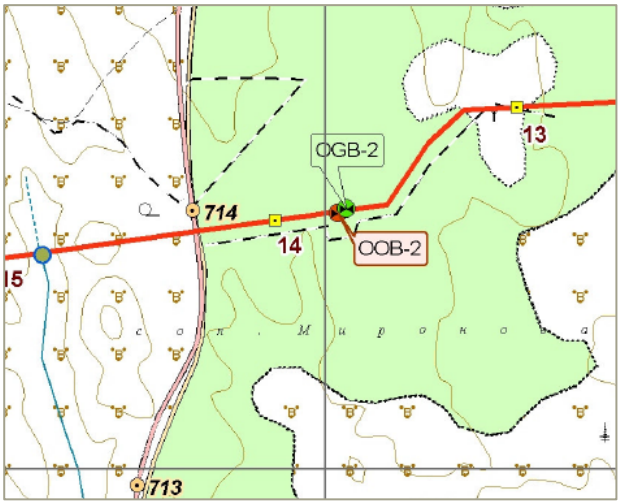
APPENDIX 4: RIGHT OF WAY REPORT

List of Right of Way (RoW) Locations Visited		
KP	**River / Location**	**Date Visited**
RoW from Chaivo Landfall to OPF		
14	Fault Crossing #1	12 September 2017
154	Bridge Repairs	14 September 2017
Lun-A to OPF		
14	Beach Landfall	13 September 2017
RoW from OPF to LNG/OET		
123	Sandy Slope	14 September 2017
123	Booster Station 3 (BS3)	14 September 2017
145.5	North Khandasa River	14 September 2017
230-231	Wetland near Smirnykh	14 September 2017
251	Buyklinka River	15 September 2017
325	Nitui River	15 September 2017
382.5	Landslide – Lesnaya Ridge	15 September 2017
383.4	Landslide – Lesnaya Ridge	15 September 2017
298	Booster Station 2	15 September 2017
420	Landslide	16 September 2017
444	Booster Station 4 (BS4)	16 September 2017
449	Duet River	16 September 2017
499	Listvenitsa River	16 September 2017

ROW FROM CHAIVO LANDFALL TO OPF

KP 14 – Fault Crossing #1ALT

Fault number 1ALT extends on an east-west alignment at approximately KP 14. A low hill is situated in the centre of the fault crossing, so much of the section is situated on a slope.



The crossing has a number of detailed engineering design features to reduce the risk of seismic movements causing damage to the two pipelines. At the surface, the soil is quite sandy and only very sporadic vegetation and grass has established despite seeding. However, no signs of erosion were evident and erosion protection features such as slope breakers and geojute matting has been installed in part of the section (Photo 1).

The slow establishment of vegetation may be attributable to the sandy nature of the soil and a probable low nutrient status, combined with the harsh climate. It is likely that any topsoil previously present was mixed with sub-soil. An indication of the difficulty of establishing a natural vegetation can be gained from inspection of the vegetation adjacent to the RoW. The forest is quite sparse in this area and the forest floor comprises a mixture of low woody shrubs, interspersed with mats of lichen mats and what appear to be biogenic crusts. Biogenic crusts are typically a few millimetres thick where the soil surface held together by combinations of microphytic communities such as mosses, lichens, soil algae, bacteria and fungi (Photos 2 and 3). These vegetation types are very fragile and easily damaged but play an important role in reducing erosion from wind and water. They can also take a long time to re-establish post disturbance. It is unlikely that there is much that Sakhalin Energy can do to speed up the natural regeneration of these natural vegetation types.

To the west of the fault crossing, the vegetation within the RoW was well established and dense growth of young trees (especially Alder *Alnus sp.*).

Photo 1. View downslope to the east from the top of the low hill, with Piltun Bay in the distance.

Photo 2. Sparse forest vegetation adjacent to RoW

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 3. Close-up of forest floor vegetation adjacent to RoW (field layer), showing lichen mat

KP 154 – Bridge Repairs

A brief visit was made to inspect the bridge repairs at KP154. Steel supporting structures are routinely used by Sakhalin Energy for maintaining river crossings for access tracks within the RoW. The steel supports are decked with timber, which require routine replacing once they become decayed or damaged.

