

Addis Ababa University, Ethiopia
October / November 2013



SAKHALIN, FAR EAST

Landslides and construction of oil and gas pipeline

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Sakhalin, Far East, Landslides and construction of oil and gas pipeline

Name of the project: Sakhalin II –
Onshore pipelines

Goal of the project: construction of gas
and oil pipeline from North of Sakhalin to
the south

Client: Sakhalin Energy Investment
Company Ltd (SEIC)
(Shell, Mitsubishi a Mitsui)

Geological service of the client: Scott
Wilson Kirkpatrick & Co Ltd.

Geological investigation: Inzashita

Contractor: Starstroj

Geological service of the contractor:
ARCADIS



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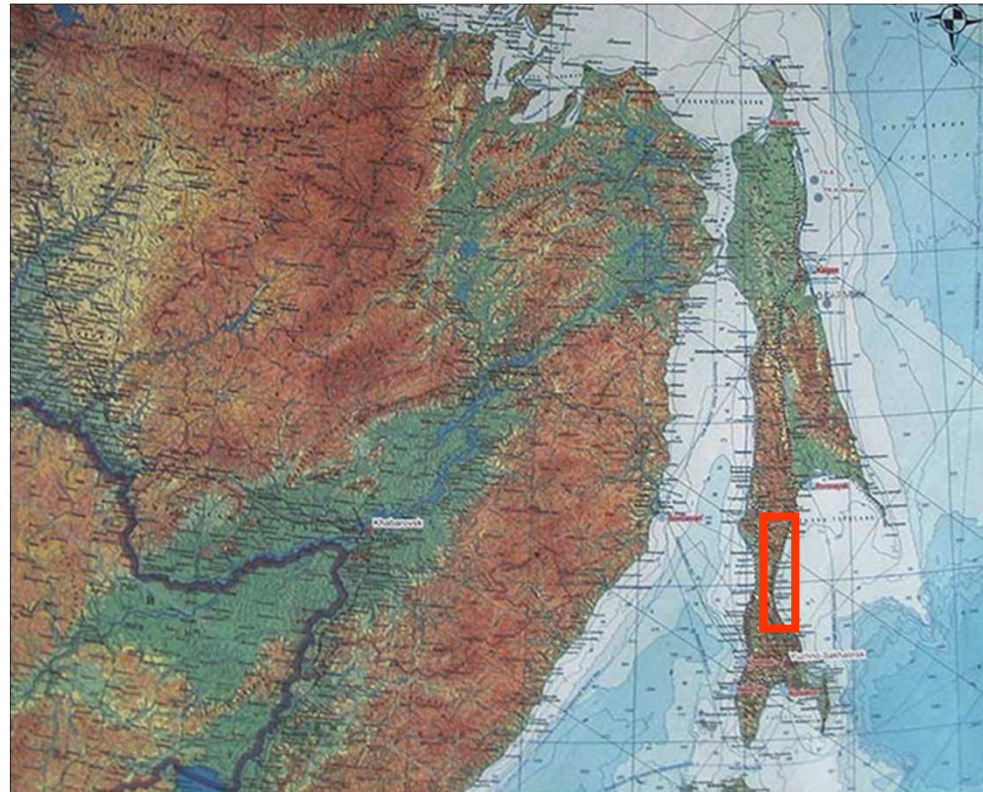
Engineering geological problems to be solved:

Liquefaction of sandy
sediment due to earthquake

Low bearing capacity of subsoil

Active tectonics

Slope stability
Landslides and erosion



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Hilly area around the city of Makarov



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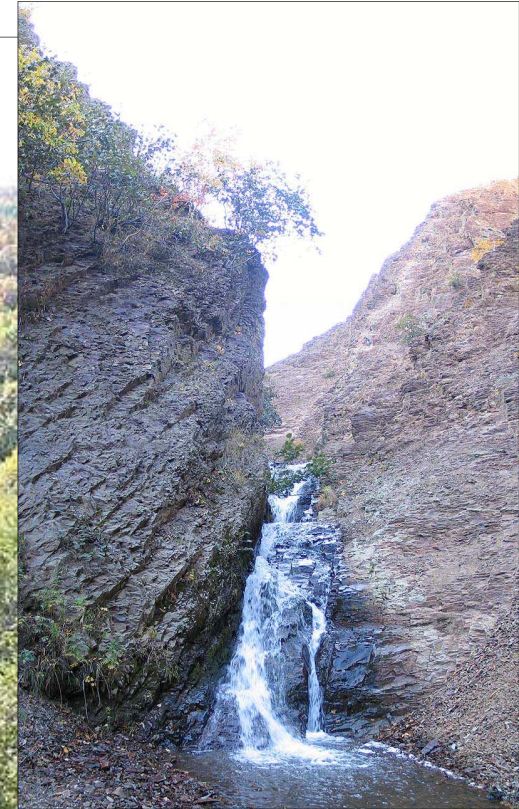


