



# Possibilities for mitigating negative effects of noise and dust caused by extraction of sand, gravel and peat

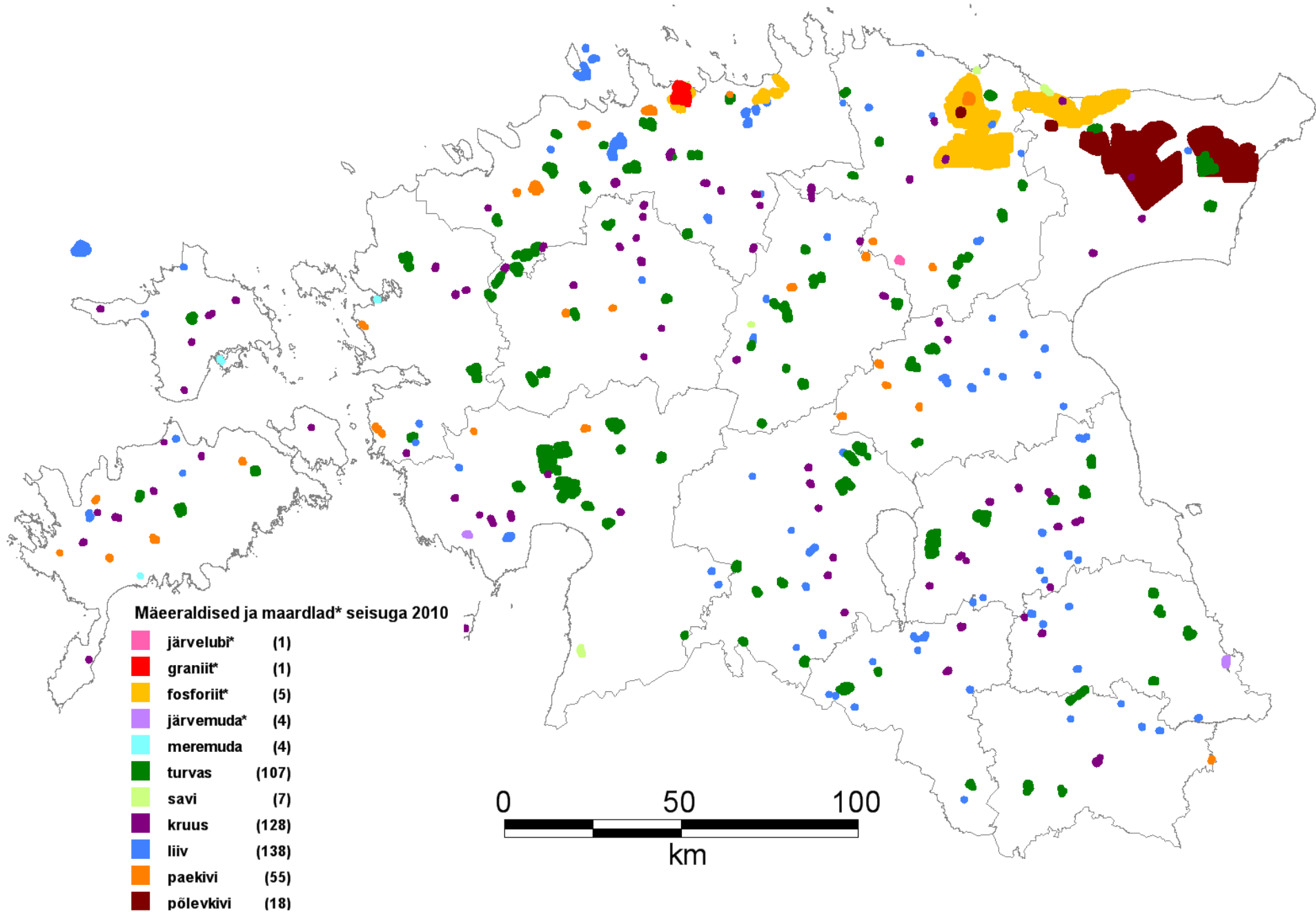
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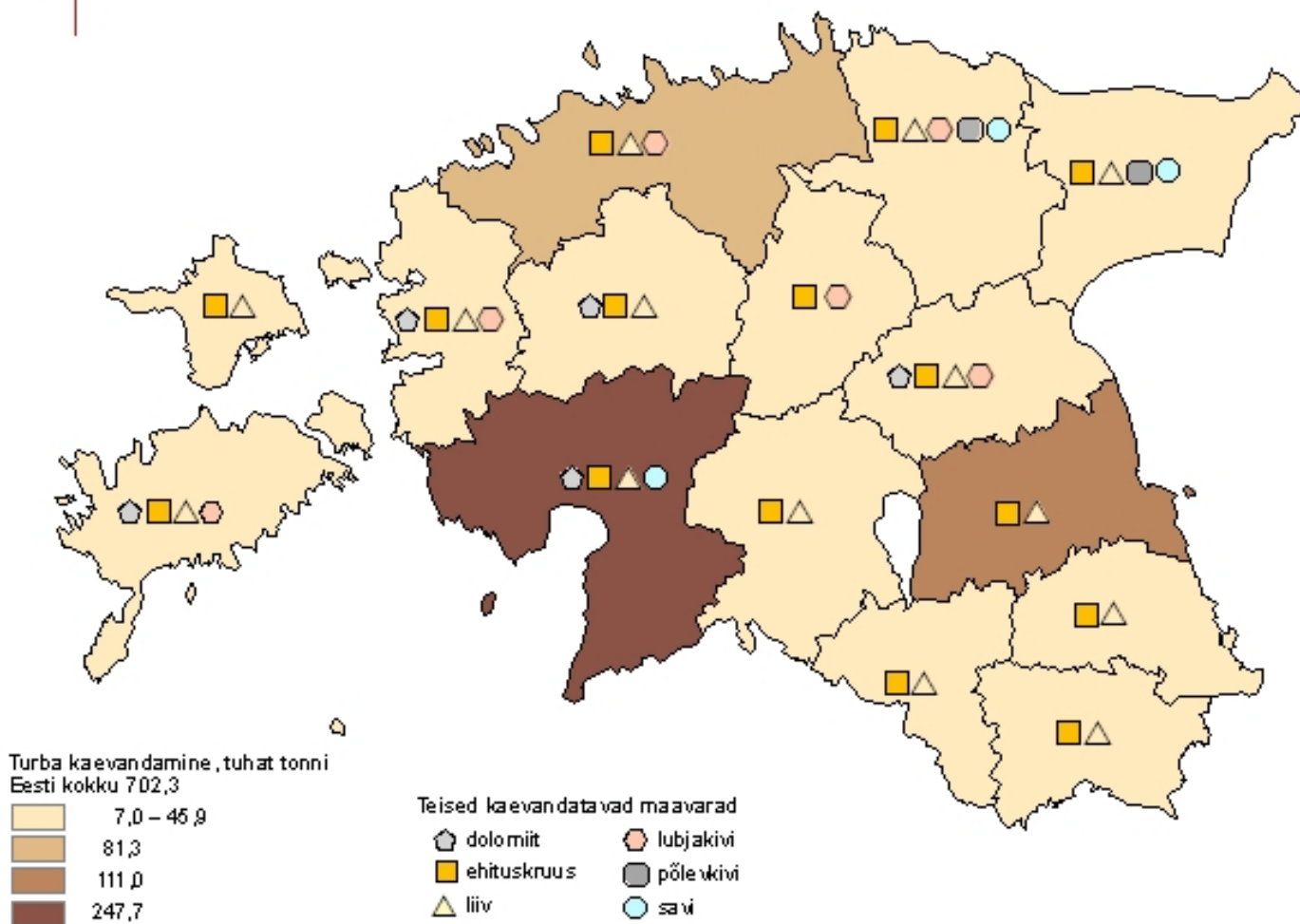
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- For mining permit, an environmental impact assessment (EIA) is needed, including assessment of noise and dust.
- Gravel
- Sand
- Peat