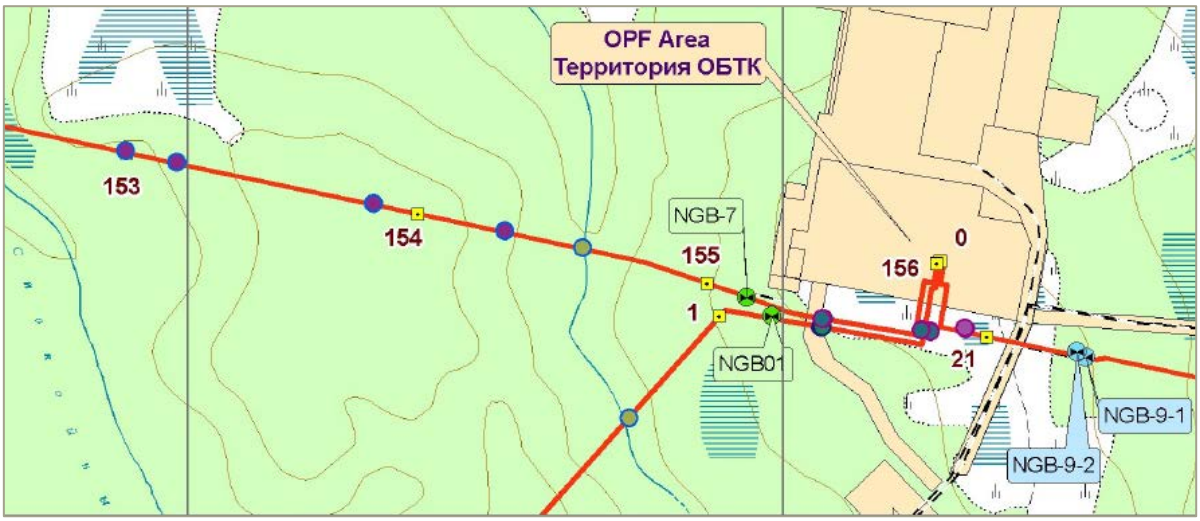


Photo 1. Bridge repairs underway

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

LUN-A TO OPF

KP 14 – Beach Landfall

The coast of Lunskiy Bay comprises sandy beaches, with a dune system immediately inland. The dunes are characterised by a narrow “yellow” dune consisting unconsolidated sand supporting marram (Photo 1). The majority of the dune system appears to be mature stable “grey” dunes, which supports a vegetation complex that includes low trees and shrubs, as well as lichen mats (Photo 4).

The “yellow” dune vegetation within the RoW has re-established well. Marram grass can spread quickly through rhizomal root growth and has indeed spread inland into the disturbed soils. However, the “grey” dune vegetation has not re-established within the RoW (Photo 3). It appears that the very fragile soil surface layer that would have contained the small amount of organic matter and seed back has been lost within the RoW. The grass species seeded in this area is struggling to establish given the very sandy sub-soil present. It is likely that further specialist intervention will be required to restore the vegetation in this area, including the collection of seed and growing of plants in nurseries for transplantation.

The RoW vegetation has been damaged in this vicinity by fishermen driving from the beach landed facility access road to an illegal camp located to the south. An abandoned fisherman camp is also located immediately adjacent to the RoW, and the remains of temporary shelter, rubbish and a tracked excavator are present. Better security and control of the beach access facility access road is required to prevent the damage caused by this induced access.

Photo 1. Beach Landfall showing re-established “yellow” dune vegetation and track created by illegal fishermen.

Photo 2. Beach Landfall showing re-established “yellow” dune vegetation and track created by illegal fishermen.

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 3. RoW between landfall and first block station showing lack of dune vegetation

Photo 4. Mature “grey” dune vegetation adjacent to RoW.

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

ROW FROM OPF TO LNG / OET

KP 123 – Sandy Slopes

The sandy slopes have shown a large improvement in vegetation cover since June 2016 (compare Photos 1 and 2). The sown seed mixture of grass and legumes has established well, probably assisted by the legume's ability to fix nitrogen into the naturally low-nutrient soil. The vegetation within the RoW will assist in the prevention of soil erosion, but does not match the naturally occurring forest floor vegetation present either side of the RoW (Photo 3). This in part is likely to be due to the loss or mixing of the very shallow topsoil along with its seedbank during construction. It may take decades for a more authentic forest floor vegetation to restore within the RoW as the soil profile matures and seeds spread from its edges.