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EROSION



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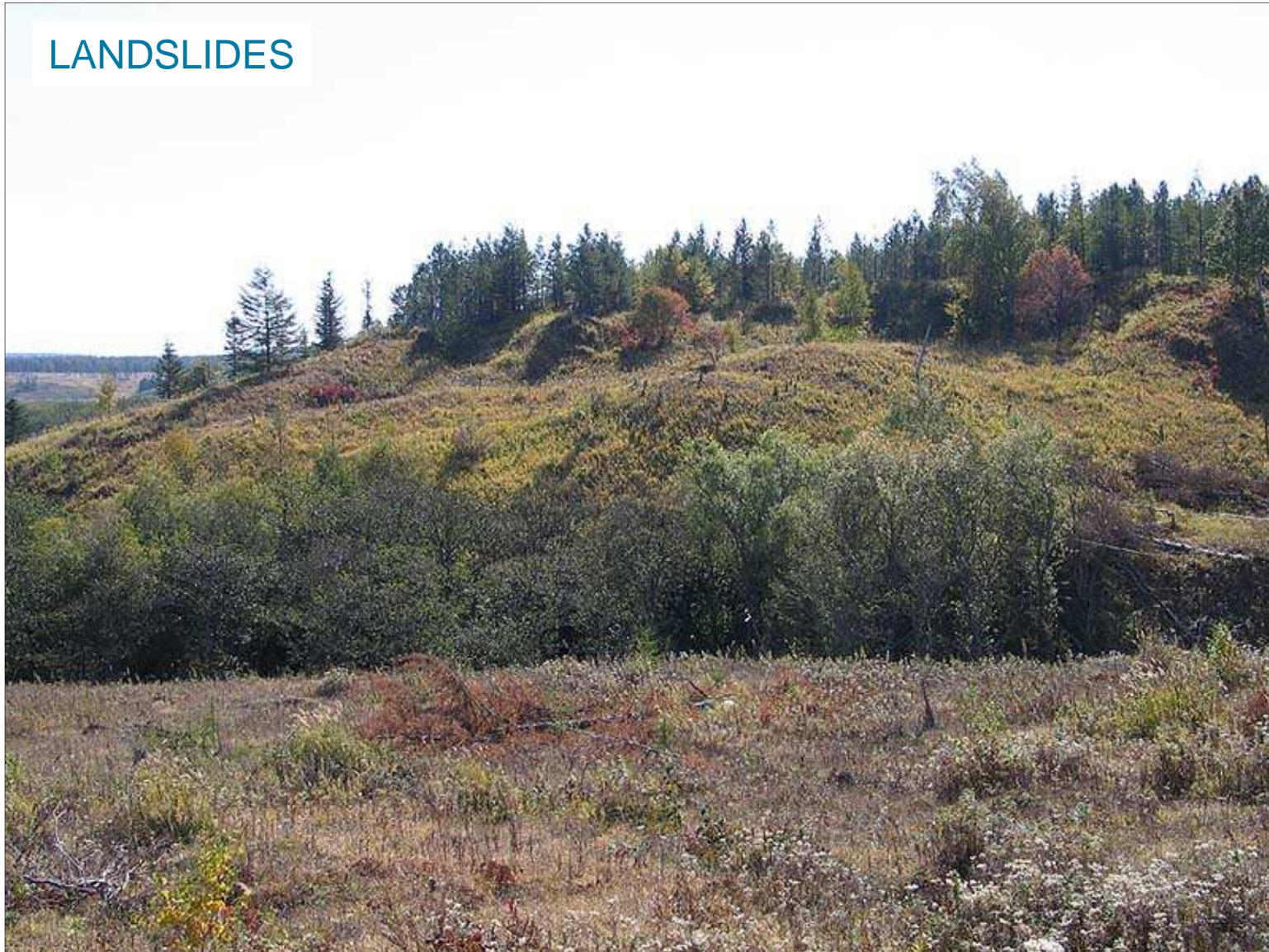
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EROSION