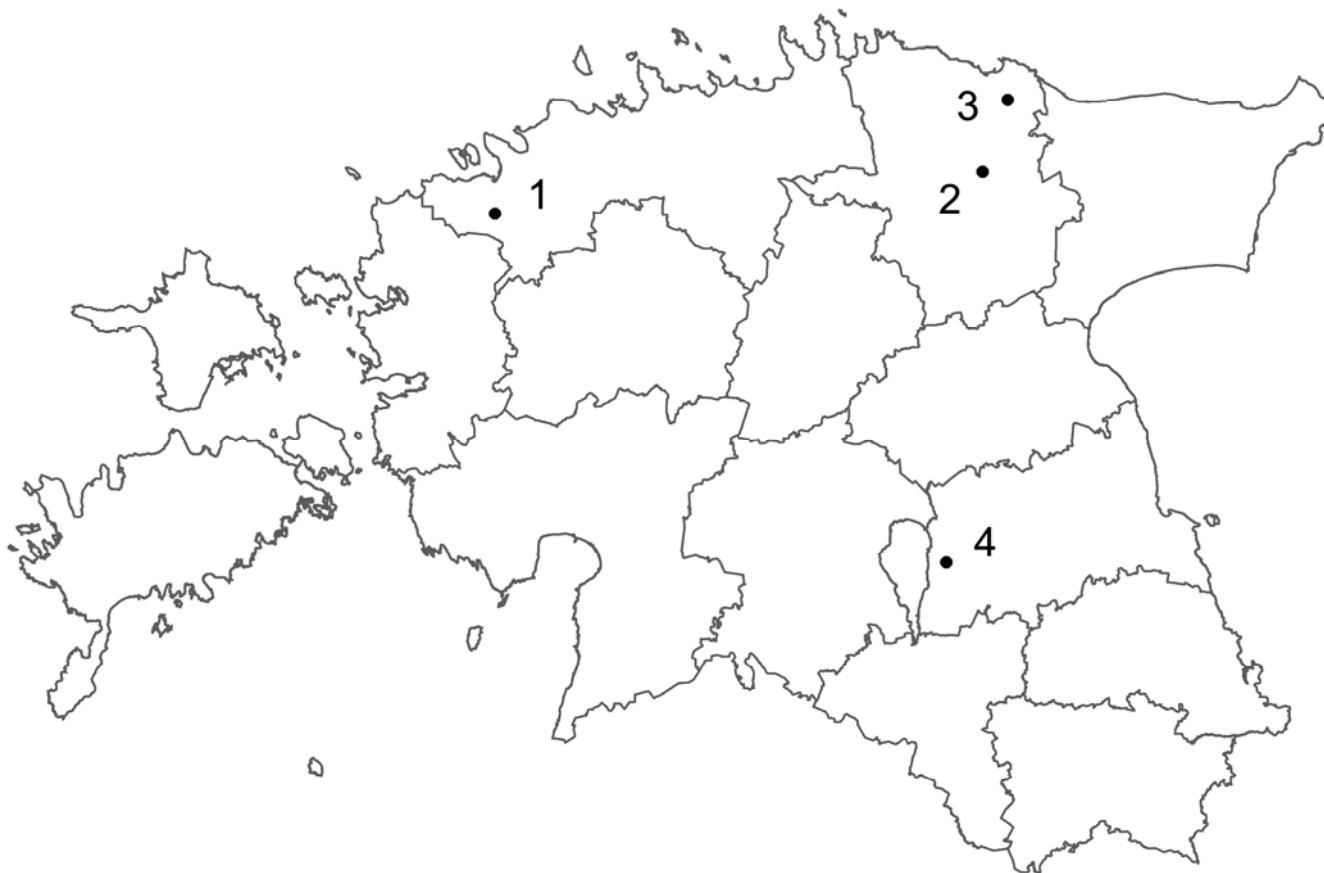


# Peat, 700 kt/y





# Study area



1-Tatramäe II; 2 - Vinni; 3 - Varudi; 4 - Sangla



# Peat dust

Peat production (milling and collection)

