Appendix 2: Individual RoW Descriptions

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List of RoW Locations Visited		
KP	**River / Location**	**Date Visited**
33	East of Val River Near NOB 04	3 October 14
36-37	Wetland near NOB 06	3 October 14
63	Dagi River	3 October 14
95	Djimdan River Crossing	3 October 14
15 - 21	Plelarnya River and RoW	6 October 14
24.5	RoW	4 October 14
131	RoW	4 October 14
137	RoW	4 October 14
141 - 144	RoW	4 October 14
149 - 152	NOB 24 and RoW	5 October 14
0	Sakhalin-3 Tie-in location	5 October 14
4	Wetland	5 October 14
47	ROW Slopes	6 October 14
54-55	ROW Slopes	6 October 14
66.5	ROW Slopes	6 October 14
84.5	Vaskrasnovkaya River Crossing	6 October 14
128	RoW Sandy Slopes	6 October 14
146-147	Wetlands (TOB 12)	6 October 14
212	Pobedinka River	7 October 13
230-231	Wetlands (SOB 15)	7 October 14
296	Dig Up and RoW	7 October 14
300	Gastelovka River	7 October 14
421-422	Pugachevo Wetland	8 October 14
460	Manui Wetland	8 October 14
531	Dolinsk Wetland	8 October 14
622	Mereya River	

KP 33 – East of Val River

The RoW in the immediate vicinity of the access road is poorly vegetated (Photo 1). However, further to the west the RoW has good vegetation cover, which includes grasses on the running track section (Photo 2), and Alder and Willow trees above the pipes and on the periphery (Photos 3 and 4). Some of the trees reach four meters in height. The area was visited as part of the review of wetland. However, at the time of the visit the wetland area was mostly dry. There is evidence of rush *Juncus* sp. Growth, but no other wetland species and we suggest that this area should no longer be considered as a wetland.

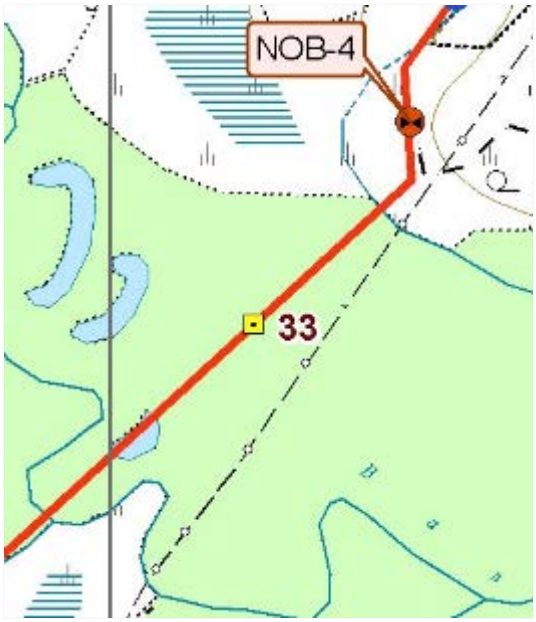


Photo 1 – View to the west showing poorly vegetated area in the foreground and better vegetation cover further west.

Photo 2 – View to the west showing good vegetation cover across the RoW with mostly grass in the middle and trees on the sides.

Photo 3 – Showing trees next to KP 33	**Photo 4** – Tall trees on the RoW in the vicinity of KP 33
	

KP 36/37 – Wetland West of Val River

The area west of the Val River near NOB 06 is a well developed wetland. The RoW shows good signs of recovery with native wetland plant species encroaching from both the north and the south (Photos 1 and 2).

The area around the RoW supports a bog wetland with abundant bog mosses *Sphagnum* sp., and harestail cotton-grass *Eriophorum vaginatum*. The area above the RoW is grassier than the surrounding habitat, but the mosses and shrubs are showing evidence of recolonisation. Two areas of sedge fringed open water have formed over the pipelines. These are a different form of wetland to that present prior to installation of the pipeline, but support native species and no negative effects on surrounding wetland was evident.

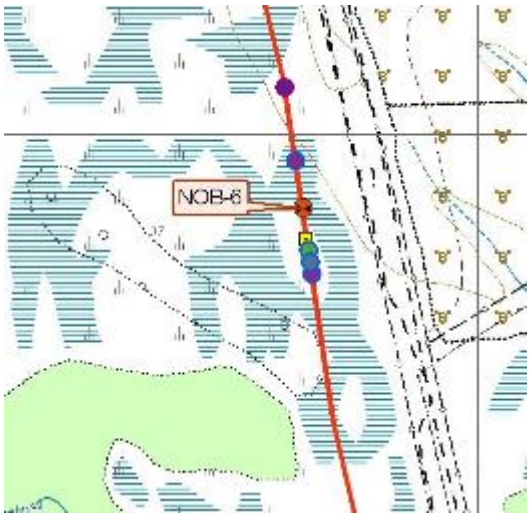


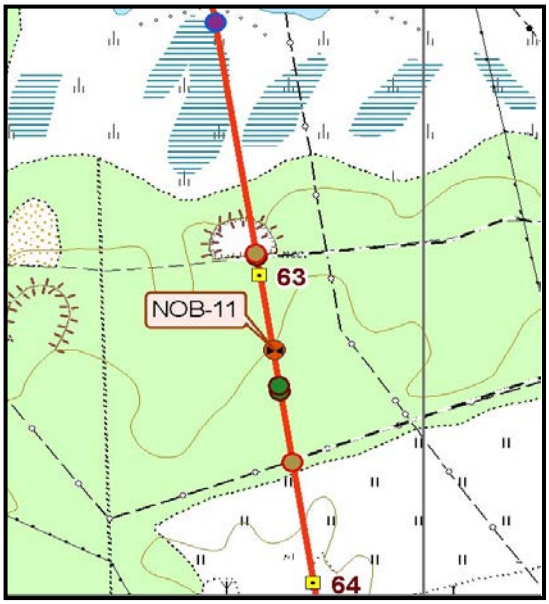
Photo 1 – View to the East towards NOB6 showing well recovered wet land.

