



KESKKONNAMINISTEERIUM



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REMEDICATION OF PURTSE RIVER BASIN

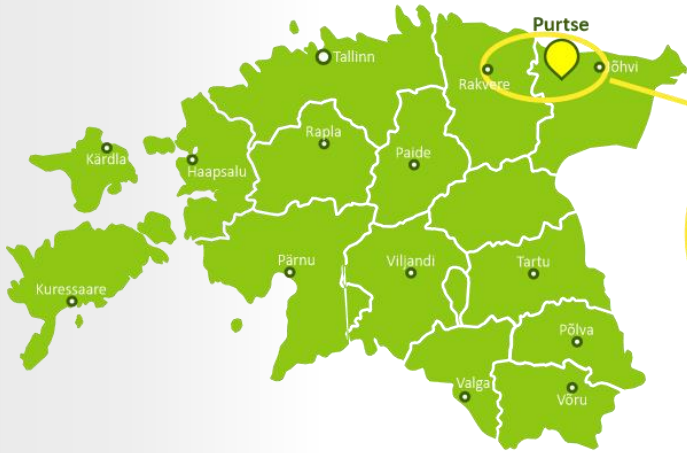
Raimo Jaaksoo, Ministry of the Environment

International Seminar on Dam Removal

May 22-23, 2019

Pärnu, Estonia

Purtse River is located in North-East Estonia



History of Purtse River basin pollution

- 1916 First oil shale open cast mine was opened in Kohtla-Järve
- 1921 Test unit for producing shale oil was commissioned in Kohtla-Järve
- 1935 Salmon river of local importance became polluted
- 1940s Soviet Union prioritized industry over nature, so the actual state of the river stayed a secret for decades. All the pollution was directed to the river
- 1966 Long-term environmental monitoring of the river started. First observations detected that the river was heavily polluted
- 1990 Polluting the river was stopped after Estonia regained its independence
- 2009-2014 Remediation of semi-coke landfills in Kohtla-Järve and Kiviõli. At the same time, a new technology for depositing semi-coke at Kohtla-Järve and Kiviõli oil shale chemical plants was implemented
- 2014-2015 Preparatory project for the clean up of the polluted areas of the Purtse river basin

Major components of pollution

Indicators for oil shale pollution

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graph TD; A[Indicators for oil shale pollution] --- B[Oil products]; A --- C[Polyaromatic hydrocarbons (PAH)]; A --- D[Heavy metals];
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Oil products
hydrocarbons
C10...C40

**Polyaromatic
hydrocarbons**
(PAH)

Heavy metals
Cd, As, Hg, Cr,
Ni, Pb, Zn, Cu

Objectives of the Purtse River Project

The residual pollution is eliminated to ensure a safe environment for humans and a favorable environment for wildlife.



Main objectives

- With the elimination of residual pollution of the Purtse River basin, soil quality will be brought in line with the required limits set for residential land.
- Removal of hazardous substances and recovery of natural appearance will improve the chemical and ecological status of the watercourses.
- The environment in the area will improve significantly for the local residents because of a less severe negative impact on human health.

Overview of the Purtse River Project

Eliminating residual pollution 2018-2022:

