique habitat in Aniva Bay.

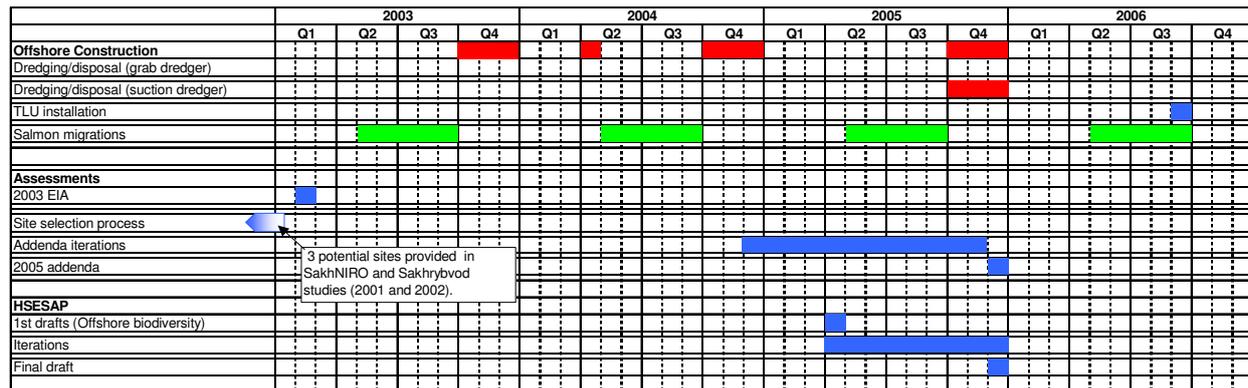


Figure 6-7 Timeline of Aniva Bay Assessments Against the Construction Schedule

6.9.3 Impact assessment

The EIA addendum provides a good description of the impacts associated with dredging and spoil disposal (using predictive modelling tools). We consider the assessment to be appropriate and initial monitoring results at the disposal site align with the predicted modelling results.

6.9.4 Mitigation and monitoring

Mitigation measures and monitoring plans are also provided in the addenda. We consider these to be appropriate and can confirm that these have been captured in the HSESAP.

6.9.5 Materials Offloading Facility

In addition to the Project changes highlighted in Chapter 13 of the EIA addenda (Material Project Changes) we were subsequently informed by SEIC in 2006 that the Material Offloading Facility at the LNG site would be modified slightly to become a permanent facility for the deployment of oil spill response equipment during the operation phase. This project change is a relatively recent development and consequently the findings of studies determining the long-term impact of a permanent MOF were not included in the EIA materials released for public disclosure and have not yet been reviewed by AEA.

6.9.6 Summary

AEA’s concerns with the adequacy of the 2003 EIA were suitably addressed by the EIA addenda. The dredged spoil site selection process did not follow a rigorous analysis of alternatives, however SEIC have been able to demonstrate that the selected site is appropriate.

The rocky nature of the dredge spoil will change the character of the seabed immediately beneath the disposal zone, although this may actually provide a new habitat for other species. Away from the immediate disposal zone there will be short-term impact through smothering of immobile benthic organisms, although the uncontaminated nature of the spoil should allow full recovery within a few years.

The output from monitoring surveys needs to be assessed to confirm the extent of impact and recovery of the area.

Table 6-8 Summary of Key Issues Relating to Aniva Bay

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
6.41	<p>The analysis of alternatives and selection of a preferred dredge spoil disposal site in Aniva Bay was not clearly explained in the 2003 EIA. Since then SEIC has produced an addendum that addressed the disposal site selection process. This highlighted 3 possible sites and provided reasonable justification for the preferred site. However much of this was undertaken retrospectively in order to demonstrate the site was appropriate, rather than prior to construction activities. AEA believes the site selected was appropriate and we therefore assess the environmental materiality of this issue to be low. However, a robust analysis of alternatives was not undertaken prior to construction activities and, as such, this is an historical ‘best practice’ issue because the requirements of OP4.01 were not met.</p>	<p>Environment L</p> <hr/> <p>Best Practice L/M</p>	<p>OP4.01</p>	<p>Adequacy of assessments & plans</p>	<p>Historical</p>
6.42	<p>The MOF was originally intended as a temporary structure but in 2006 SEIC decided it would be modified to become a permanent structure. We understand that an environmental assessment, looking at the long-term impacts of a permanent jetty has been undertaken by SEIC. To date, this study has not been reviewed by the IEC.</p>	<p>Environmental Potentially L/M</p>	<p>OP 4.01 Annex B</p>	<p>Adequacy of Assessments & Plans</p>	<p>Pending</p>
6.43	<p>During the earlier stages of due diligence, we identified the potential for future classification of currently unclassified water bodies (such as Aniva Bay) by the authorities to the higher sensitivity classification. In such cases major restrictions could potentially be placed on the construction and the operation of the Project.</p> <p>Since our initial concerns SEIC have acquired permits to release effluents to Aniva Bay (during construction phase). This demonstrates that the authorities do not consider Aniva Bay to be of the highest water classification which would be compatible with the fact that other effluents are already discharged to the Bay e.g. from Korsakov.</p>	<p>Potential regulatory issue</p>	<p>Compliance with Russian Law</p>	<p>Adequacy of Assessments & Plans</p>	<p>Closed</p>

6.10 MARINE MAMMALS OTHER THAN WGW

6.10.1 Background and Evolution of the Issue

Following review of the 2003 EIA, AEA identified limitations in the baseline characterisation of marine mammals other than WGW (so-called “non-WGW” marine mammals). These limitations in baseline characterisation in turn raised concerns over the adequacy of impact assessment, including:

- The Steller Sea Lion (SSL)⁹¹, particularly with reference to potential winter use of waters around Aniva Bay and potential impact of Project activities on this species.
- Noise impact assessments resultant from offshore construction activities, especially impacts from piling activities in Aniva Bay on potentially sensitive species such as the Cuvier’s beaked whale.
- Consideration of vessel collision risks (ship-strike), particularly with respect to the North Pacific Right whale and bowhead whale.

In response, SEIC undertook further survey and assessment work culminating in Chapter 6 of the EIA addenda, which specifically addressed the above issues.

6.10.2 Current Status and Compliance

From our review of the EIA addenda we now conclude that SEIC has resolved the above issues and the assessment of impacts on non-WGW marine mammals as presented in the EIA addenda is adequate and in line with relevant standards for environment assessment. In particular, the EIA addenda provides:

- Much improved baseline characterisation of non-WGW marine mammal habitats. This includes greater use of available survey and literature information (especially in relation to the SSL), improved interpretation of data and greater definition of the spatial relationships between the habitats of sensitive species and the Project’s facilities and activities. More remote sensitivities (*e.g.* seal haul outs) could be affected by an oil spill, and further year-round information on the SSL habitat usage has been produced by SEIC through the coastal sensitivity mapping required for the development of the OSRP (see Section 10).
- An assessment of noise impacts, including impacts resulting from piling activities in Aniva Bay. These studies provide suitable demonstration that the risks from such impacts are low.

In addition, mitigation measures, including those relating to collision risks with vessel are now described within the MMPP. The issue of collision risks has been the subject to review by the ISRP/IISG (see Section 6.4).

⁹¹ The SSL is listed as “Endangered” within the IUCN Red List and the Red Book of the Russian Federation (2001)

Table 6-9 Summary of Key Issues Relating to Non-WGW Marine Mammals

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.44	<p>The EIA addenda provided an improved and adequate characterisation of the extent and interpretation of baseline characteristics, including the definition of the spatial relationships between the habitats of sensitive species and project activities. SEIC have been able to demonstrate that there are no sensitivities in close proximity of their activities. Further assessments of other impacts, such as noise impacts from piling activities in Aniva Bay have also been undertaken that demonstrate that the impact risks are low.</p> <p>More remote sensitivities (<i>e.g.</i> seal haul outs) could be affected by an oil spill, although these are understood to have been addressed in the oil spill response plans.</p>	Environmental H	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed

6.11 COMMERCIAL FISHERIES

Following the review of the 2003 EIA, a number of information gaps were identified which resulted in the EIA falling short of Agency Lenders' policy requirements. These included:

- Lack of baseline on fisheries and in particular non-fish species of commercial value
- Impacts from construction activities in Aniva Bay
- Clarification of some issues relating to how compensation to fisherman is provided through the fish damage compensation arrangement.

These information gaps were addressed through the preparation and release of a Marine and Coastal Fisheries addendum to the EIA.

6.11.1 Information on Fisheries

The lack of baseline data on fisheries in the EIA, and in particular non-fish species of commercial value, had the potential to expose SEIC to unrealistic compensation claims, for example, in the event of an oil spill. Thus additional data were requested by Agency Lenders via an EIA addendum on commercial fisheries.

The EIA addendum provides an improved description of commercial fishing activities within Aniva Bay and waters around Piltun and Lunskeye, with better use of the available official catch data and some biomass data.

In summary, the EIA addendum demonstrates the low level of commercial fishing activity in the Piltun and Lunskeye offshore areas, although it does recognise the importance of the shallow lagoon systems along the north east coast for small-scale enterprises and subsistence fishing. Based on the limited commercial fishing activity in the vicinity of SEIC's Piltun and Lunskeye offshore activities it concludes that any impact on commercial fishing activity will be negligible. In Aniva Bay SEIC has made good use of official catch statistics and quotas for fish and shellfish.

6.11.2 Impacts from Construction Activities in Aniva Bay

The impacts resulting from Project activities are assessed in the addendum. This includes consideration of the adverse effects associated with noise, including piling, dredging⁹² and vessel movements, and loss of catch associated with safety exclusion zones. Noise levels for each of these activities are presented and used to demonstrate that any impact on fish would be localised and temporary, leading to temporary avoidance of the noisiest areas. A suite of mitigation measures is presented, including restrictions on the timing and duration of certain activities and the use of (quieter) vibropiling. AEA considers the assessment and proposed mitigation measures to be adequate.

6.11.3 Compensation and Arrangements for Fish Damage Calculation

The compensation process for fish damages is outlined in the EIA addendum along with a reference to the Resettlement Action Plan (which addresses both physical and economic displacement and is further discussed in Section 8) and a further reference to the grievance procedure for claims falling outside of the RAP.

⁹² The impacts from dredging and spoil disposal are addressed in the Aniva Bay EIA addendum.

There is also a commitment to monitor the level of small-scale fishing activity in the vicinity of the LNG plant in order to determine the level of recreational fishing from the beach such that any adverse impact can be assessed and appropriate mitigation/compensation measures developed.

In recognising the difficulties in obtaining reliable fisheries data, AEA considers the information gaps highlighted following review of the 2003 EIA to be adequately addressed in the EIA addendum.

During the course of earlier due diligence review work, AEA noted the potential for impact from possible dredging activities in readiness for platform installation, and also expressed concern that dredging activities may not be possible within the available timeframes, given environment induced timing constraints. These issues have since been superseded/resolved – see Table 6-10.

Table 6-10 Summary of Key Issues Relating fisheries

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.45	Earlier in the due diligence process the possibility of dredging at the platform locations was being considered, however, this was not required.	Environmental M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed
6.46	<p>Following review of the EIA earlier in the due diligence process we noted:</p> <ul style="list-style-type: none"> • the need for further benthic surveys at the actual pipeline locations (we understood that such surveys were indeed being planned by SEIC). • that the timing of the dredging activities to avoid the most sensitive periods (May to September) was very limited given the impossibility of dredging during ice conditions. <p>However, additional survey work was undertaken/reported along the pipeline routes for inclusion in the EIA addendum. Also the dredging activities were completed within allowable time windows following the commissioning of an additional high capacity suction dredger.</p>	Environmental M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed

6.12 GEOHAZARDS

6.12.1 Background

The information provided within the 2003 EIA was considered to contain a number of important information gaps and uncertainties. In particular, the EIA did not identify all geohazards, provide sufficient detail about the significance of those identified geohazards, and mapping was weak. These deficiencies were largely a result of incomplete survey work at that time. SEIC accepted these observations and produced a geohazards addendum to the original EIA. The addendum is underpinned by a large amount of additional survey and assessment work carried out in 2004 and 2005. AEA commissioned the services of specialist geologists to undertake a technical review of these underpinning studies and the adequacy of the addendum. During the course of the review, two field trips were carried out allowing the geologists to witness first hand those geohazards with potential to affect the Project.

The geohazard issues evaluated included surface fault rupture, liquefaction, and slope failure. The EIA addendum was reviewed to evaluate the methodology, data collection techniques, adequacy of information, analytical results, and design recommendations related to SEIC's assessment of geohazards along the pipeline route and related facilities. In order to evaluate the basis of information presented in the EIA addenda, a number of specific technical reports that addressed seismic design basis, ground motion characterization, fault crossings, liquefaction, and landslides also were reviewed.

The review was limited to the identification and significance of geohazards. This is essential information required for detailed design, however, the review did **not** assess the adequacy of pipeline/facility design. The adequacy of design to withstand geohazards is addressed by the Agency Lenders' Independent Technical Consultant (ITC).

6.12.2 General Approach for Geological Hazard Investigations Related to Pipelines

Pipeline systems, including production and export facilities, are geographically distributed systems that cross a variety of geological environments and are exposed to a diverse range of geological hazards. The geological hazards typically considered in pipeline design include:

Surface Fault Rupture Hazard

Surface fault rupture occurs when a displacement along an active fault⁹³ is of sufficient size to propagate to the ground surface. The size of the fault rupture area determines the magnitude of the earthquake produced by the fault rupture. Surface fault rupture is an important consideration for buried pipelines, because pipelines crossing fault zones must deform longitudinally and in flexure to accommodate ground surface offsets.

Strong Ground Shaking Hazard

Strong ground shaking hazard is related to seismic waves generated from the primary fault rupture and is measured in terms of wave frequency, amplitude, velocity, particle displacement, and acceleration. Ground motion hazards for major engineering projects are now most typically characterized through an estimation of the probability that different levels of ground motion may occur at a site during some future period of time (e.g. 1, 50, 100, 500,

⁹³ The term "active fault" is defined based on local regulatory statutes and the types of facilities being considered. For most engineering projects a fault is considered active if it can be demonstrated to have displaced the ground surface within the past 10,000 years. Other more critical facilities, or facilities that pose a greater risk to public safety, may use more stringent criteria.

1000 years). Strong ground shaking poses a minimal hazard to modern welded steel buried pipelines, but is a more critical factor to above ground facilities such as production platforms, processing and LNG facilities, and export terminals.

Liquefaction Hazards

Soil liquefaction is defined as “the transformation of a granular soil from a solid state to a liquefied state as a consequence of increased pore water pressure and reduced effective stress.” Liquefaction occurs as seismic waves propagate through saturated granular sediment layers, which induce cyclic shear deformation and collapse of loose particulate structures. Assessment of liquefaction hazards requires examination of a regions historical seismicity and locations of active faults to determine if levels are sufficient to trigger liquefaction phenomenon in areas underlain by susceptible sediment. Damage to pipelines from liquefaction generally occurs when the liquefaction leads to some form of permanent ground deformation or ground failure. Liquefaction hazards can be mitigated through proper route selection or implementation of engineering measures in the hazard areas.

Landslide Hazards

Landslides are the downslope movements of soil masses and can pose significant hazards to pipelines. Landslides can occur statically (*e.g.* due changes in groundwater conditions) or dynamically (*i.e.* seismic loading during earthquakes). The potential hazard to pipeline performance is a function of: (a) the amount of ground displacement; (b) the depth of the landslide failure plane relative to the depth of pipeline burial; (c) the type of slope failure mechanism associated with the movement (*i.e.* block-type (coherent) movement or distributed movement); and (d), the direction of landslide movement relative to the pipeline. Key mitigation measures against landslide hazards are: routing to avoid the hazard areas; design to accommodate the potential strains; or burial beneath hazard areas

These hazards must be characterized for the route selection, basic design, detailed design, and construction stages of a project.

6.12.3 Evolution of the Issue

Review of the SEIC EIA addendum for geohazards was an iterative process that involved close interaction and support of SEIC personnel and contractors. The initial review of the geohazards EIA addendum was completed in 2004 and involved both document review and a field reconnaissance trip along the southern half of the pipeline route. At the time of this initial review the following key issues were identified:

- **Fault Crossings**

Uncertainties in the location, style of deformation, and displacement estimates of the fault crossings because investigations conducted at that time were not adequate to confidently characterize the potential surface fault rupture hazard along the pipeline route, although we understood that additional geological and geomorphic investigations were planned by SEIC. AEA supported the performance of these additional investigations and recommended that an overall report that met international standards of practice be prepared to summarize the geological and tectonic environment, seismic setting and fault segmentation, and specific conditions at each of the fault segments crossed by the pipeline.

- **Landslide hazards**

At the time of the initial review, SEIC and their contractors were still in the process of conducting field mapping and geomorphological analyses to characterize landslides hazards through the key risk area of the Makarov Mountains, and to identify the need for potential re-routes if conditions were found to be unfavourable through the Makarov.

Recommendations were provided to SEIC for supplementary investigations along the pipeline system. SEIC subsequently completed additional geohazard characterization along the pipeline route to address the review recommendations.

AEA undertook a second field trip in 2005 to review progress made by SEIC. Following this field trip, a final review of the revised draft of the geohazards EIA addendum was undertaken. This review found that the addendum presented a reasonable framework with which to evaluate the geological and tectonic setting, hazards and potential impacts. It also provided a summary of the mitigation measures to be used to reduce the hazards along the route to an acceptable level.

6.12.4 Current Compliance/Status of EIA addendum

Overall, the revised EIA addendum (released on the SEIC website in Dec 2005) is much improved over previous drafts, and with a few exceptions due to ongoing work, presented an adequate summary of conditions along the pipeline route and measures being taken to mitigate hazards. At the time of the final review, a number of geological hazard investigations and engineering analyses were still in progress, and therefore the characterisation of geohazards was not entirely complete. However, based on discussions with SEIC personnel and consultants, it appeared that the remaining work was being completed in a professional manner, with experienced Project personnel, and internationally recognized peer reviewers. SEIC has implemented a project management structure that is anticipated to result in adequate characterization and mitigation of the remaining hazard areas along the pipeline. A number of commitments were recommended to finalize the geohazard characterization, develop appropriate mitigation measures, and assess residual risk as assurance that the outstanding investigations would be adequately completed.

Based on the review of available data and information sources, and SEIC's commitment to carry out additional supplementary investigations, the following conclusions are drawn:

- The methodology used to investigate the geological hazards along the pipeline route was acceptable.
- The data acquisition techniques used to collect geohazard related information were acceptable.
- The quality of geohazard data is adequate for evaluation of potential impacts and development of mitigation measures.
- The interpretations and conclusion of the investigations are acceptable.
- The design recommendations (in terms of seismic event return periods) for mitigation of risks associated with geohazards appear to be appropriate.

The commitments related to geohazard issues along the pipeline are provided below (in italics) along with a status update:

- *A qualitative assessment of residual risk shall be performed for the pipeline, focussing on uncertainties associated with landslides in the Makarov mountains and the impacts that construction may have had on slope stability (specifically covering stability of cut slopes and all stockpiles of fill material) as well as active faults that cross the right of way. At the time of writing AEA has been informed that a land risk register covering landslides, spoil tips, steep slopes and cuts is nearing completion. Each registered risk has been further assessed and mitigated to minimise risk in line with the ALARP principle.*
- *As-built geological records in the Makarov mountains shall be developed and maintained for the pipeline covering cut slopes, pipe trenches and spoil disposal areas. This shall form the basis of an operations geohazard monitoring schedule (to be included in the “operations” HSESAP section on monitoring) which shall be developed including geohazards management contingency plans, prior to commissioning. A Geotechnical ‘As-Built’ Documentation Report is being commissioned.*
- *A qualified geologist or engineering geologist/geotechnical engineer will be present at critical times during construction activities at active landslides and active fault crossings (e.g. on completion of excavation, and during remedial works). This geologist will document the geological conditions present at these areas and the as built aspects of the engineering measures implemented as mitigations. A geologist is permanently on site to inspect and report on RoW preparation, trench excavations and to monitor spoil tips. For faults, all crossings were subject to additional field investigation in 2006.*
- *SEIC and its contractors shall review all known landslides and re-assess the potential re-routing/avoidance on those areas where pipe is not yet in the ground. This work has taken place. The study rejected the main proposed re-route in preference for local re routing (along ridges and around landslides). Elsewhere minor re routes have been implemented.*
- *SEIC and its contractors shall hold regular geohazard meetings to ensure that the contractor is aware of all geohazards, and the required mitigations in the area scheduled for immediate work. AEA is informed that weekly meetings take place.*
- *SEIC shall initiate a training program to inform construction personnel of the dangers associated with geohazards and best practice for mitigation and monitoring. SEIC shall promote communication and cooperation between the geo team and the environmental team on the basis that these two disciplines inter-relate and the environmental team will benefit from the available geo-engineering solutions and the geo-team needs to understand the environmental commitments and undertakings. AEA has been informed that landslide awareness training has taken place and there is continuing dialogue between the two disciplines.*

These commitments are captured in Table 2.5 of the HSESAP, Land Management, rows 147 to 152.

6.13 ATMOSPHERIC EMISSIONS, LIQUID DISCHARGES AND NOISE

6.13.1 Atmospheric Emissions and Noise

AEA has previously raised issues regarding the adequacy and results of the assessment presented in the EIA of atmospheric emissions and/or noise impacts from:

- The LNG site during its operational phase, including the models used for the development of the SPZ and the adequacy of the baseline monitoring data.
- The BCS-2 during operations, including uncertainties in the design requirements and the prediction of MPC breaches and noise levels at the nearest residences.
- Flaring during commissioning, especially atmospheric emissions and noise impacts from commissioning of the LNG plant.

These issues were subject to additional assessment in Chapter 10 of the EIA addenda and progress made towards addressing each of these earlier concerns is discussed in turn below:

- **LNG air quality modelling.** Concerns were previously raised by AEA regarding the use of modelling approaches to assess the air quality impacts during the operational phase and uncertainty in the size of the SPZ required. AEA can confirm that SEIC has now obtained approval for a 1km SPZ from the RF authorities (the Ministry of Health), based on an approved RF model (OND-86) but with revised input assumptions. AEA confirms that this represents a technically reasonable approach.

The lack of baseline data has been acknowledged in the EIA addenda, but AEA concurs that due to the coastal and rural nature of the LNG location this is unlikely to compromise the evaluation of the SPZ. SEIC will need to undertake monitoring during operation to confirm compliance with the MPCs at the edge of the SPZ.

- **BCS-2 air quality and noise assessment.** The precise location and basic design requirements for the BCS-2, in terms of whether oil line pumps and gas compressors are necessary, were uncertain at both the time of publication of the EIA in 2003 and the EIA addenda in 2005. In the EIA addenda SEIC committed to conduct assessments of both air quality and noise impacts and to ensure that relevant standards are met once more definitive design of the BCS-2 was confirmed. AEA understands from SEIC personnel that this outline design has now been fixed (the BCS-2 will comprise both an oil pump station and a compressor station), as has its location (this location is slightly different from that proposed in the TEOC, but is still near to the village of Gastello). SEIC has not yet finalised the required noise and air quality assessments although we have been informed at the time of writing that these are in progress. Preliminary earthworks are underway and therefore finalisation of the studies is now a matter of priority to confirm that air quality and noise levels are within prescribed limits. Given that the environmental impacts from the BCS-2 are likely to be significant (environmental limits may be challenged) it is important that suitable assessments are undertaken to demonstrate otherwise (such assessments will also need to be reviewed by the IEC on behalf of the Agency Lenders). The study has recently been provided for review but AEA is awaiting clarification on a number of points before we can finalise our review.

- **Assessment of atmospheric emissions and noise impacts from flaring.** AEA previously identified that quantitative assessment of both atmospheric and noise impacts from flaring during commissioning (principally from the LNG plant commissioning) had not been undertaken within the EIA. With regard to the assessment of flaring the EIA addendum states that a volumetric flaring forecast is being prepared together with an assessment of the commissioning process. This study had not been completed for review by AEA at the time of writing and, without this, assessment of atmospheric emissions and noise impacts cannot be made (timescales for completion of the flaring study are unclear, but we note that it is required prior to the main flaring phases, such as LNG commissioning). Given that the environmental impacts from commissioning of the LNG plant may be significant, the materiality of the need to undertake adequate assessment is considered to be high from a best practice perspective. This issue will require ongoing review. This volumetric flaring forecast study has been requested by AEA.

In addition to the above items, a number of minor cases have been identified in the HSESAP (Part 1 Annex 7) where specific Project facilities/plant will not meet certain international standards/guidelines for discharges (although RF standards should still be met). These have been agreed by the Agency Lenders (HSESAP Annex A and C) on the basis they are likely to occur in exceptional circumstances and/or will be of short duration with minimal environmental impact, and are summarised below:

- PA-B and Lun-A diesel firewater pumps. The pumps will be tested for one hour per week. The quoted maximum instantaneous emissions are above the IFC standard for NO_x.
- PA-B and Lun-A standby generators. The generators will be tested for one hour per week. The quoted maximum instantaneous emissions are above the IFC standard for NO_x.
- OPF Main standby power generation - 2 diesel generators. These bespoke units, designed to satisfy OPF technical and operational requirements, are designed to be used in emergency or abnormal events and will be operated for 1 to 4 hours per week for testing. During commissioning SEIC shall undertake emissions monitoring of these standby generators, for comparison with international standards.
- OPF firewater pumps package – caterpillar diesel engine. The diesel engine shall be used in emergency situations, and shall be operated for approximately one hour per week for testing purposes only. The standards quoted are not directly comparable for diesel engines, though there is compliance with the World Bank standards quoted.
- Ambient Air Quality Standards for the OPF site. Impacts on air quality shall be monitored throughout the Project phases, and shall be summarised in the HSESAP. There are significant difficulties in comparing the different standards quoted.
- LNG compressor driver. Emissions are mostly compliant with the relevant international standards, though some are not directly comparable. There is a minor breach of the EU NO_x limit.
- LNG diesel driven firewater pump. The pumps exceed the WB guidelines limits for NO_x emissions. However, as the pumps will be only used in emergency and test conditions (the pumps will be tested for one hour per week), the significance of this is very limited. Regular measurements are not planned though mobile instruments shall be available in due time to verify all exhaust gases. Exhaust gases of stationary machines are also monitored.

- **OPF Main power generation - 2 gas and 2 dual fuel turbines.** It is stated in the HSESAP that during normal operation three turbines will run continually on gas, with the load being varied according to demand, with one turbine in standby mode. All four units will, however, be used during the winter period. The project is compliant with World Bank and EU standards, with the exception of NO_x emissions for the one turbine that will use diesel oil. All units shall be tested on a monthly basis, when NO_x emissions will exceed the quoted standard. Emission control systems were evaluated, but not incorporated in the design, as diesel fuel shall only be used in abnormal conditions. However, from July 2006 to September 2007 two units shall run on diesel and will exceed the quoted standard. Ambient air quality will however be monitored in the area during this time, and it is understood that Sakhalin Energy will consider the purchase of gas from another source for this prolonged period.

6.13.2 Liquid Discharges

AEA has previously raised a number of issues with respect to:

- **Drill muds and cuttings.** Deficiencies were identified in the EIA regarding the assessment of impacts from the discharge of water-based drill muds (WBM) and cuttings, including compliance with RF emission standards. Since that time SEIC has committed in the HSESAP that no muds or residual cuttings, including WBM, will be discharged to sea (re-injection will be used for all muds). This resolves the issues previously raised by AEA regarding WBM.
- **Hydrostatic testing.** Uncertainties were identified in the EIA regarding the assessment and management of hydrotest waters, and in particular the requirements for additives in hydrotest waters for both onshore and offshore pipelines. In relation to offshore pipelines, the current hydrotest plan (as described in the HSESAP) is to prevent the discharge of chemicals into the marine environment. Therefore, no corrosion inhibiting or biocide chemicals will be used for hydrotesting of pipelines from the offshore platforms. In Aniva Bay, the use of chemicals in hydrotesting is permitted under the Russian regulations, and their use is deemed necessary by SEIC. However, the Company has made a commitment not to discharge these into the marine environment, rather they will instead be diluted and loaded onto the first tanker at the TLU terminal for treatment and disposal at the receiving refinery. This resolves the previous issues raised by AEA regarding offshore hydrostatic testing.