Photo 2 – View to the West from NOB6 showing well recovered wet land.

Photo 3 –Sedge fringed pool formed over pipeline 	**Photo 4** – Closer view of well revegetated RoW 

KP 63 – Dagi River and RoW

The Dagi River valley is showing improvement since last year's visit, with pronounced recovery in the wetlands area south of the river (Photos 4 and 6).



The riverbanks are well protected with reno mating and vegetation. The northern bank has willows on it, but on the southern bank the willows were removed together with other trees on the RoW (Photos 1 to 3).

An additional area of tree removal was observed on the slopes leading out from the valley on the south side (Photo 4) where the cut trees were collected in piles on the RoW. This method of waste handling should be reconsidered.

An area of Alder growth on the RoW next to KP 63 was de-vegetated last year using mechanical mean (tractor mounted). However, during the current visit it was observed that saplings wre re-growing in the same area (Photo 6).

Previous visits to the Dagi wetland showed two clear dark lines above the pipelines where peat had not re-vegetated. This effect was not as noticeable on this visit, largely as a result of both moss and shrub species having started to grow on the previously bare areas. A number of sphagnum species are showing new growth in small hollows on the peat and young bog bilberry *Vaccinium uliginosum* and Labrador tea *Ledum palustre* have also colonised with some small plants found to be present.

Some patches of peat that have been reinstated contain partially dried out sphagnum and do not look to have been placed correctly, which is the likely cause of the slow recovery. However, ENVIRON is now confident that the RoW will fully re-vegetate with wetland species.

Photo 1 – View to the upstream showing stable river banks. Note that the trees are being cut at the time of the visit.

Photo 2 – View to the down stream showing stable and vegetated banks.

Photo 3 – View north showing river bank with reno mats and good vegetation cover.

Photo 4 – View south showing wetland vegetation and slopes on valley edge with cut trees piles.

Photo 5 – View north showing wetland vegetation on pipeline and running track

Photo 6 – View south of the Dagi valley showing recovered Alder saplings in an area where they were cut last year.

Photo 7 Some dried out peat with new regrowth in between. 	**Photo 8** Close up showing sphagnum regrowth 

KP 95 – RoW by NOB 16 North of Djimdan River

The RoW south of NOB 16 and north of the Djimdan River crossing on the slope leading to the river is covered by dense growth of Alder trees that reach two or more meters in height (Photo 1).

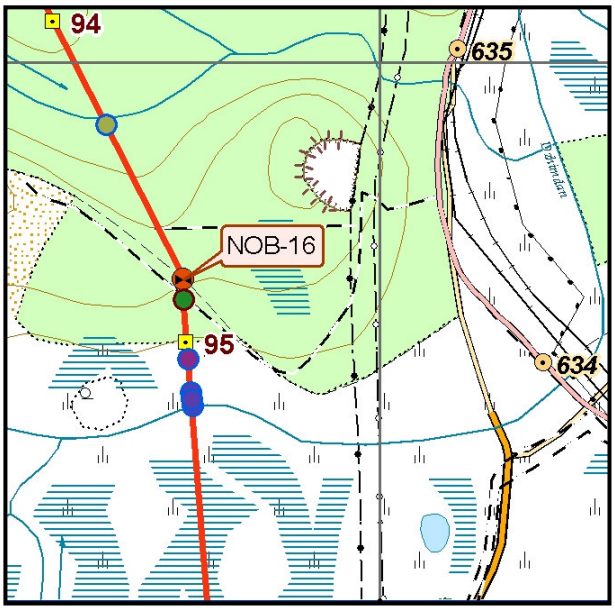
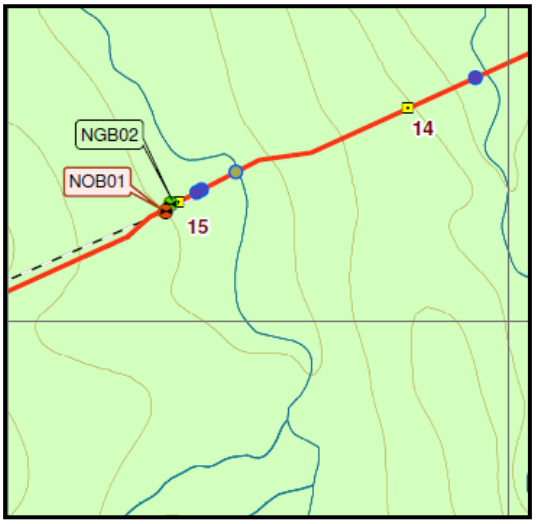


Photo 1 – View south from the Block Valve showing dense growth of Alder on the RoW

KP 15 - Plelyarna River and RoW KP 15 to 21



The Plelyama river was accessed by a long access road starting at KP 21 and ending at KP 15 at the river crossing and the Block Valve stations NOB 01 and NGB 02. The riverbanks are protected with with a combination of reno matting and Enkamat. Grass is growing through the matting, but does not have full coverage yet. A few Alder trees were also observed on the banks (Photos 1 to 3).

The RoW between KP 21 and 15 has good vegetation cover on each side of the access road (Photos 4 and 5). A sloping section of the RoW just north of NOB 01 had deep erosion along the slope last year that has since been repaired.