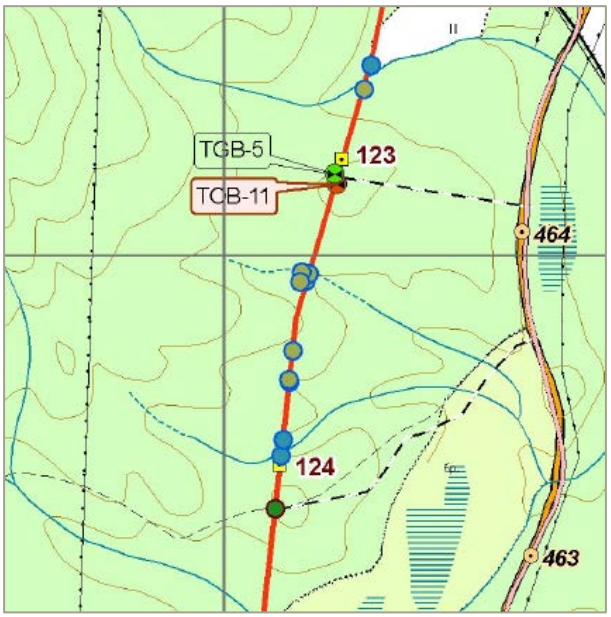


Photo 1. June 2016

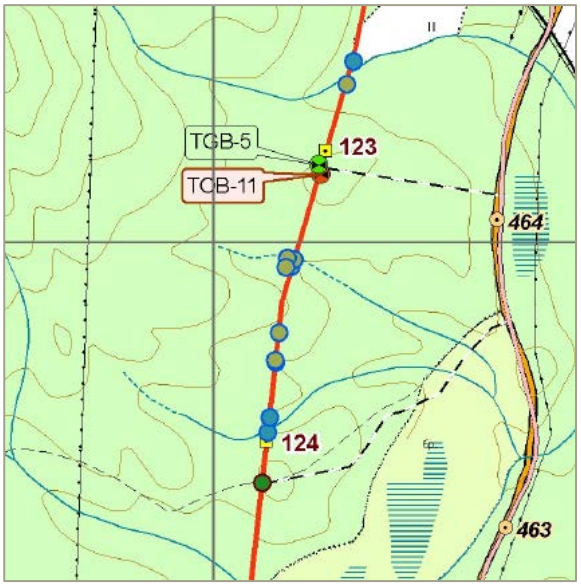
Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 2. September 2017

Photo 3. Forest floor vegetation adjacent to RoW

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 123 – Booster Station 3



A visit to the proposed site of BS3 was made during the RoW inspection. A new access track has been cleared through the forest from the RoW to the proposed site (Photo 1). The track has not been reinforced with hardcore and comprises loose soil, limiting vehicular access to the proposed site. The track crosses a number of small streams that have not been culverted under the track at the current time.

The tree cover on the proposed site of BS3 has also been felled, with the resulting timber currently stacked on-site. The cleared area still has tree stumps in-situ and currently retains forest floor vegetation cover in patches across the area (Photo 2). However, vehicle movements and other forestry operations have removed the covering of vegetation in many areas, exposing bare soil. The proposed site of BS3 is located on a realtively steep slope and signs of soil erosion are already present (Photo 3). The run-off of sediments poses a signifcant risk to the adjacent retained forest habitats and nearby water courses unless a robust monitoring and control plan is instigated. This risk will be much higher during construction as the large site will require signficant cut and fill of the hillside to create a level site.

Photo 1. Recently created access track to BS3

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 2. View of the proposed site of BS3.

Photo 3. Soil erosion taking place on cleared BS3 site

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 145.5 – North Khandasa River

Stone rip-rap has been installed on one bank of the river that was suffering erosion (Photo 1). The rip-rap has been installed along the bank extending either side of the RoW to protect the full extent of the bankside vulnerable to erosion. Based on discussions with Sakhalin Energy, it is understood that the permiting process for works outside of the RoW is relatively complicated and requires a long-lead time. It is understood that river restoration works are completed during low-flow winter periods, outside of the salmon spawning season.