For onshore pipelines the main hydrostatic testing will be undertaken during non-freeze conditions using freshwater. The exception to this was the hydrotesting of short sections of pipeline installed during winter river crossings. In these cases glycol has been added to the hydrotest waters. Used hydrotest waters that contain glycol were discharged into dedicated tanks and sent back to the manufacturer for processing. Although this process did not entail discharge to the environment, the handling of toxic substances within the WPZ of rivers needs to be assessed in terms of compliance with RF legal requirements and this is further addressed below (under 'Water Protection Zones'). Main pipeline hydrotesting will be undertaken outside of freeze conditions and the original intention had been to source water from surface water bodies. However, due to restrictions on surface water abstraction during the extended salmon spawning seasons, SEIC considered the development of a number of groundwater wells. In Q2, 2007 a survey of potential groundwater sources was undertaken. The results have not been reviewed by AEA, but it is

understood that the initial findings were not promising and therefore the decision was taken not to use groundwater sources, although this may be subject to review.

In light of the uncertainty surrounding the reliability of groundwater sources, SEIC abstracted surface water outside of the restricted periods, which was then stored in sections of the pipe. This has allowed abstraction at a slow rate and thus abstraction within permitting constraints. The results of groundwater survey may also provide additional back-up water sources, but regardless of this, the issues surrounding the sourcing of hydrotest water have been resolved.

Abstraction licenses are in place and abstraction has taken place. Methodologies for the discharge of spent water have been approved by Rosprirodnadzor. SEIC's finalised hydrotest plan for onshore pipelines has been reviewed. The plan aligns with the commitments made in the HSESAP. However, of note it does allow for the use of chemicals for pH adjustment.

The need for pH adjustment can only be confirmed at the time of abstraction. At the time of writing, water abstracted for hydrotesting has not required any pH adjustment. AEA further note that the use of chemicals for pH adjustments, unlike the more harmful corrosion inhibitors and biocides, would have minimal environmental impact if carefully managed.

- **Water Protection Zones.** Water protection zones are established under RF law for the purpose of protection of surface waters. A water protection zone (WPZ) is a land area adjacent to water to which a special regime of use and protection of natural resources and conduct of commercial activities applies. Under the Water Code that was in effect before 1 January 2007⁹⁴ and the regulations⁹⁵ issued pursuant to it, within WPZs certain types of activities were prohibited, which included:
 - application of chemical substances used to combat pests, plant diseases and weeds
 - location of storage of poisonous chemicals, mineral fertilizers and oil and lubricant materials
 - location of areas for refuelling of apparatuses with poisonous chemicals
 - refuelling, washing and repairing of vehicles and other machines and mechanisms.

Under the regulations **bank protection belts** were established over certain parts of WPZs⁹⁶. The width of those belts varied from 15m to 100m, depending on the type of the adjacent land plots and the incline of the bank. The width of the bank protection belts near particularly valuable parts of water bodies (including spawning areas) was always 100m. The bank protection belts regime imposed certain other restrictions in addition to the restrictions imposed within WPZs. These conditions presented difficulties as outlined below:

⁹⁴ The Water Code of the Russian Federation, of 16 November 1995, No. 167-FZ (“**Water Code**”).

⁹⁵ Regulations on water protection zones of water objects and their bank protection belts, approved by Resolution No. 1404 of the Government of the Russian Federation, dated 23 November 1996 (the “**Regulations**”).

⁹⁶ Section 1 of the Regulations.

- The refuelling of HDD machinery, which has taken place within WPZs, was technically prohibited. However, we recognise that extending the drill length in order to position the HDD machinery outside of the WPZ (sometimes 1 km) was unrealistic.
- The storage and handling of antifreeze used for hydrotesting within the WPZ was also prohibited. Similar to the above, extending the pipeline length in order that hydrotest waters could be located outside of the WPZ was unrealistic when attempting to minimise the use of antifreeze during the hydrotest programme.

AEA has discussed this issue with members of the pipeline team and reviewed permit conditions for an HDD crossing. The permit conditions did not specifically address the use of glycol in the WPZ and we are not aware of any restrictions having been imposed on SEIC in relation to their use of glycol. From discussions with SEIC pipeline staff we understand the 2006/07 winter crossings only required the use of glycol for approximately 6 crossings. We are also informed that approvals allowing the use of glycol in WPZs were in place, permits were duly received and the HDD crossings are completed. A new Water Code came into force on 1 January 2007, which does not contain the same restrictions as to permitted activities within the WPZ as the old legislation. However, water use licenses granted prior to 1 January 2007 remained in force until their expiry.

- **Waste water discharges.** Following review of the original ESHIA, AEA previously identified the need for further assessment of the impacts of treated wastewater discharges to surface freshwater bodies (e.g. from construction camps), particularly in relation to the dilution capacity of the receiving waters and the impacts of discharge for frozen water bodies. However, since this time, wastewater outfalls from camps have been designed to discharge waters to soakaways rather than directly to surface water bodies.
- **OPF disposal wells.** SEIC intends to dispose of all produced waters at the OPF site to two disposal wells. AEA previously identified that further assessment was required of the suitability of the geological strata for such disposal (the necessity for such assessment was also raised in the SEER conclusions). Since this time SEIC stated in the EIA addenda that additional studies show that the disposal of wastewater in the required volumes is environmentally safe. AEA has undertaken a high-level review of these studies. The studies appear to be generally comprehensive in demonstrating that the geophysical risks from injection of wastewaters are negligible, although this needs to be confirmed by the ITC. From an environmental perspective further details are required on monitoring of the wastewater prior to injection and also monitoring of any potential effects on water quality in monitoring boreholes and local potable water abstraction wells in the vicinity (including those to be used for the OPF). The monitoring details should be addressed in the operational monitoring plan (HSESAP Annex C – see also Section 6.18) will need to identifying sampling frequencies, monitoring parameters and action levels.

In addition to the above items, a number of minor cases have been identified in the HSESAP (Part 1 Annex 8) where specific Project facilities/plant will not meet certain international standards/guidelines on liquid discharges (although RF standards should still be met). These have been agreed by the Agency Lenders and are summarised below:

- LNG/OET treatment facilities – effluent water discharge to Aniva Bay. For the Biological Oxygen Demand (BOD) the SEIC specification is in excess of the EU standard for urban wastewater (which is not directly applicable to discharges to coastal waters), but meets the World Bank standard.

- Treated wastewater discharge from the PA-A platform. The World Bank does not set any specific offshore limits on BOD and TSS discharges to the marine environment. In the absence of specific offshore oil and gas standards for BOD and TSS these parameters have been assessed against the general World Bank guidelines that are intended for the more sensitive freshwater environment. BOD and TSS discharge levels marginally exceed the general World Bank guidelines.

During monitoring trips during the construction period AEA found that the discharges from sewage treatment plants (STP) at the onshore pipeline construction camps typically failed to meet RF discharge permits for BOD₅. Although we note that the permit discharge limits for BOD₅ are very restrictive for discharges to land (as opposed to discharges directly to surface freshwater), in some cases the measured BOD₅ levels are also in excess of the World Bank discharge level standards. Although efforts to reduce BOD₅ levels at certain camps have led to some improvements, it is possible that further reduction in BOD₅ levels will only be achieved by reduced flow throughput (or increased Sewage Treatment Plant (STP) capacity); we understand that the total numbers of personnel accommodated at some construction camps may exceed the capacity of the existing STPs. We also note that the Project standards for camp STP discharges stated in the HSESAP are in excess of the actual RF permit conditions and this should be resolved. However, we understand that SEIC has now engaged a specialist contractor who is responsible for the maintenance of the STPs and ongoing review is required to assess any level of improvement in STP performance that may result. Overall, due to the persistent nature of the breach of discharge limits, we consider this issue to be of moderate environmental materiality.

Table 6-11 Summary of Key Issues Relating to Atmospheric Emissions, Liquid Discharges and Noise

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
6.47	The 2005 EIA addendum states that a volumetric flaring forecast is being prepared together with an assessment of the commissioning process. This study had not been completed for review by AEA at the time of writing and without this assessment of atmospheric emissions and noise assessments (notably at the LNG site) cannot be made and hence this issue will require ongoing review. This volumetric flaring forecast study has been requested.	Environmental Potentially M	Best practice/ Procedure	Adequacy of Assessments & Plans	Pending
6.48	Regarding the BCS-2, SEIC committed in the EIA addenda to conduct assessments of both air quality and noise impacts and to ensure that relevant standards are met once more definitive design of the BCS-2 was confirmed. AEA now understands that this outline design and precise location have now been fixed. SEIC has undertaken the required noise and air quality assessments which are currently being reviewed by AEA.	Potential regulatory issue	OP4.01	Adequacy of Assessments & Plans	Pending (completion of review)
		Environmental Potentially M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Pending (completion of review)
6.49	For onshore pipelines the main hydrostatic testing will be undertaken during non-freeze conditions using freshwater. The exception to this was the hydrotesting of short section of pipeline installed during some winter river crossings where glycol was added. Used hydrotest waters that contained glycol was discharged into dedicated tanks and sent back to the manufacturer for processing. In 2006 AEA had concerns regarding the handling of toxic substances within the WPZ of rivers in terms of compliance with RF legal requirements (including glycol and also fuel for HDD equipment). However the 2006/07 winter crossing campaign only required the use of glycol for approximately 6 crossings and approvals allowing the use of glycol in WPZs were in place, construction permits were received and the HDD crossings have been completed.	Potential regulatory issue (referred to the ILA)	OP 4.01 Annex B	Adequacy of Assessments & Plans	Historical

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.50	The refuelling of equipment within water protection zones and/or bank protection belts requires further investigation/monitoring.	Potential regulatory issue (see also issue 6.49)	RF Law/Permitting	Implementation of Plans	Unresolved
6.51	Monitoring visits by AEA have identified that BOD ₅ levels in STP discharges from onshore pipeline construction camps are often in excess of permit requirements and in some instances World Bank guidelines limits. AEA also notes that the project standards for BOD ₅ levels in camp STP discharges stated in the HSESAP are in excess of the actual permit limits.	Environment M	OP 4.01 Annex B HSESAP Annex A	Implementation of Plans	Unresolved
6.52	AEA has undertaken a high-level review of these studies. The studies appear to be generally comprehensive in demonstrating that the geophysical risks from injection of wastewaters are negligible, although this needs to be confirmed by the ITC. From an environmental perspective further details are required on monitoring of the wastewater prior to injection and also monitoring of any potential effects on water quality in monitoring boreholes and local potable water abstraction wells in the vicinity (including those to be used for the OPF). The monitoring details should be addressed in the operational monitoring plan will need to identifying sampling frequencies, monitoring parameters and action levels.	Environmental M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed
6.53	In the early stages of due diligence, differences in RF and international standards for gaseous emissions and air quality were identified.	Potential regulatory issue	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed
	Since the earlier concerns the SPZ for the LNG site has been agreed with RF authorities based on the standard OND-86 model but with revised input assumptions as described in the EIA addenda Chapter 10.	Environmental M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed
6.54	In 2003 AEA found that the impact assessment of the disposal of hydrotest waters offshore required further justification given the uncertainties in the chemical additive make-up of these waters. In addition the uncertainties in the water classification of the marine environments, particularly Aniva Bay, may affect to possibility of discharge to the sea. Since these concerns were expressed, SEIC have committed in the HSESAP to avoid the use of chemical additives in offshore hydrotesting, except for the OET to TLU pipeline, where hydrotest waters will be shipped from the area within the first departing oil cargo.	Environmental M	OP 4.01 Annex B	Adequacy of Assessments & Plans	Closed

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.55	<p>During the early stages of due diligence, AEA expressed the opinion that the impacts of treated wastewater discharges to surface waters (<i>e.g.</i> from construction camps) requires further analysis, particularly in relation to the dilution capacity of the receiving waters and the impacts of discharge for frozen water bodies.</p> <p>Discharge from construction camps is now treated and then released to land (with energy dissipaters) rather than water bodies. Thus our earlier concerns no longer apply.</p>	Environmental L/M	OP4.01 & PPAH	Adequacy of Assessments & Plans	Closed
6.56	<p>SEIC have now committed to zero discharge of all drill muds. Muds from the first wells will be stored and later reinjected. Previously the decision to discharge WBM from the first 4 (rather than just the first) wells at Lunskeye had appeared to be based on economic rationale. Commitment to zero discharge has closed this issue.</p>	Environmental L/M	OP4.01 & PPAH	Adequacy of Assessments & Plans	Closed
6.57	<p>In our earlier review work we expressed concern over discrepancies in the proposed use of oil based muds (OBM) within the (earlier) Basis of Design and the PEIA/EPB.</p> <p>SEIC has made firm commits in the HSESAP that no muds (including OBM and water based muds and residual cuttings) will be discharged to sea (these will be re-injected)</p>	Environmental H	PPAH	Adequacy of Assessments & Plans	Closed
		Best Practice H			
6.58	<p>In 2002/2003, AEA noted that the toxic effects of WBM discharge had not been fully assessed. In particular we noted that confirmation is required that whole mud ecotoxicity tests and contaminant levels in barite meet WB/IFC standards. There was also confusion regarding compliance with MPCs or suspended solids at PA-B (a potential regulatory issue).</p> <p>SEIC has since committed to zero discharge of will not discharge any WBM, thus no longer a concern/non compliance.</p>	Environmental M Potential regulatory issue	PPAH	Adequacy of Assessments & Plans	Closed
6.59	<p>It was noted during earlier due diligence that impacts from well clean-up and maintenance had not been assessed.</p> <p>Since this observation, reasonable commitments to manage emissions from well clean-up and maintenance are made in the HSESAP. (Table 2.1, row 18)</p>	Environmental M	PPAH	Adequacy of Assessments & Plans	Closed
6.60	<p>A number of (generally minor) cases have been identified in the HSESAP (part 1 Annex 7 & 8) where specific Project facilities/plant will not meet certain international standards/guidelines, including PPAH emission and discharge guidelines. These have been agreed by Agency Lenders</p>	Environmental L	PPAH	Adequacy of Assessments & Plans	Closed

6.14 BEACH LANDING FACILITY AT THE OPF

6.14.1 Background

The 2003 EIA described the need for a beach landing facility (BLF) in order that OPF construction teams could receive pre-assembled heavy equipment by sea e.g. pressure vessels. At the time the original EIA was produced a fixed pier was being considered although there remained considerable uncertainty surrounding the design of the BLF and hence the associated impacts. AEA thus identified the need to undertake further environmental assessment once the location and final design of the BLF had been confirmed.

6.14.2 Evolution of the Issue

SEIC's plans for a pier were replaced by the use of transit barges capable of delivering heavy equipment to the beach where it would be unloaded and subsequently transported 7 km to the OPF via a heavy haul road. This approach still required some dune cutting and land take, but removed many of the coastal impacts associated with construction of a pier e.g. piling and dredging.

The remaining impacts are adequately identified and assessed in the EIA addenda (Chapter 14), along with appropriate mitigation and monitoring requirements.

6.14.3 Current Status and Compliance

In May 2006 AEA visited the OPF BLF. At that time all heavy equipment had already been delivered and the dune system was undergoing the early stages of reinstatement in accordance with the reinstatement plan. AEA does not have any particular concerns with SEIC's approach to the BLF, although the success of the reinstatement needs to be monitored over the coming years.

6.15 MANAGEMENT OF CHEMICALS

The management of chemicals was not addressed in detail within the EIA, although AEA has looked at separate plans, procedures and the SEIC HSE Standard for Chemicals Management which outline SEIC's approach to the management of chemicals. The general approach is translated into Table 2.9 and a comparison table⁹⁷ in Annex 5 of the HSESAP.

AEA has reviewed these materials and considers that SEIC's plans and procedures represent good practice in terms of chemicals handling, storage, labelling, classification, transportation, risk assessment and training. Furthermore, we find SEIC's written procedures meet with the relevant guideline requirements/EU Directives listed in Section 3.5, including IFC Hazardous Materials Guidelines (Dec 2001).

However, a number of concerns have been identified during AEA's site visits regarding the implementation of chemical storage at project facilities and construction camps. The most significant of these was identified during the May 2006 site visit, when hundreds of drums of water glycol solution were seen to be stored at the Sokol camp on bare earth, uncovered, and without Material Safety Data Sheets. The drums were also stored 2-high in an unsafe manner.

⁹⁷ The comparison table explains how SEIC's management of chemicals meets the requirements of various guidelines, highlighting derogations where applicable.

This situation is recognised and documented by SEIC. A follow-up site visit in May 2007 revealed that some improvements in the storage of the glycol solution had been achieved (e.g. earthen bunding) and, more importantly that much of the glycol had been removed (we have been informed that 68% of the glycol solution has been returned to the vendor with a further shipment expected in August 2007).

6.16 INTERNATIONAL AND CUMULATIVE IMPACTS

Assessment of cumulative and international impacts of the Project requires understanding of the existing baseline conditions, consideration of the potential future growth of other developments that may impact on the environment and quantitative assessment of the additive impact that the Project may have. Although the RF is not a signatory to the Espoo Convention on environmental impacts in a transboundary context, RF Order No. 372 Section 2.9 (May 2000) states: *“if activity may have transboundary impact the assessment of the impact on the environment should take account of the provision ofEspoo”*. SEIC has committed to endeavour to comply with the spirit of the Espoo convention insofar as it is reasonable for a private sector company to do so, as detailed in Annex B of the HSESAP and to offer the Russian federal authorities all reasonable assistance in relation to the provision of information to other affected countries with regard to any transboundary impact of the Project.

The cumulative impacts of the Project with other developments on Sakhalin, and in particular the Sakhalin I project, have been addressed in the Final EIA. However, due to limited information on the other proposed industrial developments, the assessment of the cumulative impacts is qualitative in nature. Further assessment and collaboration of other developments should be ongoing, and we note that SEIC is making considerable efforts in this regard, for example in relation to cumulative impacts on WGW.

Overall, AEA finds that the assessment of environmental impacts in the context of both transboundary and cumulative impacts is adequate. Key issues concerning transboundary and cumulative impacts relate to the following aspects, and further specific commentary on these issues is provided in the following sections of this report:

- Oil spill assessment & planning (see Section 10).
- WGW (see Section 6.4).
- Public consultation (see Section 7).

Table 6-12 Summary of Key Issues Relating to International and Cumulative Impacts

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
6.61	<p>SEIC will endeavour to comply with the spirit of the Espoo convention insofar as it is reasonable for a private sector company to do so, as detailed in Annex B of the HSESAP and to offer the Russian federal authorities all reasonable assistance in relation to the provision of information to other affected countries with regard to any transboundary impact of the Project.</p> <p>Key areas of transboundary and/or cumulative impacts relate to oil spill assessment & planning, WGW and public consultation. The cumulative impacts of the Project with other developments on Sakhalin, and in particular the Sakhalin I project have addressed in the Final EIA. In recognition that there is limited information on the other proposed industrial developments, the qualitative assessment of the cumulative impacts is adequate.</p>	Best practice H	HSESAP Annex 2 (Espoo)	Adequacy of Assessments & Plans	Closed
6.62	<p>The issue of cumulative effects to WGWs is to be addressed through the WGWAP, including consideration of range-wide impacts and approaches to their minimisation. To assist in this, we understand efforts are underway to involve other oil and gas development projects off Sakhalin, as well as other relevant stakeholders, in the WGWAP process (see Section 6.4 for further details).</p>	Environmental M	OP 4.01	Adequacy of Assessments & Plans	Pending

6.17 WASTE MANAGEMENT

6.17.1 Introduction

SEIC initially explored the potential for integrated hazardous waste management facilities, four preferred landfill sites for upgrade, development of a waste minimisation plan and sourcing of recycling outlets. Since then, a number of significant changes have occurred, as described earlier in the due diligence process and detailed below:

- Upgrade of three existing landfills (including use of liners).
- Temporary use of non-upgraded landfill sites.
- Selection of hazardous waste disposal routes.
- Identification of waste streams and quantities.

AEA has further reviewed SEIC's revised waste management strategy and associated documentation and held numerous discussions with SEIC personnel. Documentation received and assessed includes:

- Landfill Operator Code of Conduct, Internal Draft, April 2004.
- Municipal Solid Waste Landfills Upgrade, Explanatory Notes for Conceptual design (undated).
- Landfill Up-grade Site Monitoring Plan, February 2005
- Waste Management Strategy, 0000-S-90-04-P-7059-00-E, July 2005
- Waste Minimisation Plan 0000-S-90-04-P-7060-00-E, August 2005
- Waste Streams List 0000-S-90-04-T-7899-00-E, July 2005
- EIA Addendum Chapter 11 "Solid Waste Management" Final Draft, 11 February 2005
- HSESAP Table 2.2 Waste Management (draft 21 Feb 2005)

All assessments of the Waste Management proposals were made against IFC EHS Waste Management Guideline, July 1998 covering the site selection, waste analysis and handling, collection and transport of waste, health and safety and record keeping. For the upgrade designs, and Construction Quality Assurance of the liners and collection systems for the three landfills, European legislation is interpreted by the English Environment Agency in Regulation Guidance Notes (RGN), in particular RGN 6 relating to the engineering design of landfill containment. During the assessment consideration has been given to local conditions, availability of materials and skills, and the requirements of the local authority regulations.

Following a number of refinements the Waste Management Strategy was developed (July 2005) with the following elements:

- Waste minimisation as a priority.
- Construction and use of three upgraded, lined landfills (Korsakov, Smirnyk, and Nogliki).
- Construction waste legacies and liabilities.

- Storage of Hazardous Wastes (Class I to III).
- Oily wastes bio-remediation.
- Sustainable development objectives, including potential development of further landfills.

6.17.2 General Comment

Much effort has been required to resolve the waste issues for the Project. The three upgraded landfills have been completed and are now in use by both SEIC (and ENL which cost shares at Nogliki) and the local Raions, with co-disposal of the two waste streams taking place with SEIC supporting the infrastructure for the local authority. The use of the upgraded landfill sites for municipal waste represents a significant improvement in the management of waste on Sakhalin.

These upgrade facilities seem to be having the effect of encouraging the local Raions to develop further waste contracts with other local firms and therefore greater use of the facilities. It should be noted that the three upgraded landfills have only been in full use since November 2005 or later. Prior to this all Class IV and V waste (generally considered to be non-hazardous outside of the RF) was being taken to non-upgraded sites and, as a result of this, nearly half of the waste generated by the construction phase has been disposed of into unlined/uncontained landfills, some of which are located adjacent to watercourses. Delays in completing the upgrades have been caused by local problems, site selection delays, design issues and contractor availability; the use of these landfills and other non-upgraded landfills by SEIC through to November 2005 is likely to have made a contribution to the environmental degradation in the localities of the disposal sites. SEIC has undertaken to offset the environmental liability associated with the use of non-upgraded landfill sites by remedial action and upgrade of eleven unlicensed landfills⁹⁸ as committed to in the HSESAP (Table 2.2, row 26) by providing funds of \$350,000 for local up-grades and training. In April 2007 AEA was informed of a survey of 40 landfills carried out in 2006, which identified 20 landfills that had actually or potentially received Project waste and thus have potentially been subject to adverse environmental effects. Of these, 12 priority sites have been selected for remedial action. The level of remedial actions varies between each landfill site depending upon the severity of the issue and the likely environmental gain associated with the remedial actions. At the time of writing, AEA does not have detailed information regarding proposed remedial actions at these sites.

There are also plans to develop Phase 2 lined cells at the newly upgraded sites to provide further disposal capacity for use by the local authorities. This will provide up to a further five years lined void space at current waste production levels (based on Smyrnikh Landfill). Specific waste plans have been developed for the OPF and are in the process of being implemented by the site. This program is yet to be carried out for the LNG facility.

The waste streams list document has generally managed to identify disposal routes for the majority of wastes. In July 2006 an agreement was reached with a licensed waste service provider for the collection, transportation and treatment of the Project's Hazard Class I - III

⁹⁸ The HSESAP refers to seven landfill sites. AEA Technology has since been informed that remedial actions will take place at eleven sites.

wastes. These include wastes such as fluorescent bulbs containing mercury, lead acid batteries, used filters, oily rags and sorbent, oil contaminated soils, paints, ethylene glycol, spent X-ray film and used tyres which are sent to approved recycling and/or treatment outlets. However, while disposal routes are being planned/in place for most hazardous wastes there are others for which solutions have not been developed, and some materials that have not yet accumulated in sufficient quantity to make disposal financially viable. This has the effect of necessitating storage of some hazardous waste at the assets.

Monitoring plans have been developed for the landfill sites concentrating primarily on impacts on the local water table. Each site has water monitoring boreholes drilled in both up-gradient and down-gradient locations. These are sampled and tested at regular intervals by a local contractor and records kept to monitor the impacts of site-generated leachate on the groundwater. The records have yet to be assessed by AEA, although no impacts have been reported by the Company.

An intention to develop bio-remediation facilities at the landfill sites for the oil spill wastes has been stated. To date no construction work has been started and these Hazard Class III wastes are either being sent for recycling via asphalt plants⁹⁹ or stored. For contaminated soils/sand resulting from large scale oil spills, SEIC have committed to develop oily waste holding areas with a capacity of 20,000m³, which will include bioremediation cells. The visit to the island in May 2006 indicated that the small scale incinerators originally intended for use at each of the assets are not being utilised, the only examples seen during the visit were at the Zima residential complex and the OPF.

6.17.3 Follow-up items

Landfills

1. The three upgraded landfills are not having cover material placed over the waste on a daily basis in breach of HSESAP Table 2.2 Commitment 21. In part this is due to a lack of suitable cover material such as construction soils, although at Korsakov there is the potential for using the soils excavated as part of the LNG development. At Smirnykh, although there is a limited amount of bottom ash from the local coal-fired power station used at the site for cover, there is a need for further chemical testing of this material to ensure that it meets the classification requirement to allow deposition in the landfill. Again there is potential for suitable material in this case by excavating the next cell to be developed in a phased manner to provide cover on the active cell. Vermin and litter are a potential problem at all sites without the cover material.
2. In May 2006, there was still use of non-upgraded landfills by the pipeline construction crews, for example, Sokol camp sends its waste to the Dolinsk landfill. This practice was scheduled to finish by end of Q2, 2006 and in fact a centralised waste collection contract for Hazard Class IV and V was signed in September 2006. The centralised contract offers the advantage that a single truck can collect wastes from a number of sites which are operated by different sub-contractors before disposal at an approved landfill. The

⁹⁹ AEA Technology has viewed a contract applicable to the LNG/OET site specifying the requirement to recycle oil spill wastes via asphalt plants but has not been in a position to verify actual use of this route. We are informed that SEIC have visited and approved a facility near Yuzhno which has received oiled sand.

effectiveness of this contract has not been confirmed at the time of writing this report and should be verified during future audit/monitoring.

3. To determine the volumes and locations of waste deposited prior to the upgrade of the landfills SEIC commissioned a Legacy Waste Evaluation study. This study should enable SEIC to determine the necessary remedial action plans needed to address the impacts of earlier waste disposal at unlicensed (non-upgraded) landfills.

Hazardous Waste

1. At present the building of a Hazardous Waste Facility has been shelved and a waste streams document developed in order to identify potential disposal routes. SEIC has a contract with Ecoshelf to supply transportation and disposal of all classes I to III hazardous wastes. However, disposal options for some waste streams are yet to be identified, for example, spent glycol, photographic waste, paints and solvents. SEIC is in contact with several waste companies that purport to have disposal capabilities. SEIC are checking that the waste operators meet SEIC's environmental standards and will further consider providing assistance to improve the waste facilities in order to meet SEIC standards. SEIC is also meeting with more organisations in Moscow to inspect their existing facilities, and to view output from a waste facilities database (with Russia wide coverage) to determine the most appropriate disposal routes for their hazardous wastes. Thus, the ultimate disposal routes for some hazardous wastes are still to be resolved.
2. SEIC has proposed that bespoke oily waste cells be developed within the up-graded landfills, with a view to being able to bio-remediate material within the cell. Currently no plans have been viewed for these cells although we note that the Sakhalin II crude is likely to be readily biodegradable even when contaminated with salt (in the event of a marine oil spill). On this basis, a properly designed bioremediation site or cell could provide a disposal option for oily waste. Other disposal options considered in the OSRPs (see section 10) include the use of incinerators and disposal to the island's landfill sites. AEA was previously informed that incinerators were either not available or their use was not permitted. The OSRPs also cite the use of landfills for the disposal of spill generated oily wastes, although this would contradict SEIC's existing commitments with respect to the disposal of hazardous wastes.
3. The storage of hazardous waste is currently being undertaken at some sites. Short-term storage of hazardous wastes is an acceptable practice provided the storage facilities are adequate. Based on site visits carried out in 2006 a number of examples of poor practice/poor maintenance were observed. These included poor ventilation in a chemical store, capacity issues, damaged bunding and exposure to snowfall at some sites. Poor ventilation presents a health and safety risk if dangerous gases were released in the store, whilst capacity and bund failure can both result in loss of containment and localised contamination of the surrounding area. These issues should be addressed such that the risks highlighted are minimised.
4. Waste Storage at Project Facilities/Camps. Waste segregation at OPF – although properly labelled skips were being provided they were not being utilised correctly. Some good efforts were being made to segregate cardboard although there is no recycling outlet on the island at present. Tumanovo also has similar problems of waste segregation where for example oil filters were stored in incorrect containers.