Photo 1 – View to the upstream showing riverbanks with reno matts

Photo 2 – View to the downstream showing partially vegetated riverbanks

Photo 3 – View across the river showing stable vegetated banks with Reno mats.

Photo 4 - View to the north showing good vegetation cover on each side of RoW

Photo 5 – View North showing good vegetation cover on the RoW 	

KP 131 – RoW and Slopes

The RoW at the road crossing at KP 131 shows good vegetation cover and stable slopes. Vegetation is mostly comprised of grass, but trees were seen to be growing in the low areas where the RoW crosses a drainage ditch (Photos 1 and 2)

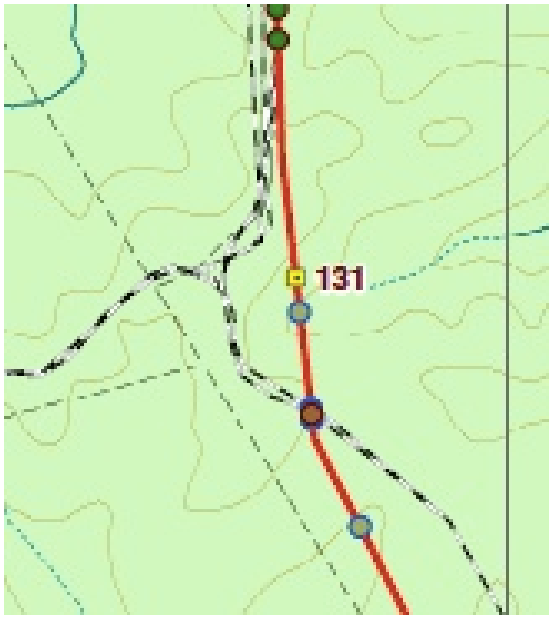


Photo 1 – View north showing good vegetation cover on the slopes

Photo 2 – View south showing good vegetation cover on the RoW

KP 137 – RoW

The RoW in the vicinity of KP 137 shows good vegetation cover (see Photos 1 and 2).

Photo 1 – View to the north showing good grass cover on the RoW

Photo 2 – View south showing grassy RoW

KP 141 to 144 – RoW and Wetland

The RoW between KP 141 and 145 traverses several sections of wetlands. These areas are areas of bog wetland that lie within open areas in the coniferous forest. The habitat is characterised by small shrubs such as Labrador tea and berry species with harestail cottongrass and abundant bog mosses.

Over the RoW itself, the shrub species and mosses have been slower to colonise than the cotton grass and other graminoids, leaving a distinct boundary between the undisturbed and disturbed areas. However, here, as at the Dagi wetland, evidence was found that species from these groups are starting to establish themselves, and ENVIRON is confident that in time the shrub species will recover to a comparable height to the surrounding wetland.

Additionally, no negative effects on the surrounding wetlands were noted.

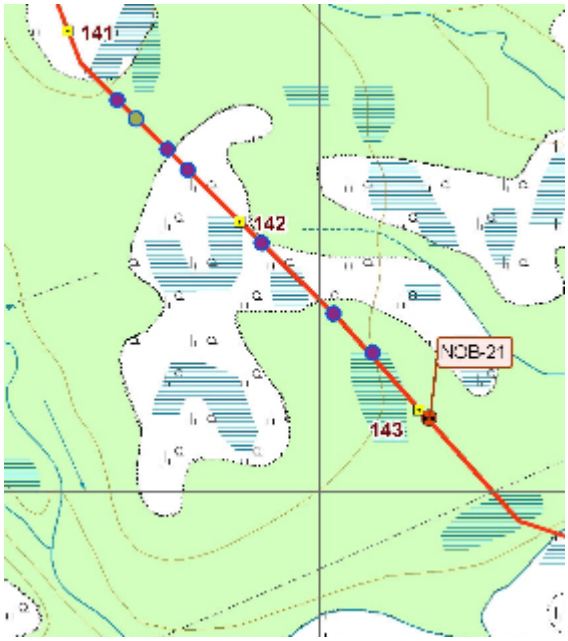


Photo 1 – Good re-vegetation of RoW

Photo 2 – Good re-vegetation of RoW

Photo 3 –Typical revegetation-more graminoids, hence lighter colour 	**Photo 4** –Existing wetland near KP143 showing no negative effects from nearby RoW 

KP 24.5 – Road Crossing

The RoW at this crossing has gently sloping topography towards the south. The RoW has good vegetation cover, which consists mostly of grasses (Photo 1).

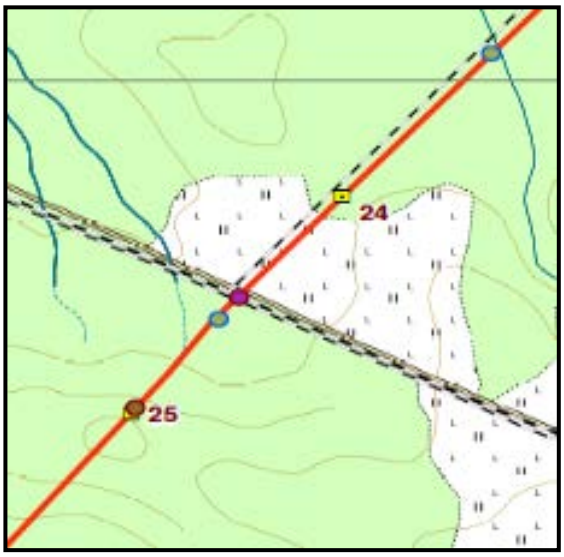
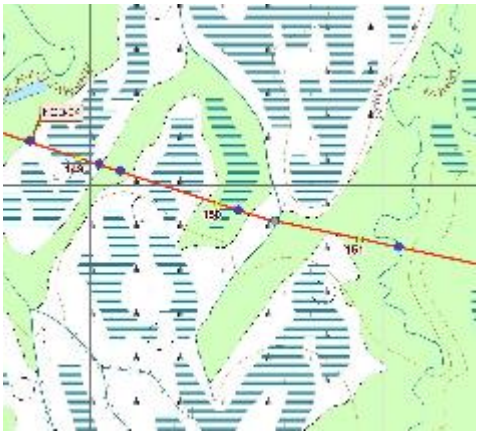


Photo 1 – View to the south showing the RoW with a gentle slope and good grass cover.