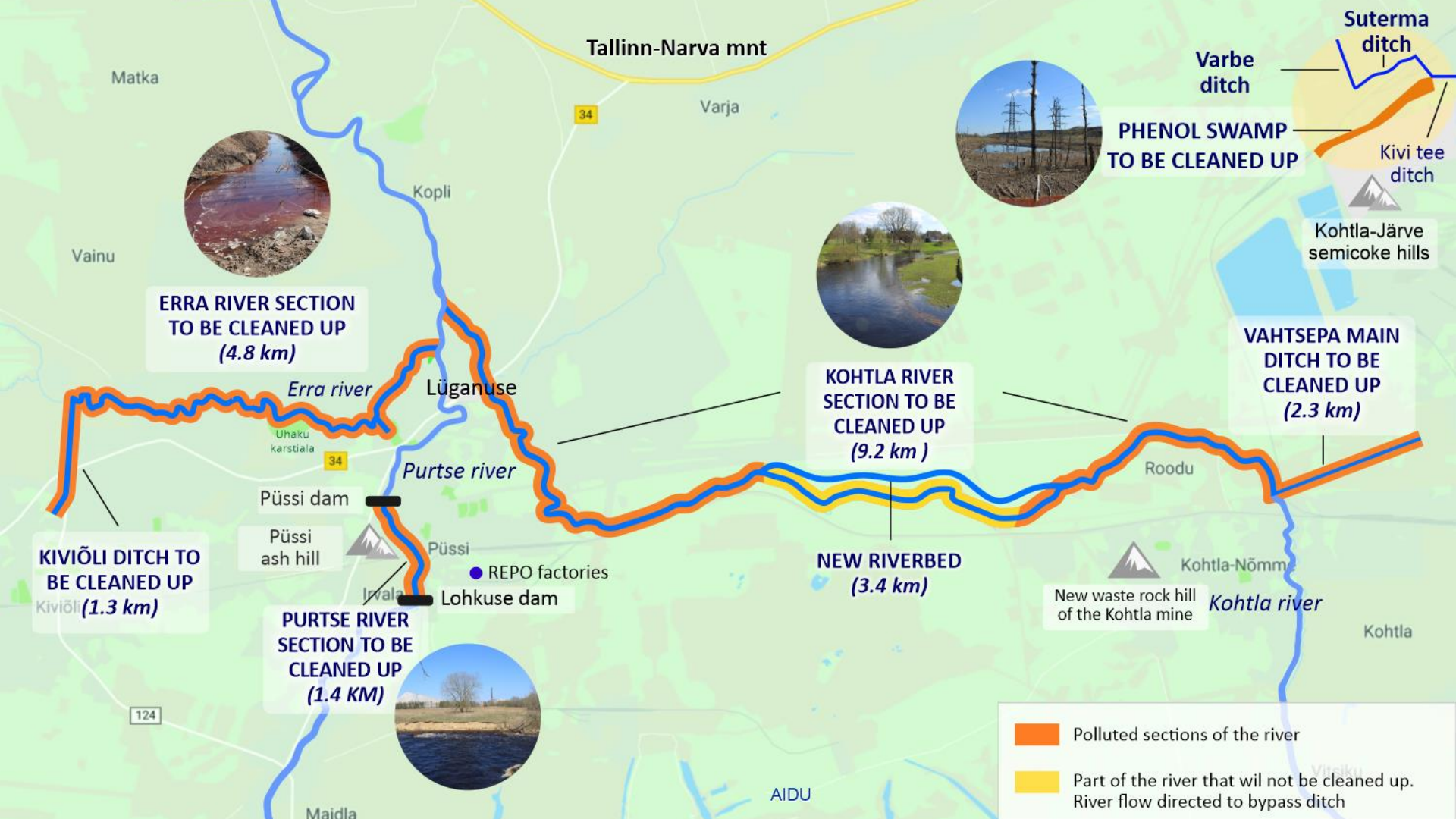
Purtse River, Kohtla River and phenol swamp

A unique residual pollution clean up project for Estonia

- A total of 13 km of Purtse and Kohtla rivers will be cleaned up and a 14 ha phenol site will be remediated
- 77,000 m³ of contaminated soil and sediments will be removed from the Kohtla River
- 9,700 m³ of polluted soil and sediments will be removed from the Purtse River
- Soil excavated from rivers is treated by thermal treatment
- A new riverbed will be built on the 3.4 km of Kohtla River

The project is co-financed by the EU

- The overall cost of the project is 22 million euros and the project is scheduled to be completed by the end of 2022.
- The project is financed in the extent of 85% by EU Cohesion Fund and in the extent of 15% by the Estonian state.



Matka

Tallinn-Narva mnt

Varja

Varbe ditch

Suterna ditch

PHENOL SWAMP TO BE CLEANED UP

Kivi tee ditch

Kohtla-Järve semicoke hills

Vainu

ERRA RIVER SECTION TO BE CLEANED UP (4.8 km)



KOHTLA RIVER SECTION TO BE CLEANED UP (9.2 km)

VAHTSEPA MAIN DITCH TO BE CLEANED UP (2.3 km)

Erra river

Lügánuse

Purtse river

Roodu

KIVIÕLI DITCH TO BE CLEANED UP Kiviõli (1.3 km)

Püssi dam

Püssi ash hill

Püssi

● REPO factories

Iwala

Lohkuse dam

NEW RIVERBED (3.4 km)

New waste rock hill of the Kohtla mine

Kohtla-Nõmm

Kohtla river

Kohtla

PURTSE RIVER SECTION TO BE CLEANED UP (1.4 KM)



█ Polluted sections of the river

█ Part of the river that will not be cleaned up. River flow directed to bypass ditch