Peat dust measurements

Fine particle PM10 measurements were carried out following the Ambient Air Protection Act (RT I, 31.12.2010, 31)

Fine particles PM10 were measured using the Dust Trak II HC dust analyzer, 60 min cycles

# Peat field, collectors





# Measuring dust



# Peat dust

- Measurements of peat dust (fine particles less than 10 micrometer, PM10) diffusing in the ambient during an operating period of 30 minutes gave results between 0.002 and 0.448 mg/m<sup>3</sup>.

# Peat dust

- Diffusion of dust is proportional to the distance from the source and the spreading distance itself is in exponential dependence. Therefore, critical quantities of dust spread only close to the source.
- Based on the acquired knowledge, it is certain that the amount of peat dust will not cause a health hazard to the surrounding population.

# Peat production noise

- Noise caused by the peat transport from peat production areas was measured during summer.
- Production area had the average noise level of 40 dB.



# Peat field





# Noise measurements for pits

- Noise levels were measured following the noise measurement method (RTL 2002, 38, 511) and each point was measured with TES 1254.









# Noise

- Modelling with the CadnaA 4.1 software.
- Noise of the machinery
- Impact of forest
- Transportation noise
- Size and location of spoils

## Noise model for pits

- One excavator (80 dB), one mobile crusher (90 dB) and a dump truck (70 dB) were placed in every pit in the model.
- Model shows that the noise from the pit decreases below 40 dB before reaching inhabited areas
- The model indicates that pit noise will be marginal. The main sources of noise are the highway and other surrounding roads.





















# Dust modelling for pits

- Dust modelling was done with the CadnaA 4.1 software
- fieldwork results, impact of forest, wind direction and speed, location of spoils
- Excavator, mobile crusher and truck
- Results show that already 300 meters away the dust level will be reduced below the upper limit of allowed levels