Sakhalin, Far East, Landslides and construction of oil and gas pipeline

LANDSLIDES



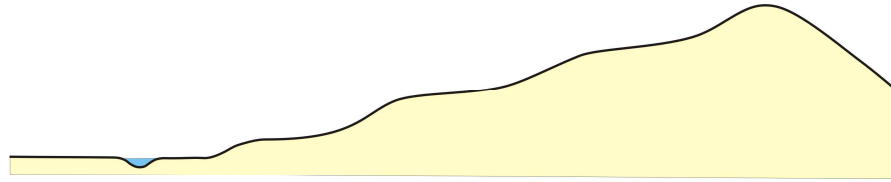
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EROSION - LANDSLIDES



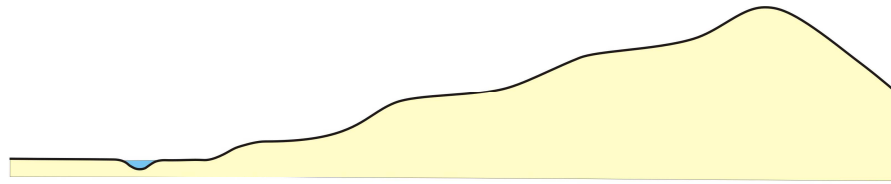
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Morphology interpretation

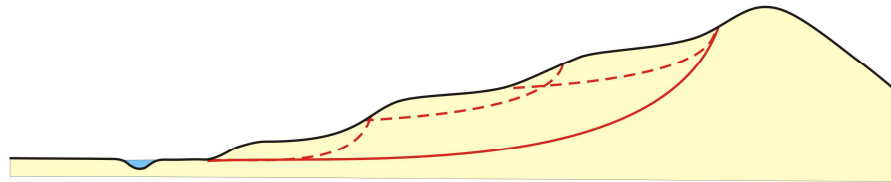


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Morphology interpretation

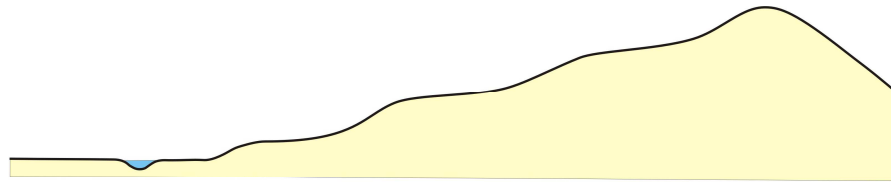


Landslides

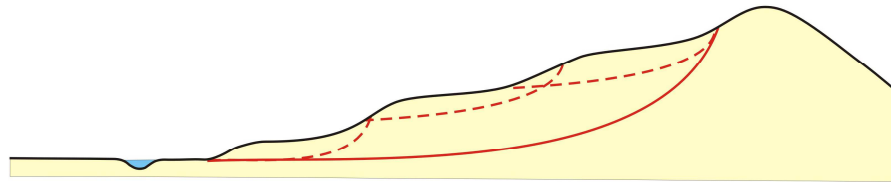


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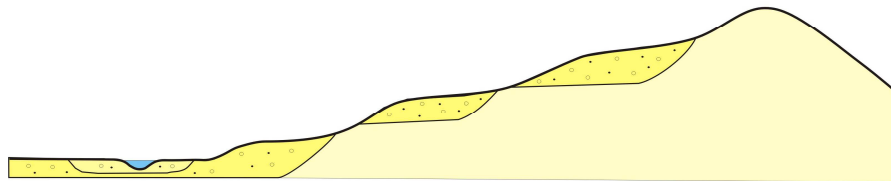
Morphology interpretation