5. Clinical waste from the camps is transported in suitable containers but unsterilised, from the camps by the medical staff in their cars to the hospital in Yuzhno for disposal. It is understood that the incinerator at the hospital is still not permitted by the local authorities so final disposal route will need confirmation/auditing.

6.17.4 Current status and compliance

SEIC has made a number of noteworthy improvements to the management of Project waste and, to a lesser extent, the island's wastes. These include:

- the upgrade and use of 3 existing landfill sites with capacity for both Project and municipal wastes
- implementation waste manifest system
- establishment of a centralised waste management service provider for hazardous and non hazardous wastes
- identification of waste treatment/ disposal routes for most hazardous wastes
- ongoing development of facilities for holding and treating oil spill materials
- provision for upgrade of landfills (other than the 3 main upgraded sites)
- monitoring programmes are in place.

Some work remains ongoing, but this is relatively minor and can be addressed. Overall waste management practices are much improved when compared with the situation at the onset of construction.

A number of key issues relating to waste management are provided in Table 6-13.

Table 6-13 Summary of Key Issues Relating to Waste

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.63	<p>A Waste Streams document has been produced that tabulates the waste types and quantities and for most waste streams has identified a disposal route. However, there are still some outstanding hazardous wastes without a known disposal path. In the short term to medium term this can be managed without environmental impact, but if not addressed in the long term there is the potential for moderate environmental damage.</p>	<p>Environment M (in the long-term)</p>	<p>HSESAP (T2.2, R 14)</p>	<p>Adequacy of Assessments & Plans</p>	<p>Unresolved</p>
6.64	<p>Upgraded non-hazardous landfill facilities were not in use until Autumn / Winter 2005 (<i>i.e.</i> sometime after initiation of construction). All upgrades are now in use, although some non-upgraded landfills were still being used to end of Q2, 2006.</p> <p>The Project's waste has therefore contributed to the overall waste volumes arriving at some poorly managed non-upgraded landfills. The practices at these sites are likely to have resulted in moderate damage to ecosystems, and we have therefore categorised this as a moderate environmental issue.</p>	<p>Environmental M</p>	<p>HSESAP (T2.2, R27) WB Technical Paper 426</p>	<p>Adequacy of Assessments & Plans</p>	<p>Historical (prior to upgrades)</p>
6.65	<p>SEIC has stated its intention to develop oily waste bio-remediation facilities within a specially designed cell in each of the up-graded landfill sites. SEIC's longer-term plans for the disposal of oily wastes have not been finalised. We also note disposal options considered in the OSRPs include the use of incinerators and disposal to the island's landfill sites. AEA was previously informed that incinerators were either not available or their use was not permitted. The OSRPs also cite the use of landfills for the disposal of spill generated oily wastes, although this would contradict SEIC's existing commitments with respect to the disposal of hazardous wastes.</p>	<p>Environment M (Potentially)</p>	<p>HSESAP (T 2.2 R30) 91/692/EEC</p>	<p>Adequacy of Assessments & Plans</p>	<p>Pending</p>

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
6.66	<p>AEA was informed that clinical waste from the camps is transported in suitable containers but unsterilised, from the camps by the medical staff in their cars to the hospital in Yuzhno for disposal. It is understood that the incinerator at the hospital is still not permitted by the local authorities so final disposal route will need confirmation/auditing.</p> <p>Exposure to clinical wastes can result in serious health implications and in the extreme possible mortality. Until there is evidence to confirm an acceptable final disposal route this issue is considered to have potentially high materiality.</p>	<p>Environmental and Health</p> <p>Potentially H</p>	<p>Best practice (WB Healthcare Waste Management Guidance Note)</p>	<p>Adequacy of Assessments & Plans Implementation</p>	<p>Pending</p>
6.67	<p>SEIC had initially assessed the potential for fully integrated development of waste management facilities with the local authorities and with other industrial developments on the island. SEIC subsequently decided against this option and reasonable rationale is provided in the EIA Addenda for not including IWMF in the strategy.</p>	<p>Environmental H</p>	<p>Best practice</p>	<p>Adequacy of Assessments & Plans</p>	<p>Closed</p>
		<p>Social M</p>	<p>Best Practice</p>	<p>Adequacy of Assessments & Plans</p>	<p>Closed</p>
6.68	<p>During the earlier stages of the due diligence process, numerous other issues of concern were raised that have either been adequately addressed or superseded. These include:</p> <ul style="list-style-type: none"> • the development of a waste management plan (now developed) • justification for landfill only strategy • integration of facilities with municipal facilities (now shared sites) • adequacy of landfill design (verified) • temporary storage facilities for hazardous waste • the phasing out of PA-A incinerator (intention confirmed) • quantification of waste volumes • disposal route for food and sanitary wastes (confirmed it will go to landfill) 	<p>Environmental L-H</p>	<p>Best Practice</p>	<p>Adequacy of Assessments & Plans</p>	<p>Closed</p>

6.18 MONITORING

Monitoring plans, for all phases of a Project, form an essential part of any Environmental Action Plan, as defined within IFC Guidance Note C. SEIC has developed monitoring plans for the construction phase of the project that cover all project activities up to January 2007, which is released in the public domain in Annex C of the HSESAP. A further plan for commissioning and operations will be produced in due course, and in advance of such plans being required. The staggering of plans allows monitoring to be refined (particularly important on projects with a long construction phase) and the approach has been agreed with the Lender group.

6.18.1 Construction

Overall AEA finds that the monitoring plan for the construction is adequate and in line with the requirements of OP 4.01 Annex C and IFC Guidance Note C. Some concerns have been identified with regard to adequate implementation of the monitoring plans during certain construction activities, notably during onshore pipeline river crossings (see Section 6.5).

6.18.2 Commissioning and Operations

The preparation of commissioning and operational monitoring plans must take place prior to commissioning/operational activities so that users can familiarize themselves with content and requirements of the plan. Final drafting of the plans was scheduled for Q4 2006, at which point they were to be agreed with the Agency Lenders before finalisation. However, the original timeframes have slipped, and amended text in an updated (though not released) Annex C states that *'The commissioning and operational monitoring plans will be developed in accordance with regulatory requirements and in line with the Project schedule, allowing sufficient time for their agreement with the [Agency Lenders] before finalisation'*.

Conflicting timeframes are provided in the Common Terms Agreement leaving overall uncertainty over the precise timeframes for the commissioning and monitoring plans. However, regardless of the precise date for the plans, the intent is for these plans to be released in the public domain via an updated Annex C in a timely manner. In our view, monitoring plans should be made available for review such that they are in place at least 3 months prior to activities. Given the current plans for commissioning the LNG and oil handling components of the Project in summer/autumn 2007, the development and approval of the monitoring plans for commissioning should be resolved as a matter of urgency.

For the commissioning and operational phases, the monitoring requirements will be adequate to demonstrate compliance with RF regulatory requirements (including MPEs, MPDs and MPCs), all relevant commitments in Part 2 of the HSESAP and all relevant standards as described in Annex A of the HSESAP. A commitment is made in the HSESAP that the commissioning and operation phase monitoring programme will define the precise parameters to be monitored, location of sampling points and the frequency and duration of sampling, and will cover the following aspects:

- Ambient air quality around relevant facilities
- Stack emission monitoring of main emission sources
- Greenhouse gas emission estimates
- Flaring volumes (onshore and offshore)

- Liquid discharges (end-of-pipe monitoring, including STW, hydrotest water discharge, drainage discharge points from onshore and offshore facilities, vessels)
- Water quality (potable water, groundwater, fresh surface waters and marine)
- Wetlands (hydrological effects etc.)
- Waste management facilities (including landfill, e.g. leachate)
- Noise (onsite and offsite, including LNG (including during commissioning), booster station, OPF and WGW feeding grounds as necessary)
- River and riverbank quality (hydrological, water quality and fisheries/spawning) following construction (or other disturbance works within the river, such as pipeline repair/replacement)
- Land reinstatement status (including pipeline RoW, construction camps etc.)
- Commercial fisheries
- Flora and fauna (including WGW)
- Pipeline integrity (leak identification offshore and onshore).

Table 6-14 Summary of Key Issues Relating to Monitoring

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
6.69	A monitoring plan has been developed for construction activities through to the end of 2006. Post construction monitoring will be addressed in a commissioning/operational monitoring plan. Given the current plans for commissioning the LNG and oil handling components of the Project in summer/autumn 2007, the development (and agreement with Agency lenders) of this monitoring plan should be resolved as a matter of urgency.	Environmental M	OP 4.01 Annex C	Adequacy of Assessments & Plans	<div style="background-color: #00FF00; padding: 2px; text-align: center;">Closed (Construction)</div> <div style="background-color: #FFD700; padding: 2px; text-align: center;">Pending (Commissioning & operation)</div>

6.19 DECOMMISSIONING

Decommissioning activities can be categorised broadly as those at the end of the Project's life e.g. decommissioning of major assets, and those associated with the end of construction e.g. decommissioning of temporary camps.

Temporary camps

HSESAP Table 2.5, row 106 states *'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.'*

End of Project life

The EIA materials include little detail about decommissioning activities. The main decommissioning considerations include use of design that allows for the dismantling and re-use of assets, and a commitment to implement a decommissioning strategy that meets industry best practice at a time when the Project is approaching the end its lifetime.

Given the life expectancy of the Project, it is unlikely that current legislative and best practice decommissioning requirements will remain applicable, and on this basis it is common for decommissioning strategies to be prepared in the years running up to decommissioning.

AEA considers it reasonable practice to prepare a decommissioning plan close to the time of actual decommissioning. However, under the PSA, the assets will be handed over to the Russian Federation in approximately 20 years (depending on oil and gas prices) and in any case well before the development of decommissioning plans.

SEIC are also in discussions with the RF regarding the establishment of a decommissioning fund (set-a-side of funds that will be secured for the use in responsible decommissioning).

7 Public Consultation

7.1 INTRODUCTION

Stakeholder engagement/consultation has been an ongoing process, taking place via a number of routes and for a variety of purposes, ranging from formal public hearings as required under Russian law through to engagement with individuals/small groups of project affected people (PAP). For the purposes of this report, commentary is limited to SEIC's communication with stakeholders since AEA's appointment as the IEC in late 2001.

Key communication activities include:

- The Public Hearings (as part of the TEOC process); in late 2001;
- Numerous targeted stakeholder meetings during the collection of social/health baseline data;
- Public meetings with SEIC to discuss the 2003 ESHIA;
- Frequent discussions with targeted groups of PAP (e.g. dacha community residents and indigenous peoples);
- Continuous and ongoing meetings and engagement activities between the Community Liaison Officers (CLOs), local authorities and some community members;
- Regular community meetings to provide updates on Project activities;
- Engagement with stakeholders with specific transboundary interests in Japan, including six-monthly meetings in Hokkaido and Tokyo.

In this section of the report we provide:

- A history of SEIC's consultation process, and previously identified issues of concern;
- A summary of the most recent PCDP and SEIC's implementation of this plan and other consultation activities;
- An evaluation of the adequacy of implementation against agreed standards and benchmarks.

7.2 BACKGROUND TO THE PCDP

Meaningful Consultation and disclosure is required in order to comply with the OP4.01 Environmental Assessment, which in turn has the requirement for public consultation and disclosure. More detailed guidance to support the requirement in OP4.01 is provided in the IFC Guidance Note F - Guidance for Preparation of a Public Consultation and Disclosure Plan, which specifies the need for a PCDP and should:

- Describe the local requirements for consultation and disclosure;
- Identify key stakeholder groups;

- Provide a strategy and timetable for consultation with the various stakeholders during different stages of the project;
- Describe responsibilities and resources for implementing consultation activities;
- Describe the process by which people affected by the project can bring their grievances to the sponsor, in a culturally appropriate manner, for consideration and redress; and
- Detail reporting of consultation activities.

An initial PCDP was released in December 2002, outlining SEIC's approach to public consultation and disclosure of information in relation to the Project. It summarised consultation activities that had already been undertaken and outlined planned activities in relation to the ESHIA. This PCDP did not include a timetable for future consultation, but stated that the final timing, scope and format of the consultation meetings would be determined in early 2003. It also did not include a grievance procedure.

The PCDP subsequently evolved and a 2005 plan was released onto the web, taking into account the comments raised by AEA and Agency Lenders, including the required grievance procedure. It has subsequently been updated and the version on the SEIC website at the time of writing this report is dated November 2006 (Revision 4). The PCDP outlines SEIC's approach to consultation and details both historical and future consultation activities on the island, and more broadly, includes disclosure and consultation activities in neighbouring Japan. Feedback from previous consultations, contact details and information about the role of CLOs, the grievance procedure and public information leaflet are also presented in the PCDP. The final grievance procedure, which met all relevant requirements, was formally rolled out to employees and the public in 2006, has been included in Section 8 of the PCDP (also see Section 8.3.8).

In assessing SEIC's performance in respect of its public disclosure and consultation activities we focussed primarily on the adequacy of the PCDP and SEIC's implementation of the August 2005 plan and more recently we reviewed updates included in the November 2006 Plan. The assessment has been made against:

- Requirements for disclosure and consultation specified under RF Law
- IFC Guidance Note F "Guidance for preparation of a public consultation and disclosure plan"¹⁰⁰
- Implementation of commitments on the ground.

Where appropriate, reference is also made against other relevant WB/IFC guidance and international conventions.

The above requirements can be broadly broken down into consultation associated with the ESHIA process and consultation targeted at specific groups, including those that will be directly affected and require relocation/compensation (e.g. dacha owners) and consultation with vulnerable groups such as indigenous peoples.

¹⁰⁰ Guidance Note F provides detailed guidance to support the disclosure and consultation requirements of OP 4.01.

The IFC Guidance Note F, Guidance for preparation of a public consultation and disclosure plan, requires that Project sponsors **meaningfully** consult with stakeholders. Key to meeting the requirements outlined in this guidance note is an understanding of what constitutes meaningful consultation. Within the IFC good practice manual entitled “*Doing better business through effective public consultation and disclosure*”, a definition of meaningful is not provided. However, several references to meaningful consultation are made. On the basis of this document, the key elements of ‘meaningful consultation’ are provided below:

- The project sponsor provides relevant information in a timely manner (sufficiently in advance) and in a form and language that are understandable and accessible to the groups being consulted
- The project sponsor is required to conduct consultations with relevant stakeholders including affected groups and other interested parties (e.g. non-governmental organizations (NGOs) and local authorities) about the project’s environmental and social aspects, and to take their views into account. In particular, this relates to consultation on the ESHIA package declared as fit for purpose in December 2005
- The project sponsor consults relevant stakeholders at least twice
- During scoping and before the terms of reference for the EA are finalized
- Once a draft EA report is prepared
- For the initial consultation, the project sponsor provides a summary of the proposed project’s objectives, description, and potential impacts
- For consultation after the draft EA report is prepared, the project sponsor provides a non-technical summary of the report’s findings
- The summaries should be disseminated proactively to local stakeholders in a form and language meaningful to those being consulted
- Following public consultation on the draft EA report, the project sponsor supplements the EA by adding details of the public consultation process, as necessary, including the project sponsor’s responses to concerns raised by the various stakeholders and details of measures taken to incorporate these concerns into project design and implementation.

AEA has reviewed the PCDP and other related SEIC consultation activities and approaches against the above requirements. The findings of this review are presented in the following sections of this Section.

Under the second bullet point above, there is the requirement for consultees’ views to be taken into account. Such a requirement is critical if consultation is to be meaningful. Thus in order to demonstrate meaningful consultation has taken place, a number of examples where SEIC has taken account of views are provided across a range of stakeholder types.

Issue description	Action taken by SEIC	Stakeholder type
Pipeline route selection	Selected a predominantly onshore pipeline route to maximise Russian content and facilitate gas off-take.	RF Government
Concern expressed by various stakeholders about the proximity of the Piltun pipeline route in relation to the southern tip of the Piltun feeding area.	Following the decision to revisit the optimal pipeline routing, the views of various stakeholders were taken into account in deciding the most preferred pipeline option.	Whale Experts and NGOs focussing on the WGW issue. Indigenous People (Reindeer Herders) and potentially affected enterprises.
Measures to protect/enhance biodiversity. Development of the Biodiversity Action Plan – measures to protect/enhance biodiversity.	Still under development, although seeking input on issues such as salmon habitat enhancement.	Wild Salmon Centre
Dacha owners' compensation preferences.	Dacha owners have been consulted regularly. Their views have been considered whilst developing compensation options to owners (in recognition that not all dacha owners wish to leave).	Dacha owners
Siting of construction camps and laydown yards	During collection of baseline social data, local residents were consulted about the location of camp sites. On some occasions, the site was moved, e.g. the original proposed Val camp was moved to the other side of the railway, such that the railway provided a physical barrier between the camp and local community. Similarly at Onor the camp was moved following input from local community members (SIA pg 5-5).	Local communities
Various common topics/concerns raised at public meetings	Provision of numerous position papers.	Various.
Numerous views/requests from indigenous people.	SEIC facilitated the establishment of the Sakhalin Indigenous Minorities Council to help in the development of the SIMDP and in doing so, identify and prioritise issues. SEICs agreement to monitor groundwater quality from the IPs water well.	Indigenous People
Offset for the loss of part of the recreational beach at Prigordonoye	SEIC held a number of consultation activities (e.g. questionnaire, public meetings) and preference was expressed in 2002 for the upgrade of a park in Korsakov. This has not materialised for a number of reasons, and it is now more likely that in accordance with the Korsakov Administration's wishes, the funds earmarked for the park will be spent on a sports stadium. In April 2007, AEA reviewed evidence to demonstrate that SEIC has engaged in discussions with targeted stakeholders (Korsakov Administration, District Assembly and the general community) to progress the provision of the beach offset.	Korsakov community
Impact of the pipeline on a cemetery	Residents of Gornoye and Tumanovo believed that there was a cemetery on the pipeline route. The pipeline was re routed to avoid the cemetery (ref SIA pg 5-19)	Residents of Gornoye and Tumanovo

This list is not intended to be comprehensive. Furthermore, there are likely to be many occasions where views are taken into account, and although SEIC has not responded in a project change, they have provided a response through positions papers presented on their web site, or through direct correspondence. For example, several papers addressing project alternatives, comparison with TAPS pipeline, and the provision of additional information through the ESHIA materials have been presented.

7.3 RF DISCLOSURE AND CONSULTATION REQUIREMENTS

Under RF law, disclosure and consultation is required as part of the TEOC approval process, which calls for public hearings. These hearings were carried out in late 2001 in a number of administrative districts, often in town halls/other official buildings.

AEA has undertaken a detailed analysis of the public hearings process and a summary of the main findings is provided below.

Date	Activity	Details
Nov 2001	Release of the PEIA	Provided publicly available information on the project for use during public hearings.
Nov/Dec 2001	Pre-public hearings	52 communities were consulted, involving 1,500 people. Aimed to gather preliminary information about issues of concern in various localities.
3 rd – 18 th Dec 2001	Statutory public hearings	One held in each of the 15 District Administration Centres on Sakhalin Island.

AEA attended three of the 15 public hearings, in an observer capacity, on Sakhalin Island during December 2001. The geographical scope was considered adequate since it included most of the people who will be directly affected by the project and a number of those who will be indirectly affected. Overall it was the opinion of AEA that the formal public hearings process complied with relevant Russian Federation legislation and guidelines.

Since the original TEOC, a number of additional hearings have taken place. Specifically these include repeat hearings associated with the LNG jetty construction (following a court case against in which SEIC was a third party), and also following the major pipeline re route through Chaivo Bay¹⁰¹.

7.4 FURTHER CONSULTATION

In addition to consultation carried out in line with RF requirements, a considerable amount of further consultation has taken place during the collection of social baseline data collection; public meetings to discuss the 2003 ESHIA materials; with specific Project Affected Groups; via CLO interaction with local communities; and for transboundary issues consultation has taken pace with Japanese stakeholders (see Section 7.5.4). This consultation is described in Section 4 of SEIC's PCDDP.

¹⁰¹ Following the Chaivo Public hearing, two additional public meetings were conducted in Nogliki with a total of 8 participants, and separate meetings were held with two potentially affected fishing enterprises.

SEIC's performance against relevant requirements is provided in the remainder of this section. Commentary is also provided specifically on SEIC's consultation activities since the release of a 'fit for purpose' package in December 2005 in Section 7.5.10.

7.5 CURRENT STATUS AND COMPLIANCE

7.5.1 General Approaches to Disclosure of Information

All appropriate documentation has been made available in English and Russian (the indigenous peoples do have their own languages, but all of them can be presumed to be literate in Russian – see SIA Chapter 6, p. 6-5). Furthermore documentation covering issues of a transboundary nature has also been made available in Japanese. The documentation therefore fully meets language guidelines.

Previously SEIC's consultation strategy relied to a great extent on its website, newspaper announcements and the placing of material in district libraries. In addition they sponsored radio programmes about the project and have also held 6-monthly round-island public meetings. While these are effective mechanisms they should ideally be supplemented by individual face-to-face contacts particularly in communities likely to feel the greatest impacts. It is therefore good to note that SEIC has broadened its approach to disclosure, primarily through the instigation in 2003 of a network of CLOs; the CLO network is discussed in more detail below and in Section 8. Notification mechanisms are also supplemented by a suite of communication methods described in the PCDP. In addition to newspaper announcements, communication methods include CLO meetings, CLO open hours, bulletin boards and use of district libraries.

AEA also found that in 2006 SEIC became more creative in consultation practices e.g. round table discussions and smaller meetings rather than large public meetings, allowing more informal engagement to take place. A high-level consultation timetable for 2007 has also been provided for recent and planned engagement that includes meetings with Japanese stakeholders¹⁰².

7.5.2 Coverage of Consultation Already Undertaken

With respect to consultation already undertaken, it is important that the PCDP and/or the ESHIA provide reference to records of consultation activities; there is little point in stating that meetings took place without providing feedback and an outline of any actions taken as a result. AEA considers that the SIA and SIAA provide an appropriate summary of the history of consultation work and concerns arising. The SIA also links appropriately to the PCDP.

Also Section 4 of the 2007 PCDP includes updates on the consultations that took place in 2005-2006 and Section 5 provides feedback on the consultation activities to date, which AEA considers appropriate.

7.5.3 Consultation with Local Communities

The PCDP, SIA and SIAA outline that ongoing consultation, linked to ongoing activities such as negotiation of compensation and provision of supplemental assistance, is largely managed through a network of CLOs. The network is comprised of a combination of both Corporate

¹⁰² This is available at: <http://www.sakhalinenergy.com/en/documents/Consultation%20activity%20in%202007.pdf>.

SEIC CLOs working on community relations and contractor-appointed CLOs who work with communities affected by construction during the construction period. CLOs are required to:

- Be involved in weekly and daily monitoring activities
- Meet with contractor community liaison personnel and SEIC
- Disseminate Project information to local authorities, businesses and the community
- Organise community meetings
- Work on resolution of grievances in accordance with SEIC grievance procedure
- Interface with community employment centres to ensure that the Company makes its best effort in maximising local content
- Promote SEIC sustainable development principles among community stakeholders, applying to SEIC for social investments.

The CLOs are thereby expected to employ a range of consultation and communication methods including CLO open hours, meetings with community members, and use of local media. Details of SEIC's CLO network are clearly laid out in the PCDP and it is evident that CLO's communication, facilitation and mediation skills are key to the implementation of the PCDP requirements. The CLOs are crucial to the continuing "meaningful" consultation required by guidelines.

AEA notes the significant resources that SEIC has and is continuing to invest in CLO's responsible for carrying out key consultation activities.

While the approaches to consultation with local communities appear comprehensive, during site visits to communities in the Korsakov District by Agency Lenders and AEA in 2005, some stakeholders reported that CLOs were not communicating sufficient information on the Project and they were perceived as being largely reactive. The CLOs were reportedly failing to make communities aware of the public grievance information leaflet and it was argued that they appeared to be "fire-fighting" rather than proactively identifying needs and opportunities in the community and feeding this back to SEIC in Yuzhno. Various stakeholders complained that access to Project information was difficult and unsatisfactory and SEIC had not always consulted at each stage of Project implementation. In response to the findings of the 2005 visit to Korsakov, SEIC developed and rolled out an External Affairs Korsakov Issues Management Plan. Following a site visit in May 2006 by AEA, where similar issues were noted, SEIC also reviewed the CLO communication practices. As a result the HSESAP has been revised to include a commitment to develop a community meetings plan, outlining where and when meetings will take place.

Based on the limited discussions that AEA was able to subsequently have with members of two affected communities (including one outside of Korsakov) during a later site visit in May 2006, awareness of the public grievance information leaflet was low, suggesting information dissemination amongst project affected people remained inadequate, at least in the locations visited. SEIC agreed an awareness plan to address this and subsequently between 2nd and 20th June 2006, SEIC placed advertisements of its public grievance leaflet in 13 newspapers across the island, with a total readership of 43,000. In addition, over 17,000 postcards providing the same information were delivered to individual addresses in over 60 communities across the island.

In this regard, AEA considered that the PCDP could be improved by identifying those locations where there is expected to be high impact but low “contactability” (i.e. communities that will have the least means of transmitting their views due to difficulties in travelling to a public meeting, or having access to a telephone or email) and thus where the importance of face-to-face interaction is increased. During site visits in September 2006 to the north of the island, AEA found that consultation had taken place and both information and contact details were posted throughout most communities with the exception of one hamlet. Although awareness in most small communities was found to be generally good at the time of the visit, further updates to the PCDP should specifically address the ‘contactability’ of affected communities and ensure effective interaction with all affected communities.

7.5.4 Transboundary Consultation

SEIC has stated that they wish to comply with the “*spirit*” of the Espoo Convention, despite neither the Russian Federation¹⁰³ nor Japan having ratified it, and are taking measures accordingly. Furthermore, EBRD Environmental Policy requires that projects with the potential to cause a transboundary impact follow the principles of the Espoo Convention. SEIC has improved its provision of project information in Japanese and implemented a consultation programme for Japanese stakeholders. This work has evolved into the Japanese Stakeholder Engagement Plan (provided in Japanese within Appendix 4 of the 2005 PCDP currently posted on the SEIC website), which include specific details of public consultation activities in Japan, documents to be available in Japanese, the grievance procedure, and a modified version of the public grievance information leaflet which can be used by Japanese stakeholders should they wish to lodge a complaint. Section 6.7 of the 2007 PCDP includes details on consultation activities with key stakeholders in Japan for 2005 and 2006 and summarises the meetings planned for 2007. Engagement with Japanese stakeholders has included meetings with the Japanese Coastguard and fishing agencies, meetings at town halls and specialist meetings attended by technical experts. SEIC also attended meetings organised by JBIC in Tokyo and Sapporo during May 2005 and again in June 2006. SEIC has made positive efforts in this area.

The timetable with dates for meetings planned in Japan during 2007 is included on the SEIC website¹⁰⁴.

7.5.5 Consultations with NGOs

Environmental NGOs and other NGOs are significant stakeholders for the Project. SEIC has identified and stated in the PCDP the local, national and international NGOs to which it will provide regular news updates. It also organises meetings between technical staff and NGOs.

7.5.6 Consultation with Indigenous Peoples

Best practice requires that special attention be given to the interests of IPs, that they are consulted and that their concerns are addressed in a timely way. SEIC has made considerable efforts to adopt a meaningful consultation approach to its interaction with IP’s as part of the SIMDP and in AEA’s opinion, SEIC’s efforts have been appropriate and effective.

In terms of guidance and legislation, there is an International Labour Convention (169) on Indigenous and Tribal Peoples in Independent Countries and a World Bank draft Operational

¹⁰³ The Russian Federation has signed the Convention but has not ratified it.

¹⁰⁴ Available at: <http://www.sakhalinenergy.com/en/documents/Consultation%20activity%20in%202007.pdf>

Policy on Indigenous Peoples. As far as the former is concerned Russia has not ratified it, and the requirements for consultation contained in it are mainly connected with administrative or legislative measures likely to affect an indigenous population. Article 7 para 3 states: “Governments shall ensure that, whenever appropriate, studies are carried out, in co-operation with the people concerned, to assess the social, spiritual, cultural and environmental impact on them of planned development activities...”. The World Bank draft Operational Policy, however, is more relevant to SEIC. AEA finds that SEIC is compliant with the World Bank Guidelines.

7.5.7 Consultation on Health Issues

The HIA itself is considerably less detailed and comprehensive than the SIA on the question of consultation about anticipated health issues with impacted communities. The HIA does provide a detailed table (Chapter 19, Table 3.2) of consultations carried out on health issues. Unfortunately, with the exception of specific consultation with indigenous peoples, the HIA suggests that all the health consultation efforts have been with health professionals and institutions (hospitals, diagnostic centres, regional health services, insurance groups and many others). Clearly much has been done on clinical studies, developing plans for the health infrastructure and survey work by the Regional Health Services.