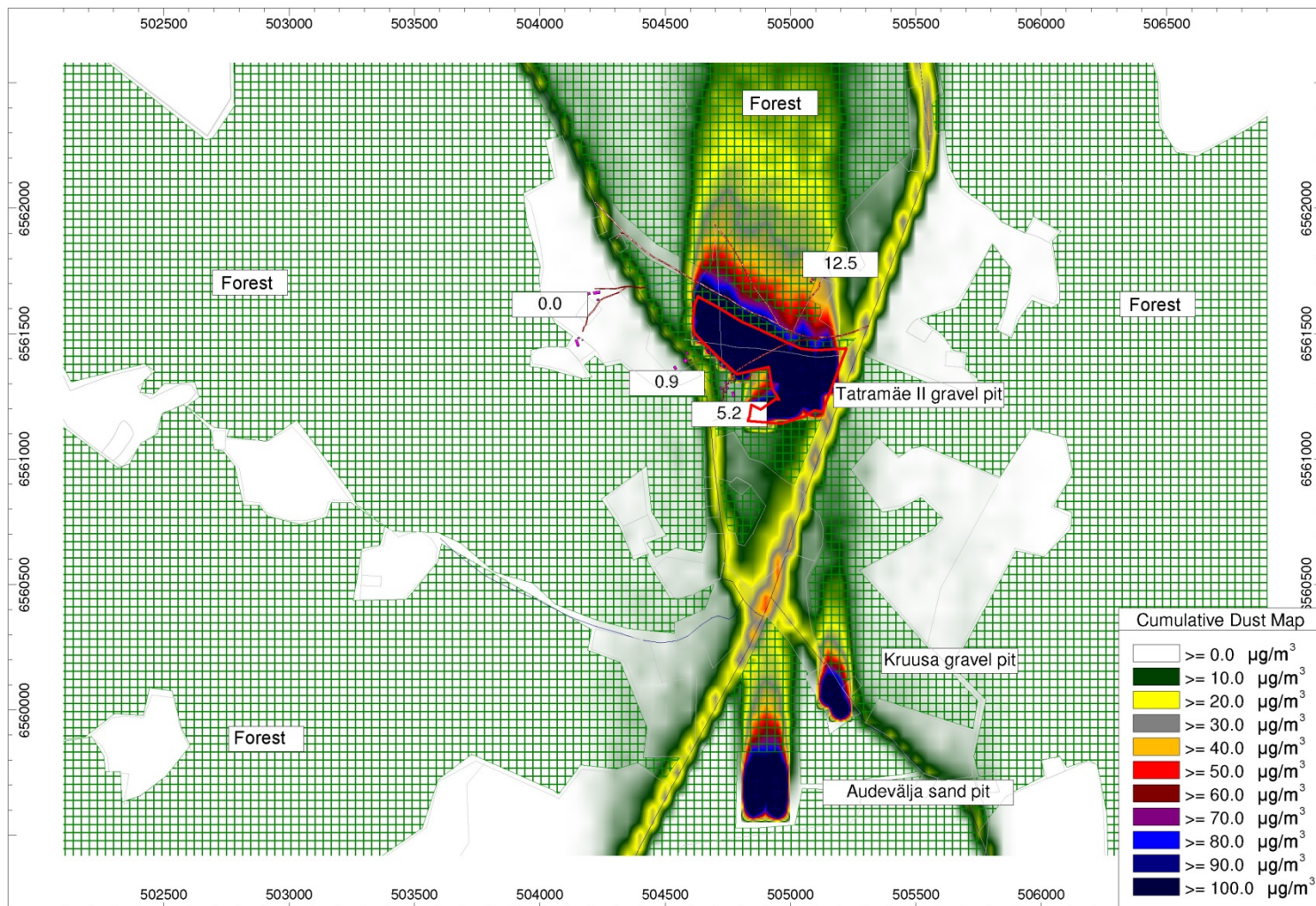




# Cumulative dust model

- Dust from the Tatramäe II, Kruusa and Audevälja gravel pits spreads up to 300 meters away. As the Tatramäe II gravel pit is located 300 m away from the Kruusa and Audevälja pits, it is considered as separate dust source