An otter spraint was observed on one of the installed rip-rap boulders (Photo 2). If large crevices are present within the rip-rap, they could be utilised by otters as holts.

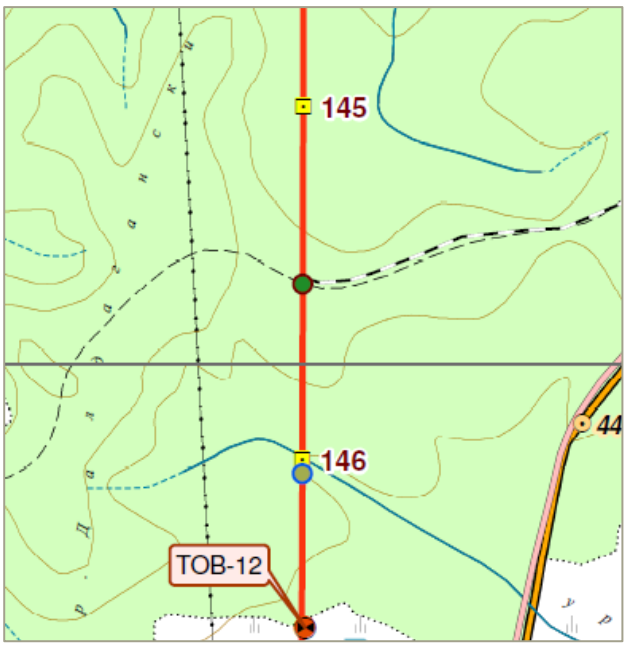
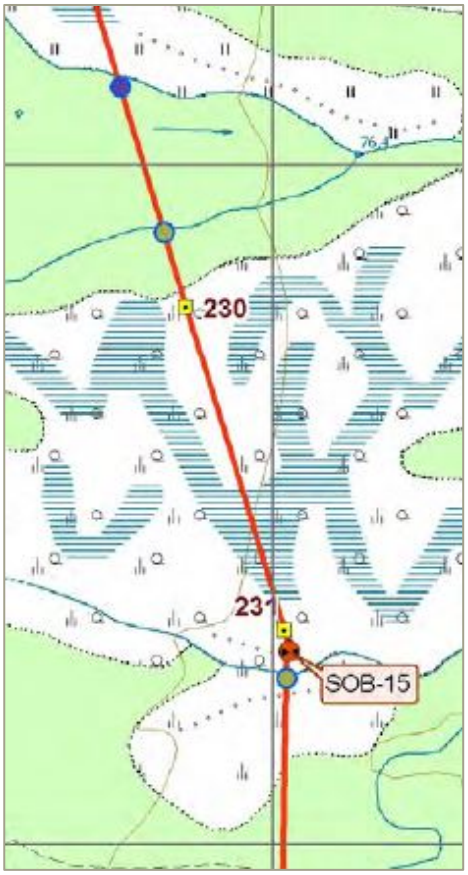


Photo 1. Stone rip-rap erosion protection

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 2. Otter spraint on rock within the rip-rap

KP 230-231– Smirnykh Wetland



Since the last IEC monitoring visit in June 2016, additional culverts have been installed across the RoW as recommended in the previous monitoring visit report (Photo 1). In addition, shallow ditches and low bunds have been installed to assist water flow to and away from the culverts. Unfortunately, the monitoring visit took place in a period of low rainfall and no water was present to gauge the efficacy of the newly installed works.

The vegetation within the RoW continues to develop and now provides adequate cover to protect from erosion. However, it is unlikely to develop wetland vegetation similar to a pre-construction condition for many decades. Photo 3 shows the strong contract between the RoW and adjcacent wetland vegetation. An investigation of the soil conditions between the two areas indicates the likely limiting factor, where the original wetland is supported by a deep layer of un-decomposed moss and peat soil (Photo 4). This organic soil has been lost from the RoW during the construction, which now comprises a mineral sub-soil with no organic layer (Photo 5). Whilst restoration to the original condition within the RoW, continued monitoring of the water levels in the wetlands either side of the RoW should continue to ensure that the tow remain hydrologically connected and that effective water movement continues to a level where neither side dries out. In the longng-term, this would lead to a drying and loss of peat soils and a potential change in vegetation over a much larger area.