SEIC has helped to facilitate a conference and consultation activities on HIV and Aids and has also established a joint company-community STD/HIV/AIDS committee, which is focused on the preparation of specific SD community HIV/AIDS project proposals. This is further discussed in Section 9.

7.5.8 Timetable

The 2007 PCDDP includes details of SEIC plans for consultation during construction and beyond for the following stakeholder groups: affected communities, other communities in Sakhalin, IP's, stakeholders in Japan, NGO's and the media.

The 2005 plan included activities such as the release of the ESHIA Addenda and consultation activities in Japan. It also outlined the routine CLO activities for consultation and what was planned for NGO's and other interest groups. SEIC posted a high-level consultation timetable on their web site, but it was not sufficiently detailed for future consultation and disclosure activities (i.e. lacked precise dates, venues and topics for the forthcoming quarter) and was not updated on a monthly basis in line with HSESAP Table 2.10A line 2 commitment.

A detailed timetable of proposed activities is a necessary and important element in enabling meaningful consultation, providing information on a timely basis to allow people to plan and be informed prior to meetings. The absence of a detailed timetable was therefore a material concern. During the April 2007 site visit, SEIC demonstrated that it has posted the 2007 consultation activity timetable on the web and places information about meeting schedules and venues in communities in advance, including in local media, announcements in public places and CLO offices¹⁰⁵.

However, monthly updates to the calendar on the website are still not being provided.

¹⁰⁵ This is available at:

<http://www.sakhalinenergy.com/en/documents/Consultation%20activity%20in%202007.pdf>

7.5.9 Project Changes

Since the release of the 2003 ESHIA a number of material project changes have been made, both in terms of design and scheduling. Public hearings were conducted according to Russian legislation requirements for all material project changes. These project changes are described in the Material Project Changes addendum that was released in December 2005. However, in some instances such as Aniva Bay dredging, there was a lack of routine and timely information provided to local communities, and dredging activities had been completed by the time the addenda was released. The failure to provide routine updates represents a shortcoming in SEIC's engagement with local communities, preventing an opportunity to input into the design and scheduling of design changes, and is likely to be a contributory factor to some of the ill feeling amongst project affected communities.

Material project design changes to the addendum were made, which are publicly available in both Russian and Japanese (excerpts only in Japanese). Many design changes were relatively minor, however, for one at least, namely the Chaivo re-route, initial consultation was insufficient in that not all PAP were identified and consulted with and only a small number of people were included in the study. However SEIC has since revisited affected communities/local enterprises and subsequently updated the Chaivo SIA thereby addressing our concerns.

7.5.10 Consultation since release of the fit for purpose ESHIA package

The ESIA addenda and HSESAP were released in December 2005. At this time the ESHIA package was considered to meet lender requirements for consultation and therefore considered fit for consultation. A series of public consultation meetings was then organised by EBRD (as a part of their policy requirements) in Q1 and Q2 of 2006. Meetings were held in London, Moscow and on the island in Yuzhno, Korsakov and Nogliki and each of these was attended by SEIC. Additional meetings, organised by SEIC, also took place in Tokyo and Sapporo.

With the exception of the Japanese meetings, SEIC did not undertake their own consultation meetings in relation to the fit for consultation package, although they did receive a small number of communications relating to these meetings. AEA understands that SEIC has responded to all enquiries although we are unaware of the precise nature of the public's questions. Section 6.2 of the 2007 PCDP reports that SEIC received 19 written enquiries during the ESHIA disclosure period which they responded to individually and referred people to the website for questions raised at public meetings.

As discussed above, SEIC did not undertake their own consultation meetings, although they did attend the EBRD meetings and have been willing to respond to any questions/requests directed at the Company. To this extent we believe that SEIC has participated in a series of public meetings engaging with interested stakeholders both locally and on an international scale since release of the fit for consultation package. It is AEA's opinion that this meets lender requirements. However we do note that the addenda were published almost 3 years into construction, and as such stakeholders' ability to influence the project design at the time of the meetings was undoubtedly limited.

7.5.11 Implementation of PCDP

In Q3 2006, AEA undertook a systematic compliance review of the commitments made in Table 2.10a of the HSESAP. We also reviewed levels of compliance during our April 2007

site visit and found SEIC to be attaining a high level of compliance, although we note the following exceptions of minor materiality.

Row 2 requires that *'SEIC shall maintain a publicly available up to date calendar/timetable of planned consultation activities to be updated monthly'*. Although a calendar is available on the website, it seems to be updated infrequently. We further note the PCDP states in section 6 that *'The date, time and venue for all key consultation meetings will be posted on a calendar on the Company web site'*. See Section 7.5.8.

Row 9 requires that the *'Company should post its response to the HSESAP and addenda consultations on the web site within 30 days'*. We were not aware of any queries being directed at SEIC following the HSESAP addenda consultation. However the 2007 PCDP states that 11 of the 19 written enquiries during the ESHIA HSESAP disclosure period directed to SEIC were to provide documentation. SEIC report that they responded to the other 8 queries individually, but did not post details of these on their website.

Row 13 (3rd bullet point) requires *'...to monitor, audit and report on contractor/employee compliance with SEIC policies and standards and socio-economic plans using the social compliance monitoring handbook'*. By late 2006 the social compliance monitoring handbook had been fully rolled out and reporting was in progress by the time of the AEA April 2007 site visit. See Section 8.3.6 for more details.

Row 25 requires that *'a review of the engagement activities in Japan shall be undertaken at the end of Q4, 2005 to determine the 2006 programme'*. As of November 2006, a Japanese stakeholder engagement plan for 2006 had not been produced, however an updated Japanese stakeholder engagement timetable for 2007 was available on the web following the AEA site visit in April 2007.

7.6 CONCLUSIONS

AEA concludes that SEIC is putting additional effort into their public disclosure and consultation plans. Of note, during recent preparation of the SIMDP, appropriate people had meaningful input on the components of the plan. The current PCDP conforms with the relevant WB/IFC guidelines and other provisions. There is also a high level of compliance with the HSESAP Table 2.10A Public Consultation and Disclosure commitments with the following exceptions:

- In order to facilitate meaningful consultation with stakeholders, consultation timetables should be available. Such timetables are required to be placed on the SEIC website under HSESAP commitments. Historically these timetables have not been provided on a timely basis (notably for Japanese stakeholders) or updated each month, however improvements have been made to rectify this and a timetable for Japanese engagement is now in place.
- SEIC also failed to meet the requirements specified in Table 2.10a of the HSESAP in respect of the posting of responses following addenda/HSESAP public consultation meetings.

AEA considers that SEIC should be able to meet all its HSESAP requirements with respect to public consultation. SEIC's monthly HSESAP monitoring and reporting systems should help in this regard.

Table 7-1 Summary of Key Issues Relating to Public Consultation

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
7.1	On the basis of the limited discussions that AEA was able to have during the May 2006 site visit with members of two of the affected communities, contractors, and staff, awareness of the grievance leaflet was poor, suggesting inadequate information dissemination amongst project affected people. SEIC addressed this issue in Q3, 2006. AEA revisited awareness of the grievance leaflet in September 2006 and found awareness had improved.	Social Potentially M	OP4.01 (IFC Guidance Note F)	Adequacy of Assessments & Plans	Historical
7.2	Material design changes do not appear to have included adequate meaningful consultation; for example changes to dredging in Aniva Bay where information was released after completion of the dredging.	Social L/M	OP4.01 (IFC Guidance Note F)	Adequacy of Assessments & Plans	Historical
7.3	In order to facilitate meaningful consultation with stakeholders, consultation timetables should be available. Such timetables are required to be placed on the SEIC website under HSESAP commitments and updated on a monthly basis. A timetable was made available in July 2006 and we noted the high level nature of this timetable and recommended that it should be supplemented by a more detailed breakdown of consultations for the next quarter, for local community meetings in particular. AEA reviewed the updated consultation timetable posted on the web in April 2007 and specific dates for community meetings in May had been listed. However, it appears that monthly updates of the timetable have not been happening in practice.	Social/ Environmental L	OP4.01 (IFC Guidance Note F)	Adequacy of Assessments & Plans	Pending
7.4	With the exception of specific consultation with indigenous peoples, it appears from the HIA that all the health consultations focussed on health professionals and institutions (hospitals, diagnostic centres, regional health services, insurance groups and many others).	Social L	OP4.01 (IFC Guidance Note F)	Adequacy of Assessments & Plans	Historical
7.6	SEIC is failing to meet the requirements specified in Table 2.10a of the HSESAP in respect to: <ul style="list-style-type: none"> • Monthly updates to the consultation timetable (as stated above); • Posting of responses to queries following addenda/HSESAP public consultation meetings; • The 2006 Japanese Stakeholder Engagement Plan had not been made available. However a plan for Japanese consultation activities in 2007 was posted onto the SEIC website in April 2007. 	Best Practice/ Procedural L	OP4.01 (IFC Guidance Note F)	Adequacy of Implementation of Plans	Historical

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
7.7	<p>A number of additional concerns were previously raised, relating to:</p> <ul style="list-style-type: none"> • Attendance profile at the main meetings • Availability of information • Consultation on transboundary issues (with Japanese stakeholders) • Consultation with remote communities. <p>These issues have been adequately addressed through continual consultation, the release of new environmental information (the addenda), execution of Japanese stakeholder meetings, and the development of a CLO network that has engaged with remote communities and vulnerable individuals. These have been largely closed (recognising the specific issues highlighted above).</p>	<p>Best Practice (lender requirement) Project Delays H</p>	<p>OP4.01 (IFC Guidance Note F)</p>	<p>Adequacy of Assessments & Plans</p>	<p>Closed</p>
7.8	<p>During the early stages of due diligence we made the observation that it is a World Bank requirement that the Environmental Management Plan (EMP) is made available for stakeholder consultation. SEIC had not produced an EMP, preferring (at that time) to manage monitoring and mitigation through the existing Environmental Management System and international style ESHIA.</p> <p>This was closed following release of the HSESAP in Dec 2005 (although we note this was released well into the construction schedule). The HSESAP was posted on the Company's websites in Russian and English in January 2006.</p>	<p>Best Practice (lender requirement) Project Delays H</p>	<p>OP4.01</p>	<p>Adequacy of Assessments & Plans</p>	<p>Closed</p>

8 Social Impact

8.1 INTRODUCTION

AEA has undertaken detailed reviews of the approaches, research, documents and various activities undertaken by SEIC to address social issues since 2001. This chapter reviews the Project's approach to identifying and managing its social impacts as outlined in a number of documents including the:

- Social Impact Assessment (SIA)
- Social Impact Assessment Addendum (SIAA)
- Resettlement Action Plan (RAP)
- Sakhalin Indigenous Minorities Development Plan (SIMDP)
- Health Safety and Environment and Social Action Plan (HSESAP)
- Social Compliance Monitoring Handbook (SCMH)
- Treatment Plan for Objects of Cultural Heritage
- Social Performance Plan (SPP)

The purpose of AEA's review is to assess SEIC's actions to forecast and manage the social impacts of the Project and, more specifically, to assess the extent to which SEIC's actions to address social impacts are in line with relevant guidelines and standards. Of particular relevance are the following IFC Safeguard Policies:

- Indigenous Peoples (OD4.20, September 1991)
- Involuntary Resettlement (OP4.30, June 1990)
- Cultural Property (OPN11.03, September 1986)

The findings of the review represented in this section are based on:

- reviews of SEIC's social policies, assessments and plans (as listed above)
- meetings with SEIC teams
- meetings with staff from a selection of SEIC's contractors and sub-contractors, including their two largest contractors, Starstroi and CTSD
- a series of field visits to the island by AEA.

The SIAA was produced to further develop some areas, which had not been fully covered in the SIA or had arisen since the completion of the SIA (released 2003). In addition, further documents have been produced such as the SIMDP and the RAP and the 2003 Treatment Plan for Objects of Cultural Heritage¹⁰⁶ was updated. These have resulted in significant

¹⁰⁶ This includes the treatment of archaeological sites, historical and palaeontological objects and plans for the treatment of religious objects and locations (including indigenous peoples' cultural heritage) as well as places with unique natural environmental features.

improvements. Specific details on the improvements made and remaining issues are discussed through reference to examples in Section 8.3.

Figure 8-1 provides a summary timeline of the production of key social/public consultation assessments and plans, against the construction schedule.

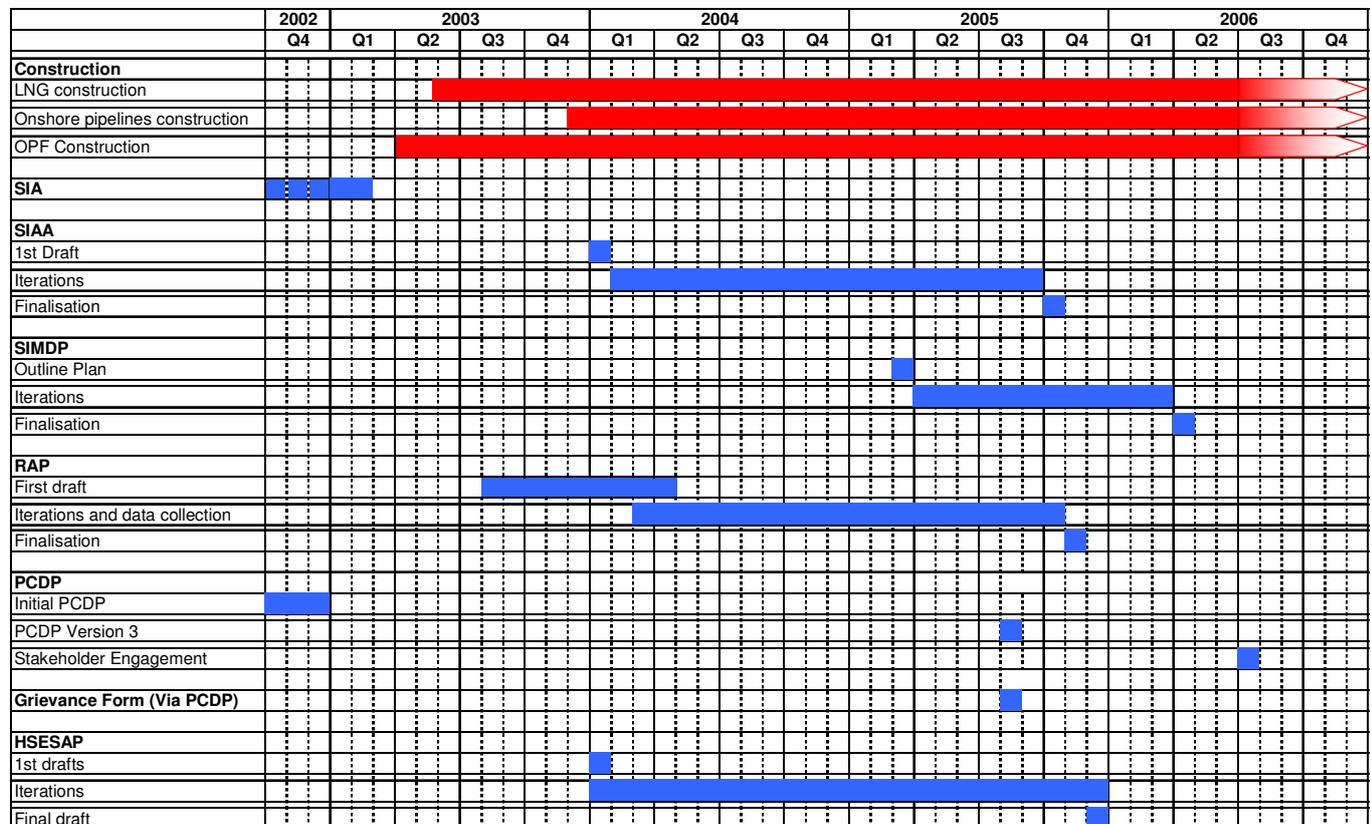


Figure 8-1 Timeline of Social/Public Consultation Assessments and Plans Against Construction Schedule

Prior to the development of the RAP and SIMDP work on resettlement and Indigenous Peoples (IP) issues was carried out as part of the development of SIA.

8.2 SOCIAL BENEFITS

The Project will result in financial investment on the island and socio-economic benefits. Some of the main investments and potential benefits are briefly described in the section. AEA’s concerns related to potentially negative social impacts are discussed in Section 8.3.

The Project is being developed under a Production Sharing Agreement (PSA) between the Government of the Russian Federation, Sakhalin Oblast Administration and SEIC. In accordance with the PSA, revenue received from selling the Project’s oil and gas is first subjected to a royalty charge of 6%, which is paid to the Russian Federation. Changes in the tax legislation in 2004 has led to Sakhalin Oblast’s share of these royalties being cut to 5% (previously 60% intended for the Oblast), with the remaining 95% going to the Federal

Government. The direct benefits in revenues for the Russian Federation are estimated to be in excess of \$50 billion dollars (\$2 billion to the Oblast) during the life of the project. Since the arrival of the offshore oil and gas industry in the 1990s, the standard of living on Sakhalin Island has greatly improved. Nominal per capita income of the population is reported to have increased by 31.3% in 2005 compared to 2004, which surpassed the rate of inflation by about 12%. This increase has resulted in a decrease in the proportion of population living below subsistence level; 20.4% were living below the subsistence level in 2005, compared to 21.3% in 2004¹⁰⁷.

Employment opportunities have been created as a result of project activity, and unemployment on the island has fallen. Unemployment in Sakhalin Oblast decreased from 13% to 7.4% of the labour force from 2000 to 2004, compared to a decrease of 10.5% to 8.2% over the same period for the Russian Federation overall¹⁰⁸. During the final quarter of 2005, 22,752 people were employed on the Sakhalin II project, either directly or through contractors. Of these, 14,076 (62%) were Russian, including 7,800 (>34%) residents of Sakhalin. More recent information shows Project related employment in 2007 reached 25,000, with 70% of the workforce being Russian. SEIC has provided training courses, apprenticeships, scholarships and internships to build local technical expertise and encourage young, talented people to stay in Sakhalin. SEIC invested \$7 million in training employees in 2005, of which \$5.9 million was spent training Russian nationals.

The PSA states that SEIC must show preference to Russian enterprises when awarding contracts, provided that they are duly qualified and meet the basic criteria for a competitive bidding process as described in the PSA. Since 1996, SEIC has placed contracts worth \$6.1 billion with Russian companies. This includes the major onshore pipeline engineering, procurement and construction contract awarded to Starstroi. In 2005 alone, 87% (\$1 billion) of contracts were awarded to Russian contractors, and the utilisation of Russian subcontractors during LNG construction is planned to exceed \$700 million.

Between 2001 and April 2006, almost \$390 million has been invested in the Sakhalin infrastructure upgrade programme for improving roads, health care facilities, telecoms and waste disposal facilities to support Phase 2 construction activities. Of this, \$280 million was spent on municipal or publicly accessible facilities including roads, hospitals and airports. Upgrades of three hospitals (Nogliki, Poronaysk and Yuzhno-Sakhalinsk) commenced in 2005 at a total cost of \$7.2 million, bringing in new medical equipment and providing emergency response ambulances for six district hospitals. SEIC has also funded clearance work for UXO, which threatens both animal and human life (\$37 million spent between 2001 and April 2006).

In a move to 'help communities help themselves' in the future, SEIC has organised a Contractor Set-Aside fund, whereby 0.5% of the value of many major contracts has been set aside to be used for Sustainable Development (SD) projects on the island. SEIC also has a Social Investment Fund – running at \$0.4 million in 2004 and raised to \$0.5 million annually between 2005 and 2008 – for grants and sponsorship. A Sustainable Development (SD) Council has been set up to look for ways to promote SD and manage these funds (which total

¹⁰⁷ Sakhalin II: A Summary of Social Performance (July 2006)

¹⁰⁸ Russian Federation Statistical Appendix, IMF, August 2005

about \$20 million) so that they are used for SD projects that will bring lasting benefits to the island's communities¹⁰⁹.

Nearly 200 people were involved (5% of the IP population of the island) in the consultations to develop the SIMDP five-year plan, agreed in April 2006. SEIC has committed \$0.3 million per year for five years to the plan, which will fund social, environmental and business development programmes led by IP. The SIMDP includes a traditional economic activities support programme for IP, fishing activities, enterprises and potential partnership projects, and a social development programme with a healthcare component, which focuses on education, culture, training and capacity building amongst IP. In addition, an advisory body of five IP representatives is being set up to administer a Sakhalin Indigenous Minorities Mini-Grant Fund (SIMMGF), whereby 10% of the annual SIMDP grant will be paid directly to this group to administer themselves with a possible view to administering the majority of their grant in the future.

Nearly 3,600 Sakhalin residents were involved in the Social Impact Assessment (SIA) process, which has led to detailed action plans for mitigating social impacts. An Addendum to the SIA focuses on impacts that have arisen since early 2003, and the management and mitigation commitments made by SEIC to address these issues.

8.3 REVIEW FINDINGS

In many respects, AEA finds that SEIC's measures for social impact management are now progressing well. In particular the Company has undertaken a full RAP, which includes project-affected people (PAP) who would not be eligible for compensation under Russian law, and has developed a detailed and consultative SIMDP. The Treatment Plan for Objects of Cultural Heritage is well presented and evidence has been provided that measures have been taken to implement its requirements. The production of clear HSESAP commitments for contractors and the commitment to third party monitoring for the RAP, the SIMDP and the programme of social investment activities represent significant steps forward.

However, a number of issues remain or are of historical importance, which are discussed in more detail in the remainder of this section of the report. These relate to:

- The adequacy of the Social Impact Assessment material
- Korsakov Community issues
- Resettlement
- Indigenous people
- Social investment
- Social compliance management and monitoring
- Community liaison
- Grievance procedure

¹⁰⁹ Sakhalin Energy 2004 Annual Review
(http://www.sakhalinenergy.com/en/docs_news_stat/nws_releases_20041202.pdf)

- Third party monitoring.

Evolution of social issues management

AEA notes that there have been delays in finalising SEIC's approach to the management of social issues with the result that plans and systems were not in place during earlier phases of construction. Some of the impacts that should be managed through these systems have remained un-mitigated and have caused adverse effects on the livelihoods of local people (many of whom, as identified in the RAP, can be classified as 'vulnerable'¹¹⁰) as discussed in the following two subsections.

The most significant of the delays in developing systems for managing social issues have included major components of the RAP, SIMDP, grievance procedure and the rollout of social HSESAP commitments to contractors.

RAP and SIMDP

Initially SEIC had preferred to address the World Bank requirements for the RAP and IPDP within the SIA and its addenda. However, the information provided for resettlement planning and for IP in the SIA was not fully compliant with the World Bank requirements.

Non-compliances for resettlement planning included: failure to list numbers of project affected people; failure to include economic displacements; missing components in baseline surveys; no clear description of how the Project determined the eligibility for some aspects of compensation or how compensation was calculated; lack of a detailed budget and implementation schedules.

Non-compliances for the IPDP included: the failure to include all potentially affected IP through the IPDP process; the failure to ensure that IP derived benefits from the project, and weaknesses in fostering a participatory and capacity building process in the development of the IPDP.

This has resulted in long periods of delay and uncertainty for some project affected people namely: residents at the LNG dachas, and some people who had RAP related grievances, and non Uilta indigenous people. More detailed comments on the RAP are provided in Section 8.3.3 and in Section 8.3.4 for IP.

Grievance Procedure

Although SEIC have had a grievance procedure¹¹¹ in place since 2002 as part of the PCDP, this procedure has been subject to revision a number of times and was not promoted widely (both internally and externally) until 2006. The procedure itself was also not supported by an effective grievance management system to ensure timely resolution of grievances. A centralised database was established in 2006, for detailed comments on the current status of the grievance management system see Section 8.3.8.

¹¹⁰OD 4.30 Para 16. Vulnerable groups at particular risk are indigenous people, the landless and semi - landless, and households headed by females who, though displaced, may not be protected through national land compensation legislation. The resettlement plan must include land allocation or culturally acceptable alternative income-earning strategies to protect the livelihood of these people.

¹¹¹ Guidance Note F provides detailed guidance to support the disclosure and consultation requirements of including the need for a grievance process. A procedure is also required for those with grievances relating to resettlement impacts under OD 4.30.

Social Management System

While the development of a social management system and roll out of a HSESAP are not a policy requirement, it is nonetheless vital to ensure that the various commitments made by the Company (including policy commitments, plans and audits) are managed and implemented in practice by the Company and its contractors. The SPP was issued at the end of 2005, however SEIC did not meet a number of the timescales defined within the plan. Also the HSESAP was finalised in 2005, but by the middle of 2006 it had not been fully rolled out to SEIC staff and contractors. See Section 8.3.6 for further comments on the SPP and the HSESAP rollout.

AEA considers it important to highlight SEIC's history of delays in responding to social issues and in meeting compliance and best practice requirements. In view of this history, AEA consider that it is important that systems for progress and compliance reporting to Agency Lenders are implemented as agreed in the CTA and that reporting is sufficiently detailed to allow for effective monitoring by the IEC.

The following sections discuss the current status of social impact management.

8.3.1 Adequacy of social impact assessments

Social assessment and mitigation measures are outlined in the various documents listed in the introduction to this chapter. Primarily, those impacts that are not explicitly linked to resettlement, IP or cultural heritage are addressed in the SIA, and in the SIAA. The SIA and the SIAA provide an appropriate assessment of the potential social impacts of the Project. Furthermore, we consider that the proposed mitigation measures outlined in these documents and committed to in the HSESAP are adequate to address these impacts.

The outstanding issues relating to social impact assessment and mitigation are discussed below.

Baseline characterisation

The baseline characterisation of the Sakhalin Region and the affected districts presented in the SIA and the SIAA now provide a sufficient overview. However, in 2005 information about some PAP was missing from the baseline characterisation provided in the SIA and the RAP, including non-IP fisherfolk in the north of the island, commercial fishing companies and their ancillary enterprises who will be economically displaced both in the north and south of the island and dacha residents near to the LNG site. To address this issue SEIC has been undertaking additional surveys from 2005¹¹². As a result the baseline survey on IPs and the ancillary fishing industries is now sufficient to enable future monitoring. Also PAPs in proximity to the two camps which were constructed prior to the PCDDP and SIA were not evaluated using the methodology for resettlement planning that was subsequently used in other communities, and as a result some PAPs were overlooked in one of these two communities (Sovetskoye). These two communities have now been retrospectively surveyed.

¹¹² These include additional survey work: on indigenous people, which has been successfully undertaken and incorporated into the SIMDP; on the ancillary fishing industries on the island which may be affected by economic displacement, and for the residents of the dachas at the LNG site, Quality of Life indicators have been agreed (Nov 2006) to provide a baseline on their livelihoods and quality of life which can be used to determine eligibility for compensation during the construction and operations phase of the LNG site.

The final components of survey work for the LNG dachas are now in place or planned, with a consensus that five 'Quality of Life Indicators' agreed with the dacha community will be monitored from 2007, using licensed institutes and (in the case of access to transport and road use) consultation with the community. Indicators are to include: air quality; noise levels; loss of crops; access to public transport and road safety. SEIC informed AEA that a meeting was held in June 2007 during which the individual components of the quality of life monitoring plan were finalised with the dacha community and monitoring commenced.

Administrative Capacity

A description of the local administrative capacity for managing social issues is important in relation to compliance with OD 4.30 (as it will have implications for whether compensation paid to government will in fact mean that the livelihoods of PAPs are maintained) and is required in relation to compliance with OD 4.20 (which refers to the need to build the capacity of those government institutions working with IP). However, while the administrative structures and responsibilities on Sakhalin Island are described in the SIA, there is no assessment of the capacity of these institutions to administer mitigation compensation from SEIC or their transparency and accountability in doing so¹¹³.

SEIC has taken steps to address this and has made available in the public domain the amount of compensation paid to government entities and will also make this information readily and frequently available to the institutions working in the interests of the community. Thus the use of SEIC funds by government entities will be open to public scrutiny, and any problems with government capacity in using these funds should be brought to the attention of SEIC and Agency Lenders during the life of the Project.

SEIC is also taking steps to facilitate the development of capabilities in local administration, by financially supporting The Living Earth Foundation (an international NGO), to run an accredited training course in sustainable development and community management issues for local government officials.

Local social impacts

The engagement and SIA process started in 2001, leading to the progressive development of mitigation measures for many local project impacts. These mitigation measures were further developed through the socio-economic plans provided by contractors, the SIAA and were consolidated in the HSESAP.

