



# What are the railways/countries planning next?

## Banedanmark/Denmark



# Roughness measurements in Banedanmark (BDK) – implications for efficient environmental noise reduction

- A mobile method for estimation of rail roughness level on a large scale, suitable for countrywide surveys
- Data provides useful data for track maintenance both in terms of environmental noise and rail quality
- Data is stored in BDK's track measurement database
- BDK has conducted a statistical analysis to see how roughness levels correlate to other types of rail control measurements
- BDK has developed a tool to rank track sections according to e.g. rail quality, traffic and population density to most effectively out from a socioeconomic perspective to reduce the amount of environmental noise from the track and to document the effect of noise reduction measures



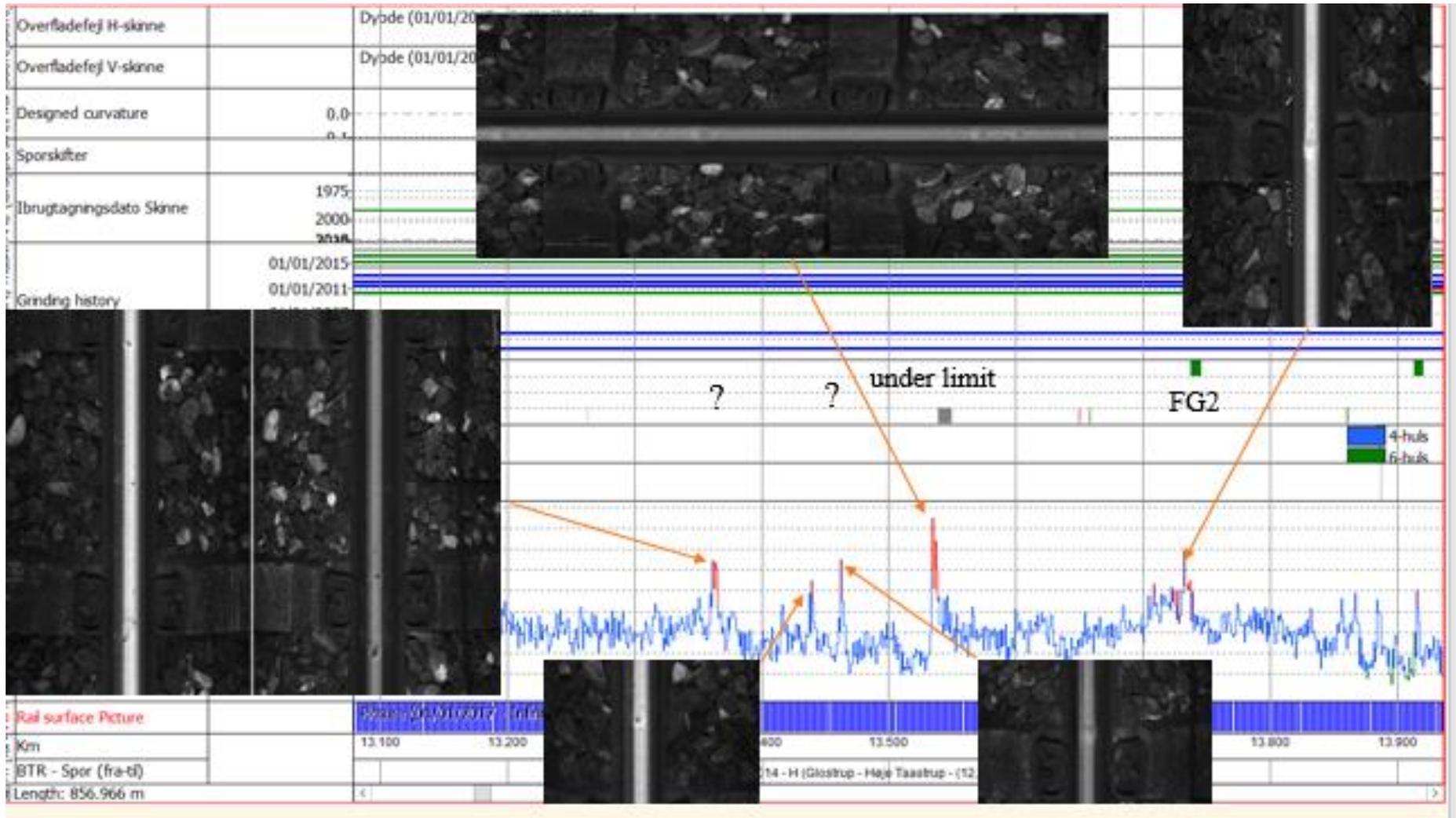
# Roughness measurements in BDK – implications for efficient track maintenance