To the south of block station SOB-15, the RoW passes through forest and it appears that the tree growth within the RoW is very dense and will require cutting in the near future.

Photo 1. Newly installed culvert

Photo 2. New culvert, low bund and shallow ditch

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 3. RoW with good cover of vegetation (left), but contrasting with mature marshland vegetation (right).

Photo 4. Un-decomposed moss and peat soil in mature wetland adjacent to RoW.

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 5. Soil surface within RoW – no surface organic peat layer

KP 251 – Buyklinka River

Stone rip-rap has been installed on both banks of River Corssing #2 as both were suffering erosion. In particular, the steep bank to the west of the RoW visible in Photo 1 was eroding, posing a risk of undermining the pipelines that are only buried to 1.5 metres deep at river crossing points. This has required installation of rip-rap beyond the RoW boundaries.

The RoW either side of the river are well vegetated no signs of soil erosion were evident.

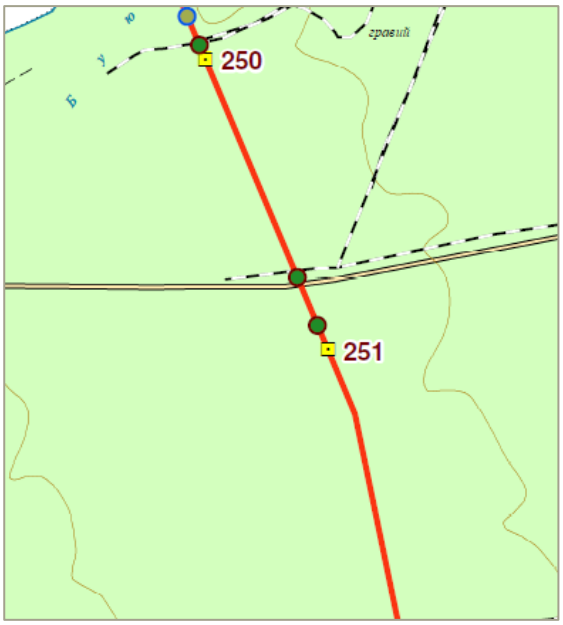


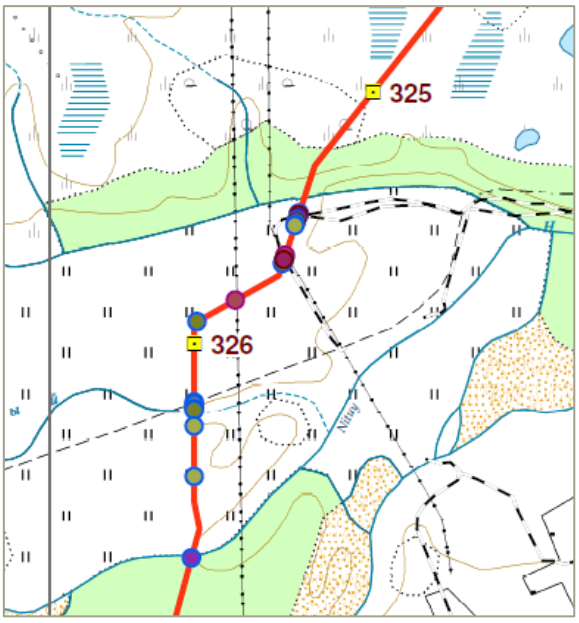
Photo 1. River Crossing #2 with stone rip-rap installed on both banks of river

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 325 – Nitui River

The Nitui River is a high energy braided channel that alters its course from year to year. This has posed signficant challenges to Sakhalin Energy to protect the banks from erosion and stone rip-rap has been installed over a number of years. Where rip-rap was installed four years ago, the cracks beetwen stones have become colonised by vegetation and have become much more natural in appearance (Photo 1). No signs of damage to the rip-rap was observed from high water flows.

The multi-channel nature of the river, with its stone rip-rap banks, pose a challenge for access to the RoW tree cutting teams. One section inspected had recently been cut, although the section to the north of the River appears due for a cut (Photo 2).