It is noted in the SIA that construction nuisances such as additional traffic dust, light and noise will be a problem during the works. According to the SIA, contractors must include in their socio-economic plan their plans and procedures for issues such as traffic management, dust control, *etc* and other measures are also specified in the HSESAP. The response to these requirements has varied by contractor and in some cases there have been complaints from community members about construction nuisances e.g. Leonidovo, Osersk, Onur and Prigorodnoye. AEA was informed that monitoring of contractor management of these issues

¹¹³ Individual compensation, e.g. for land acquisition, will be managed by SEIC and approved by local administration. However, much of the responsibility for the disbursement and/or use of other compensation monies, for example for damage to natural resources, or the recreational beach at Prigorodnoye, will be taken by local administrative systems, and in fact, the compensation for the beach at Prigorodnoye has been greatly delayed by difficulties encountered by the company in agreeing a definite solution with Korsakov Administration.

would be undertaken through the implementation of requirements specified within the SCM. However, the final version of the SCM does not include monitoring of these local construction nuisances, which means that there is not a routine mechanism to monitor these impacts and control them to avoid them leading to community grievances. AEA has therefore recommended that the SCM needs to be updated to include monitoring of construction related impacts.

AEA also recommends that, given the delays to date in setting up and implementing this monitoring system, Agency Lenders would benefit from immediate and regular reporting from SEIC on the management of local social impacts, including progress reporting on outstanding issues.

During the course of the Project there have been a number of complaints/concerns related to the condition of roads and road safety. Community concerns relating to the impact of project vehicles on unpaved roads persisted until early 2007. Some of these were captured via the grievance mechanism, but others appeared not to be¹¹⁴. In order to support the HSESAP commitments relating to road maintenance, AEA recommended in 2006 that CLOs need to be visible in all affected communities on a routine basis during the construction period to be aware of impacts and capture grievances as they arise. Evidence reviewed in 2007 confirmed that CLOs were active in ensuring that project related impacts to local roads were being mitigated.

In terms of traffic safety, SEIC is undertaking a highly visible road safety campaign targeted at Company and contractor staff as well as at community members, via a variety of media, and also require contractors to undertake a number of measures (e.g. driver training, compulsory daily alcohol tests for drivers) to promote road safety. The road safety measures that are being undertaken and promoted by the Company are comprehensive.

Recreational and accommodation facilities for workers appear to be adequate. Camp management measures are on the whole effective and the relationship between construction workers and local community members appear to be amicable although some tensions have been experienced at Korsakov.

Local Livelihood Resources (Fishing, Hunting and Gathering)

The SIA provides a review of potential impacts on livelihood resources (fishing, gathering and hunting). This was achieved through a process of consultation with affected populations and gathering of baseline information on resource use (e.g. identification of berry thickets along the pipeline route). SEIC's approach is consistent with international best practice in recognising uses of natural resources even where they are not officially sanctioned by law. This is of particular importance in the context of Sakhalin Island where use of natural resources (often illegally) makes a significant contribution to household economies, as is evidenced by the consultation and baseline data cited in the SIA. In this light, the SIA makes provision for a number of mitigation measures to reduce the impacts of the Project on local

¹¹⁴ For example in the hamlet of Pugochovo, SEIC and the Local Administration have agreed mitigation measure for impacts to the local roads. However, during the September 2006 site visit, community members alleged that damage to roads by contractor vehicles persists and that they did not know how to contact the Company to complain. Contact details for the Company were not displayed or available at the local shop, which is the only public meeting place within the hamlet.

livelihood, resources and thereby subsistence activities that are appropriate. SEIC continues to promote awareness amongst contractor staff and community members about the 'Hunting, Fishing and Gathering policy', as illustrated by the recent awareness campaign using over 1,000 posters.

SEIC needs to demonstrate close monitoring of the implementation of mitigation measures for livelihood resources in line with their SIA and HSESAP commitments and lender reporting requirements.

Employment and Demobilisation

Significant employment opportunities are derived from the Project. The SIA and the HSESAP list SEIC's commitments to promoting the use of Russian and, in particular, Sakhalin Oblast employment, goods and services, in line with the requirements of the PSA.

The SIAA states that the loss of labour from local enterprises (to the Project) will be monitored and addressed through the 'Issues Management' process (see Section 8.3.6 for comments on the issues management process). However in practice this process has been changed as reflected in the updated 2007 HSESAP, and SEIC is monitoring this issue, via meetings with local authorities and employment centres, twice a year for each affected community. On the basis of this monitoring SEIC state that loss of labour from local enterprises is not a problem.

Demobilisation at the end of the construction period is a major concern for the Project and local community members, given the large numbers of construction workers. SEIC have included a commitment to the development and implementation of demobilisation plans in the HSESAP and the strategy for demobilisation was discussed and initially agreed during a round table meeting with SEIC, contractors and Oblast representatives in May 2006. SEIC continues to work on this issue and is now collecting forecast data for demobilisation and holding meetings with relevant government departments, contractors and other industry stakeholders. Draft guidelines to facilitate the transfer of workers around the project and on how to manage surplus manpower are underway but have yet to be finalised. AEA acknowledges that SEIC is taking a pro-active approach to address this issue, although plans have not been finalised at this point.

Housing availability and affordability

SEIC has taken steps to reduce the Project's impact on housing availability and affordability through the provision of temporary construction camps (the SIAA Appendix F shows the planned provision of worker accommodation at January 2005 to be 14,330 for the Project) and the development/expansion of the Zima Community for SEIC staff. Furthermore the Company is in the process of developing a subsidised mortgage scheme for local staff.

Despite these measures, discussions with SEIC staff responsible for housing and a number of SEIC Russian employees during the May 2006 visit indicated that housing cost is a significant problem both for locally recruited SEIC staff that do not receive assistance for housing costs from the Company and for the community more broadly. Furthermore, it is clear that many community members attribute this rise in cost to the Project, so, regardless of whether this can be substantiated, SEIC would benefit from undertaking a targeted action plan either to deal with this public opinion issue, or, if the house price rises can be attributed to the Company, develop an action plan to mitigate this issue, as per the commitments made in the HSESAP.

SEIC has reported that there are targeted plans for housing issues that are being developed by the HR Department which monitors housing affordability. AEA has been provided with an outline plan for review. However, AEA considers that this plan is not of sufficient detail as it does not provide a breakdown of the activities to be undertaken to achieve the objectives, or the timescales, or responsible action parties.

Chaivo Spit pipeline re-route

In 2005 it was decided to re-route the pipeline in the north of the island across the Chaivo spit to minimise disturbance to the Western Gray Whales. Under the management of change process, a SIA was undertaken to identify any new potential PAPs and to assess any potential socio-economic impacts and develop appropriate mitigation measures. In early 2005, survey work was undertaken and a stand-alone SIA was produced for the re-route. A number of gaps were identified in this SIA, including a review of potential impacts on the community at Val and on fishing enterprises using the affected lagoons. However these issues have now been satisfactorily addressed and incorporated into the final version of the SIA.

8.3.2 Korsakov Community

The community of Korsakov, located to the west of the LNG/OET site, has been subject to some of the Project's most significant negative and positive social impacts. Negative impacts include: those associated with the Project's largest concentration of construction workforce (at the LNG site); exposure to road nuisance due to the concentration of heavy vehicles going to the LNG site; and the loss of part of the recreational beach at Prigorodnoye. Positive impacts include: the employment of over 1,400 people from the Korsakov area; the funding of infrastructure upgrade works; the financing of emergency response equipment and support to a range of social development projects.

SEIC recognises the impacts that the Project has on the Korsakov community and has plans to minimise its negative impacts; however implementation has been mixed and in some instances the Company has been slow to respond to concerns raised.

The community and the Mayor's Office have raised a range of issues and complaints repeatedly with the Company, although few community members seem willing to use the formal grievance procedure. Many of these issues have been resolved, such as: the allegation of the misuse of SD funds by contractors¹¹⁵; some road safety and maintenance issues and complaints related to the non-use of the Korsakov landfill. Others may have been based on unreasonable expectations and/or do not relate to the Project (e.g. a request that SEIC should be responsible for decommissioning the military depot in the Korsakov District). Furthermore, AEA is informed that some aspects of problematic relationships arising from differing political agendas locally has slowed SEIC's efforts to implement previously agreed mitigation measures and social / SD / infrastructure projects.

Nonetheless, because a number of Project related grievances were not resolved in a timely manner (see Section 8.3.8), and because of problems relating to community outreach and provision of information (see Section 8.3.7 on CLO's) the poor relationship with some community members has been reinforced. In 2005, to respond to this, SEIC developed a 'step change' in their relations with Korsakov citizens and produced the 2005 and then the 2006 Korsakov stakeholder engagement plan which contains a number of steps to this end,

¹¹⁵ There were complaints during a public meeting in 2005 that CTSD said that they would donate wood to the community for free, but then charged the transport cost for this wood against the SD Fund.

including: communication efforts through media; specific efforts to deal with a number of community concerns including road conditions, road safety, the beach offset (park upgrade), local employment and impacts on fishing enterprises amongst others. SEIC provided quarterly updates on progress of the plans, samples of which were reviewed by AEA and found to be satisfactory. Site visits revealed that some of the issues have been addressed, others, in particular the issue of the compensation for the LNG beach, remain unresolved.

Given the current status, Agency Lenders need regular reporting on the implementation of the Korsakov Stakeholder Engagement Plan and associated levels of resourcing. AEA therefore recommend that Korsakov stakeholder engagement be specifically included on the IEC terms of reference for quarterly monitoring visits.

8.3.3 Resettlement

A RAP is required for the Project to comply with World Bank OD 4.30. However, following an initial assessment in 2001, SEIC concluded it was not necessary to undertake a full RAP on the basis of the small number of people who would be affected by permanent physical resettlement (it was argued that the number of project affected households fell under the threshold of 100 PAP outlined in OD 4.30) and their approach was to include resettlement planning within the SIA. This initial approach to resettlement did not include PAP who are economically displaced by the project, and when these PAP were factored in, the numbers affected were estimated to be over 2,800 (see table 4.01 of the RAP), well over the World Bank threshold of 100. Therefore from late 2004 the Company committed to undertaking a full RAP.

SEIC's approach to resettlement as outlined in the RAP (Issued Q4, 2005) is in line with WB OD 4.30. It makes a number of provisions that exceed the requirements of Russian regulations. In particular, in line with OD 4.30, SEIC are now:

- working to ensure that land users who are affected by project activities are eligible for compensation even if they are not regarded as official land users under Russian legislation¹¹⁶,
- recognising the need to compensate not only for physical displacement but also economic displacement (for example where project activities have affected the amenity value or market value of properties, the value of loss of subsistence crops, or have affected the market for produce in areas which are now perceived as contaminated by Project activities).

To date 125 households/4037 individuals have been affected by resettlement impacts. During 2006, 32 landowners were paid compensation. Eight of these resettlement claims were raised as RAP related grievances logged via the grievance process. There is one outstanding RAP related claim as of June 2007, relating to a household to be resettled out of the pipeline SPZ in Firsovo. AEA has reviewed evidence that this claim is being processed. The resettlement package has been agreed and work is commencing on a replacement house and should be completed by early autumn. The compensation for the LNG dacha residents is now nearly complete, although the loss of market value compensation has not yet been provided to a

¹¹⁶ World Bank OD 4.30 para 3(e) states that: 'Land, housing, infrastructure, and other compensation should be provided to the adversely affected population, indigenous groups, ethnic minorities, and pastoralists who may have usufruct or customary rights to the land or other resources taken for the project. The absence of legal title to land by such groups should not be a bar to compensation.'

small number of residents due to delays in finalizing their paperwork. SEIC state that they have done all in their power to assist these residents in completing this paperwork but this has yet to be fully verified by AEA. In addition, while SEIC has provided funds for the Korsakov park upgrade and for the construction of a swimming pool, the project will not be compliant with OD 4.30 until one of these offsets has actually been delivered. SEIC has recently made progress in moving forward, and has agreed the scope of works with the local administration for the delivery of the park.

However, as discussed below, some aspects such as the collection of all baseline survey data and the compensation of residents at the LNG dachas have yet to be finalised.

The baseline survey has now been provided for those PAPs who were identified as having been missed or inadequately surveyed in 2005, including unregistered land users, ancillary fishing industries and dacha residents. Quality of Life Indicator baseline data will also be collected for LNG site dacha owners from June 2007.

During site visits in early 2006, when reviewing resettlement related grievances, concern arose that some PAPs (principally unregistered land users) might not be aware of their rights under the resettlement process. SEIC took steps in summer 2006 (via a postcard mail out) to raise awareness that PAP can make a claim against the Company. AEA has reviewed evidence to support that CLO's have visited 33 directly affected communities to raise awareness of the resettlement claims process; and that no additional PAP were identified during this awareness-raising/survey work, although one new grievance was raised (a land users plot had been waterlogged due to contractor earth moving activities).

In September 2006, AEA recommended that the eligibility of unregistered land users be included on the agenda for all future scheduled meetings with project affected communities. SEIC has since developed a leaflet about the RAP, including information on eligibility of unregistered land users, used at community meetings and distributed to the public. During the April 2007 site visit AEA were able to confirm that CLOs are, as a standard agenda item, stating that unregistered land users have resettlement compensation rights during all community meetings.

The Company has been subject to some long running grievances related to resettlement which are now largely resolved. One of these was the case of the Calypso fishing company (now resolved) and a second case with another fishing enterprise (Kontract) is still ongoing. In May 2007 SEIC confirmed that an assessment agency was hired with the agreement of Kontract and that this agency has now determined the compensation sum. SEIC are now waiting for a response from Kontract on the sum determined by the assessment agency.

An independent mediation mechanism for unresolved claims under the RAP has been agreed, representing an important step forward. This independent mediation mechanism has now been incorporated into the newest draft of the Grievance Procedure. However, some problems remain in the implementation of the RAP resulting in some eligible PAPs being unable to access compensation effectively and in good time. AEA's concern relates to the prompt payment of compensation to people classified as 'vulnerable'. SEIC have acknowledged that there have been delays in their resettlement claims process in the past. However SEIC have recently agreed that the RAP claims process will use the same timeframes as the grievance procedures, which means a target of twenty working days and a

maximum resolution period of forty five working days, which AEA considers is sufficient. SEIC state that the Social Performance Team (SPT) pay special attention to vulnerable claimants and in May 2007 SEIC informed AEA that they intend to fast track resettlement related grievances for vulnerable PAPs by creating a ‘flag’ in the grievance database for grievances raised by people who are vulnerable¹¹⁷, and ensuring that these grievances are addressed as priority by notifying Action Parties when grievances are raised by people who are vulnerable. Compliance with these resettlement claims timeframes will be monitored via the KPIs and lender reporting for the grievance process.

8.3.4 Indigenous People

There are four officially designated communities of Indigenous Peoples on Sakhalin (Nivkhi, Nanai, Uilta, and Evenki) comprising 3,513¹¹⁸ people, all of whom are considered Project-affected people for the purposes of the SIMDP¹¹⁹. Working with IP in Sakhalin has presented a number of challenges to the Company, in part due to the lack of clarity on their legal rights. There are a number of (federal and regional) laws recognising the specific needs of IPs, but the SIMDP notes that many of these laws are high level and lack implementation measures. For example, the SIMDP notes that although there is a federal law on the territories of traditional natural resource use of IP, no action has been taken to implement relevant provisions.

The production of an Indigenous People’s Development Plan (IPDP) is required for compliance with World Bank OD 4.20. From 2001, SEIC’s preferred approach was to include measures to benefit and mitigate impacts to IP in the SIA. However, this approach did not meet all the criteria outlined for an IPDP in OD 4.20, and the measures were overly focused on Uilta Reindeer Herders (on the basis that they were the only group of IPs displaced by the project) and did not reach other affected IP.

Delays in undertaking a full plan for IP meant that some aspects of compliance with OD 4.20 were initially absent, these included: consultation with all IP who carry out livelihood activities in project affected areas; comprehensive baseline data collection and sharing of project benefits with all IP groups. These delays had a negative impact on SEIC’s relationship with IP and IP leadership, which was only resolved following intensive participatory work during the development of the SIMDP.

In early 2005, SEIC agreed to appoint an international expert on IP issues (approved by RAIPON, the Russian umbrella organisation representing IP groups) to develop the SIMDP. The SIMDP was completed in April 2006 and has now been set up as a developmental and consultative approach for working with IP. It is in compliance with OD 4.20 and is in line with international best practice. The SIMDP appears to have the support of the majority of IP and was formally launched in May 2006. Furthermore, the IP community appears to have

¹¹⁷ As defined in the RAP (section 6.5.3) vulnerable people include:
Households or individuals reliant on government pensions as their primary source of income,
Families with physically or mentally challenged members.
Low-income families with average income less than 4400 R/person/month
Non-registered land users, and
Reindeer herders and their families

¹¹⁸ Sakhalin Indigenous Minorities figures supplied by the Sakhalin Oblast Administration, reported for January 1, 2005.

¹¹⁹ More detail on the context of IP on the island is provided in section 2 of the SIMDP.

increased their levels of confidence in communicating with the Company and have more defined and realistic objectives.¹²⁰

In 2006, SEIC had one full time IP Co-ordinator (replaced in December 2006, with a hand over period), one full time administrator and one member of staff from external affairs working for 50% of their time on the Traditional Economic Activities (TEA). Given the heavy capacity building, monitoring, consultation and social development activities envisaged in the SIMDP, AEA was concerned that the human resources allocated for its implementation in 2006 seemed insufficient, particularly during the early stages of the implementation of the plan and this concern was also reflected by the inception report of the SIMDP Third Party Monitor. However, by May 2007 the SIMDP team had been increased to three full time and three part time employees. The adequacy of future levels of staffing for the SIMDP will continue to be assessed by the SIMDP third party monitor.

The results from the first independent third party monitoring report also recommended that the replacement IP Co-ordinator should be appropriately skilled and selected with the approval of indigenous minorities and that the Traditional Economic Activities Support Programme (TEASP) reflected the emergent development needs and desires of the Indigenous Minorities themselves. The new IP coordinator was hired with the approval of the IP community and the SIMDP third party monitor has expressed satisfaction with this appointment. During the April 2007 site visit, AEA also reviewed the status of recommendations made by the third party monitor and found that action had been taken on most issues. In addition to the actions arising from the expert's report, AEA recommends that a watching brief is maintained on the accessibility of funds available under the various funding mechanisms of the SIMDP to ensure accessibility to all members of the IP community, regardless of their ethnic origin and criteria for selection of proposals are simplified where possible.

Given the importance of the SIMDP, SEIC should report to Agency Lenders the progress made in addressing the issues raised by the third party monitor on a six monthly basis for the duration of the SIMDP. To date, SEIC has responded to the findings of the first SIMDP external monitor's report publicly on the SEIC web site. AEA considers it important that the IEC reviews SEIC's progress in addressing recommendations made by the third party monitor.

8.3.5 Social Investment

Initially, SEIC provided *ad hoc* funding to various cultural, social and educational projects, finding it difficult to reconcile local government and community project requests for charitable and infrastructure projects with their stated vision of a more strategic and sustainable use of social investment funds. In addition, some social investment funds were being used to offset project impacts. For example set aside funds from Starstroi were being used to help with reinstatement of land affected by pipeline construction.

SEIC have since developed a more strategic programme for social investment and sustainable development, encompassing both direct SEIC funding and contractor funds set aside as a

¹²⁰ The development of the SIMDP is used as an example in the IFC's good practice handbook 'Stakeholder Engagement: A Good Practice Handbook for Companies Doing Better Business in Emerging Markets, May 2007'.

contractual requirement. There will also be a long term social investment strategy during the operations phase for which funds have not yet been specified.

Under the current structure social investment has been incorporated under the umbrella of sustainable development. Project proposals are approved by a Sustainable Development Council established in 2005 (comprising members of the local administration and company representatives). The selection criteria have now been included in the HSESAP and the SD brochure (published in August 2005), and can also be found in the 'community' area of the SEIC website along with examples of the type of project supported. A hard copy of the brochure is provided at CLO offices.

In general the approach to social investment has improved greatly since 2005, since SEIC has been working on a strategy to foster a more sustainable approach. For example, the SD Council has been subject to training on sustainable development, and the creation of the SD Chair at Sakhalin University will be used to develop strategies and capacity for SD on the island. SEIC are increasingly supporting more sustainable projects, such as the Sakhalin Salmon Initiative, and SEIC stated in 2006 that SD funds will no longer be used for 'mitigation' projects. Nonetheless, in 2006 AEA found that in order to ensure that funds have a long-term beneficial effect on the development of the island, a number of issues needed to be addressed.

Firstly, further actions needed to be taken to ensure that local people feel that they are able to have an influence on decisions about the use of SD funds. The September 2006 site visit found that SEIC are making efforts to ensure that projects considered for the SD Fund come from the community, through CLOs and other sources. However, although the SD Council does include members of the local administration, field visits by AEA have indicated that members of some local administrations continue to feel excluded from decision-making about the use of SD funds¹²¹. To address this issue AEA recommended that SEIC should use the CLO system to consult more widely on community and local government preferences for SI projects, in addition to working with the SD Council. Furthermore the decision-making process for awarding SI grants should be made more publicly transparent. During April 2007, AEA reviewed evidence that SEIC promotes social investment routinely as part of CLO wider stakeholder engagement activities and through local media, as well as using two local NGOs (Pilgrim and Chance) who have been contracted to run social investment programmes to raise awareness. The award process is also undertaken through consultation with a range of local stakeholders via, for example, the SD Council, and selection criteria for projects are publicly available in the SI/SD brochures.

Secondly, while SEIC has been working to ensure that social investment projects foster 'sustainability', these efforts need continued work. Site visits in 2006 found that the understanding of sustainability was still limited amongst contractors, community members and local government officials¹²². Review of the SD and SI catalogues found that less than a third of the overall portfolio of projects supported could be described as 'sustainable'. AEA recognise that there are challenges in engaging with local people to develop projects with a sustainable approach, and that SEIC have an ongoing strategy to ensure that SD funds are used for more sustainable projects. In the meantime however, in the interests of

¹²¹ In discussions during the May 2006 visit in Korsakov, members of the new Regional Assembly complained that they were not consulted about the projects areas to be supported.

¹²² Discussions during May 2006 and September 2006 site visits

accountability, it is important that charitable projects do not fall under the umbrella title of 'sustainable development' projects. In 2006 AEA therefore recommended that reporting on the SD programme should indicate the proportion of SD funds spent on the three categories of project described in the SD Brochure, namely: charitable; strategic, and sustainable. During the April 2007 site visit SEIC demonstrated that they have started to report on the number and type (e.g. charitable, strategic, SD) of projects, as part of monthly HSESAP compliance reporting. Charitable projects still make up the larger share of the SD projects but progress is being made in promoting sustainable projects.

Thirdly, AEA recommended that SEIC needed to ensure financial accountability on the use of funds. In 2005 there were complaints about the working of the SD Council in Korsakov and allegations of misuse of the funds¹²³ from community members. According to discussions with the SEIC SI team in July 2006, all SI projects, including those funded from contractors set asides are financially auditable¹²⁴. AEA was therefore concerned about the potential reputation impact of the mis-use of funds, and so recommended that this financial monitoring be included in the Social Investment third party monitor's scope of work. In May 2007 SEIC informed AEA that the Russian Accounting Chamber (federal auditing agency) conducted a financial audit of the Sakhalin II Project, which included a detailed audit of the use of SI funds. AEA consider that audit by the Russian Accounting Chamber is an adequate alternative to monitoring by the (as yet un-hired) third party monitor for social investment activities, on the condition that this audit is repeated at regular intervals during the life of the project and made available to Lenders

Finally, AEA found that there was not a clear system for evaluating the impact of social investment and SD projects. This meant that efforts to track the long-term sustainability and impact of projects were limited and also that the experience of past projects could not be used to inform future funding strategy.

However, towards the end of 2006, SEIC in conjunction with Shell undertook a review of social investment activities. As a result a new draft SI strategy was developed for the operational phase of the project. This draft strategy has been designed to ensure that the principles of sustainable development are applied more rigidly to the social investments that the company makes. The draft strategy is in the approval stage. AEA recommends that this type of monitor of social investment activities should become a routine activity during the life of the project.

8.3.6 Social compliance management and monitoring

The plans outlining the management approach, staffing and organisational structures and social monitoring required for ensuring compliance with social commitments have evolved significantly from the general plan outlined in Chapter 17 of the 2003 SIA, to the far more specific details given in the current SPP. Similarly whilst developing the SIAA, SEIC has continued to develop its social management system.

¹²³ One specific example cited was a case in which CTSD, the LNG site contractor, had committed in the SIAA to giving waste wood from construction free to community members, but had then charged the cost of transporting this wood against the SD Funds at around \$17,000. This sum has subsequently been removed from the SD project catalogue.

¹²⁴ Finances for projects involving the delivery of goods and services to beneficiaries are documented in the 'Act of Transition' required by Russian accounting law, and SEIC require a financial report to be included in the SD database for projects involving the hand over of money to beneficiaries.

The current SPP provides a framework for social compliance management. It gives a clear description of the responsibilities of the various teams, including the SPT, other relevant groups in external affairs and other SEIC corporate and asset teams. It also gives a schedule of works with milestones to be achieved, and refers to the HSESAP for the detail of social commitments.

However, AEA notes that some of the milestones in the SPP related to the implementation of key parts of the social compliance management system, were not achieved within the specified timeframes. For example actions that were to be completed by the end of Quarter 4 of 2005 and Quarter 1 of 2006 included: roll-out of the SCMh (completed in October 2006); plans for third party audits relating to social issues (still not finalised), and development of targets for monitoring KPI outlined in the HSESAP (completed as part of the 2007 SPP) which was also delayed. These delays are problematic given that the Project is now well advanced into its construction phase.

As of May 2007 the SCMh has been fully rolled out and HSESAP KPI monitoring is underway, with targets set for 2007. The 2007 SPP was issued in April 2007 and the outstanding action to develop the third party audit system in 2006 has been incorporated in this year's plan, under the priority social performance crosscutting activity to finalise the audit plan. The target for completion of the audit plan was Quarter 1 2007, and an advanced draft of the plan was provided to AEA for review during the May 2007 site visit. The delay in finalising the audit plan is an issue as currently, apart from Lender visits there is limited independent verification of the whole social impact management system and its supporting data management systems.

SEIC staff and contractors have been informed of the commitments to be complied with in the HSESAP Part 2 through a series of workshops during autumn 2006 and monitoring of compliance is now being routinely undertaken using the SCMh.

In September 2006, when AEA reviewed a sample of HSESAP commitments with selected contractors it was found that they were compliant with the majority of the sampled commitments, and during the April 2007 site visit the further sample of Contractor staff interviewed were found to be familiar with HSESAP requirements relevant to them.

In November 2006 SEIC have advised Agency Lenders and AEA that they believe there to be only four social HSESAP non-compliances. These were: resolution of grievances within 20 working days; independent review of grievances that are unresolved after 45 working days; provision of alternative transport to areas of wild livelihood resources where access is blocked by Company activities, and; the establishment of an external monitoring project for social investment projects. One of the four social non-compliances reported by SEIC in November 2006 is now in compliance, as action was taken to unblock the road restricting access to wild livelihood resources.

In terms of non-compliances in addition to the list provided by SEIC, while we recognise the difficulties in mediating an agreement within Korsakov Local Government, AEA consider that SEIC cannot be considered fully in compliance with the RAP until the compensation for Prigorodnoye Beach has been implemented.

In September 2006, Agency Lenders requested a continuous social monitor on the island to assess compliance until financial signing, which AEA supported, particularly as the HSESAP compliance monitoring, and the third party independent monitoring programme was not yet fully in place. A continuous social monitor was not appointed, and following the site visit in April 2007, AEA consider that HSESAP compliance is sufficiently good and that quarterly monitoring by the IEC and the third party monitors for SIMDP, and RAP and Social Investment (on the assumption that these are appointed by mid 2007) should be adequate to assess continued compliance.

Monthly internal test reports on HSESAP compliance have been collected since October 2006 onwards and quarterly reports are planned for Agency Lenders. AEA has been provided with extracts from two sample test reports from early 2007 which demonstrate that SEIC are making progress.

Monitoring of social impacts extends to ongoing monitoring of house and basic goods inflation, and monitoring of social impacts to communities. One of the mechanisms defined within the SIAA to deal with social impacts identified either by monitoring or community members expressing concerns or grievances is the Issues Management process. This process should trigger the production of targeted action plans and responses as issues arise. However, two of the issues which according to the HSESAP should be addressed by the issues management process (namely loss of labour from local enterprises and housing availability) have in practice not triggered the issues management process. Instead, SEIC have reported that these have been dealt with via separate processes of social monitoring and stakeholder engagement. This means that the social management measures outlined in the SIAA and HSESAP are different from those used in practice. SEIC has therefore proposed to change the HSESAP text to reflect the actual management processes used rather than the issues management process which AEA considers appropriate.