Landslides

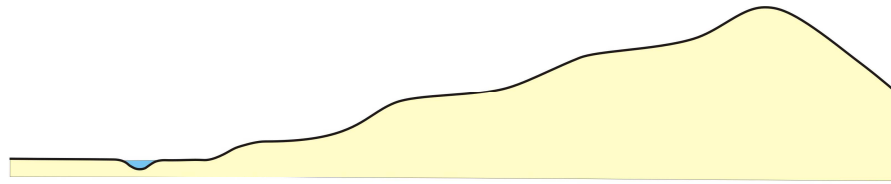


River terraces

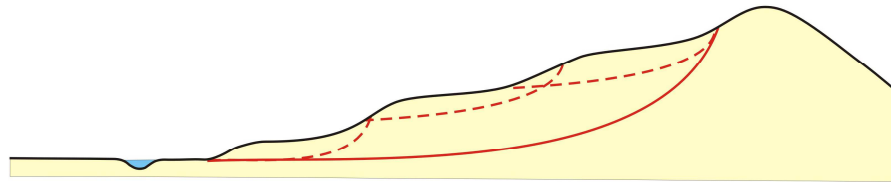


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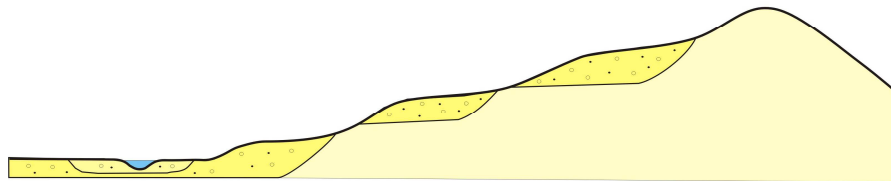
Morphology interpretation



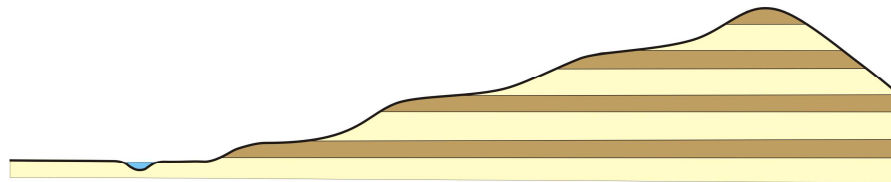
Landslides



River terraces

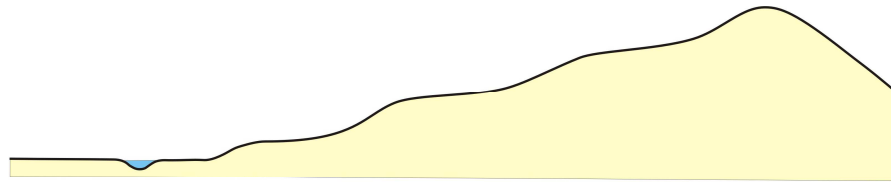


Rock structure

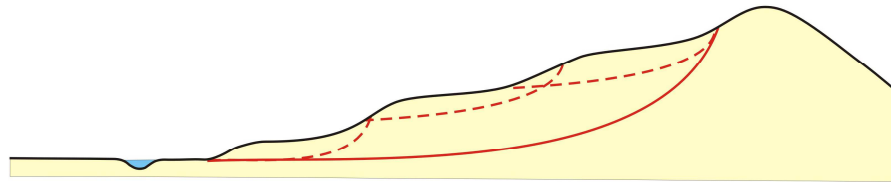


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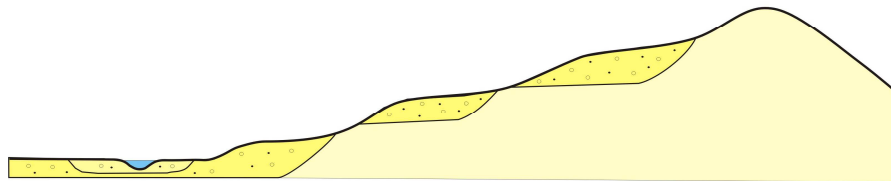
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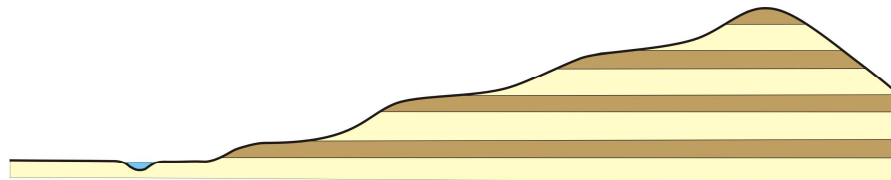
Landslides