Salmon were observed spawning within the river bed within the RoW and numerous bear prints were evident along the river banks at this location. Otter spraint was observed on one of the rip-rap stones.

Photo 1. Rock armour placed 4 years ago, showing good vegetation regrowth in cracks

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 2. Tree growth on RoW due for cutting

KP 382.5 – Landslide, Lesnaya Ridge

Repairs to this landslide were inspected. The repairs have included the installation of stone-filled gabion walls combined with an extensive network of drains to prevent the build-up of water. The replaced soil slope has been reseeded and has established very successfully (Photo 1). It is understood that Sakhalin Energy is undertaking a proactive monitoring approach to areas vulnerable to landslips to assess when pre-emptive works are required in an attempt to reduce landslides in the future, along with the need for significant engineering works to restore the damage.

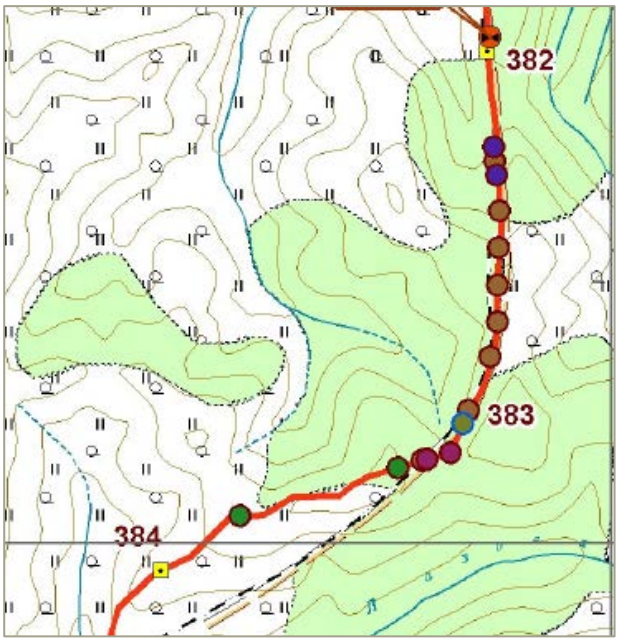


Photo 1. View of gabion walls (left) and excellent vegetation growth in restored area

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 383.5 – Landslide, Lesnaya Ridge

The landslide at this location presented significant engineering challenges to restore the slope. This has included re-enforced concrete piles to support a large retaining wall. Underground drains have been installed and water is collected at a central location and removed by a pipe lain over ground (Photo 1). The works have been completed recently, and the reseeded surface is still establishing itself.

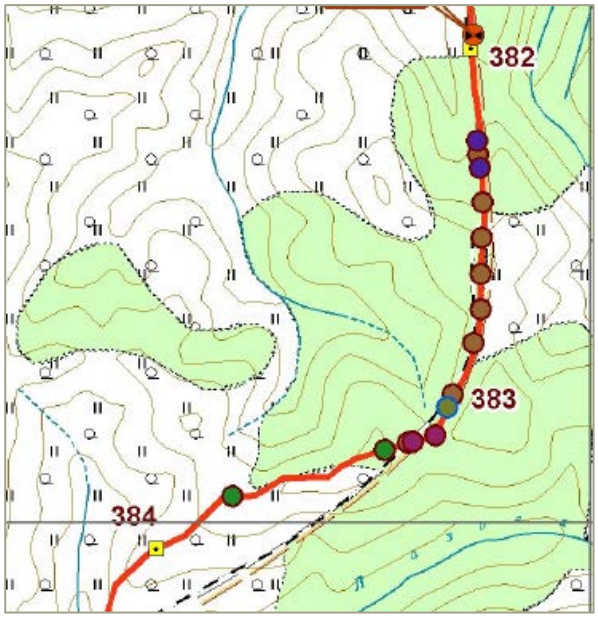


Photo 1. View of reinforced concrete retaining wall, outflow drainage pipe and recently reseeded soil surface.

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 298 – BS2

A very brief visit was made to BS2 during the RoW inspection. It is undertsood that as part of the Train 3 Project, additional plant will be installed within the existing footprint of the site. The BS2 site is situated within an area of previously cleared forest and it is understood that no additional tree clearance will be required for the main train 3 related works at BS2 (Photo 1).