Guidance for the reporting of non-compliances has been developed to align with the HSESAP methodology. A new social incident reporting form was developed in August 2006 which coordinates the reporting of grievances, social incidents and non-compliances, using the HSESAP matrix agreed with Agency Lenders to rank impacts¹²⁵. AEA reviewed examples of this methodology being used to address non-compliances that have been incorporated into the company's 'IMPACT' tracking system to date.

Historically, SEIC has not been able to respond quickly to problems with aspects of its social management system that have been identified through the due diligence process. Currently, sufficient management commitment and human resources are being dedicated to the management of social issues, but it is important that these are maintained to ensure that similar problems are not experienced in the future. After financial signing there will be a process via the Common Terms Agreement that requires remedial actions are taken within a specified timescale. Reporting by SEIC on social issues must be sufficiently detailed to ensure that the Agency Lenders are made aware of HSESAP non-compliances promptly. Given the delays that there have been to date in setting up and implementing plans and monitoring systems, Agency Lenders should require immediate and regular reporting from SEIC on social impacts, including progress reporting on outstanding issues.

¹²⁵ The methodology as described in HSESAP, Part 1, Section 6.

8.3.7 Community Liaison

Public consultation and the grievance procedure are also discussed in Section 7 of this report. The Public Consultation and Disclosure Plan (PCDP), SIA and SIAA explain that ongoing consultation, linked to ongoing activities such as negotiation of compensation and provision of supplemental assistance, is largely managed through a system of CLOs. These comprise External Affairs CLOs working on community relations and camp CLOs (including Company and contractor CLOs) who work with communities affected by construction during the construction period. As part of their role CLOs:

- are involved in weekly and daily monitoring activities;
- disseminate Project information to local authorities, businesses and the community;
- organise community meetings.

While these are generic goals, implementation results have been mixed as discussed in the paragraph below. A review of the community liaison work as outlined in the PCDP has been undertaken and there is a clear system in place to assess CLO competency and to build CLO capacities. Training covers a number of issues including communication, facilitation and mediation skills; compliance and monitoring, the effective utilisation of the Social Compliance Monitoring Handbook; and development and implementation of the Grievance Procedure. Furthermore those CLOs met with during site visits in 2006 and 2007 appear to be committed, hard working and competent.

In spite of this, visits in May 2006 to two communities with concerns revealed a low awareness of Company activities, including approaches to mitigating impacts, grievance procedures and social investment activities. As a result SEIC have taken a proactive approach to raise awareness of how to contact the Company, including newspaper advertisements, a postcard mail out and posting of information in public areas, such as shops and bus stations. AEA assessed the effectiveness of this work during the September 2006 site visit to communities in the north of the island and found that information was prominently displayed in communities and people's awareness was significantly improved.

AEA is of the opinion that CLOs, throughout the island, should be required to have frequent and systematic visits to communities, which reach a range of local people and organisations. All directly affected communities should have scheduled and pre-advertised community meetings at least twice a year. In September 2006, AEA recommended that during these meetings CLOs should, in addition to dealing with specific issues as required, routinely communicate three core messages: i) the rights of unregistered land users, ii) the grievance procedure and contact details and iii) the fact that community members are encouraged to submit, and can be assisted in developing SD project proposals. SEIC have confirmed that CLOs have been required to do this from October 2006. They should also explore new vehicles for disseminating project information. Also it is recommended that minutes of meeting and attendance lists should be kept and signed by representatives of local administrations. Discussions with CLOs and reviews of community meeting minutes during the April 2007 site visit confirmed that CLOs have been communicating these core messages as envisaged.

In September 2006 AEA recommended that a detailed plan for CLO activities in the community was needed, with specific dates of public meetings and open hours, the frequency of which should be determined by need and that this information should be advertised locally

and also be included in the PCDP. AEA was able to confirm during the April 2007 site visit that community meetings are being advertised locally and that dates for future meetings are now also included in the PCDP timetable posted on the web site.

8.3.8 Grievance Procedure

An effective and transparent grievance procedure is a PCDP and HSESAP commitment¹²⁶ and is also required for those with claims relating to resettlement impacts under OD 4.30 (see paragraphs 8 and 17 of OD 4.30 and footnote 11 which refer to the need for mechanisms to deal with concerns and appeals). Following a long period when grievances could not be tracked effectively, the Company has a grievance database that is now operational and allows consolidated tracking of grievances.

SEIC now has a single grievance procedure that applies to community members (as well as staff and contractor staff) which is outlined in a leaflet, as referenced in the PDCP. In addition, SEIC has refined its own internal Whistle Blowing Procedure (finalised in February 2006), to bring all the Company's grievance procedures and processes under one clear umbrella.

In 2006 AEA found that while a single grievance leaflet did exist, it had not been rolled out effectively to employees, contractors and their employees or members of the public by early 2006. The May 2006 site visit revealed that awareness of the procedures was very low among staff, contractors and other relevant parties. While an introduction to the grievance procedure was part of initial orientation training, older employees had not necessarily been exposed to it and might not have been aware of their rights under the policies. SEIC undertook a number of initiatives to improve awareness of the grievance procedure and the September 2006 site visit indicated that the grievance procedure was well publicised in local communities and camps and that local Administration staff were familiar with and had copies of the procedure.

By November 2006, 196 grievances had been registered on the database, of which 42 (which were all registered since April 2006) were not yet resolved. The largest number of the grievances (about a third) related to roads and transport, followed by grievances relating to land and property (slightly less than a third). Most other grievances related to labour conditions and pay, nuisance and environment issues. By April 2007 the situation was improved, with 20 open grievances in the system, of which four were less than 45 days, five were actions agreed, and of the remaining eleven, six were waiting for further information from the claimants and five were under investigation.

While the system has been working much more effectively since the work on the roll out of the procedures to communities, staff and contractors and the centralised database were undertaken in early 2005, some issues relating to grievance management persisted as described below.

Firstly, a number of grievances in the database were taking periods of more than a year to be resolved (about 5% of the total). Long delays in resolving grievances are of serious concern, given that some of these unresolved grievances relate to issues that (if the claims are valid) mean that SEIC's activities are directly affecting people's livelihoods (e.g. uncompensated damage to or acquisition of land, damage to local roads which are needed to access livelihood

¹²⁶ See HSESAP Table 2.10 B

resources such as wild food and fuel wood, and payment by contractors to their sub-contractors). In some cases SEIC argued that delays were unavoidable as mitigation measures were not possible until a future date (e.g. roads which could not be built until after construction is finished). To deal with this such grievances are now being listed as 'action agreed' rather than 'unresolved'. However, in some cases, delays were not unavoidable, and the Compliance Team developed a series of actions to follow up and track grievance resolution more effectively during September and October 2006.

As noted above, this appears to have been effective, and the number of grievances that remain unresolved or not agreed after 45 days was eleven in April 2007. This indicates that SEIC's progress in resolving grievances is improving, however AEA still recommends that Agency Lenders should be informed of any open grievances that cannot be resolved within 45 working days.

The key mechanism for monitoring the effectiveness and speed of the grievance process will be third party monitoring as committed to in the HSESAP (Table 2.10B). However the appointment of this third party monitor has been delayed. In May 2007, SEIC proposed an alternative approach, whereby the Lender IEC undertakes the third party monitoring of grievances. Agency Lenders agreed to this approach in June 2007. AEA recommends that detailed tasks for the monitoring need to be specified in the IEC terms of reference. For example it should be required that the IEC should assess all grievances that have been closed without being resolved (i.e. all cases in which SEIC and the grievance lodger could not come to an agreement) and that the IEC reviews all grievances that have been referred to the Business Integrity Committee. A sufficiently early provision of the grievance database to the IEC will be needed to allow for meetings to be set up with grievance lodgers in advance of monitoring visits, and enough time should be included in the visit plan to enable the IEC to cover all geographic locations.

8.3.9 3rd Party Monitoring

The HSESAP commits to third party monitoring for the grievance procedure, the RAP, social investment activities and the SIMDP. Third party monitoring for the SIMDP is in place, and an internal audit on social investment was completed by SEIC. The SEIC Tender board has approved a monitor for the RAP and the grievance procedure but this appointment is not yet in place. The third party monitor for social investment activities has yet to be identified.

As noted above, in June 2007 Agency Lenders and SEIC agreed that the Lender IEC will be responsible for third party monitoring of grievances. SEIC also confirmed that they will hire external monitors for the RAP and social investment activities. AEA has not reviewed detailed TOR for these roles and dates for their appointments have yet to be agreed.

8.3.10 Conclusions

SEIC has implemented a range of measures to proactively manage social impacts and meet Lender requirements. For example the Company has undertaken a full RAP, and has developed a SIMDP which AEA regards as best practice. The development of HSESAP commitments for contractors and the commitment to third party monitoring for the RAP, the SIMDP and the programme of social investment are also key to demonstrating compliance with Lender policies. In addition to the financial benefits that the project provides to the Island, it also brings positive social benefits to the Island, which includes: infrastructure

improvements; employment opportunities; assistance to indigenous people and social investment projects.

However, there have been significant delays in the finalisation of key assessments and plans (notably the baseline assessments, RAP, SIMDP and SPP). This has resulted in periods during which there were insufficient formal processes in place to ensure that all negative social impacts were mitigated, and as a result some groups did not receive compensation in a timely manner e.g. LNG dachas and some project affected people who lodged grievances.

Plans are now largely in place and provide the basis for the future management of social issues. However AEA has been concerned about the delayed implementation of some mitigation measures and plans. Although systems are now being established, it is too early to assess their effectiveness, particularly in respect to the social compliance monitoring of contractors and the grievance procedure. However, AEA acknowledges that progress has been made, particularly in the implementation of the SCMH and the grievance procedure.

AEA considers that contractor awareness and implementation of HSESAP commitments need to be assessed and reported to Agency Lenders as a matter of urgency, so that the levels of compliance, effectiveness of reporting and issue resolution process continue to be closely monitored.

There are no material obstacles that would prevent SEIC from achieving full compliance with the requirements of the HSESAP in the future. SEIC can improve the management of social issues by full implementation of the social management system and compliance monitoring. More specifically, compliance will be achieved by meeting the requirements defined in the plans and procedures such as the SIMDP, RAP, Grievance Procedure and HSESAP.

In terms of addressing those impacts that have resulted from non compliances, remedial actions, timely resolution of grievances and provision of compensation is feasible.

The key outstanding social issues that are either unresolved or require further monitoring are summarised in the Table 8-1.

Table 8-1 Summary of Key Issues Relating to Social Impact

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
8.1	AEA previously identified that SEIC needed to develop an explicit strategy for the compensation of displaced people, including economic displacement and unregistered/informal land and structure users as required by World Bank OD 4.30. SEIC has subsequently developed the RAP (finalised in Q2, 2006). However, this was only developed some time after the commencement of Project construction activities and hence impacts may have been incurred historically, although the precise extent of these is difficult to determine.	Social L/M	OD 4.30	Adequacy of Assessments & Plans	Historical
8.2	An Indigenous Peoples Development Plan was not completed prior to construction. However, in Q2, 2006 SEIC finalised and launched a good SIMDP.	Social Potentially M	OD 4.20	Adequacy of Assessments & Plans	Historical
8.3	<p>AEA had some concerns as to whether SEIC had sufficient resources to implement the commitments made in the SIMDP during the early stages of implementation. Ineffective implementation of the SIMDP as a result of insufficient resourcing could result in concerns within the IP community, a potential short-term loss of benefits derived from the TEAs and failure to implement mitigation measures agreed within the SIMDP. This could potentially result in minor short-term detrimental impacts to IP and we therefore view this as a potentially Low social materiality issue. However, given the high profile nature of the SIMDP, ineffective or delayed implementation of the plan (due to lack of resources) could potentially result in significant adverse publicity.</p> <p>AEA notes that SEIC plan to review the adequacy of resources periodically on the basis of the SIMDP external monitor reports. As of April 2007 SEIC has appointed three full time and three part time staff on the SIMDP.</p>	Social Potentially L Reputation Potentially M/H	OD 4.20	Implementation of plans	Closed

Issue ref.	Issue	Materiality	Relevant guideline/ standard	Nature of Issue	Status
8.4	<p>Instances have been identified where the grievance process has taken a long time to resolve issues. In May 2006, a review of the grievance database revealed 15 grievances/ claims related to damage to or uncompensated use of property (1 from 2004, 11 from 2005 and 4 from 2006) that have not yet been resolved. Ineffective implementation of the Grievance Procedure through to May 2006 represents a persistent breach of the Company's procedures and is therefore categorised as a 'Moderate' against the Best Practice/Procedure materiality criteria. While the grievance management system is improving rapidly, to date 11 grievances are still over the 45 day unresolved period after which independent review should be considered.</p> <p>A small number of these unresolved grievances have resulted in moderate loss/reduction of livelihood or disruption to the community, which equates to a 'Moderate' social impact.</p>	<p>Best Practice/ Procedure M Social M</p>	<p>OD 4.30</p>	<p>Implementation of plans</p>	<p>Pending</p>
8.5	<p>In November 2006 AEA recommended that SEIC needed to expedite the disbursement of compensation to PAPs defined as vulnerable. In the November 2006 Grievance database 10 unresolved grievances relating to land use were listed, 7 of which had been unresolved for over 8 weeks, and some of which dated from as far back as May and June 2006. The database did not specify which of these land related grievances were lodged by people defined as vulnerable, but the RAP states that the majority of those affected by resettlement can be considered vulnerable. It should therefore be assumed that most of these are vulnerable people who, until their grievances are resolved, are experiencing a loss of livelihood, which equated to a 'Moderate' social impact.</p> <p>As of June 2007 it has been agreed between SEIC and Lenders that RAP claims timeframes will be the same as those for the grievance process and that claims lodged by vulnerable PAPs will be flagged. AEA consider that this is an appropriate response but it is too early to assess the implementation of this process in practice.</p>	<p>Social M</p>	<p>OD 4.30</p>	<p>Implementation of Assessments & Plans</p>	<p>Pending</p>

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
8.6	<p>During 2006 site visits AEA found that some plans and processes defined within SEIC’s social management system were not being fully implemented. Namely:</p> <ul style="list-style-type: none"> SPP- there had been slippage in achieving some milestones in the SPP (e.g. plans for third party audits had not been finalised and development of targets for monitoring KPIs). These milestones have now been achieved with the exception of the finalization of the audit plan and third party monitoring. Issues Management - the issues management process was a SEIC HSESAP commitment, yet site visits indicated that there were instances (e.g. loss of labour to the Project and housing affordability) where the issues management process had not been used to instigate action plans to address concerns raised by community members. The process has now been changed in the HSESAP but a sufficiently detailed Action Plan for housing is still to be provided to AEA. HSESAP commitments needed to be updated (to reflect the latest agreements with Agency Lenders), communicated and monitored effectively to contractors, as some evidence during site visits highlighted that there were examples of HSESAP non-compliances and contractors were unfamiliar with some commitments. This has now been achieved. <p>These are examples of breaches of non-mandatory guidelines, which equate to ‘moderate’ classification under the best practice criteria. If the social management system is not working effectively, there is a lack of protection of impacts on livelihoods, which equates to a potentially moderate impact.</p>	<p>Best Practice/ Procedure M</p> <p>Social Potentially M</p>	<p>Best practice</p> <p>OD 4.30</p> <p>OD 4.01 Annex C HSESAP pt 1, (Contractor management)</p>	<p>Implementation of plans</p>	<p>Pending</p>

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
8.7	<p>In November 2006 AEA noted that the compensation for the loss of the beach adjacent to the LNG site had still not been used to develop the Korsakov Park. Whilst we are aware that delays were due to 3rd Party involvement SEIC need to provide some offset for the beach within reasonable timeframes. SEIC now propose to ensure that an offset is provided for the beach as soon as possible either through the delivery of the park upgrade or through the provision of a swimming pool using money from the infrastructure fund, and to demonstrate that they are doing all that is reasonably possible to expedite the delivery of an offset.</p> <p>As this is a permanent loss of a moderate amenity this equates to 'Moderate' social impact classification.</p>	Social M	OD 4.01 Annex C	Implementation of plans	Pending
8.8	<p>While SEIC continues to work on this issue, the development of construction related demobilisation plans is not yet finalised. There is a potential for significant loss of livelihood if the plans are not effective, hence the 'Potentially High' classification, however AEA recognise that SEIC are taking a proactive approach to this issue.</p>	Social Potentially H	HSESAP	Adequacy of Assessments & Plans	Pending

9 Health Impact

9.1 HIA PROCESS

AEA undertook a detailed review of the Health Impact Assessment (HIA) produced in 2003 by SEIC. A number of observations were made pertaining to HIA best practice and suggestions made to improve the assessment. Many of these comments related to the process and timescales. However, these observations were set against developing best practice, rather than any recognised standard within the WB/IFC guideline requirements.

SEIC's strategy is based on ensuring the good health of the workforce as well as promoting improvements in the health of the host community. The SEIC Minimum Health Management Standards are adhered to and SEIC initiated the HIA even though no legal requirement to produce an HIA exists in the Russian Federation.

The SEIC HIA team gathered much of the relevant information needed to gain an overview of the most important health issues on Sakhalin Island prior to construction. In the process of our original review of the HIA, AEA made the following observations:

- Potential for bias created because the HIA team is not independent of the Project proponent but actually employed by SEIC.
- Problems resulting from a HIA process that was not fully in line with HIA best practice with respect to team composition and general adherence to commonly accepted HIA procedures and HIA methods.
- The lack of clear mitigation action plans in the HIA and assignment of responsibility as well as indications of cost implications of alternatives for mitigation. This latter point has subsequently been resolved through Table 2.6 of the HSESAP.

Nevertheless a number of reasonable KPIs have been identified and commitments to monitoring and improving health amongst the Sakhalin communities have been made in the HIA and captured in the HSESAP (Table 2.6). AEA has reviewed the HSESAP to confirm that these mitigation measures and commitments have been properly captured. A compliance review against the commitments of the HSESAP is provided below. The HSESAP table also includes numerous commitments aimed specifically towards protection of the workforce. In this section of the report we have focused primarily on mitigation measures/commitments that relate directly to community members.

9.2 COMPLIANCE REVIEW

During the course of the due diligence process, various elements of the HSESAP Community Health issues table have been reviewed on an ongoing basis through site visits (e.g. reviews of camp management procedures at construction camps). In Q3 2006, a more comprehensive review of the HSESAP commitments was undertaken. The review drew upon the findings of site visits, review of documentary evidence and discussions with SEIC personnel responsible for managing community health issues.

9.2.1 Management of Health Issues

SEIC has developed a Minimum Health Management Standard (MHMS). This standard was developed specifically for the Project and as such understandably draws heavily upon the findings of the HIA. Similarly the HSESAP table for community health issues has been developed in order to action the recommendations of the HIA. The objectives and content of both the HSESAP and the MHMS are largely comparable.

The HSESAP provides the basis for mitigation and monitoring of health issues within the workforce and local communities. Commitments relating to the construction workforce are passed down to contractors and subcontractors via contractual agreements, which include SEIC's Medical Conditions of Contracts. Based on observations during recent field visits, camps and main construction sites are largely in line with the requirements set out in this standard in terms of provision of medical facilities, catering facilities and more general compliance with the camp management policy.

In March 2006 third party auditors (from Shell) undertook an audit of the Health Management System including SEIC's Minimum Health Management Standards (MHMS), effectively capturing a large number of HSESAP commitments. The audit was comprehensive, covering clinics, catering accommodation and laundry services, workshops at the LNG plant, OPF, Tumanovo, Sokol and Yuzhno. The overall audit was rated as fair with no serious issues identified.

AEA has reviewed the audit report and used it to help assess SEIC's compliance with the HSESAP. In addition, a systematic compliance review of the entire HSESAP table was carried out via discussions with SEIC personnel responsible for managing health issues in order to confirm/supplement the findings in the audit. Key findings of this review process are provided below against each issue type and associated mitigation/monitoring commitments.

9.2.2 Infectious diseases

The risk of sexually transmitted diseases (STDs), including HIV/AIDS, syphilis, gonorrhoea and Hepatitis B and C was identified as a significant risk to the community by the HIA. Numerous measures are prescribed in the HSESAP that can be broadly categorised as pre-employment health screening and immunisation, collaboration with community health care professionals, awareness raising and camp management.

Pre-employment health screening is a RF requirement and is captured under the MHMS and the HSESAP. Third party audit confirms compliance with this requirement, although concerns were expressed regarding the authenticity of some of the pre-employment 'fitness-to-work' certificates. The concern has since been brought to the attention of SEIC senior management and an additional programme of screening has been implemented since 2005 using SEIC's own service provider.

However, there is a high level of compliance in relation to the management of STDs and a number of noteworthy initiatives and achievements have been made in this respect, which are briefly summarised below.

Key to the implementation of any Sakhalin wide programme has been the establishment of a joint (SEIC-Oblast) Health Advisory Committee (HAC) in December 2003. SEIC participates in this committee on a number of initiatives, and in late 2004 a sub committee of

the HAC was formed to deal exclusively with HIV-AIDS. Measures to manage HIV-AIDS are described in the HSESAP and include; a camp management policy (based on SEIC's Medical Conditions of Contract Standard which is encompassed in the contractors contractual agreements); numerous Company/community awareness programmes; provision of assistance to the local health community in their HIV-AIDS programmes; and organisation of national and international workshops. One of these workshops resulted in a significant achievement in which a new government resolution was written that imposed a number of actions on various health, educational and media entities within Sakhalin Oblast.

SEIC has also provided approximately \$7.3m funding for a health infrastructure upgrade programme which includes improved emergency response capabilities. The funds have been spent on the provision of equipment, training in the use of new equipment, hospital refurbishment and improved capabilities to screen for blood-borne pathogens within blood transfusion laboratories.

Of note, the incidence of HIV cases is rising at a much slower rate than on mainland Russia (based on data from the Russian Federal AIDS Centre).

AEA has viewed individual camp management policies to confirm the requirements of SEIC's overarching camp management policy are incorporated. We can further confirm, the availability of condoms within the camps visited.¹²⁷

Other noteworthy initiatives include:

- SEIC's involvement with a NGO (Trans Atlantic Partner against AIDS) in a 'train the trainer' AIDS awareness programme working with Sakhalin communities.
- Improved blood transfusion facilities as part of the hospital upgrade programme.

The HIA also identified TB as a high-risk issue. Medical screening is used to identify TB cases amongst the workforce, and within the community SEIC have been engaging with TB carers to identify ways in which they can help. They have further developed a community support and awareness programme. TB is also an issue discussed within the HAC forum.

Within the section of the HSESAP devoted to the management of risk from zoonotic bacterial and vector borne disease, the majority of commitments relate specifically to workforce protection. AEA confirms that SEIC meets these commitments, although we highlight that medical examinations are not being carried out every two years (as per the HSE Standards for medical fitness). This is recognised by SEIC and it is intended that the commitment will be fully met as the Project enters into the operations phase.

9.2.3 Monitoring of mental health impacts

The potential impacts on the mental health of affected individuals in the community was inadequately addressed in the HIA, and previously highlighted by AEA as an area requiring further attention. SEIC does not consider the Project to pose a risk to mental health within affected communities, on the basis of the findings from the HIA and because mental health concerns have not been identified as an issue during construction in so far as it has not been raised during any 'challenge sessions' with local health authorities. However, AEA believes that further actions could and should be taken to confirm negligible impacts on community

¹²⁷ Camps visited in May 2005 site visit, including OPF and Nogliki pipelines camp.

mental health, for example, through direct engagement with mental health care providers, and closer liaison with CLOs.

In terms of drug and alcohol abuse, the majority of commitments are aimed at managing workforce behaviour. The exceptions include commitments to:

- Implement employee alcohol and drugs awareness, prevention, assistance and education programmes. Assist and support community programs.
- Participate in Joint Company and Community Health Advisory Committee to assist and support the community with respect to existing and new alcohol and drug abuse programmes.

Some evidence has been provided to confirm that SEIC has explored opportunities to assist and support community drug and alcohol abuse programmes, for example, a meeting with the Medical Director of the Sakhalin Oblast Centre for Alcohol and Drugs to discuss potential for alcohol and drug related sustainable development projects and meetings with Yuzhno Alcoholics Anonymous in respect to potential awareness programmes.

9.2.4 Impacts on health infrastructure

The influx of a large workforce can lead to an increased demand on health care and medical services and the strain that this could place on the existing health infrastructure was recognised at an early stage of the Project. To mitigate against additional strain, SEIC committed to, and have now completed, a health infrastructure upgrade programme.

The Project employs its own dedicated health care providers which are located at the main camps and in serious cases will repatriate ill workers. However there are occasions when the workforce will be referred to local (upgraded) hospitals. We understand that the number of referrals/usage of hospitals beds is minimal and is well below the capacity increases resulting from the hospital upgrade. Nevertheless, we recommend routine reporting in the form of suitable KPIs to demonstrate that the utilisation of local health care services is minimal and that the Project has not resulted in an increased demand on the health infrastructure¹²⁸ and specifically on the provision of Accident and Emergency care¹²⁹.

9.2.5 Annual Health Plan

The HSESAP includes the commitment that '*SEIC shall develop an Annual Health Plan that comprises a number of community related actions, typically managed by the Joint Health Advisory Council. This results in planned engagements with social and health authorities, which are reported as part of the PCDP*'. At the time of writing, a formalised health plan for 2006 had not been prepared, nor had engagements with social and health authorities been reported in the PCDP¹³⁰. AEA recommends that to rectify these issues, SEIC's programme of work should be formalised in an annual health plan and engagements, both undertaken and planned with social and health authorities, should be incorporated within the next PCDP.

¹²⁸ Increased demand based on pre project health care capacity

¹²⁹ The Project has its own medical services providers and health care facilities but may draw upon the island's A&E facilities.

¹³⁰ Weekly activity register confirms such engagements have taken place, but these are not recorded publicly as required in the HSESAP.

Additional measures to protect community health are addressed through adherence to good practice management of chemicals and wastes, environmental protection and road safety. These issues are addressed elsewhere in the report.

9.3 SUMMARY OF KEY ISSUES

Overall the Project demonstrates a high level of compliance with the requirements of the HSESAP, and some of the initiatives have resulted in real positives for the community. A number of non-compliances against the requirements of the HSESAP requirements are presented in Table 9-1 below.

Table 9-1 Summary of Key Issues Relating to Community Health

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
9.1	Medical examinations are not being carried out every two years during construction (as per the SEIC’s HSE Standards for Medical Fitness). This is recognised by SEIC and it is intended that the commitment will be fully met as the Project enters into the operations phase.	Health M	SEIC’s HSE Standard for Medical Fitness	Implementation of plans	<div style="background-color: red; color: white; padding: 2px; text-align: center;">Unresolved (construction)</div> <div style="background-color: yellow; color: black; padding: 2px; text-align: center;">Pending (operations)</div>
9.2	The potential impacts on the mental health of affected individuals in the community was inadequately addressed in the HIA, and previously highlighted by AEA as an area requiring further attention. AEA believes that further actions could and should be taken to confirm negligible impacts on Community Health. In our view there is some uncertainty whether the Project is affecting the mental health of affected community members and on this basis there is the possibility of undetected multiple morbidity, hence we have assigned this issue with a potentially Moderate materiality.	Health Potential M	Best Practice HSESAP Table 2.6	Implementation of plans	Unresolved
9.3	SEIC have not produced a formal Annual Health Plan (in line with HSESAP commitments), nor have engagements with social and health authorities been reported in the PCDP.	Best Practice/ Procedure L	HSESAP Table 2.6	Implementation of plans	Unresolved

10 Oil Spill Risks

10.1 OIL SPILL RESPONSE PLANNING

10.1.1 Introduction

This section discusses SEIC's approach to the development of oil spill response materials from the early TEOC plans through to current status of the operational oil spill response plans (OSRPs). In reviewing the various oil spill response materials, consideration is given to the status of the Project at the time documents/plans have been prepared, recognising the HSESAP commitment that operational OSRPs be approved 6 months prior to first oil. Key documents, developed over a number of years as the Project has progressed, include:

- TEOC OSRPs that were required prior to construction
- Position papers
- EIA (2003)
- EIA addendum for oil spill (2005)
- Asset specific and corporate operational OSRPs and supporting handbooks.

In the following sections we describe the evolution of issues followed by a review of the operational OSRPs. Much of the early work was a precursor to the OSRPs and thus the main focus of our review centres on the adequacy of the operational OSRPs, where we describe the good progress made against a number of standards that are representative of best practice (Section 10.1.6).