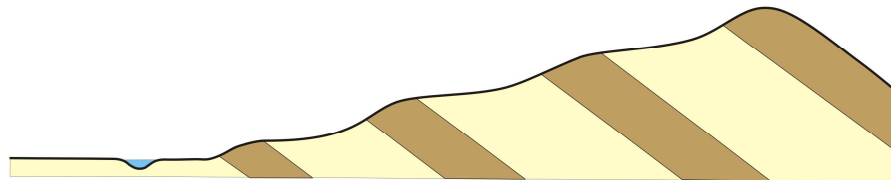
River terraces



Rock structure



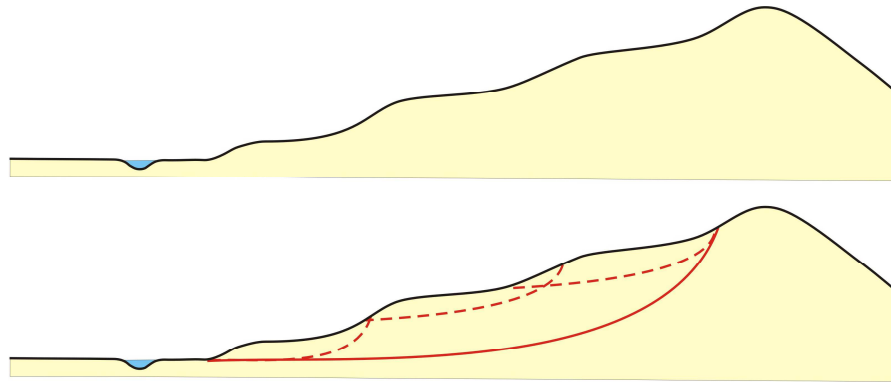
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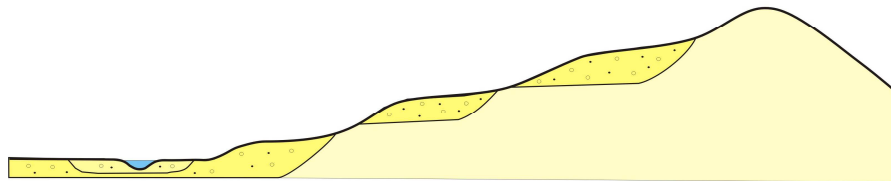
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Morphology interpretation

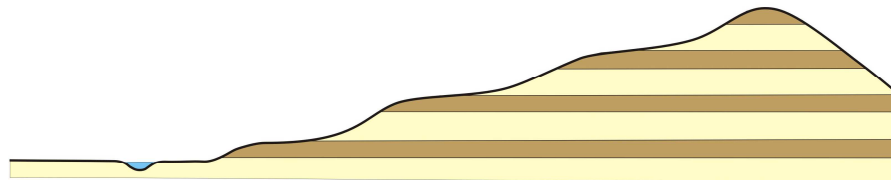
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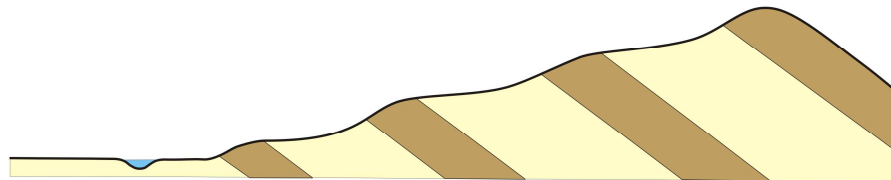
River terraces