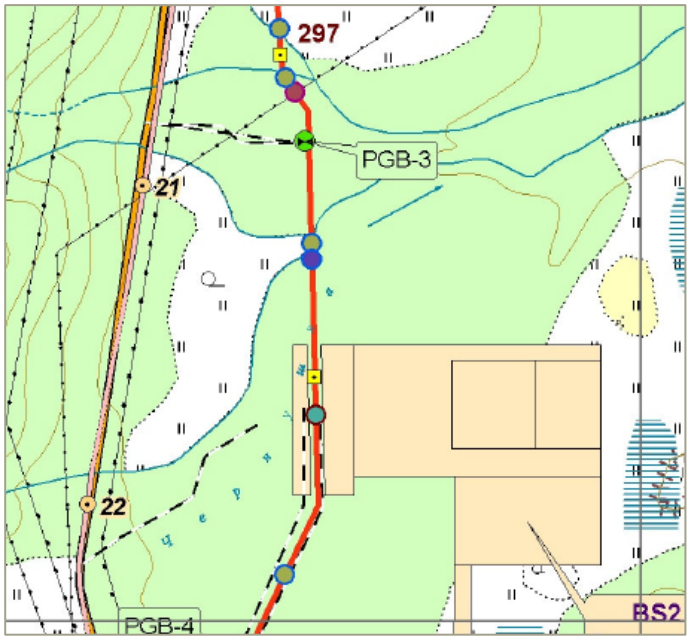
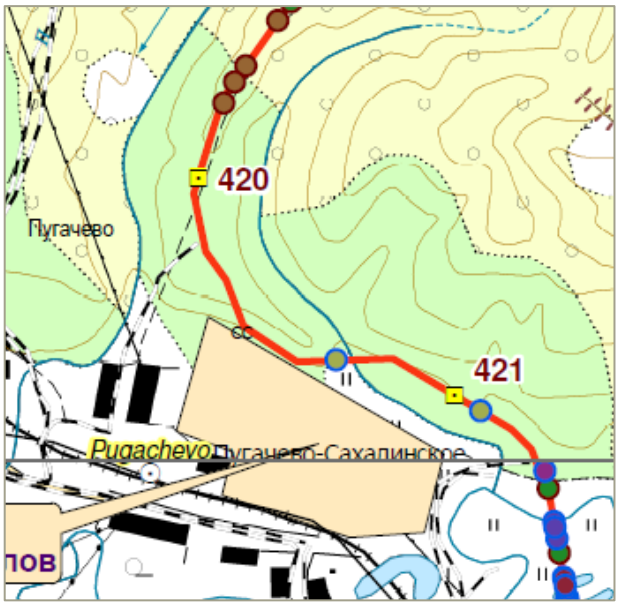


Photo 1. Edge of BS2 – showing cleared buffer area and forest

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 420 – Landslide

The landslide at KP420 is less severe than the previous two reported examples. This is an example of work being completed in attempt to pre-empt the situation worsening and requiring more extensive engineering solutions. It is understood that the situation at this loction has been exacerbated by a trench excavated by a third party along an adjacent cable right of way.



At the time of the visit, it is undertsood that the slope reprofiling at been completed (Photo 1) in preparation for the installation of surface netting and ground anchors. The area had yet to be reseeded due to ongoing construction.

The temporary contractor construction campe was visited and very brief inspection completed (Photo 1). The temporary camp looked in good order and obvious signs of environmental management was evident including a generator with a spill trap installed, waste bins provided for collection of rubbish, as well as the collection of sewage and waste water for removal sewage collected in a tank for removal. One oversight observed was that the camp has been established on a pre-existing old lay-down area that had subsequently been used for fly tipping by third parties. This fly-tipped waste has been pushed to one side and incorporated into the fill brought in to establish the temporary camp. It is understood that Sakhalin Energy plans to remove and dispose of this waste when the camp is decommissioned following completion of the nearby construction works.

Photo 1. Re-profiled slope – ready for installation of netting

Photo 2. Construction contractor temporary work camp accommodation.

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 3. Fly-tipped rubbish that has been incorporated within the filled base of the temporary work camp.