KP 149-152 – Wetlands



The RoW section between the OPF and NOB 24 has very good ground cover. The section includes an access road that terminates at the block valve. Thes road and bridges are well maintained. Several stream and minor drainage ditches cross the RoW, which are well protected with riprap and show no erosion to the banks (Photos 1 to 4). Some portions of this section have dense tree growth. Also, it appears that this year there are more Pine seedlings.

The RoW in this area is similar to that seen between KP141-144. Small wetland shrubs and bog mosses are slowly colonising the RoW, but at a slower pace than the harestail cotton grass and other grasses so a distinction between the reinstated and undisturbed bog is visible (as is the case in the area between Kp141-144 as described above). Some areas of bare or poorly vegetated peat were seen, but these were small and infrequent.

Closer to KP 152, a small wetland hollow between the coniferous trees has been re-vegetated by a carpet of harestail cotton grass, which provides good coverage.

Photo 1 – View north along the RoW showing good vegetation cover

Photo 2 – View north along the RoW showing good vegetation cover and growth of trees

Photo 3 – View of bridge and protected drainage with riprap.

Photo 4 – View of protected drainage with riprap and good vegetation cover

Photo 5 – View of the wetland east of NOB 24

Photo 6 – View of wetland boundary east of NOB 24

Photo 7 – Well revegetated RoW with small areas of bare peat

Photo 8 Close up of regetation og R0W of small shrub species

Photo 9 close up showing recolonisation by bog moss Sphagnum species. 	**Photo 10** Colonisation of wetter area at KP152 by cotton grass. 

KP 0 –Sakhalin-3 Tie-In Location

The Sakhalin-3 Tie-In is located at KP 0 near the OPF. The installation of the Tie-In was completed within the last year and reinstatement of the RoW on all sides in pending (Photos 1 and 2)). We understand that the Sakhalin-3 operator was responsible for final reinstatement of the area, but that this was not fully undertaken. We further understand that Sakhalin Energy now plans to complete these reinstatement works itself in 2015.

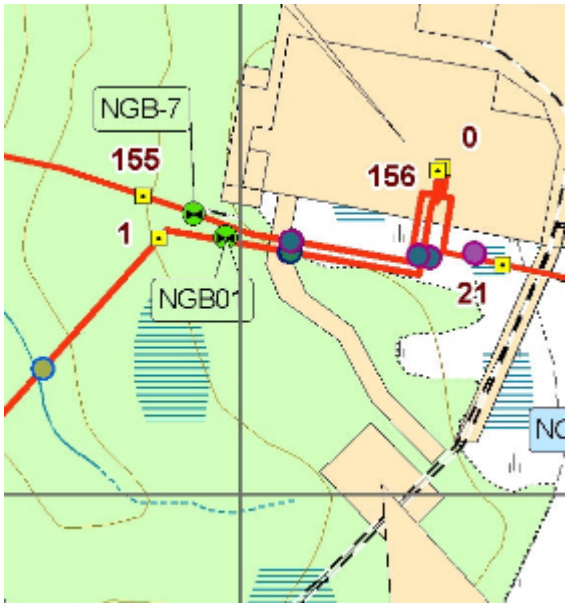
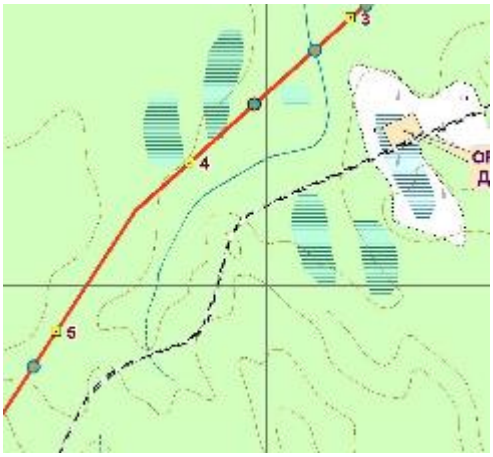


Photo 1 – View north of the east side of the Tie-In

Photo 2 – View north of the west side of the Tie-In

KP 4 – Wetland south of OPF



The RoW in this area passes through an extensive area of coniferous forest. The flora of the surrounding area contains some of the shrub and moss species found in wetlands of the area but, given the extensive forestry, it is not considered to be a true wetland.

The RoW has re-vegetated well with a grass dominated mix of plant species. Wetter areas have been colonised by sedges and small pockets of sphagnum species with patches of taller emergent vegetation such as cat-tail *Typha latifolia* and reed *Phragmites australis* and sedge *Carex* sp. Hair mosses *Polytrichum* sp. are the most abundant bryophytes in this area.

The wetland habitat that has formed in this area is largely a result of the modifying effects of the pipeline having opened up an area previously under trees. The small shrubs which form the typical understorey of the surrounding habitats appear to be recolonizing slowly and may never reach the density outside of the RoW. However, the vegetation cover is good and the species present form a good natural habitat.