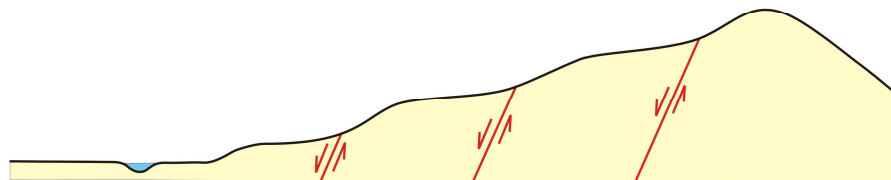
Rock structure



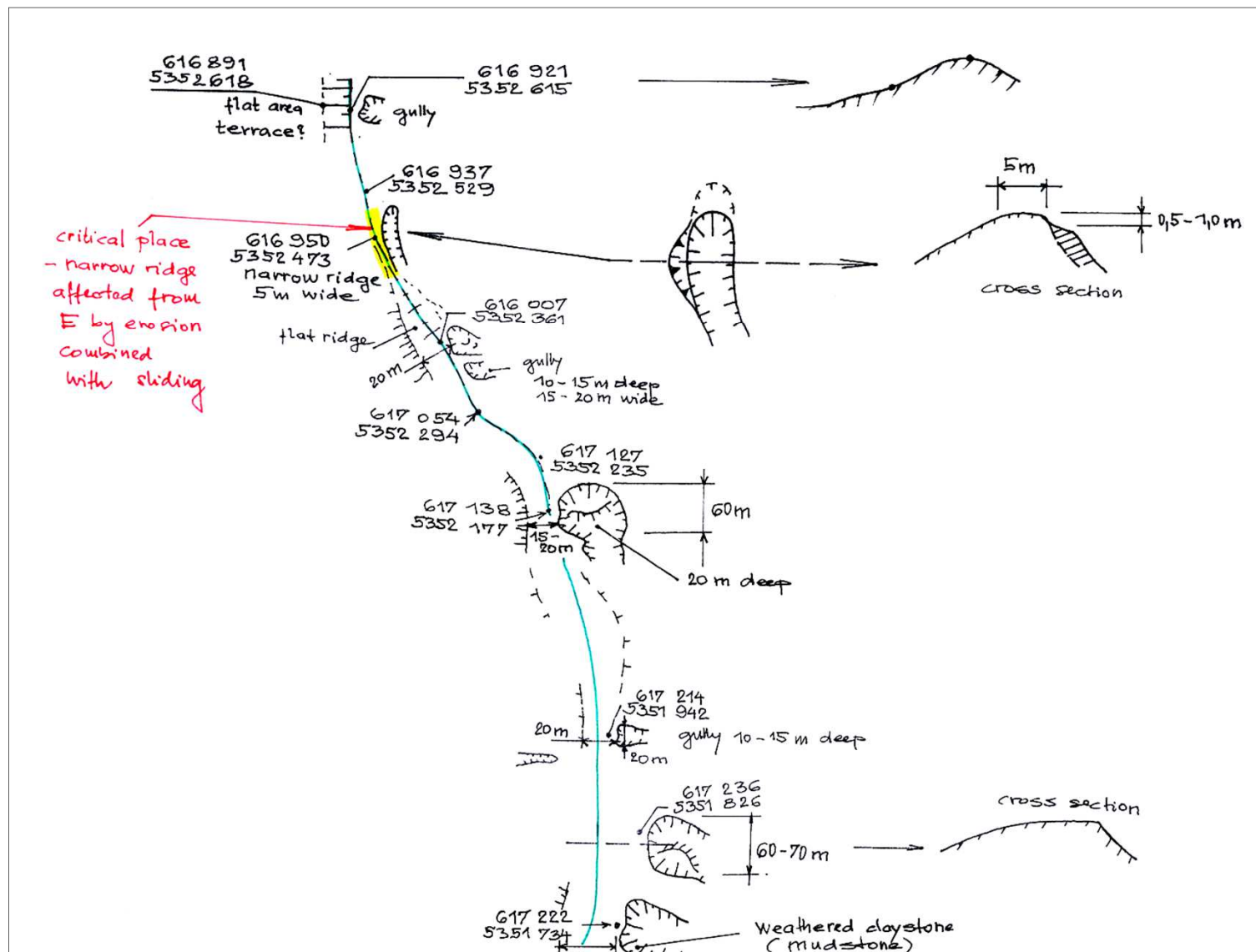
Rock structure