124

34

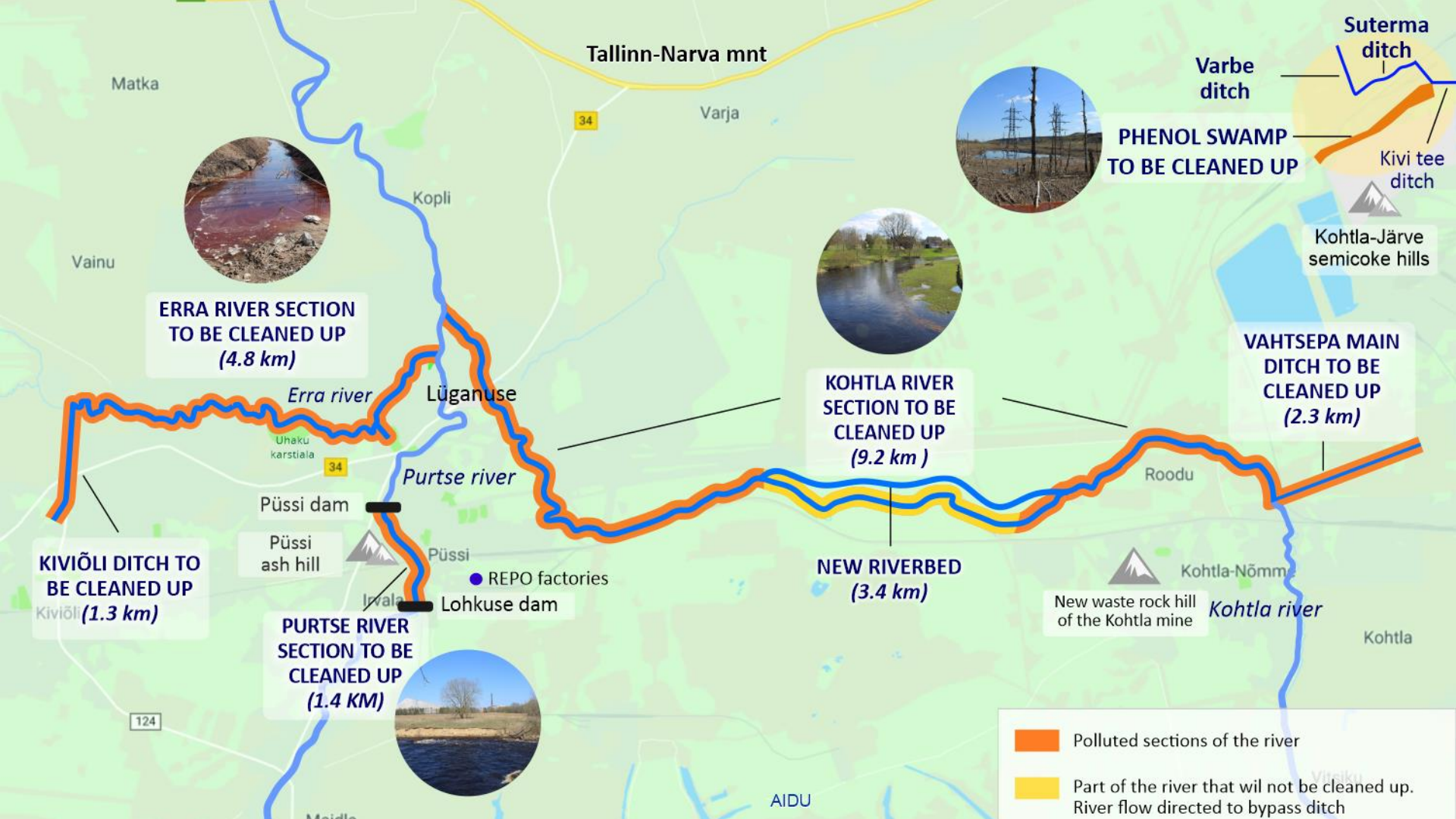
34

Maidla

AIDU

Vitõki





Matka

Tallinn-Narva mnt

Varja

Varbe ditch

Suterma ditch

PHENOL SWAMP TO BE CLEANED UP

Kivi tee ditch

Kohtla-Järve semicoke hills

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● REPO factories

Irvale

Lohkuse dam

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Kohtla-Nõmm

Kohtla river

Kohtla

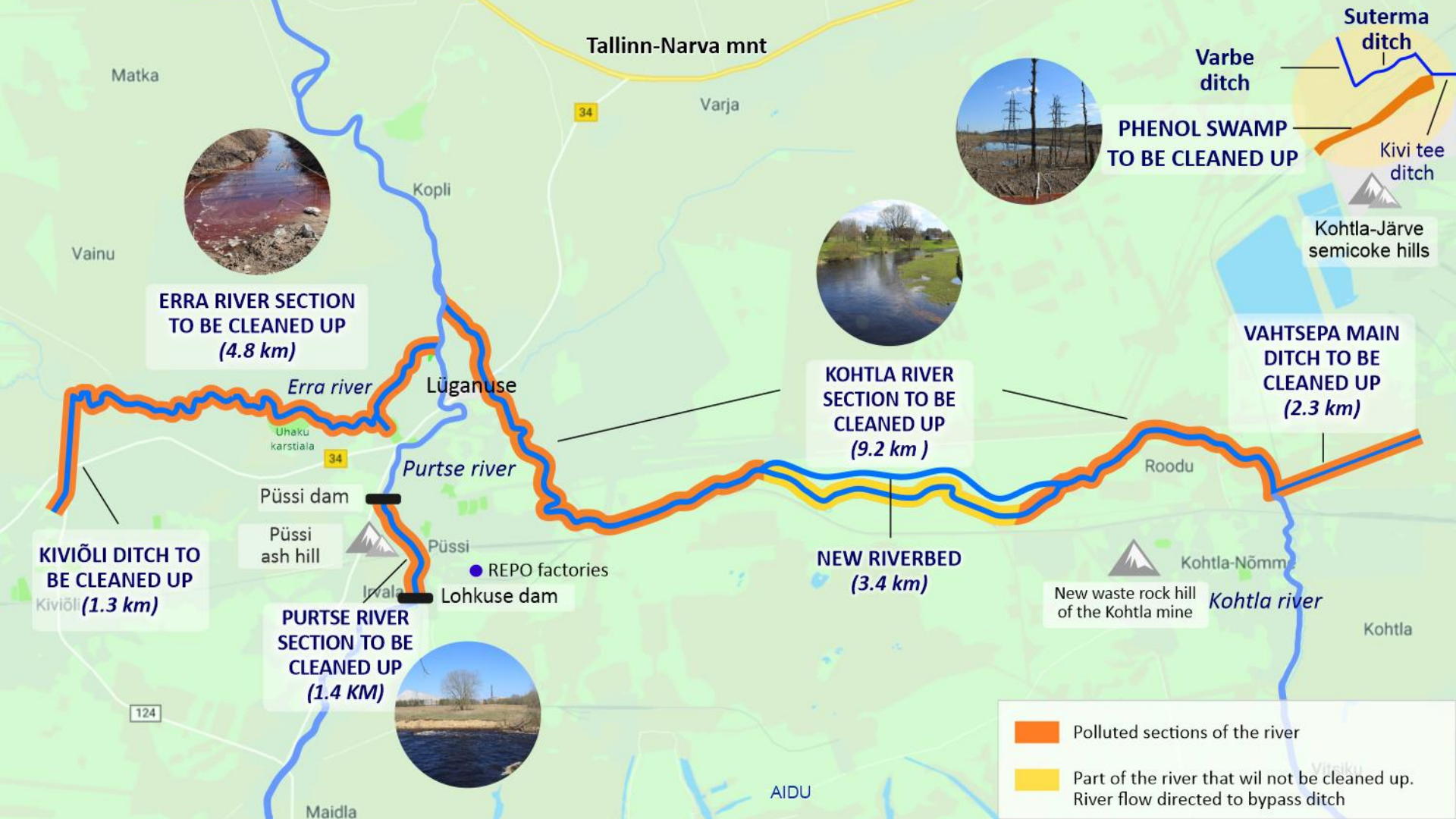
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AIDU

- █ Polluted sections of the river
- █ Part of the river that will not be cleaned up. River flow directed to bypass ditch





Matka

Tallinn-Narva mnt

Varja

Varbe ditch

Suterma ditch

PHENOL SWAMP TO BE CLEANED UP

Kivi tee ditch

Kohtla-Järve semicoke hills

Vainu



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Erra river

Lügänuše

Purtse river

Roodu

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Püssi ash hill

Püssi

● REPO factories

Jvaka

Lohkuse dam

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Kohtla-Nõmm

Kohtla river

PURTSE RIVER SECTION TO BE CLEANED UP (1.4 KM)