Photo 1 – Well revegetated RoW

Photo 2 Emergent vegetation colonising wetter depressions of RoW

Photo 3 – View south from KP 3 showing RoW partially vegetated

Photo 4 – View north from KP 3 showing running track with marginal vegetation cover

Photo 5 – View of RoW at approximate KP 4

Photo 6 – View of RoW at approximate KP 4.5

KP 47 – Steep Slopes RoW

The RoW in this area is in adulating terrain with some steep slopes. The slopes are protected with slope breakers and with good vegetation cover (Photos 1 and 2).

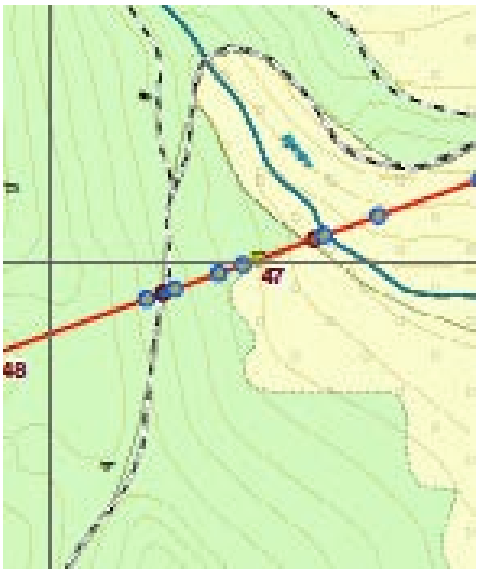


Photo 1 – View north along the RoW

Photo 2 – View south along the RoW

KP 54 to 55 – RoW and Slopes

The RoW in this area (KP 54) is poorly vegetated. However, further south vegetation cover is better and in some areas exhibits wetlands flora (Photos 1, 2 and 4). The slope on the southern end of the valley has poor vegetation cover and includes erosion in the central portion (Photo 4) in spite of the fact that it has slope breakers. It is recommended that erosion control on the slope should be re-evaluated and additional seeding be done.
The area immediately adjacent to and southeast of the RoW was most likely used as a staging area during construction. Currently the area is bare of any vegetation (Photo 3). It is recommended that the area be put on a seeding/reinstatement schedule.

Photo 1 – View north along the RoW showing sparse ground cover.

Photo 2 – View south along the RoW showing sparse ground cover.

Photo 3 – Area between access road and RoW is devoid of vegetation.

Photo 4 – View south showing RoW slope with slope breakers and erosion. Also wetland fauna in the foreground.

KP 66.5 – RoW Road Crossing

The RoW at this road crossing has a very good grassy ground cover (Photo 1).

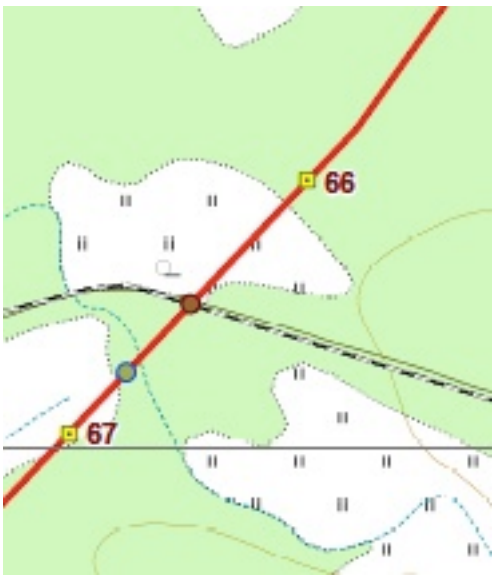


Photo 1 – View north showing a very good grass cover on the RoW.

KP 84 – Vaskrasnovkaya River

The RoW north and south of the river has good vegetation cover (Photos 1 and 2). The riverbanks are well protected by reno matting and have grass cover on the lower portions by water level (Photos 3 and 4).

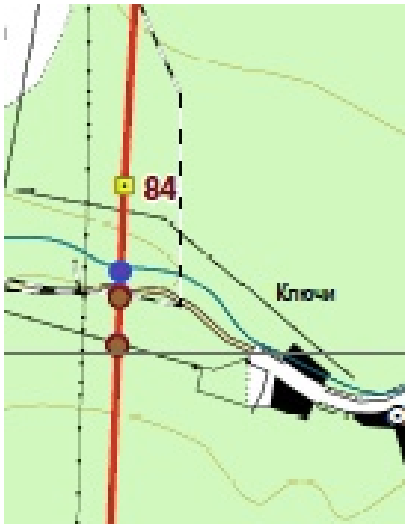


Photo 1 – View north along the RoW and across the river showing good vegetation cover

Photo 2 – View south along the RoW showing good vegetation cover.

Photo 3 – View to the upstream showing reno matting on the riverbanks

Photo 4 – View to the downstream showing reno matting on the riverbanks

KP 128 – Sandy Slopes

The RoW in this area crosses an undulating hilly terrain with sandy lithology. There was no appreciable change since last year's visit. The RoW has good vegetation cover, good slope breakers and the slopes appear stable. The area on the RoW just south to the access road has sparse vegetation and will need to be improved in time.