KP 444 Booster Station 4 (BS4)

The proposed site for BS4 was visited during the RoW inspection. As with BS3, the site has been recently clear-felled and the timber stacked in piles on-site (Photo 1). The cleared site has incurred less damage during the forestry operations than at BS3, and a relatively intact vegetation cover remains. However, soil erosion and sediment run-off will be a significant risk during construction. Due to the large size of the site and the slopes present, it is likely that significant cut and fill will be required to create a level site.

An access track has been created to the proposed BS4 site (Photo 2). This has required some tree felling in places and stone fill appears to have been imported to create a temporary road surface. The access track crosses a water course, which has yet to be culverted and forms a barrier that limits vehicular access to the site (Photo 3).

Photo 1. Part of the cleared site for BS4

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

Photo 2. Recently cleared access track to BS4

Photo 3. Small watercourse crossing on access track to BS4

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 449 – Duet River

A brief visit was made to the Duet River crossing at KP 449. The river banks at this location are still protected by reno mats that have been left in situ (Photo 1). Vegetation has grown up through the mesh of the reno mats, providing further protection against erosion.

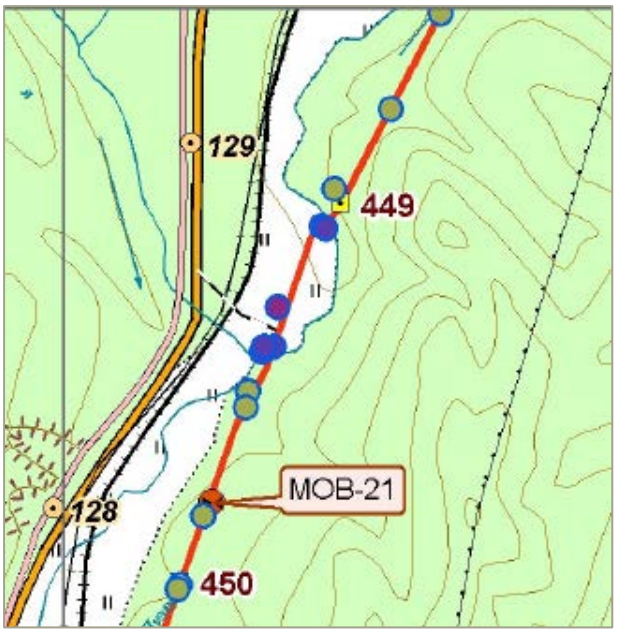


Photo 1. Reno mat with well-established vegetation

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

KP 499 – Listvenitsa River

The River crossing at this location has been reinforced with stone rip-rap. The works were completed four years ago and vegetation has established itself well anongst the large stones, providing a more natural appearance.

No signs of erosion of the protected banks were evident.

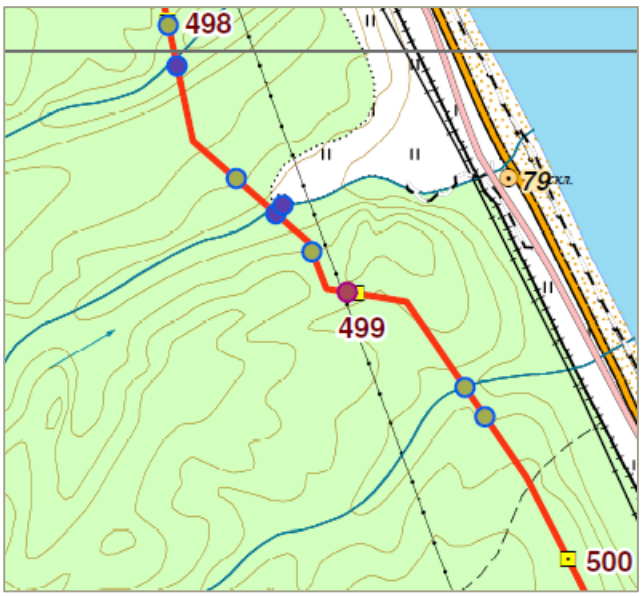


Photo 1. View of the slope to the north of KP 326 showing excellent vegetation cover.

Title:	Photographic Log – Right of Way	**Client:**	Sakhalin-2 Phase 2 Lenders
Site:	Sakhalin Energy Investment Company	**Date:**	September 2017

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