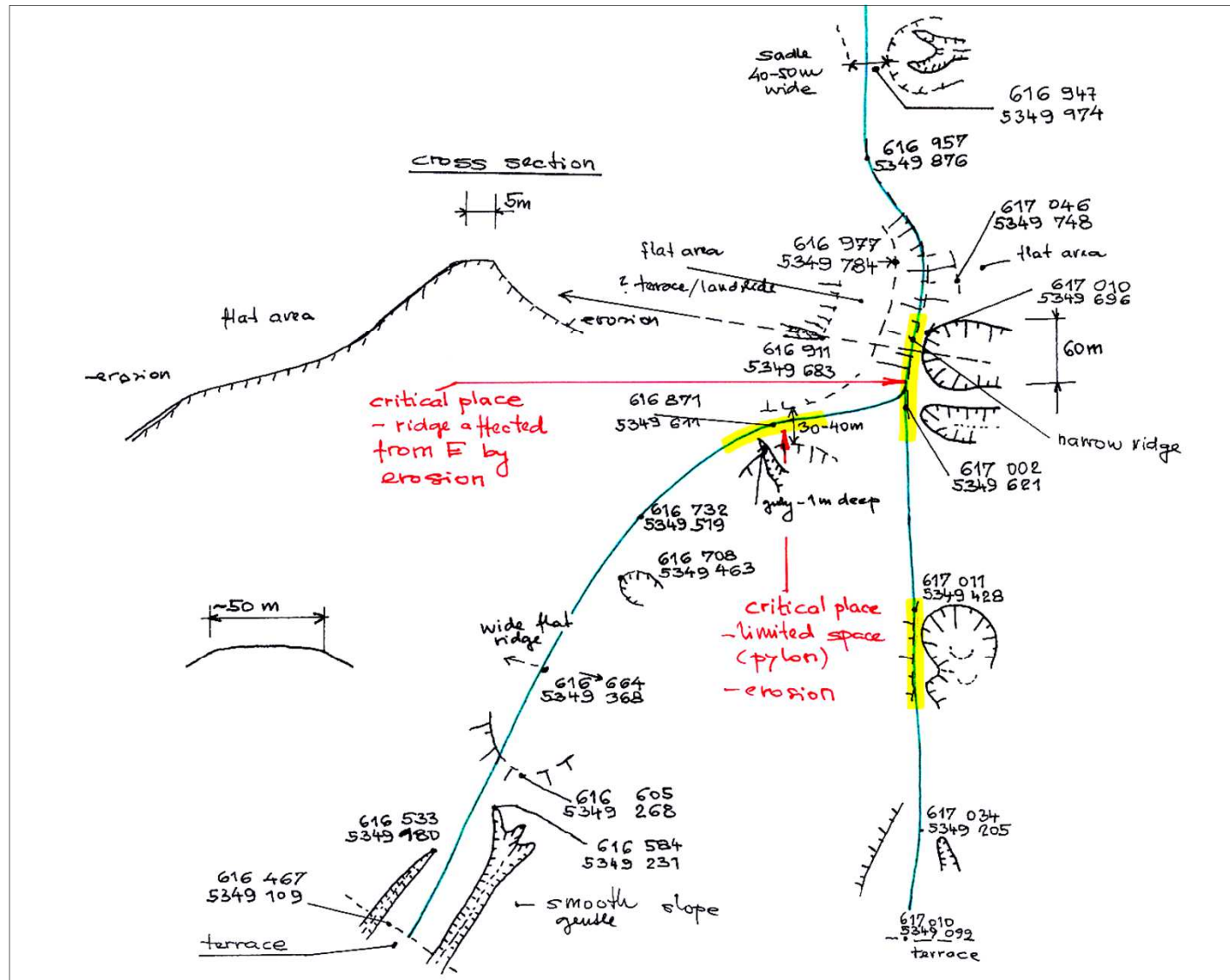
Faults



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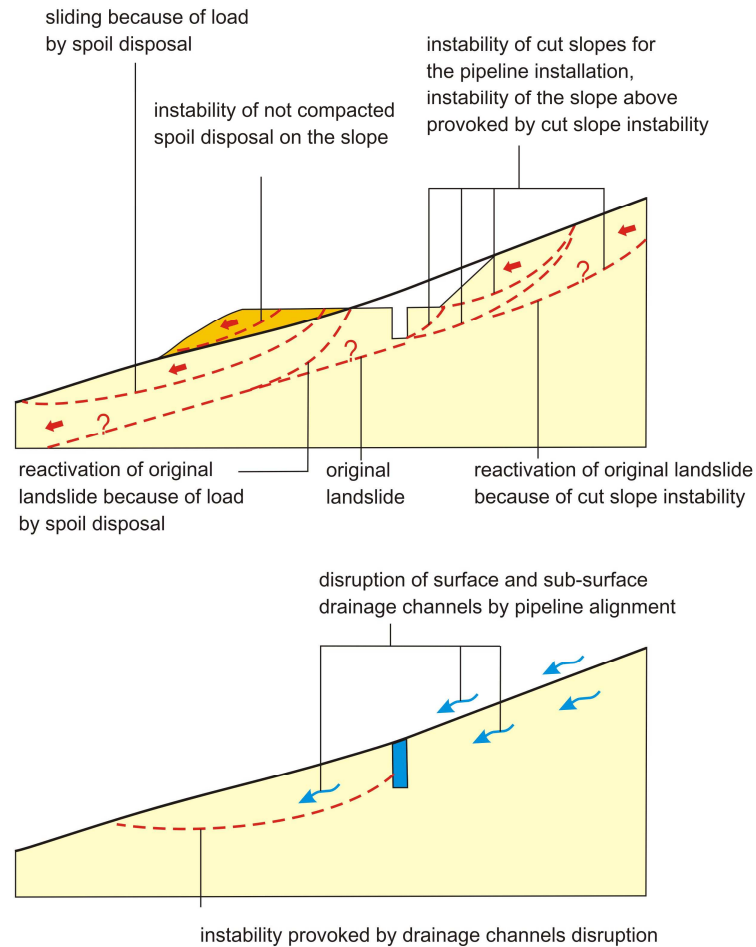