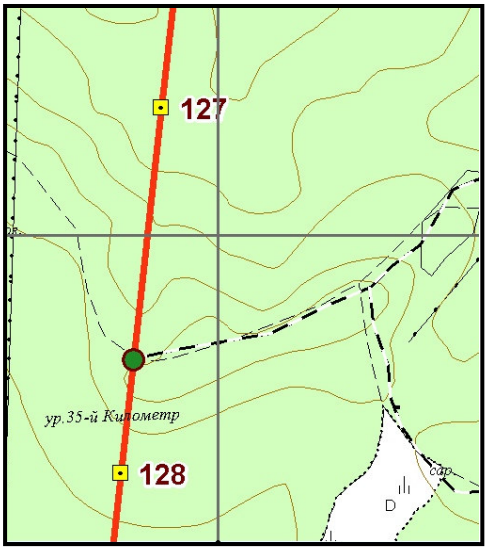


Photo 1 – View south showing good slope breakers and good vegetation along the slope but sparse vegetation on top by the access road.

KP 146-147-Wetland (TOB 12)

The RoW north of TOB 12 has generally good ground cover, although the east side of the RoW is recovering at a slower pace. The area immediately adjacent to the block valve station has poor ground cover and erosion (Photos 3 and 4), and more seeding and remedial works are needed in the area. The RoW in this area passes through another area where bog wetland occurs under relatively scattered coniferous forest and where a Labrador tea dominated shrub layer is the typical understorey.

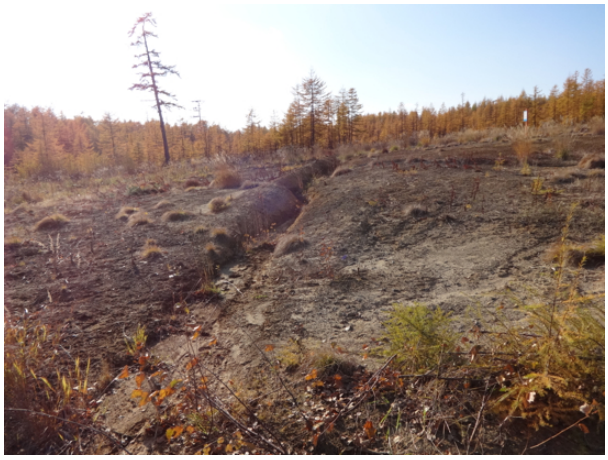
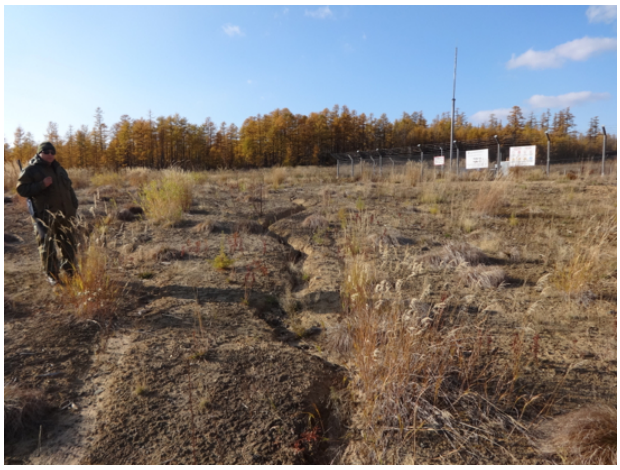
The RoW has been slow to re-vegetate with wetland species in this area and the ground conditions are noticeably drier on the RoW than the surrounding habitats. Grasses dominate with occasional stands of rushes in small depressions and hollows. There are young shoots of bog bilberry and Labrador tea, but these are very occasional. Sphagnum mosses were recorded in the few larger hollows.

The wetland either side of the RoW is wet and does not appear to have been degraded by the pipeline installation.

It is believed that in time, the wetland vegetation of the wider area will re-colonise the RoW, however this process will be slower that other sections of the pipeline due to the drier ground conditions.

Photo 1 – Grass dominated revegetation of RoW

Photo 2 Sphagnum forming in few hollows

Photo 3 – Area adjacent to the block valve shows poor ground cover and erosion. 	**Photo 4** – Area adjacent to the block valve shows poor ground cover and erosion 

KP 212 – Podbiedenka River

The Podbiedenka River is a high energy river and requires robust bank protection on the southern bank. The multi-level gabion wall on the southern bank is mostly in good condition (Photos 1 and 2), although a small portion shows minor sagging. Large riprap protection cover on the upstream portion of the south bank is intact. Both the wall and the riprap should be monitored regularly.

The RoW on both sides of the river has good vegetation cover and the slope on the south side is protected with slope breakers (Photos 3 and 4).

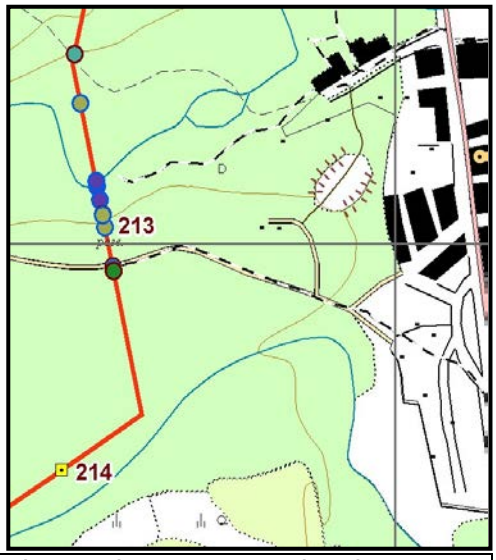


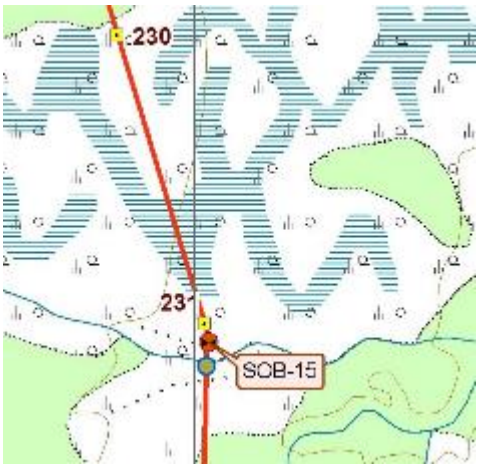
Photo 1 – View to the downstream showing gabion wall and opposite bank

Photo 2 – View to the upstream showing gabion wall and riprap protection

Photo 3 – View north across the river at the RoW

Photo 4 – View south at the vegetated slope of the RoW.