Kohtla

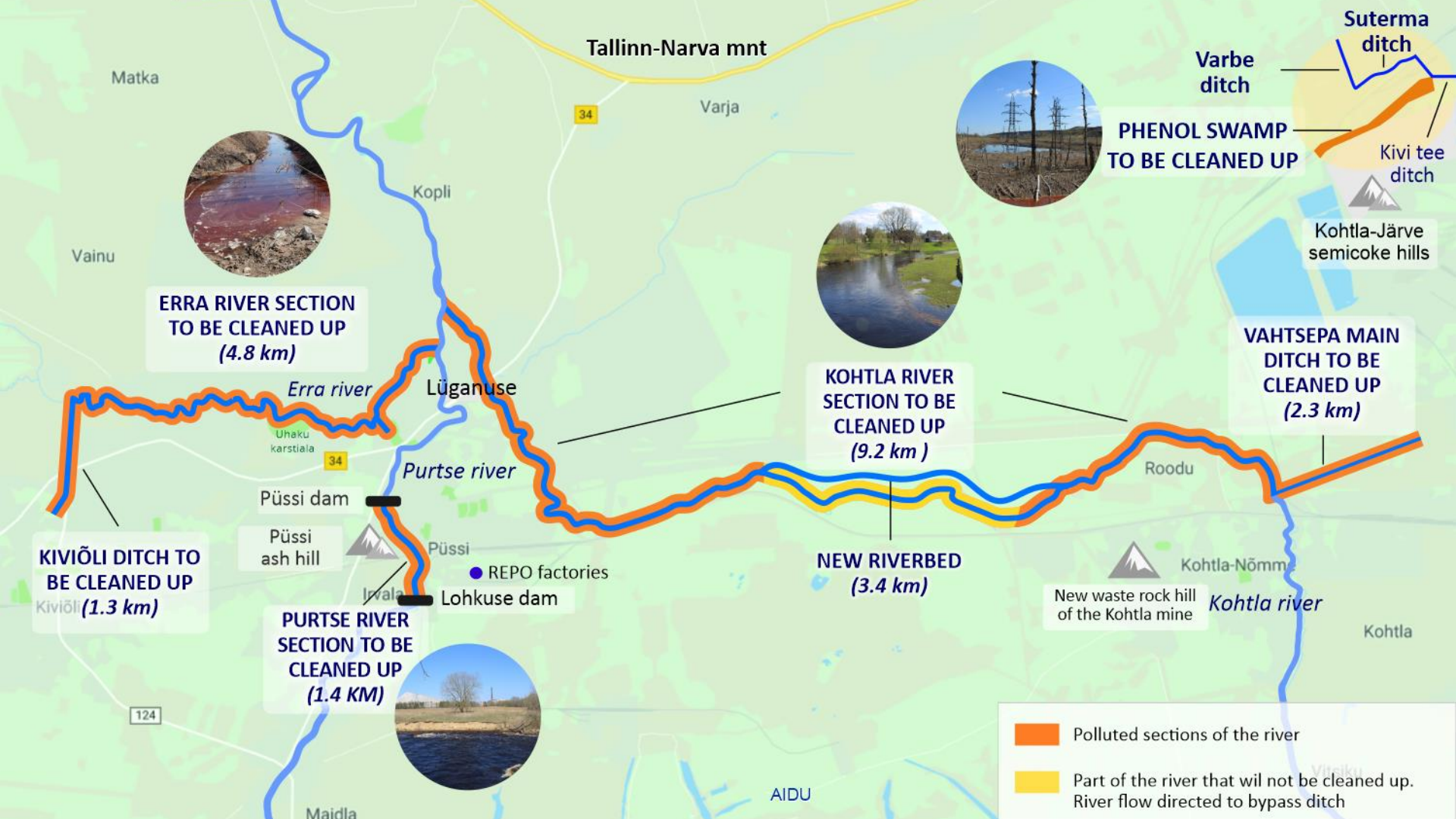
124

Maidla

AIDU

- Polluted sections of the river
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Matka

Tallinn-Narva mnt

Varja

Varbe ditch

Suterna ditch

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Vainu

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Kohtla

PURTSE RIVER SECTION TO BE CLEANED UP (1.4 KM)



Polluted sections of the river

Part of the river that will not be cleaned up. River flow directed to bypass ditch