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Principles of landslide hazard mitigation – to avoid landslide areas, to route pipelines on ridges not affected by landslides, to avoid routing on steeper side slopes

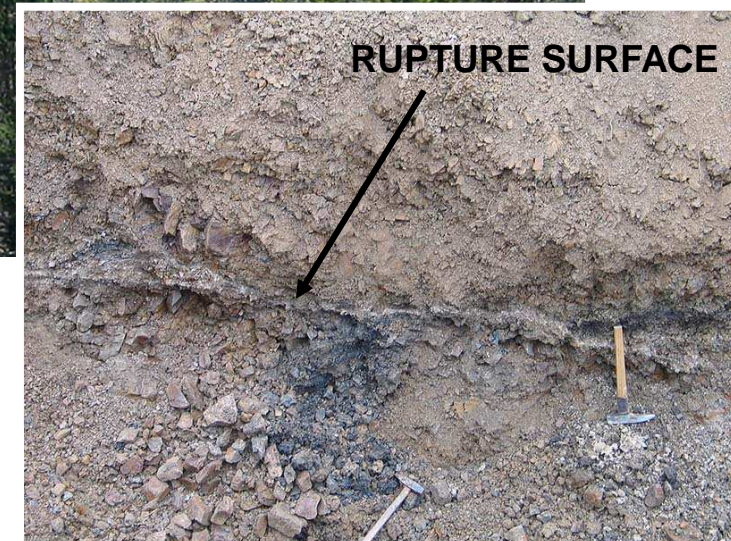


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Across unstable areas in shallow landslides – to remove unstable ground or to deepen the route of the pipelines until reaching stable rock



Trial pit at shallow landslide - slip surface up to 3,5 m under ground



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OKHOTSK SEA



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Times

www.sakhalintimes.ru

Weather forecast for YS

22°/12°	Mon Aug 30	Scattered Showers	24°/14°
21°/12°	Tue Aug 31	Rain	23°/14°
22°/11°	Wed Sep 01	Rain	23°/15°
22°/13°	Thu Sep 02	Partly Cloudy	22°/13°

halinsk

investment climate
industry, fuel and
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Sakhalin

Bear Hunting season begins in Sakhalin

On August 14, the brown bear hunting season officially commenced in the Sakhalin Region. Licensed hunting of brown bears is now permitted in all areas of the Sakhalin Region except the guarded territories which include reserves, nature memorials and barred zones. The hunting season will last till December 31, 2004. The license fee is 3300 roubles including tax. Nearly 4000 brown bears live in the Sakhalin and the Kurils.

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UNEXPLODED ORDNANCE



Sakhalin, Far East,
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LEATHER PRODUCTION, WOOD PRODUCTION, COAL MINING, FISHING



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CRAB FISHING NET



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Conclusion

- To diminish impact of geological hazards on the construction and operation of roads and pipelines – anticipation of potential geological problems at an early stage of project
- During construction, mistakes from early routing decision is possible to mitigate only in limited extent by rerouting of smaller sections and thus to avoid problems areas
- If it is not possible avoid problems areas - engineering geologist works in cooperation with engineer in order to pass successfully troubleshoot areas or to solve problems that have already occurred.