KP 230-231-Wetland (SOB 15)



The RoW in this area passes through a large wetland characterised by scattered conifer trees growing on a Labrador tea dominated habitat that has an abundant and diverse bryophyte layer in the form of *Sphagnum* and *Polytrichum* mosses. The RoW passes through the western edge of the wetland which slopes gently from west to east.

Unlike the other wetlands visited, this wetland is showing signs of dewatering, both on the RoW and also in the wider area to the east of the RoW. The cause of the dewatering appears to be two-fold. The retained access track to the block valve appears to acting as a barrier to hydrological connectivity between the western and eastern sections of wetland.

Secondly, a ditch and berm has been created in the south of the area on the western side of the RoW close to the block valve. This ditch is acting to drain water from the western area of wetland and carrying it to the south. As such, water is not reaching the RoW or the wetland to the east of the RoW, which is showing signs of negative effects with dried out understorey vegetation present and a noticeable reduction in bog mosses.

As a result of the factors described above, the RoW is barely vegetated with only occasional ephemeral grasses. No wetland plants are present. In order to address the issues identified, the ditch and berm should be filled in and fully removed. Additionally, approximately five small culverts should be installed under the access track approximately every 200m between KP 230 and KP 231.

Photo 1 – Ditch and berm on west of RoW	**Photo 2** Healthy wetland to west of RoW
	

Photo 3 Bare RoW with no wetland vegetation	**Photo 4** Wetland east of RoW that is drying
	

KP 296 – Dig-Up

The dig-up at this location was visited last year and there is a visible improvement. The actual area of the dig-up has good vegetation cover. The access road (on the RoW) that was constructed for the purpose of repair works is recovering slowly and may need additional seeding. The banks of a drain ditch that crosses the RoW north of the dig-up are well protected with very good vegetation cover.

Since last year much of the growth of Alder trees has been cut and the cut piles can be seen on site. These piles of cutting should be monitored to see if they decompose or stay intact.

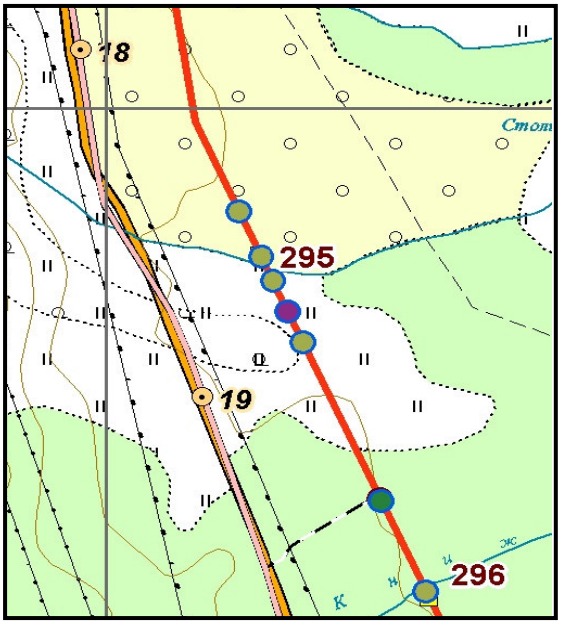


Photo 1 – View north across the dig-up showing good vegetation cover and a bare spot where the access road reached the site

Photo 2 – View to the north showing RoW with good vegetation cover

Photo 3 – View of a crossing drainage with vegetation cover on the banks.

KP 300 – Gastlovka River and RoW

The Gastelovka River is a high energy braided river with multiple channels. The main channel shows gravel banks with no scouring. The bank of the northern channel (currently the minor channel) is well fortified with Reno mattings that are in good condition and with vegetation growing through the mats.

The RoW north and south of the river has good vegetation cover.

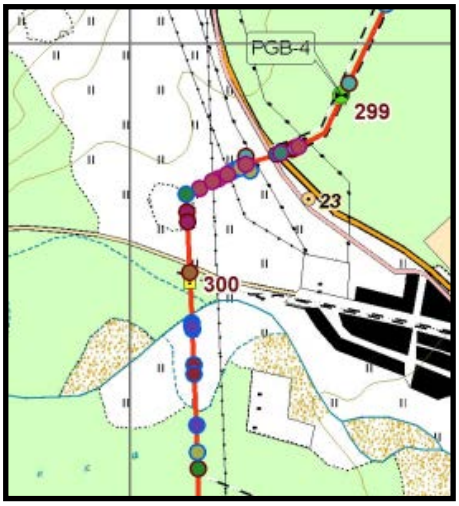


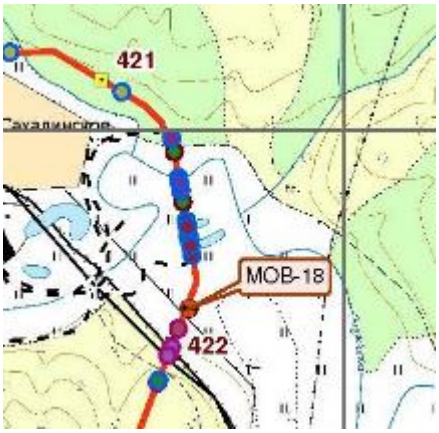
Photo 1 – View south showing a good vegetation cover

Photo 2 – View south across the northern channel.