10.1.2 Evolution of the Issue (status in 2003)

From AEA's engagement as the IEC through to the middle of 2003 AEA reviewed relevant sections of the preliminary EIA, the 2003 EIA, the TEOC OSRPs (these formed a part of the TEOC submission), and SEIC's oil spill position papers. The status of the OSRPs at that stage of the Project, recognising that Phase 2 first oil was not scheduled for several years, was satisfactory. Whilst significant progress had been made by the Company with respect to Project oil spill planning, and timeframes allowed for further development, a number of issues were highlighted. Of note, the TEOC plans, although detailed, tended to be theoretical and to some extent unrealistic in emergency situations, falling short of best practice operational plans. This was not a major concern as it was recognised that the TEOC plans were never intended to be operational plans but rather, they were prepared to meet the RF requirements to allow the start of construction. AEA was also informed at an early stage that SEIC intended to produce 'operational' oil spill response plans at a later stage, ahead of first oil.

We also concluded that the information provided in the 2003 EIA did not adequately address a number of areas that would be expected in the EIA. Specifically, the EIA did not:

- identify areas at risk from an oil spill and the sensitivities associated with these areas; in particular there was insufficient sensitivity mapping.
- demonstrate that technologies are available for the recovery of oil in icy conditions and that SEIC would procure such equipment.
- outline the level and approximate location of resources.

- sufficiently address the transboundary risk.
- outline the proposed work programme required to fill any information gaps.

10.1.3 Evolution of the Issue (Status in 2005)

Following the 2003 EIA, an addendum chapter dedicated to oil spill planning and response was produced in 2005. This addendum chapter on oil spill response (posted on the SEIC website) adequately addresses all of the issues of concern expressed above, to a level that was appropriate for the EIA. Furthermore, the addendum provides a good overview of SEIC's approach and position with respect to pertinent oil spill issues.

10.1.4 Development of Operational OSRPs

With respect to comments concerning earlier TEOC oil spill plans, SEIC took the position that operational OSRPs, produced with a format and content to meet Russian regulations and international best practice, would be developed in advance of first oil. SEIC set a timetable for finalisation of the OSRPs that aligned with the project timescales, with the commitment that the plans would be approved at least 6 months prior to first oil. Asset specific plans will sit beneath an umbrella Corporate Plan. The full suite of plans is listed below:

1. Corporate
2. Lunskeye (Platform and pipeline)
3. Piltun-Astokh (Platforms and pipeline)
4. Onshore pipelines (including BCS-2)
5. Onshore Processing Facility
6. Prigorodnoye Onshore (formerly the LNG/OET plan)
7. Prigorodnoye Offshore (formerly the Terminal Loading Unit plan)

A comprehensive work programme, designed to fill any information gaps, was undertaken to inform the preparation of these plans. The work programme included a variety of studies ranging from collaborative research studies to reviews of local/regional response capabilities. The main topics areas included:

- Oil characterisation and behaviour studies
- Oil dispersibility
- Oil recovery techniques (in ice)
- Behaviour of burn residues (and toxicity testing of residue if these are found to be neutrally buoyant/sink/float)
- Potential use of chemical dispersants
- Spill trajectory modelling
- Environmental sensitivity surveys/mapping

The majority of this work has been completed, although we understand some refinement is still ongoing.

10.1.5 Review of the OSRPs

A review process was agreed with the Agency Lenders to ensure the OSRPs are produced in a timely manner (relative to operations) and to a standard that meets with various international guidelines and industry best practice. This process requires "*the appointment by Agency*

lenders and the Company of an independent oil spill response consultant to review the OSRPs and provide comments simultaneously to Agency Lenders and the Company, such that these can be given due and careful consideration by the Company prior to their finalisation. The review will consider the plans' compliance with applicable Environmental Law, relevant parts of the HSESAP and will be benchmarked against international best practice and standards agreed between the Company and the Lenders at the outset of the review process” (HSESAP Table 2.1, row 58).

At the time of writing, the specialist oil spill consultant has been engaged, has met with the SEIC oil spill response team on Sakhalin island, and has reviewed 5 out of the 7 plans against a scope of work prepared by AEA in collaboration with the Agency Lenders. In particular, the plans are being assessed against the following guidelines, insofar as they are appropriate to the operations of SEIC, including:

- IFC Offshore oil and gas development guidelines, 2000
- ISO 2000, ISO 15544, Petroleum and natural gas industries, Offshore production installations, Requirements and guidelines for emergency response
- IMO, 1995. IMO Manual on Oil Pollution, Section II Contingency Planning
- United States ICP, Integrated Contingency Plan (One Plan) 1996
- IPIECA, 1991 2000, A guide to contingency planning for oil spills on water. The International Convention on Oil Pollution Preparedness Response and Cooperation
- IMO Guidelines on "Responding to Oil Spills" (Offshore)
- Oil Pollution Act of 1990 (OPA 90) as set forth in 33 CFR Parts 154.1028, 1030, 1035, 1040, 1050, 1055 and 1057; Parts 155.1030, 1035, 1055, 1060 and 1062; 30 CFR Parts 254; and 49 CFR Parts 194)
- 40 CFR 112, The National Oil and Hazardous Substances Pollution Contingency Plan (US NOHSPCP), sections of subparts C, D and E relevant to owners/operators, as well as Appendix F, Facility Specific Response Plan.

The oil spill consultant reports on compliance with the above standards for each of the plans. On receipt of the oil spill consultant's report SEIC committed to “*act upon the Consultant's reasonable comments, subject to Russian Party approval and relevant RF authority approval.*” (HSESAP Table 2.1, row 58).

AEA and the oil spill consultants have discussed pertinent oil spill issues with the SEIC oil spill team prior to and during the development of the plans. A number of key issues were identified that apply across the Project and progress with these issues were tracked via communications with SEIC and ultimately the review of the operational plans.

Key issues included:

- Capability to respond to oil spills during sea ice conditions
- Disposal of oily materials in the event of a clean-up operation
- Use of dispersants in open water/ice conditions
- Transboundary impacts and response arrangements

- Sensitivity mapping
- Oil spill trajectory modelling in open waters and ice conditions
- Tiered response and response equipment stockpiles
- Wildlife rescue
- Risks posed from release of fuel oils (in the event of a tanker incident)

These issues, SEIC's response and current status are discussed below.

Capability to respond to offshore oil spills during icy conditions

The EIA addendum (2005) identifies several response strategies to demonstrate that technologies are available for the ice conditions applicable to the Project. As a part of the work programme SEIC continued to identify state-of-the-art oil in ice response options and new technologies currently in development. Furthermore, SEIC is involved in a number of joint partnership projects designed to improve oil in ice recovery technologies, including the potential use of dispersants, remote sensing in icy conditions and a number of treatment and recovery methods. However, there will be environmental conditions, most notably foggy conditions that can occur for approximately 80 days/year, where a response might be severely hampered (although such constraints are equally applicable to an open water response).

SEIC has committed to “*ensure the availability of appropriate levels of onshore and offshore oil spill response resources*”. The specialist oil spill consultant is currently assessing SEIC's capability for recovery of oil in ice conditions. Any constraints limiting the use of the equipment, such as licensing requirements, will also be assessed (see section 10.1.6).

Appropriate equipment/response options are available to enable an active response in almost all of the offshore ice conditions experienced off the coast of Sakhalin. The exception can occur where windy conditions blow across the ice causing ice layering and not only increase ice concentrations, but greatly decrease surface uniformity. In this situation oil recovery may not be possible as the oil may be dispersed throughout the ice at different concentrations and depths. In such conditions, responders and equipment will not be able to come into contact with the oil and the only strategy would be to monitor and prepare for conditions where recovery could become feasible.

Consideration must also be given to meteorological/safety constraints, such as poor visibility, which can prevent an immediate response (in both ice infested and open water conditions), including quantification of limiting and adverse weather conditions. It should also be recognised, based on evidence from large spills around the world, that at-sea recovery of oil is far from 100% efficient even in optimal conditions.

Capability to respond to oil spill - response equipment

AEA (with advice from the oil spill consultants) has undertaken a preliminary review of SEIC's anticipated equipment stockpiles. At the time of writing, the majority of the response equipment has been procured and is for the most part on the island/at its intended staging location, with the remainder scheduled between August and December 2007. Overall, the type, quantity and staging of equipment is well planned and is appropriate for the Project locations and working environment.

More specifically the vessel-based, pipeline maintenance depots, marine terminal, and rapid deployment depot stockpiles are appropriate for their intended operating environments as are the large and small response trailers. The number and types of skimming systems that have been pre-staged at the various equipment locations is also appropriate and includes skimming systems that are diverse and capable of recovering the full range of foreseeable oil viscosities (from fresh and weathered oils).

One of our earlier concerns related to the interoperability of the containment systems. However the majority of the inland and coastal response equipment, including related ancillary or support equipment, is from a single manufacturer. The exception is equipment onboard the OSR Vessel Irbis, which has equipment from a number variety of manufacturers, although this equipment is rugged and state-of-the-art equipment. As such, the interoperability of equipment is not a concern.

Further consideration by the oil spill consultant of SEIC's capability to respond to oil spills, taking account of finalised equipment types, staging, ability to rapidly deploy equipment in adverse conditions and consistency of equipment inventories with finalised OSRPs, is required. However, on the basis of the review work undertaken to date, SEIC's provision of oil spill response equipment would appear to be fully considered, well researched and appropriate.

Disposal of oily materials in the event of a clean-up operation

Temporary storage and ultimate disposal options for recovered oil and oily wastes are described within the OSRPs. This consists primarily of contingency storage areas and a longer term bioremediation facility utilising a secure area separate from the active bioremediation cells for containment of up to 15,000 tonnes of contaminated soil. These secure areas are to be lined and fully contained. More traditional land farming techniques are also being considered.

SEIC proposed the bioremediation of oil contaminated soils including salt contaminated oily waste. Sakhalin II crude is likely to be biodegradable even when contaminated with salt. On this basis, a properly designed bioremediation site or cell could provide a disposal option for oily waste.

Other disposal options considered include the use of incinerators and disposal to the island's landfill sites. AEA was previously informed that incinerators were either not available or their use was not permitted. We further note that the OSRPs cite the use of landfills (without reference to dedicated bioremediation cells) for the disposal of spill generated oily wastes, although this would contradict SEIC's commitments with respect to the disposal of hazardous wastes. We have been informed that oily wastes will go to bioremediation cells within landfill sites in agreement with the commitments of the HSESAP; use of dedicated bioremediation cells should be explicit within the OSRPs.

Use of dispersants in open water/ice conditions

The use of chemical dispersants has been considered as a part of SEIC's Phase 2 response capability in line with the HSESAP which states that '*SEIC shall develop a procedure for the use of dispersants. SEIC shall endeavour to obtain prior approval from Russian Federation authorities for the use of dispersants under specified circumstances*'. A procedure, setting out the process for determining whether dispersants should be used and the steps required in requesting permission for their use, is included in the offshore OSRPs.

The use of dispersants is expected only in isolated and exceptional circumstances where a net environmental benefit can be demonstrated. As a part of this consideration the likely success of dispersant application was determined taking account of the time required to deploy dispersants, sea/ice conditions, oil characteristics (light oils with a high evaporative loss) and the overall net environmental benefit. Of note, no dispersants will be carried on board the oil spill response vessels to avoid inappropriate use.

A RF regulation dated December 2005 calls for a “preliminary” Net Environmental Benefit Analysis (NEBA) to be conducted to determine whether or not dispersants are a viable option, and if so, to establish the parameters for dispersant use. However, an important additional requirement in these regulations is for another NEBA to be performed *after* a spill has occurred and before permission for their use is requested. The results of this NEBA then go to the three major government authorities (Fisheries, Health, Natural Resources) responsible for providing permission for dispersant use. In the event of a spill, this approach would be likely to result in any approval to use dispersants being delayed and we consider this to be unworkable where the rapid use of dispersants is required. SEIC believes this process will be improved and restructured over time, to the point where certain areas are pre-approved for at least a limited level of dispersant use at specified times of the year.

At the time of writing, the RF government has not yet pre-approved areas or zones for dispersant use. We understand that use of dispersants remains an issue for discussion amongst RF approval authorities. Thus, the requirement to conduct a NEBA prior to dispersant use is still in place. These factors could result in significant delays in response in the isolated cases where SEIC would prefer to use dispersants as a mitigation technique.

Transboundary impacts and response arrangements

Oil spill trajectory modelling has been carried out to determine the risk to Japanese coastal waters and coastline in the event of a spill. The findings of these studies are captured in the EIA addenda along with an outline of the initiatives/measures that will be taken to ensure effective communication and coordination in the event of a oil spill in proximity of Japanese waters/shoreline. Most notably, SEIC has facilitated joint Japanese/Russian oil spill exercises, and where possible has encouraged the development of cooperative agreements that facilitate movement of equipment and personnel across international territories. In addition, SEIC is also facilitating technical workshops between Russian and Japanese spill response organisations.

SEIC has also committed (to Agency Lenders) within the HSESAP to the extension of the current Phase I Memorandum of Understanding (MOU) with the Japan Maritime Disaster Prevention Centre (MDPC), which will be agreed at least 6 months prior to first oil, and furthermore that *‘sensitivities for the northern coastline of Hokkaido shall be considered in SEIC oil spill planning and that SEIC shall include the coast of Hokkaido into the shoreline response components of the Aniva Bay Oil Spill Response Plans’*.

The MOU with MPDC for Phase 2 of the Project was not in place as of June 2007 although it is understood that the MOU has been drafted. Japanese sensitivity mapping will be provided in a Hokkaido OSR shoreline handbook (see ‘Sensitivity mapping’ section below).

Sensitivity mapping

A significant proportion of Sakhalin's north eastern coastline was mapped during the development of the Phase 1 oil spill response plan, and captured within a Geographical Information System (GIS). However, the expansion of Sakhalin II results in an extended area of coastline at risk from an oil spill, necessitating additional sensitivity mapping. On the basis of potentially impacted coastline/waters identified through the trajectory modelling, additional field surveys (including aerial) and sensitivity mapping has been undertaken. The entire island has been surveyed by air. Ground surveys have covered Sakhalin's eastern coastline South of Cape Elizaveta, the whole of Aniva Bay and the coastline from the Krillion Peninsula to Kholmsk.

Onshore sensitivities are also identified, using data collected by SEIC during the course of the Project and other archive materials and survey work in 2004/05, with a focus on sensitive water bodies (downstream of the pipeline crossing). Information relevant to the logistic arrangements (access/temporary storage areas etc) is also addressed in these surveys.

AEA was informed that environmental sensitivity maps for Hokkaido, produced by the Geological Survey of Hokkaido and the Japan Coastguard, would be incorporated in the OSRPs covering activities within Aniva Bay, thereby providing sufficient resolution to identify key sensitivities requiring priority protection. More recently, we understand such information will not be included in the OSRPs submitted for Russian approval, but will be included in the supporting Hokkaido OSR handbook. AEA considers this to be a reasonable approach, although the handbook is still in progress at the time of writing, and Hokkaido sensitivity maps have not been reviewed.

The environmental sensitivity mapping for the plans reviewed to date is of a high standard (see Section 10.1.6)

Oil spill trajectory modelling in open waters and ice conditions

A considerable amount of oil spill trajectory modelling has been undertaken as a part of the Phase 1 plan. This has been supplemented with additional modelling in the Sea of Okhotsk and in relation to transboundary impacts within the Aniva Bay region. The supplemental modelling has examined the fate and distribution of oils in a range of scenarios including spills in both open water and icy conditions, for a broad range of credible release scenarios including tankers spills and blow outs, although further studies are required for the Lunskeye plan (see section 10.1.6).

Currently SEIC has an **ice** trajectory model, and is at the same time evaluating available **oil-in-ice** trajectory models to improve its oil-in-ice (and open water) modelling capability. SEIC intends to purchase or develop an oil-in-ice model and train staff such that it has in-house capability. At the time of writing, an appropriate model has not been sourced.

Wildlife rescue

A comprehensive wildlife response plan is considered an essential component of any oil spill contingency plan. In the early stages of planning there was some discussion of a rescue centre, but this was considered by SEIC to be an unrealistic requirement of an individual oil company. The development of a wildlife rescue plan that can rapidly establish wildlife rescue facilities was considered more appropriate. The establishment of a permanent and dedicated rescue centre is not required by international guidance and therefore SEICs approach, to

develop a plan that enables temporary facilities to be rapidly established in reasonable proximity to the affected areas, is acceptable.

SEIC commissioned a joint study from the International Fund for Animal Welfare (IFAW) and the International Bird Rescue Centre (IBRC), which set out the background on existing capabilities for wildlife response on the island. The study investigated options/requirements to develop and enhance wildlife response capability for future operations through a training workshop, the preparation of an oil wildlife response plan and advice on equipment and rapid deployment. IBRC worked with SEIC in identifying and pre-staging adequate equipment for treating oiled wildlife. SEIC plans to invest in wildlife response equipment which will include clean-up/rescue equipment kits and equipment for hazing. Procurement of equipment, to be located at the OPF, BCS-2 (Gastello) and the LNG site, is in progress at the time of writing. Wildlife response guidelines will be developed for the Phase 2 OSRPs.

Construction phase

Construction contractors are required to produce oil spill response plans with a level of detail/resource that is commensurate with the risk of their activities, and to have resource in place via in-house capability or through a contractual agreement with a third party spill response organisation. As a control mechanism these plans are reviewed and approved by SEIC personnel prior to work taking place.

In the early stages of construction some plans developed by contractors were considered by SEIC to be inadequate. This was due to some of the contractors' having a lack of familiarity with the OSRP writing process and required content. This issue has been resolved, and a process was put in place within SEIC to update construction plans as required. The process requires that the contractors submit their plans to SEIC, which then makes changes as needed to bring the plans into compliance.

10.1.6 Adequacy of the individual operational OSRPs

As detailed above SEIC are preparing a suite of six asset specific OSRPs which will be accompanied by an overarching Corporate OSRP. At the time of writing the Lunskeye, Prigorodnoye offshore (previously know as the TLU) and OPF plans have received local and federal approvals. The Piltun-Astokhskeye has received all approvals with the exception of final signature by the Ministry of Transport. The Corporate Plan, which does not require approval, has also been prepared. The same plans have been reviewed in accordance with the process described above.

At the time of writing the Prigorodnoye Onshore Plan (previously called LNG/OET plan) has been submitted to the RF government authorities and approval is anticipated in September 2007. The Onshore Pipelines Plan is near completion with Final Federal approval anticipated by SEIC to occur in November 2007.

The overall approach taken in the review process was to compare the OSRPs against the requirements of specific international, RF and US regulations as well as Agency Lender, industry and trade organisation standards and recommended practice.

In order to do this a detailed cross-reference checklist was developed which identified each of the best practice standards/references against a detailed list of topics that should be addressed in the plans. This list of topics was taken from the International Petroleum Industry

Environmental Conservation Association's (IPIECA's) Guide to Contingency Planning for Oil Spills on Water, Appendix One.

The remainder of this section provides a summary of the findings of the reviews by the independent oil spill consultant for each of the plans received to date. It should be noted that some of the plans were reviewed as drafts and our comments expressed in this report are likely to change in view any subsequent revisions made to the plans. A process is in place that allows for the amendment of the plans, including plans that have already received approval, in order to take account of comments made by the oil spill consultant.

Corporate Oil Spill Response Plan

The majority of the best practice standards/references, against which the review was undertaken, are aimed at OSRPs for specific facilities at specific locations or for transportation of oil. The Corporate OSRP, however, is an overarching document that applies to the whole range of SEIC's operations in relation to oil. For this reason the review has concentrated upon a small number of relevant best practice standards/references and particularly the IPIECA's Guide to Contingency Planning for Oil Spills on Water, Appendix One and the International Maritime Organization's (IMO's) Manual on Oil Pollution – Section II Contingency Planning

The overall conclusion of the review of the Corporate OSRP is that it is a very well written, high-level response document that generally meets industry best practice across the board. In particular the format of the plan (which facilitates compliance with Russian Federation and regional Oblast oil spill regulations) allows it to be readily used in both the pre- and post-spill and the emergency response modes. The plan also includes all contractor operations. This increases the robustness of the plan to ensure that all contractors working for SEIC, who have the potential to cause an oil spill, fall under the same strict prevention and response guidelines as SEIC employees.

A small number of deficiencies were identified by the review, however it is considered that these could relatively easily be rectified. They are summarised below:

- In relation to the scope of the plan, it does not consider the road transportation of oil as a risk and does not assign this risk to any of the other facility-specific OSRPs.
- Against the topic 'Strategy for shoreline zones', it is considered that the plan does not include adequate discussion of the strategies for responding to oil spills that impact wetland environments, though it does include adequate discussion of protection of these environments from oiling. This type of environment is sensitive and occurs throughout much of Sakhalin Island including areas surrounding some of the land-based operations. Ensuring response to a spill in such areas should be given high priority.
- It is unclear whether employees are required to participate in emergency exercises twice per year or once every two years. In order to meet international best practice this should be at least once per year.

Lunskoye Oil Spill Response Plan

The overall conclusion of the review of the Lunskoye OSRP is that it fully complies with most of the referenced agreements, guidelines and regulations for best practice oil spill response planning for offshore oil production and marine oil pipeline transportation facilities. In particular the following topics are covered to a high standard:

- Environmental sensitivity mapping;
- Behaviour and fate and effects of spilled oil at sea and on land; and
- Shoreline protection measures and clean-up methods.

The Lunskeye OSRP also presents an excellent profile of the spill risks associated with all oil types related to the platform, sub-sea pipeline, and support vessel operations. It also meets all of the requirements contained in the applicable Russian Federation regulations.

However, in several topic areas, the draft Lunskeye OSRP provided to the oil spill consultants falls short of meeting referenced standards and in particular the requirements of the Oil Pollution Act (OPA) (1990). In more detail the following topic areas are considered to have deficiencies:

- Worst case spill scenario volumes: The scenarios considered do not include those required by OPA (1990) and it is considered likely that meeting the OPA (1990) requirements would result in greater spill volumes needing to be considered than those currently presented in the OSRP.
- Oil spill trajectory modelling: The only scenarios that appear to have been modelled are condensate spills from the platform and from a pipeline. There is no trajectory modelling undertaken for crude oil spill scenarios. In addition no modelling is provided for any type of spill in winter ice conditions.
- Limiting and adverse weather analysis: In relation to spill response, the OSRP does not determine the frequency of the sea state, current and weather conditions that prohibit response due to safety or operational constraints. In addition any response actions that could still be continued during such conditions (such as monitoring or pre-staging equipment) are not identified.
- Non-mechanical response options including dispersants and in-situ burning: Equipment required to allow in-situ burning and use of dispersants is not included in the equipment inventory despite these being discussed options. In order for dispersants and in-situ burning to be viable response options, equipment and logistics support must be pre-staged at or near the areas of risk.
- Communications and control room planning: The Lunskeye OSRP lacks detail with regard to response communications. For example information is not provided with regard to the exact areas of cell phone coverage, which VHF channels should be used and back-up communications. Such detail is considered to be required to meet best practice.
- Training and exercises: Whilst the training and exercise programme described in the Lunskeye OSRP meets international government and industry standards and recommended practice it is considered to fall short of industry best practice and government regulations in the US. With the inclusion of additional core training and annual exercises, along with clear guidance for documentation, record keeping, and incorporation of lessons-learned, this aspect of the OSRP could easily be brought up to the standards required.

Piltun-Astokh Oil Spill Response Plan

The review of the Piltun OSRP concludes that it is significantly improved over the Lunskeye plan. It follows a different format compared to the Lunskeye OSRP which makes it easier to read and understand. It is considered that the Piltun OSRP complies with nearly all of the referenced agreements, guidelines, and regulations for best practice oil spill response planning for offshore oil production platforms and sub sea oil pipelines. In particular the following topics are covered to a high standard:

- Responder health and safety
- Technical data related to oil spill surveillance, containment, recovery and disposal
- Behaviour of spilled oil in various operating environments, including on-shore
- Environmental impacts;
- Oil spill sources and associated spill risks
- Response strategies during the spring, summer and fall seasons
- Logistics support and transportation.

The Piltun OSRP also presents an excellent profile of the spill risks associated with all oil types related to the platform, sub-sea pipeline, and support vessel operations. It also meets the requirements contained in the applicable Russian Federation regulations.

The Piltun OSRP falls short of fully meeting referenced standards and industry best practice in only a few areas. These are similar to Lunskeye, with the same comments made for Lunskeye being applicable to Piltun in the following areas:

- Worst case spill scenarios volumes
- Limiting and adverse weather analysis
- Non-mechanical response options
- Training and exercises.

Prigorodnoye Offshore Oil Spill Response Plan

The overall conclusion is that the Prigorodnoye offshore OSRP is similar in format and quality to the Piltun OSRP. In particular, like the Piltun OSRP its format makes it easy to understand and user-friendly. It is considered that the Prigorodnoye Offshore OSRP complies with all Russian Federation regulations and most of the other referenced agreements, guidelines, and regulations for best practice oil spill response planning for these types of facility.

In particular the following topics are covered to a high standard:

- Safety of response personnel, including contractors
- Environmental sensitivity mapping (for Sakhalin Island)
- Behaviour and fate and effects of spilled oil at sea and on land
- Spill source identification and spill scenarios for the range of spills up to maximum credible spills

- Shoreline protection measures and cleanup methods
- Cross references materials and tables, figures and charts summarizing critical response data
- Regulatory compliance with host nation regional and federal standards for oil spill readiness.

The Prigorodnoye Offshore OSRP falls short of fully meeting referenced standards and industry best practice in only a few areas. These deficiencies are similar to those of the Lunskeye and Piltun plans, with the same comments made for Lunskeye being applicable to Prigorodnoye offshore in the following areas:

- Worst case spill scenario volume
- Limiting and adverse weather analysis
- Training and exercises.

In addition the following deficiencies were identified:

- Plans, strategies and tactics for responding to spills on, into or underneath sea ice. Whilst the plan demonstrates that SEIC is close to the industry state of the art for oil spill response in ice conditions, it recognises that there are considerable operational constraints to controlling and recovering free oil in sea ice conditions. The review considers that whilst techniques and equipment for tracking and responding to oil spills, on, into or under ice are sound, additional detailed strategic and tactical planning would increase the likelihood of additional oil recovery or removal before sensitive resources are potentially impacted. More specifically, generic information is provided on how to respond to free oil in various sea ice conditions, but detailed information on where the equipment will be located, where it will be applied and how it will be used and supported is not described in the Prigorodnoye plan or other plans. The plan(s) should detail SEIC's approach during those physical and environmental conditions where either the oil cannot be reached (i.e. distributed throughout ice) or cannot be safely responded to (e.g. high sea state, fog, darkness, high winds, whiteout).
- Environmental sensitivity mapping of the North Hokkaido shoreline is not included (although we understand it is to be included in a Hokkaido OSR handbook that is being prepared to support the plan).

OPF Oil Spill Response Plan

The initial review of the draft OPF OSRP concluded that it was considerably weaker than the other OSRPs and did not comply fully with the best practice standards/references against which it was reviewed.

Fundamentally the scope of the OPF OSRP specified in the first section, which states that the plan considers all spills on or from the OPF is contradicted in a later section that states that the scope of the OPF OSRP is limited by the physical boundary of the OPF fence. This approach led to a number of subsequent issues that are further described below.

- Oil spill risk assessment: There were three specific areas of deficiency identified by the review.

1. Information and technical data relating to the physical characteristics of the oil types are contradictory in different sections of the plan. In particular there are some critical differences in physical characteristics such as viscosity. The review recommends that this is harmonised.
2. Oil spill scenarios are not fully developed and thus the risk analysis for the OPF OSRP is deficient. The assumption is made within the plan that prevention measures in place will limit oil spreading beyond the OPF site boundary. The review does not agree that the prevention measures are sufficient to guarantee containment within the site boundaries particularly since the OPF is situated in an area prone to harsh seasonal climates.
3. Specifically in relation to RF regulations the spill scenarios identified are considered deficient because whilst the plan acknowledges spill scenario volumes specified in the Regulations, it states that spill detection and engineering controls effectively mitigate against them. This approach is not allowed by the RF regulations.

The preparation of the plan on the basis that oil would in all cases be contained within the site boundaries gave rise to further deficiencies relating to off site response and preparedness. In particular these included:

- Spill response strategies
- Response equipment, supplies & services (limited to Tier 1 spills)
- Initial response procedures and mobilisation, planning and operations
- Control of operations (accessing additional resources)
- Plan structure: The OPF OSRP has a different structure to the other OSRPs and the review considers that this will not only complicate the future review and update of the plan but could cause confusion and delays when responding to an incident that involves SEIC personnel from other sites and the Corporate office. The review recommends that the OPF OSRP is revised to follow the same format as the other OSRPs.

The findings of the OPF review, based on an early draft of the plan, were provided to SEIC. Of note, the OPF plan had been significantly revised (prior to receipt of the oil spill consultant's review) and many of the comments made had already been addressed. For those issues not already addressed SEIC has suggested a credible way forward to address the remaining issues. The current OPF plan is therefore much improved on the version initially reviewed, and will meet the agreed guidelines and standards provided the suggested way forward is fully implemented. Confirmation to this effect will only be possible upon receipt of a further revised OPF plan.