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AIDU

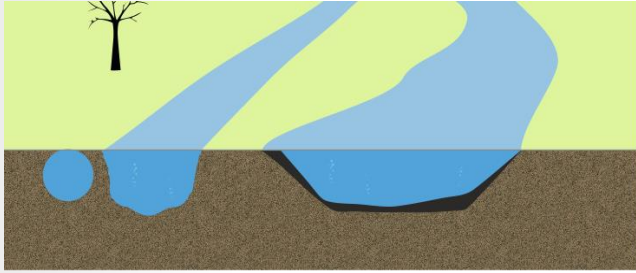
Maidla

Vitõki





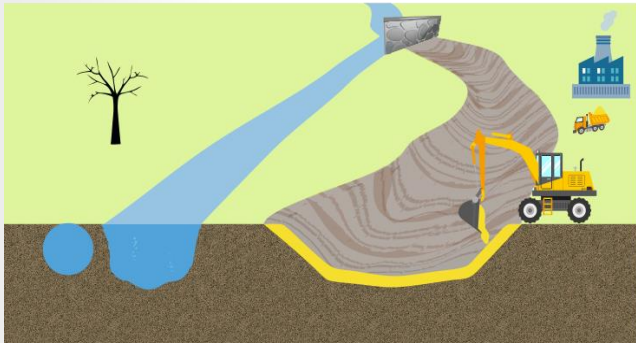
Planned activities



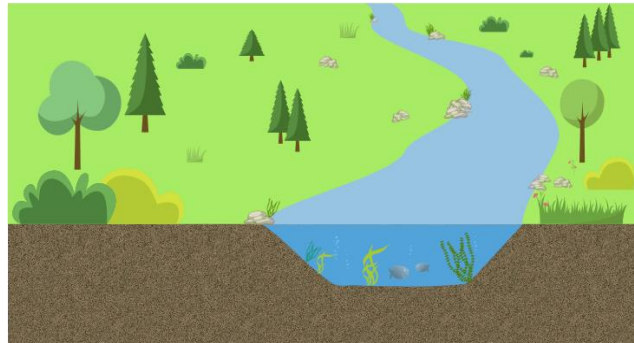
1 The part of the river that is cleaned up is separated with temporary dams and the water is led through a temporary bypass ditch or piping.