Photo 3 – View east at the banks of the main channel.

KP 421-422 Pugachevo Wetland (MOB 18)

The Pugachevo area comprises a series of ox bow lakes and supports wet grassland/tall wetland species. The RoW passes right through one ox bow lake and the access track partially remains. However, the track is being reclaimed by native emergent/marginal vegetation that fringes the lake. The track is partially submerged. No negative effects on the lake were seen.



The rest of the RoW around the lake is well re-vegetated with tall grassland and herbs typical of seasonal flooding and appears to be in a good state.

The Pugachevo River crossing appears stable. The south bank is protected with reno mating, with some grass growing through the matting. The north bank is protected with large riprap and also has vegetation coming through the rocks (Photos 1 and 2). The RoW on both sides of the river has good vegetation cover (Photo 3). The slope on the southern edge of the river valley is protected well by slope breakers (Photo 4).

Photo 1 – View upstream showing reno matting and riprap

Photo 2 – View downstream showing reno matting and riprap

Photo 3 – View north showing RoW with good vegetation cover

Photo 4 – View south showing well protected slope.

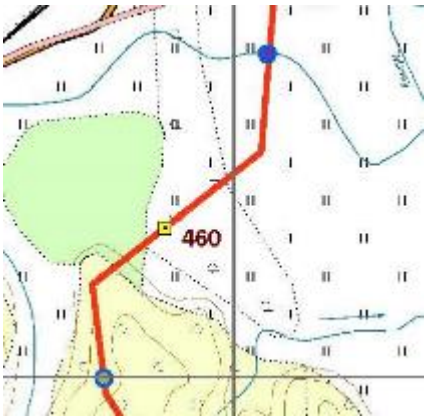
Photo 5 – Ox bow lake, Pugachevo

Photo 6 Retained track, ox bow lake

Photo 7 View north from ox bow lake showing river crossing and grassy wetland beyond

KP 460 Manui Wetland

The Manui wetland has been an area of concern in previous years as the RoW has been slow to re-vegetate and two bare lines were clearly visible above the two pipelines. However, this visit found that the RoW re-vegetation is now progressing well.



Bare patches are now only visible on the western side of the RoW (the gas pipeline), with the eastern side of the RoW now completely re-vegetated.

Upon closer inspection, the apparently bare areas are also re-vegetating with the small shrub and moss species from the surrounding wetland, including small areas of sphagnums in hollows on the peat surface and numerous round leafed sundews *Drosera rotundifolia*. The entire RoW area is very wet, indicating that the pipeline installation has not resulted in the RoW drying out. It appears that the central area of the RoW between the two pipelines has settled slightly, creating a depression where standing water occurs. This has been successfully colonised by cat-tails and other emergent.

ENVIRON believes that in time the RoW will fully re-vegetate with the wetland species from the surrounding area, with the only difference from the habitat that was present prior to installation being the stand of tall emergent wetland species that have colonised the central part of the RoW.

Photo 1 – Manui wetland from the south

Photo 2 Close up of RoW

Photo 3 Evidence of wetland plant regrowth 	**Photo 4** Tall emergent vegetation in wetter central part of RoW 

KP 531 Dolinsk Wetland

A very similar pattern of re-vegetation has occurred at Dolinsk as found at Manui. The RoW has generally re-vegetated well and, although slower to return that grass species, the shrubs and mosses from the surrounding wetland are now recolonizing the RoW. The difference here is that instead of cat-tails, there are stands of common reeds that have colonised the central parts of the RoW where settlement has allowed water to stand and pool.

The re-vegetation process will take longer in this location as the peat has not been replaced as well as at Manui, and far more young alder trees have colonised the RoW. However, the alder has been cut back in 2014.

A mosaic of wetland habitats will continue to exist at Dolinsk with the shrub dominated wetland closing in over the RoW up to the stands of reeds. Tree regrowth is the only potential barrier to that regrowth.

Photo 1 – Dolinsk wetland from the north

Photo 2 Regrowth of wetland plants

Photo 3 Stands of reeds in wetter areas

Photo 4 Sphagnum moss regrowth on RoW

KP 622 Mereya River and Slopes

The Mereya River is crossed with two separated RoWs, one for the oil pipe and one for the gas pipe (Photo 1). Both crossings are protected with Reno matting. Significant vegetation growth has come up through the matting and the banks appear to be stable.

The RoW on adjacent to both river crossings is re-vegetating well (Photo 3), although significant tree growth was identified south of the river that needs to be removed.

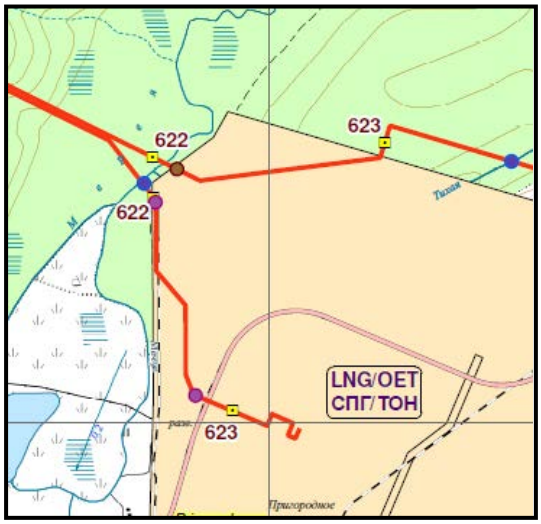


Photo 1 – Riverbank re-vegetation on the gas line crossing

Photo 2 – Tree growth on the RoW south of the gas line crossing