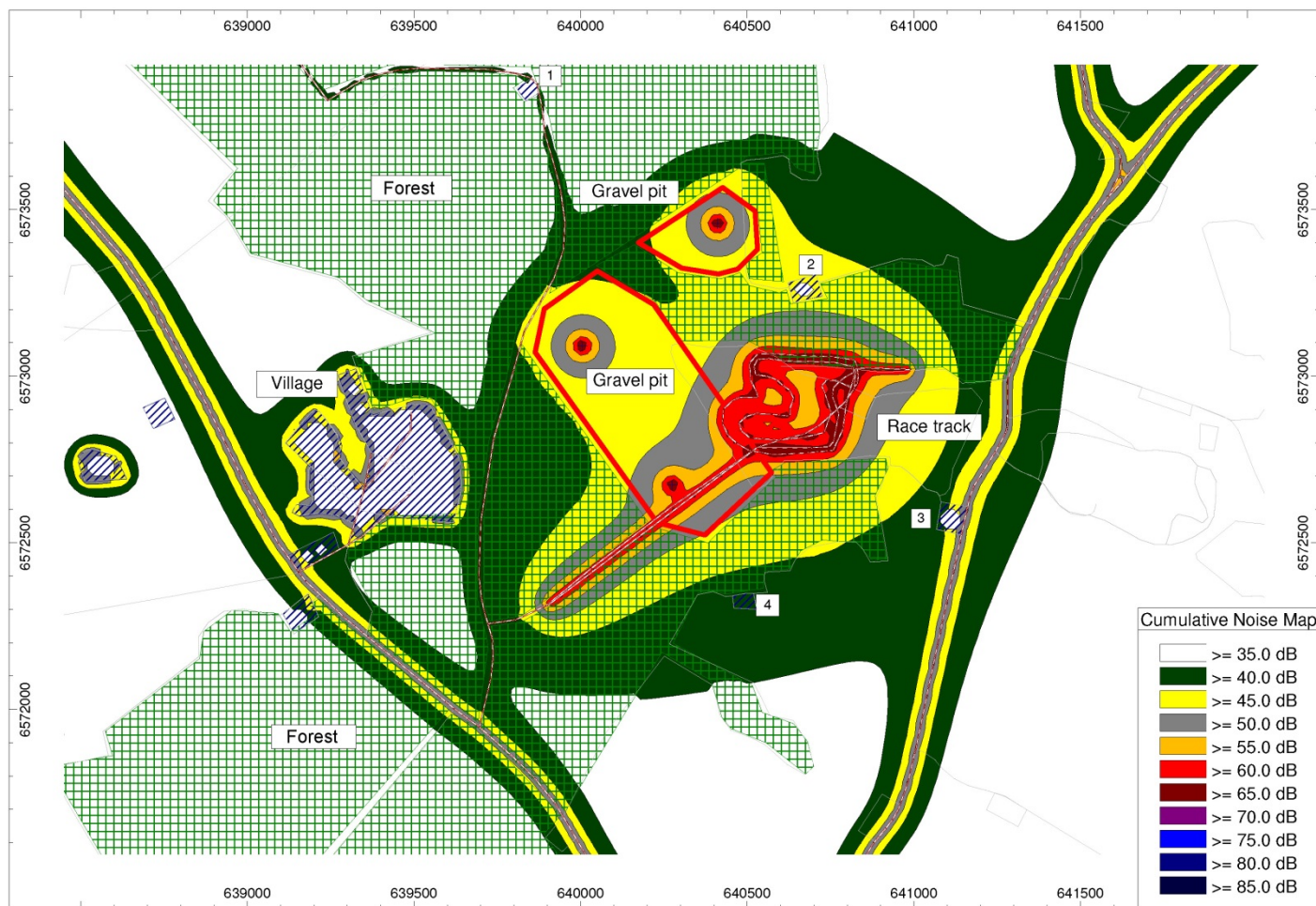




- The Estonian Minister of Social Affairs sets the noise levels tolerable for life (4 March 2002, Regulation No. 42 "Standard Noise Levels for Residential and Recreational Areas, Residential and Public Buildings, and Noise Measurement Techniques").
- This regulation permits noise level below 40 dB during the day and below 30 dB at night.