2 Polluted soil is excavated and cleaned in a soil cleaning plant.

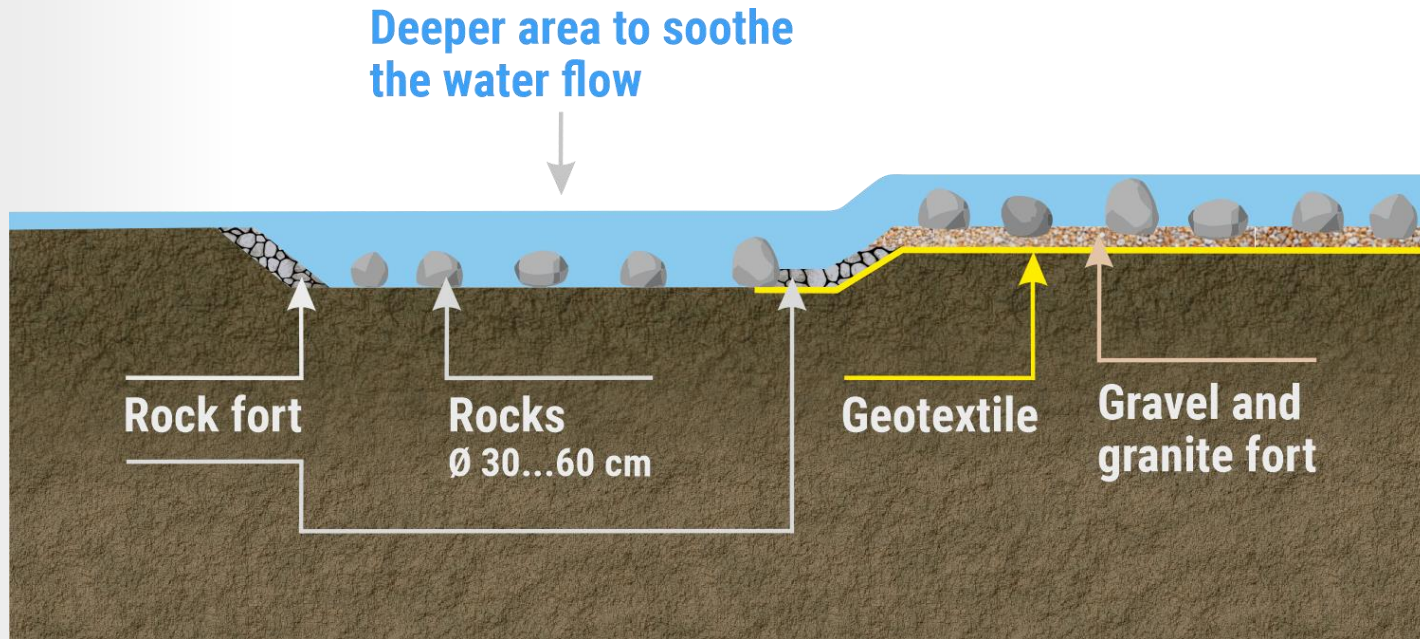


3 The excavated areas are filled with clean soil and given a natural look.



4 Temporary dams and bypassditch or piping is removed. Water is led back to the cleaned river bed.

New artificial riffles will be built to give the riverbed a natural look



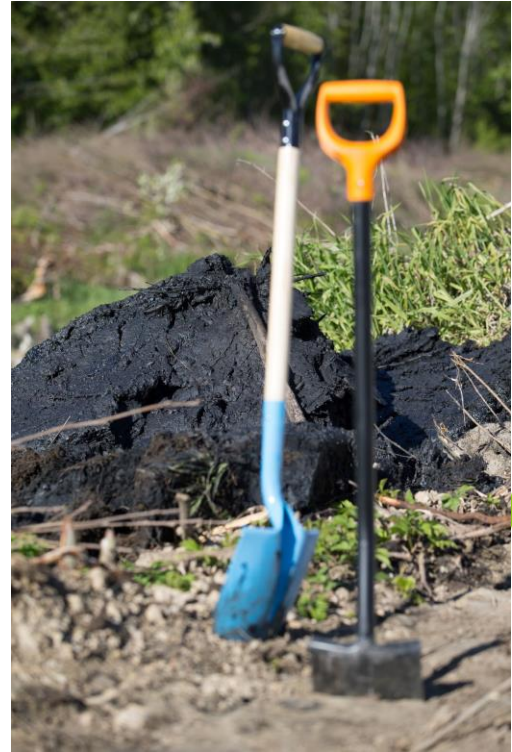
Vahtsepa ditch



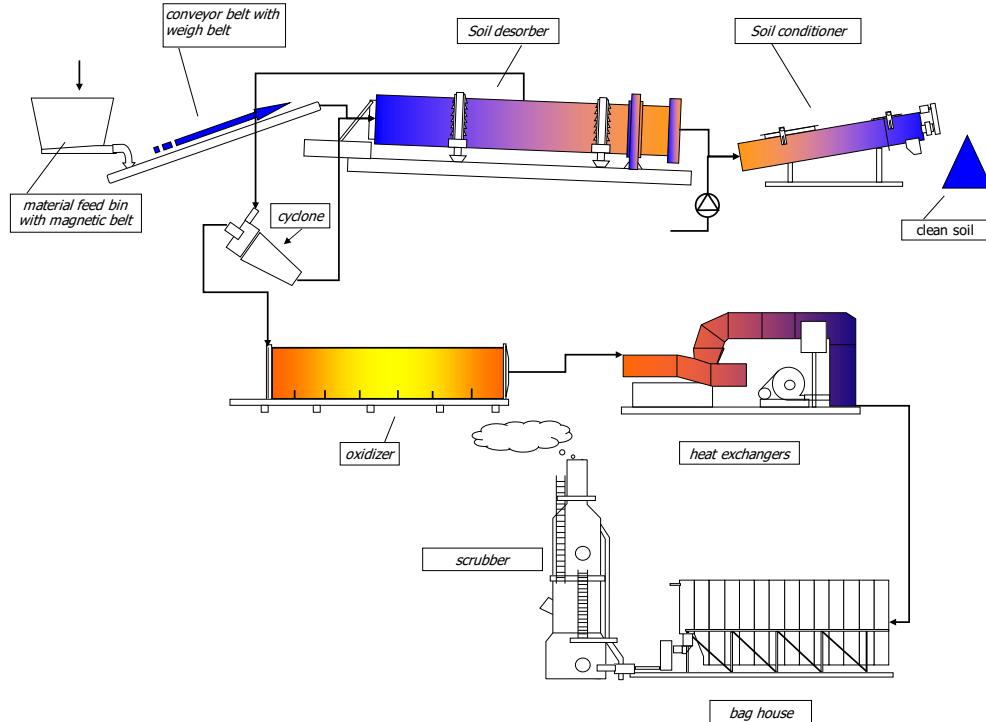
Vahtsepa ditch



Opening event, May 16, 2019

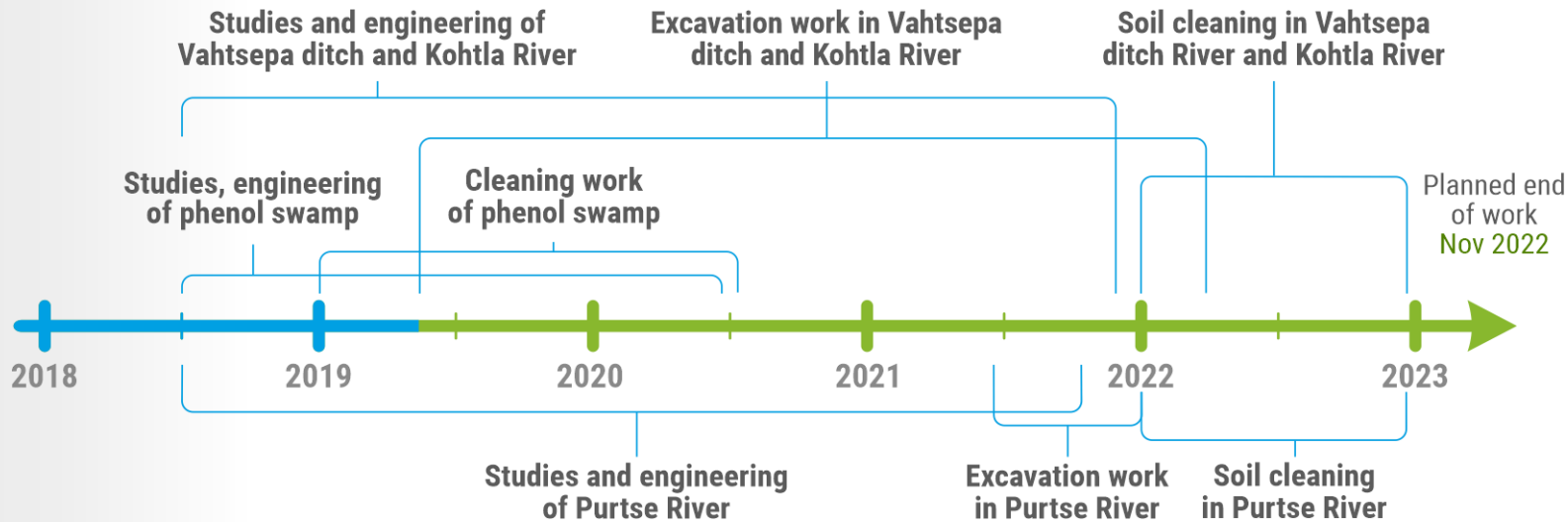


Thermal Desorption Plant Flow Chart

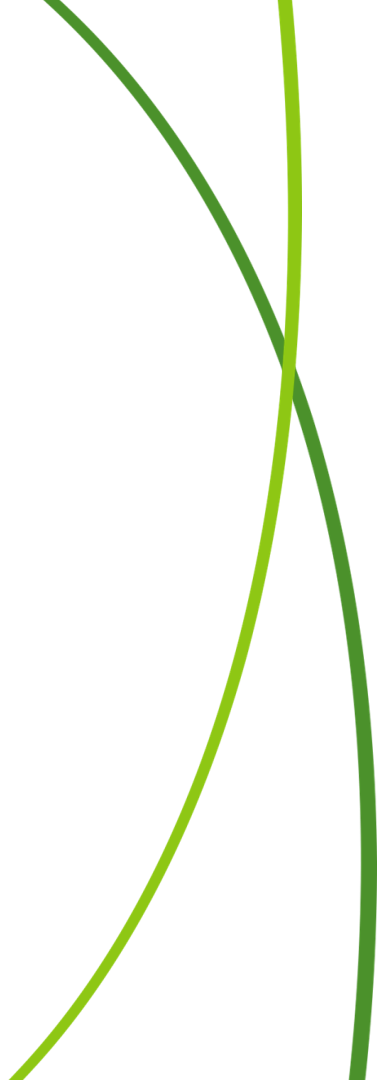


- The process temperature is controlled between 200°-800°C depending on the type of hydrocarbons present in the soil.
- In the oxidizer, vaporized contaminants are destroyed by high temperature 850° -1150°C.
- The oxidizer has a destruction efficiency for volatile organic contaminants in excess of 99%. The end products are CO₂ and water vapor.
- The baghouse is installed to reduce dust emissions to the environment.
- Scrubber system is connected to the process if sulphur concentrations in soil are exceptionally high.

Planned activities and timeline



Questions?



Thank you

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www.envir.ee/purtse