10.1.7 Conclusions

AEA has been following the development of the oil spill response documentation over a number of years. A number of concerns and deficiencies were identified in the early TEOC plans and the 2003 EIA, although these were addressed initially via the EIA addendum and then via the preparation of operational OSRPs.

Many of the remaining deficiencies identified during the review of the operational OSRPs provided to date are of low materiality when taken in isolation. However, some are

significant in their own right (e.g. detailed strategic and tactical planning for responding to oil in icy conditions) and even more so when considered collectively. Therefore, despite the considerable progress made in addressing previous issues and in the development of the OSRPs, until the issues raised are addressed the collective potential environmental materiality (of a sub optimal response in the event of a spill) for these deficiencies is considered to be moderate. The overall status of this issue is 'amber' until the OSRPs address the issues identified in reviews to date, and also because two OSRPs have not yet been provided to AEA.

SEIC has informed AEA that despite approval of the plans reviewed to date, this does not prevent further amendments, as necessary, being made in order to incorporate the comments made by the oil spill consultants. SEIC re-confirmed in April 2007 that the comments would be taken on board in the further development of the plans.

The HSESAP includes a commitment that the plans will be approved at least 6 months prior to first oil. At the time of writing not all the plans have been fully approved. Depending on the completion of outstanding plans and the date of first oil, there is the possibility that some plans will not be fully approved within the agreed timeframes. We note that the 6 month timeframe was agreed between Agency Lenders and SEIC on the understanding that 6 months was a reasonable timeframe in which all necessary equipment could be put in place and responders could familiarise themselves with the plans/equipment through a series of response training and exercises. The essential requirement is for plans, personnel and equipment to be ready before first oil rather than compliance with an arbitrary 6 month period.

A summary of SEIC's oil spill equipment reviewed by AEA (and the oil spill consultant) demonstrates that SEIC has either received or is expecting considerable amounts of response equipment for deployment aboard response vessels, at the assets or at dedicated Pipeline Maintenance Depots. Training and exercises have been ongoing during construction and as part of Phase I oil spill preparedness. A summary of past and future training and exercises provides reassurance that considerable effort is being given to this matter. These training and exercise plans and equipment lists have been provided to the oil spill consultants for review against best practice standards and guidelines, to confirm adequacy, particularly during in ice conditions.

The findings presented in this report are based on draft OSRPs and will require revision in the light of any changes made to the final version of the plans, including changes made in response to the oil spill consultant's reviews. Nevertheless, information received to date provides a good level of assurance that SEIC will be able to, and indeed is well advanced, in producing a suite of OSRPs that represent industry best practice, although timeframes for the approval of plans relative to HSESAP commitments should be monitored.

10.2 PIPELINE INTEGRITY AND LEAK DETECTION

During the development of the Project, and particularly during the earlier stages of the EIA process, some stakeholders have questioned the rationale behind SEIC's decision to bury the onshore pipelines rather than have above ground pipelines. Their concerns relate primarily to

the onshore pipelines and in particular the risk from an oil leak and the difficulties associated with detecting and then locating a sub surface leak.

AEA has considered the advantages and disadvantages of both above ground and buried pipelines. For an above ground pipeline visual inspection of the external surfaces of the pipeline and detection of a leak is relatively straightforward. However there are a number of disadvantages to surface pipelines such as the creation of a physical barrier, visual impact and susceptibility to third party interference. Buried pipelines cannot be visually inspected, relying on intelligent pigging (although this is also required for surface pipelines) and the detection of small leaks is more difficult.

In making the decision on the most appropriate design a number of factors need to be considered including environmental sensitivities and geohazards. Foremost in the decision making process is pipeline integrity. Risks to pipeline integrity include:

- Abrasion
- Corrosion
- Metal fatigue and stress fractures
- Geohazards (seismic events, landslide, wash out in flood plains, liquefaction)
- Third party interference (malicious or accidental)

Abrasion and corrosion can be controlled by primary treatment of the oil and gas streams before their transportation in the pipeline system. This basically is achieved through dewatering, the removal of particulates and corrosive compounds at the platforms and where necessary the injection of anti-corrosion additives.

Pipeline design can minimise the risks from geohazards/stress fractures. For example, the use of appropriate grade steel and expansion loops can minimise the stress on the pipeline. For sensitive areas the pipeline wall thickness can be increased and at fault crossings, the wall thickness, angle of crossing, trench slope and packing can all be used to allow pipeline movement within the trench and in doing so minimise the risk of a pipeline rupture¹³¹. Similarly, in areas prone to landslide, pipelines can be buried below the failure plane if they cannot be re-routed to avoid the hazard. The adequacy of design and maintenance programs for pipeline integrity is addressed by the Independent Technical Consultants.

The risks from third party interference for above ground pipelines can be reduced to some extent by close management of the RoW and security, although this can be unrealistic for extensive and remote areas. Of note, most onshore pipeline leaks over recent years have tended to be caused by third party interference, and recognising the impracticalities of patrolling the pipeline over such an extensive length, burial of the pipeline is the most effective way to minimise this risk¹³². Thus, where technically feasible, it is generally standard practice to bury pipelines.

SEIC has committed to manage the pipelines in line with applicable industry standards. Measures aimed at ensuring pipeline integrity, leak detection and responding to leaks should

¹³¹ All pipelines crossing geological faults will be buried.

¹³² European Gas Pipeline Incident Data Group, 6th report, December 2005

they occur are captured in Table 2.1 of the HSESAP (rows 7 to 16). These include commitments, as summarised below, to:

- Install and maintain remotely operated block valves along the onshore pipeline (101 for oil and 46 for gas). These shall be placed at maximum intervals of 30km to minimise loss of oil (or gas) in the event of a rupture and strategically placed to minimize loss close to environmental sensitivities and high risk fault areas.
- Inspections of all pipeline welds to assure their quality and hydraulic testing.
- Onshore pipelines shall have anti-corrosion measures including epoxy coating and cathodic protection.
- Maintain an onshore and offshore pipeline leak detection system, including Accidental Release Shutdown Procedures and training for engineers and operators, throughout the operation of the Project. The system shall be an integral component of a Supervisory Control and Data Acquisition (SCADA) system and shall meet the internationally recognised Alaskan standard for leak sensitivity (Alaskan Administrative Code Title 18 Chapter 75 – Regulation of pipeline leak detection systems).
- Internal cleaning of oil and gas pipelines by pigging shall be undertaken to minimize build up of corrosive material.
- Intelligent pigging (internal pipeline integrity inspections) shall be undertaken not less than once every 5 years.
- Regular ground and aerial observations along the length of the pipeline RoW shall be carried out at weekly intervals to assess pipeline integrity.

SEIC is also developing a set of OSRPs to best practice criteria, including a plan dedicated to onshore pipelines. However, it should be recognised that any leak detection system has a limit to its sensitivity. In the case of the SEIC pipeline, the leak detection system will be designed to detect leaks with a sensitivity that permits detection of leaks below 1% of the flow. It is therefore feasible, despite the measures highlighted above, that small leaks could go undetected for some time, resulting in localised soil contamination and possible groundwater contamination.

Stakeholders have also made reference to the Trans Alaskan Pipeline (TAPS), which has large sections constructed above ground. However, unlike the Sakhalin II pipeline, the TAPS pipeline traverses large areas of permafrost, which influenced the decision to go above ground.

It is AEA's view that the geohazard risks posed to the pipeline have been adequately identified and characterised, such that appropriate detailed design can be finalised (see Section 6), and whilst recognising the advantages and disadvantages to both buried and above ground pipelines, on the basis of good pipeline management we believe it was prudent to adopt a buried pipeline.

10.3 SHIPPING

A Shipping Consultant was appointed on behalf of the Agency Lenders to address shipping matters. However, AEA has also reviewed a number of shipping issues relevant to

environmental and safety concerns such as the management of ships wastes, ballast waters and sediments, and the effectiveness of ship vetting procedures.

The primary mechanism for ensuring good environmental practice is through adherence to international shipping conventions and treaties. SEIC's commitments to meet the relevant standards are set out in the HSESAP Part 2, Table 2.3 and Annex B. These are discussed below along with some other noteworthy commitments to good practice.

10.3.1 Commitment to international treaties and conventions

SEIC outlines its commitment to a number of shipping conventions that have been ratified by the RF, including:

- International Convention relating to Intervention on the High Seas in Cases of Oil Pollution Casualties Brussels, 1969
- International Convention for the Prevention of Pollution from Ships (MARPOL) London, 1973
- International Loadline Convention, 1966
- International Convention on Standards of Training Certification and Watchkeeping for Seafarers (STCW) London, 1978
- United Nations Convention on the Law of the Sea Montego Bay, 1982
- International Convention on Civil Liability for Oil Pollution Damage Brussels, 1969
- Protocol to the International Convention on the Establishment of an International Fund of Compensation for Oil Pollution Damage London, 1976
- Convention on the International Regulations for Preventing Collisions at Sea, (COLREGs) 1972
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Dumping Convention) London, 1972

The requirements of these conventions are applicable to all vessels involved with the Project.

Furthermore, for the following conventions/guidelines which the RF has not yet ratified, SEIC will *'comply with the spirit of these conventions (in the form such conventions are in force at the date of the Common Terms Agreement) which are capable of application to private entities...'*

- International Convention for the control and management of ships' ballast water and sediments
- International Convention on the Control of Harmful Anti-fouling Systems on Ships;
- International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC);
- International Safety Guide for Oil Tankers and Terminals (ISGOTT), Fourth Edition;
- Oil Company International Marine Forum (OCIMF) Guidelines.

The applicability of these conventions to both long-term and short-term vessels, including vessels of opportunity, is detailed in HSESAP, Part 2, Annex B. In general, relevant elements of the above conventions will be applicable to all visiting vessels associated with the Project.

Through adherence (either by law, or by meeting the spirit of the requirements) with the above conventions the following notable commitments are made in the HSESAP, Part 2, Table 2.3 (Onshore Biodiversity).

- A ballast water management plan to minimise the potential for the introduction of non native species by tanker traffic shall be developed and implemented.
- SEIC will not accept vessels at jetties and TLUs with TBT antifouling coating as of 1 January 2008.
- All hazardous operations at sea, such as fuelling, and hazardous waste transportation shall be conducted in compliance with the guidelines outlined by the Convention for the Prevention of Pollution from Ships (MARPOL 73/78) and with Russian federal law.
- The keeping of records of operational discharges of oil and garbage shall be a mandatory requirement, and pollution response equipment onboard ship shall be maintained in a constant state of readiness at all times.

Compliance with the list of ratified conventions, coupled with a commitment to meet the spirit of other conventions designed to protect marine biodiversity, affords a high level of environmental protection.

Furthermore, SEIC has also committed to the exclusive year-round use of double hulled vessels for the export of all LNG and oil cargos to reduce the risk of oil leaks in the events of a tanker incident, except in very special circumstances e.g. emergency transfer of cargo from a leaking vessel as shown by the HSESAP extract below.

SEIC requires that all tankers operating LNG and crude oil must be double-hulled. Access to single hull tankers would only be approved by the Company in very special circumstances, and would require approval by Company's CEO.

The sea worthiness of tankers visiting the Project's export facilities is described more fully below.

10.4 TANKER VETTING STANDARDS ASSESSMENT

AEA has previously looked at issues associated with the sea worthiness and appropriateness of vessels that will be used during the operational phase of the Project, including the adequacy of vetting procedure and the use of double-hulled oil tankers.

SEIC will adopt the STASCO (Shell Trading and Shipping Standards) tanker vetting process for its vessel chartering. AEA reviewed the STASCO tanker vetting procedure earlier in the due diligence process, in which our shipping specialist visited the STASCO offices in London to review the procedure. It is our opinion that the STASCO tanker vetting procedure, to be employed for all oil tankers and LNG Carriers, is a robust approach to ensuring the sea worthiness of vessels used on the Project. Our earlier understanding of SEIC's intention to

employ this approach is confirmed within the loan agreement documentation and the HSESAP:

“All crude oil tankers and LNG carriers chartered by SEIC or scheduled to load at the SEIC Aniva Bay facilities shall be vetted using the Shell Tanker Vetting Procedures before acceptance to load at the terminal. Where a tanker is leased by a third party, i.e. the oil or LNG purchaser, SEIC shall require the vetting procedures to be applied once SEIC is informed which tanker is to be used. Vessels that fail to meet requirements set out in the vetting procedure shall be refused entry to the loading facilities.”

Agency Lenders also required confirmation from SEIC that EU blacklisted vessels would not be used on the project. We can confirm that implementation of the vetting process will identify and thereby prevent the use of such vessels by SEIC.

10.5 COLLISION RISK ASSESSMENT

In 2004 SEIC commissioned an external consultant to undertake a tanker collision study against a ToR agreed with the IEC. Following a review of this study AEA and the shipping consultant highlighted a number of areas where additional resolution/clarification was required. A further study has been commissioned to address these matters and we can confirm that the ToR for the study requires our issues to be addressed. At the time of preparing this report the updated tanker risk assessment still in preparation. For the purposes of oil spill contingency planning, AEA believes existing spill scenarios are sensible and realistic and this should be confirmed following review of the risk assessment. However, from a commercial and reputation risk perspective, the findings of this report are important. At the time writing AEA is informed that this report is in development.

10.5.1 Conclusions

AEA considers that the STASCO tanker vetting procedures applied to all vessels prior to their use on the Project is robust and represents best practice. Similarly, the commitment to year round use of double-hulled tankers represents international good practice.

10.6 SUMMARY OF KEY ISSUES

SEIC has made good progress in developing its plans and procedures to manage oil spill risks, although some work is ongoing. A summary of key issues relating to oil spill response planning, shipping and pipeline integrity matters is provided in Table 10-1.

Table 10-1 Summary of Key Issues Relating to Oil Spill

Issue ref.	Issue	Materiality	Relevant guideline/standard	Nature of Issue	Status
10.1	<p>Two plans, namely the Onshore Pipelines and Prigordonoye Onshore plans have not been reviewed by the oil spill consultants. The latter of these plans is still in progress.</p> <p>The HSESAP commits SEIC to have approved plans at least 6 months prior to first oil production. Depending on the completion of outstanding plans, timeframes for approval and the date of first oil, there is the possibility that some plans will not be fully approved within the agreed timeframes, hence this is a Best Practice/Procedure issue with potentially high materiality.</p> <p>Considerable progress has been made, however, until all plans have been finalised, reviewed and reasonable comments of the OS consultant incorporated in the plans, this issue remains pending.</p>	Best practice/ Procedure Potentially H	Guidance outlined in Section 10.1.2	Adequacy of Assessments & Plans	Pending (Pending completion of the OSRPs)
10.2	A number of deficiencies have been identified in the OSRPs reviewed to date. Until the issues raised are addressed in revised plans, the collective potential materiality (in the event of a sub optimal response following of a spill) for these deficiencies is considered to be moderate.	Environment Potentially M	Guidance outlined in Section 10.1.2	Adequacy of Assessments & Plans	Pending
10.3	SEIC commissioned a tanker collision study. AEA (and the shipping consultants) highlighted a number of areas where additional resolution/clarification was required. A further study has been commissioned to address AEA’s concerns and we have seen the Terms of Reference that requires our issues are addressed. At the time of preparing this report the updated tanker risk assessment is incomplete. For the purposes of oil spill contingency planning AEA believes existing spill scenarios are sensible and realistic and this should be confirmed following review of the risk assessment. However, from a commercial and reputation risk perspective, the findings of this report are important.	Environmental M/H Environment Potentially L (Revised on the basis of sensible modelling scenarios)	Guidance outlined in Section 10.1.2	Adequacy of Assessments & Plans	Pending

11 Summary and Conclusions

AEA has undertaken an extensive review of the Project's health, safety, environmental and social (HSES) performance against the Agency Lenders' requirements, as specified within our Terms of Reference and notably within the HSES Action Plan (HSESAP). Due to the advanced stages of construction at the time of writing, it has been necessary to consider both i) the assessment of impacts and preparation of plans, and ii) the implementation of these plans.

11.1 COMPLIANCE WITH KEY REQUIREMENTS

11.1.1 Project assessments and plans

Many of the requirements specified in the agreed guidelines and standards relate to the preparation of comprehensive impact assessment studies and associated management plans. We find that SEIC's written assessments and plans fully meet a large majority of the individual requirements against which the Project has been assessed, although there is a generic issue of timeliness of their development. Specifically in relation to the assessment studies and plans we find that:

- The development of suitable **impact assessments** addressing all relevant aspects has been achieved through the production of a wide range of documents. These are generally comprehensive, although in some cases the level of detail provided in the baseline characterisation is limited, making quantification of potential impacts difficult. Furthermore, the Environmental Impact Assessment (EIA) addenda and Social Impact Assessment (SIA) addenda materials, River Crossing Strategy (RCS), Sakhalin Indigenous Minorities Development Plan (SIMDP) and Resettlement Action Plan (RAP) were all finalised after the commencement of construction activities.
- As an important part of its **management plans** SEIC has developed the HSESAP in line with IFC Guidance Note C. AEA confirms that the HSESAP is both comprehensive and detailed, and provides a good framework for the implementation of the required mitigation measures and monitoring programmes. However, the HSESAP was finalised in December 2005, well into the construction phase, with the result that some commitments would not have been implemented during the early stages of construction. The most significant of these relate to detailed erosion control commitments and river crossing commitments to meet the RCS.

11.1.2 Implementation of Plans During Construction

As far as implementation of the plans is concerned there is a high level of compliance for most of the Project's facilities/assets. However, there are a small number of important areas, where Project performance to date has fallen significantly short of HSESAP requirements. The key area in this respect is the construction of the onshore pipelines, and specifically is related to:

- **River crossings.** Compliance issues during river crossings include the relatively low number of the desirable dry cut crossing methods and construction practices during winter river crossings. These issues are historical in nature and were most prevalent during the 2004/05 and 2005/06 winter seasons, although significant improvements were realised in the latter half of the winter 2006/07 river crossings season. Overall we

considered the environmental materiality of these non-compliances to be potentially **moderate**.

- **Erosion control.** The implementation of temporary and permanent erosion control measures since commencement of pipeline RoW construction in 2004 has fallen significantly short of HSESAP requirements. These issues are both historical and, despite recent improvement, ongoing, particularly in relation to surface stabilisation and delays in permanent reinstatement. The overall environmental materiality of these non-compliances is assessed to be potentially **moderate**.
- **Wetland crossings.** Compliance issues include importation of materials for road construction, loss of top peat/moss layers over the installed pipelines and interruption of the hydraulic function. The environmental materiality of these issues is assessed to be potentially **moderate**.
- **Chaivo Bay.** Breach of HSESAP commitments designed to protect nesting Steller's sea eagles and other RDB birds species on the Chaivo peninsula. The environmental materiality for the impact on Steller's sea eagles is assessed to be potentially **moderate**. More broadly, the breach of HSESAP commitments results in a risk to reputation that was assessed to have a **high** materiality.

In addition to the environmental materiality, we also identify some procedural and reputational aspects associated with some of the above issues to have potentially **high** materiality. Furthermore, some aspects represent potential regulatory issues for SEIC. Certain of these have been referred to the ILA for consideration.

Important issues have also been identified in relation to some aspects of Western Gray Whale (WGW) protection. The general approach to protection of the WGW has been precautionary in nature and SEIC has adopted an independent scientific review and advice process that includes the formation of the WGW Advisory Panel (WGWAP). Nonetheless, some deficiencies have been observed principally associated with the timeliness of elements of the independent review process. These include:

- timely delivery (relative to construction activities) of important whale related studies for independent scientific review (e.g. multivariate analyses)
- lack of agreement between SEIC and the WGWAP on certain of the scientists' recommendations (principally noise intervention criteria) for implementation during 2005, 2006 and 2007 construction activities
- concerns expressed by the WGWAP that some of its other recommendations (e.g. commencement of monitoring activities and rapid analysis of WGW distribution data) were not fully implemented during the 2006 construction season.

Due to the critically endangered status of the WGW population, its high international profile and the importance of the WGWAP process, the materiality of these issues is assessed as potentially **high**.

With regard to social matters, AEA had concerns about the delayed implementation of mitigation measures agreed to minimise potential social impacts. In particular the timely provision of compensation (e.g. for Prigorodnoye beach and the LNG dachas) and delays in responding to stakeholders concerns such as unresolved grievances. However, SEIC has

recently demonstrated that it is making good progress in the implementation of the RAP, SIMDP and Social Management System and has achieved a high level of HSESAP compliance.

11.1.3 Remediation

Rectification of non-compliances entails bringing ongoing Project activities back into compliance with the HSESAP, preventing reoccurrence and the remediation (including natural recovery) or offset of any actual impacts that have resulted from these non-compliances.

Although the time taken for complex ecosystems to recover is difficult to estimate with certainty, recovery is generally possible provided that suitable remedial measures are implemented. In some instances actions to ensure full recovery to prescribed reinstatement standards may be particularly difficult to achieve (for example complete removal of imported road materials in wetlands may pose significant technical, safety and environmental risks). In such instances suitable offset options may need to be considered. The recoverability of river systems and the onshore pipeline Right of Way (RoW) is further summarized below:

- There has been a prolonged duration of impact for some rivers during the construction period due to ongoing poor erosion control and multi-season river crossings. In some cases rivers have been exposed to varying impacts for over 2 years. Although the habitat in many rivers is typically expected to recover over a period of approximately two years, recovery of habitats may take longer in some rivers depending on the nature of the river and the degree of disturbance.
- With the implementation of appropriate remedial actions reinstatement of the RoW to appropriate standards is achievable over several years. However, without such actions recovery of the RoW may take significantly longer to occur by purely natural means, especially in the many areas where topsoil has not been preserved.

In order to address non-compliances specific to soil erosion and reinstatement, river habitats and wetland crossings, SEIC is developing a remedial action plan (RemAP). Once complete, this will require review on behalf of the Agency Lenders.

The RemAP must clearly identify measurable and time-bound objectives, targets and success criteria. These should be phased as necessary and include interim targets to enable ongoing progress to be monitored in an effective and timely manner. Furthermore, the RemAP must describe what actions are required to meet all stated objectives and targets, and how these actions will be implemented, including identification of the associated resource requirements, responsibilities and sign-off authorisation. The RemAP must provide this information in sufficient detail to demonstrate the Company's capacity to meet all objectives.

11.2 ISSUES REQUIRING FURTHER MONITORING

There are a number of other areas of ongoing activity that require future monitoring by Agency Lenders and their advisors to ensure they are satisfactorily addressed in a timely fashion. Although SEIC has reasonable plans to address these issues, failure to fully action such plans could compromise the Project's ability to meet Agency Lender requirements. The most important of these are:

- finalisation of the oil spill response plans
- development of environmental and social monitoring plans for the commissioning and operations phases
- commitments relating to biodiversity including the Biodiversity Action plan and induced access control
- finalisation (and ongoing evolution) of the RemAP.

In addition to the development of the above plans, a number of other ongoing issues require future monitoring, including:

- the outcome of ongoing legal proceedings and other legal matters
- identification of ultimate disposal routes for some hazardous waste streams.

11.3 EXAMPLES OF BEST PRACTICE

Whilst there have been some shortcomings in certain areas of HSESAP implementation, equally the HSESAP incorporates commitments to many specific areas of laudable best practice. In addition SEIC is committed to a number of important environmental and social development and research programmes. The most noteworthy of these are:

- Support to the WGWAP
- Management of drill muds (which to be re-injected rather than discharged to sea)
- Upgrade of municipal landfills
- Year round use of double hulled tankers
- Road safety campaigns
- Development of a robust SIMDP
- Funding of social and sustainable development programmes
- Commitment to develop a Biodiversity Action Plan
- Health infrastructure upgrades.

Appendices

Appendix 1. RPN audits

A1.1 RPN Audit History

Since the commencement of construction the Project has been subject to numerous audits and inspections by RF government agencies and departments. These include a number of environmental audits of the pipeline RoW and associated facilities undertaken by RPN in 2006.

The RPN audit process requires formal notification of audits and a description of the scope of audit. Following each audit RPN should issue an audit report (called the “Act”) and where non-compliances are identified these are specified in a separate document known as the ‘Prescriptions’. It is the Prescriptions that are used as the legal basis for fines and improvements. The Prescriptions need to be passed on to the appropriate responsible parties, which may be SEIC, its main pipeline construction contractor (Starstroi), or subcontractors, depending on who is the relevant licence holder.

As part of this audit regime, 3 audits were undertaken between July and August 2006 as follows:

- July 2006: RPN inspection in Dolinsk region (section 4)
- August 2006: RPN inspection in Makarov region (section 3)
- August 2006: RPN inspection in Nogliki region (section 1)

These audits were undertaken according to the required audit process and both Acts and Prescriptions were issued. The issues identified in these audits (and most specifically the August inspection in section 3) included the location and design of spoil tips; design of the pipeline in landslide/mudslide risk areas; culvert/bridges designs; riverbank protection; and drainage controls on access roads. These concerns were largely consistent with the findings of AEA’s continuous monitors on the island at that time and our assessment of the materiality of these issues and actions for their resolution is discussed in Section 6.

Further inspections were subsequently undertaken in:

- October 2006: RPN inspection across RoW (various sections)
- November 2006: RPN “prosecutor’s” (this is a higher government level than RPN) audit of the RoW.

The October 2006 inspection was undertaken without the formally required notice/scope. An audit report (Act) was subsequently issued (AEA has requested a copy of this Act, but has not received it in time for this review), but we understand from SEIC that no formal Prescription was issued and hence SEIC had no formal legal basis against which to respond (the exception was a single minor Prescription relating to the R. Varvarka). The prosecutor’s audit, again undertaken by RPN, followed in November 2006 but we understand from SEIC that no Acts or Prescriptions were issued.

In the absence of documented Prescriptions, it is not possible for AEA to comment on the nature or materiality of any specific infringements raised during either the October or November RPN inspections.

In response to the inspections undertaken by RPN and other government bodies, SEIC set up a task force comprised of SEIC and Starstroi specialists to develop an Environmental Action Plan (EAP) and to work together with Sakhalin Oblast and Federal RPN specialists to jointly evaluate the observations made. The development of this EAP was aimed at addressing all possible issues that could be raised from the various RPN inspections and covers:

- Winter river crossings construction
- Erosion control and reinstatement
- Spoil management
- Design approvals
- Land management
- Protected species and biodiversity
- SEER
- Fish management
- Aniva bay
- Compliance
- Environmental monitoring project.

The EAP was formally agreed with the MNR in March 2007 as “*a basis for subsequent implementation, subject to further detailed refinement and correction taking into account the results of joint work*”. In the absence of specific Prescriptions from the October and November RPN inspections detailed actions in some areas cannot yet be determined by SEIC for inclusion in the EAP. SEIC is therefore in the process of agreeing specific Prescriptions and a procedure for their close out with RPN at both local and regional levels.

A1.2 Water Use License

On the 5th of December 2006, the Amur Water Basin Authority (AWBA) issued a letter notifying Starstroi that a number of WULs were suspended, citing violations of the licences identified in the course of RPN audits of the pipeline construction. We understand from SEIC that the violations included examples of:

- water culverts changing hydrological regime of the water courses
- spoil in the WPZ
- bank reinstatement either absent or insufficient or not to the proper standard
- silt fences not effective and/or in a poor condition
- spoil/debris (falling trees) in the river beds
- bridges changing hydrological regime of the rivers
- non-simultaneous crossings of the oil and gas pipelines

- sediment releases to the water column during crossing construction.

Starstroi undertook a remedial action campaign on the rivers named in the Acts and developed documents, including before and after photos, which were sent to AWBA. (These documents have been requested by AEA but not provided in time for inclusion in this report). MNR undertook an inspection in late December 2006 and on the 28th December the suspension of the WULs was lifted.

Appendix 2. Post July 2007 Remedial Action Plan Update

This report makes clear that, as at July 2007, there were a number of historic and existing non-compliances with the Project's Health, Safety, Environment and Social Action Plan. The report also notes that in July 2007 SEIC was preparing a Remedial Action Plan (RemAP) to address those non-compliances specifically in the areas of river habitats, soil erosion control and reinstatement, and wetland crossings relating to onshore pipeline construction.

In this report, we outline the requirements of such a RemAP, in terms of both the overall scope and also the specifics for each of river habitats, soil erosion and reinstatement, and wetland crossings.

Since the completion of this report, SEIC produced the finalised RemAP in August 2007. AEA has reviewed this document and finds that it meets the requirements specified by AEA in the relevant sections of this report, and that the objectives specified in the RemAP should be achieved if the detailed actions are fully implemented. In some areas the RemAP calls for further objectives and actions to be developed once specified monitoring data become available.