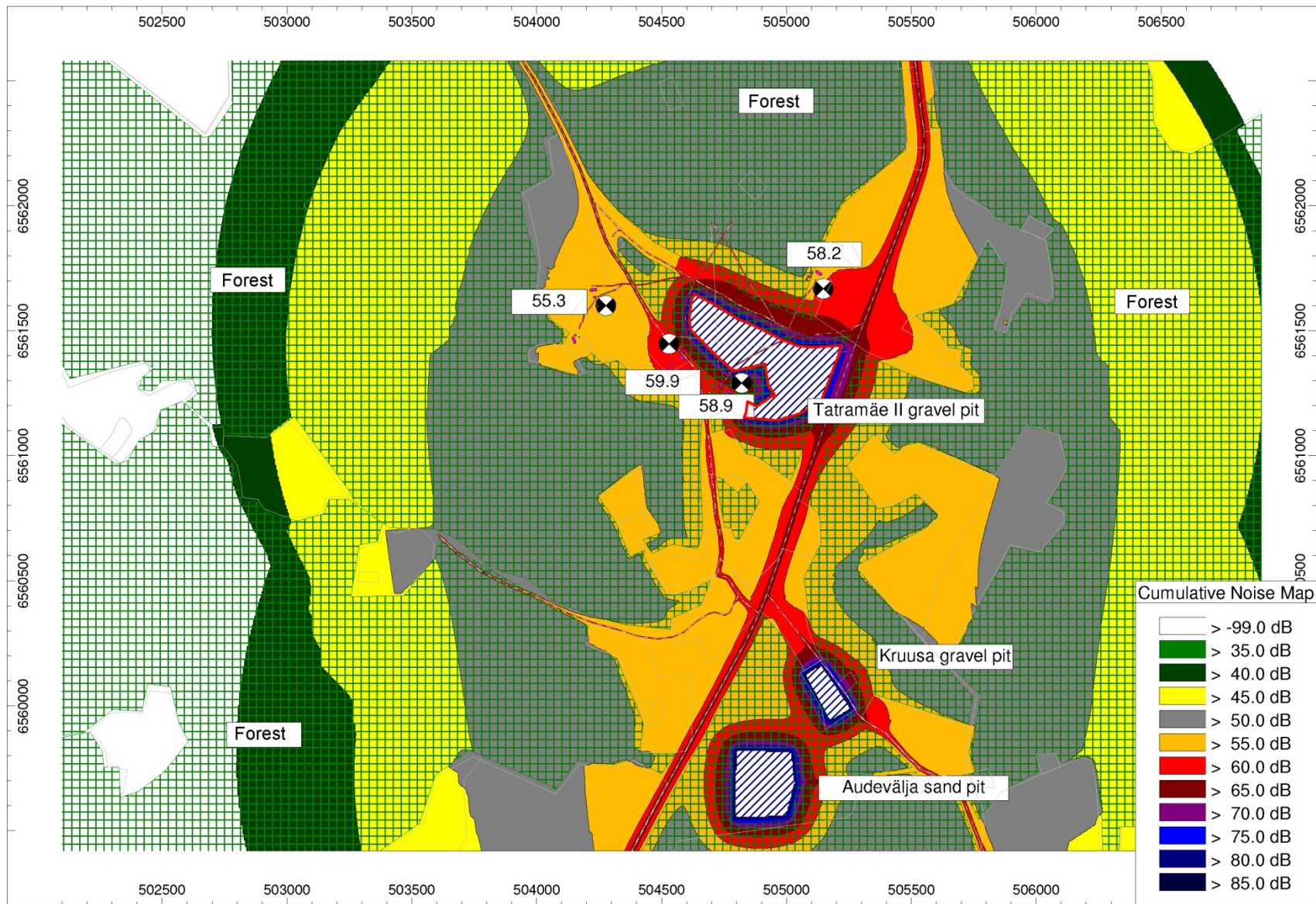
# Gravel pit noise + rally



# Cumulative noise level

- Measurements and modelling results indicate that when gravel pits are simultaneously operating, the noise level increases by 10 dB





# MITIGATING METHODS

- *Peat dust*
- Preserving the surrounding forest (preferably to the width of at least 50 meters).

- Peat transportation machinery must ensure that the load is well enough closed to minimise the impact of dust to the environment.
- Also, for the protection of employees' health, peat mining machinery cabins have to be inaccessible for dust.
- Pit roads should be moistened regularly and the maximum speed of transporting vehicles limited to 30km/h.

# Peat noise

- The most important aspect in peat noise minimisation is the preservation of neighbouring forests, which ideally should be at least 50 meters wide.

- The results of this study show that the usual average noise level in peat fields is 58 dB.
- If residential houses are at some distance from the production area and separated by a protective forest the noise level there will be low (35–40 dB).
- The average content of fine peat dust ( $<10\ \mu\text{m}$ , PM10) is usually 0.002–0.448 mg/m<sup>3</sup> per 30 minutes during operation.

- Measurements in sand and gravel pits show that the average content of fine dust ( $<10\ \mu\text{m}$ , PM10) in ambient air is  $0.011\ \text{mg}/\text{m}^3$  per 60 minutes during operation. Permitted daily average limit is  $0.5\text{--}2\ \text{mg}/\text{m}^3$  for working environment and  $0.05\ \text{mg}/\text{m}^3$  for living environment.
- An important measure is preserving the surrounding forest (50 m).



# Thank You

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