- BDK has used the data on a case by case basis to:
  - identify previously undiscovered rail defects, including ones in an early stage of development
  - identify zones with bad rail surface quality
  - identify bad quality welds and isolation joints
  - plan, prioritize and assess the quality of large-scale maintenance works such as grinding and milling
  - complement and validate the information provided by other track measurement methods.
- Peaks in the roughness data shows to correlate well with the presence of defects, welds and isolation joints, and its magnitude seems to reflect the severity of the problem

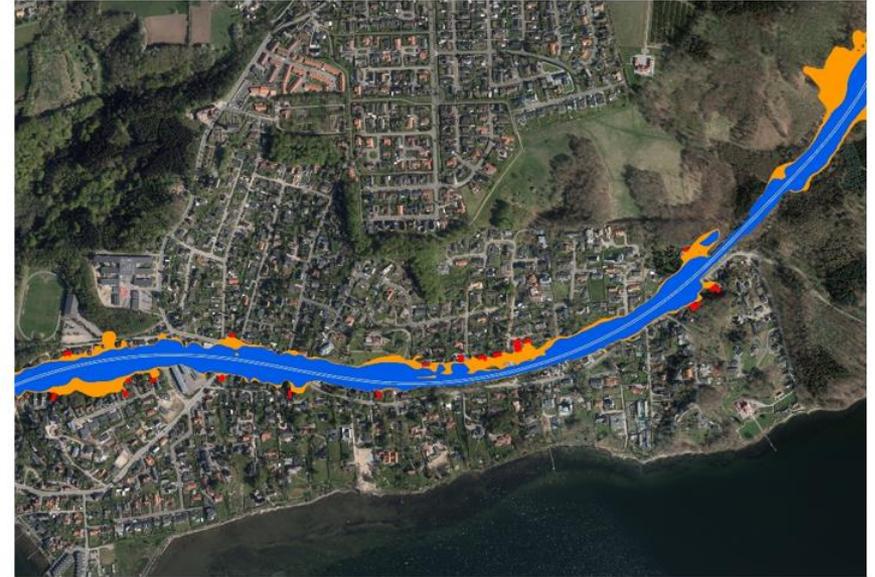
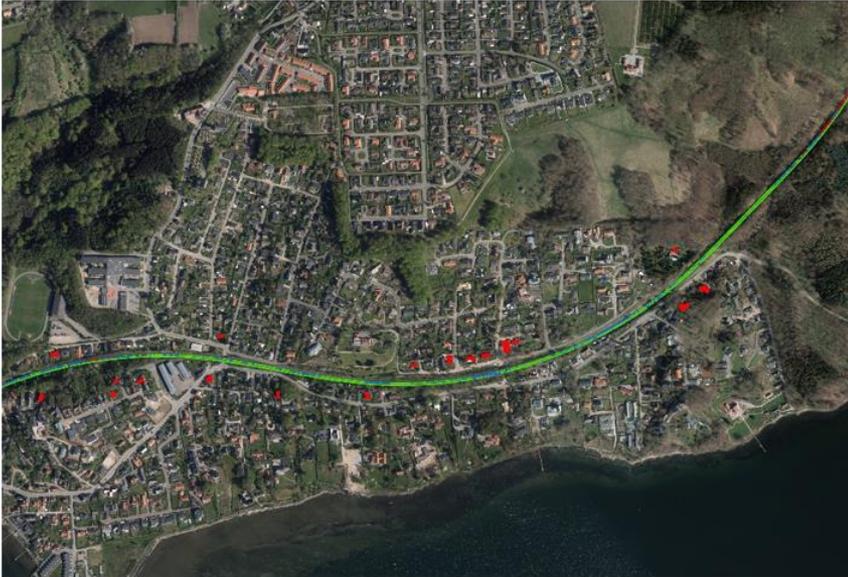
# Roughness measurements in BDK – implications for efficient track maintenance

- Likewise, high roughness levels over large lengths correlate with bad rail surface (including, but not limited to, corrugation), bad quality of maintenance (grinding and milling in particular) or a large time elapse since the last maintenance intervention.
- BDK has given the measurements a significant role in planning the large-scale maintenance operations of grinding and milling
- Future plans include ranking the quality of switches and crossings based on their surface roughness profile.

# Unreported rail defects

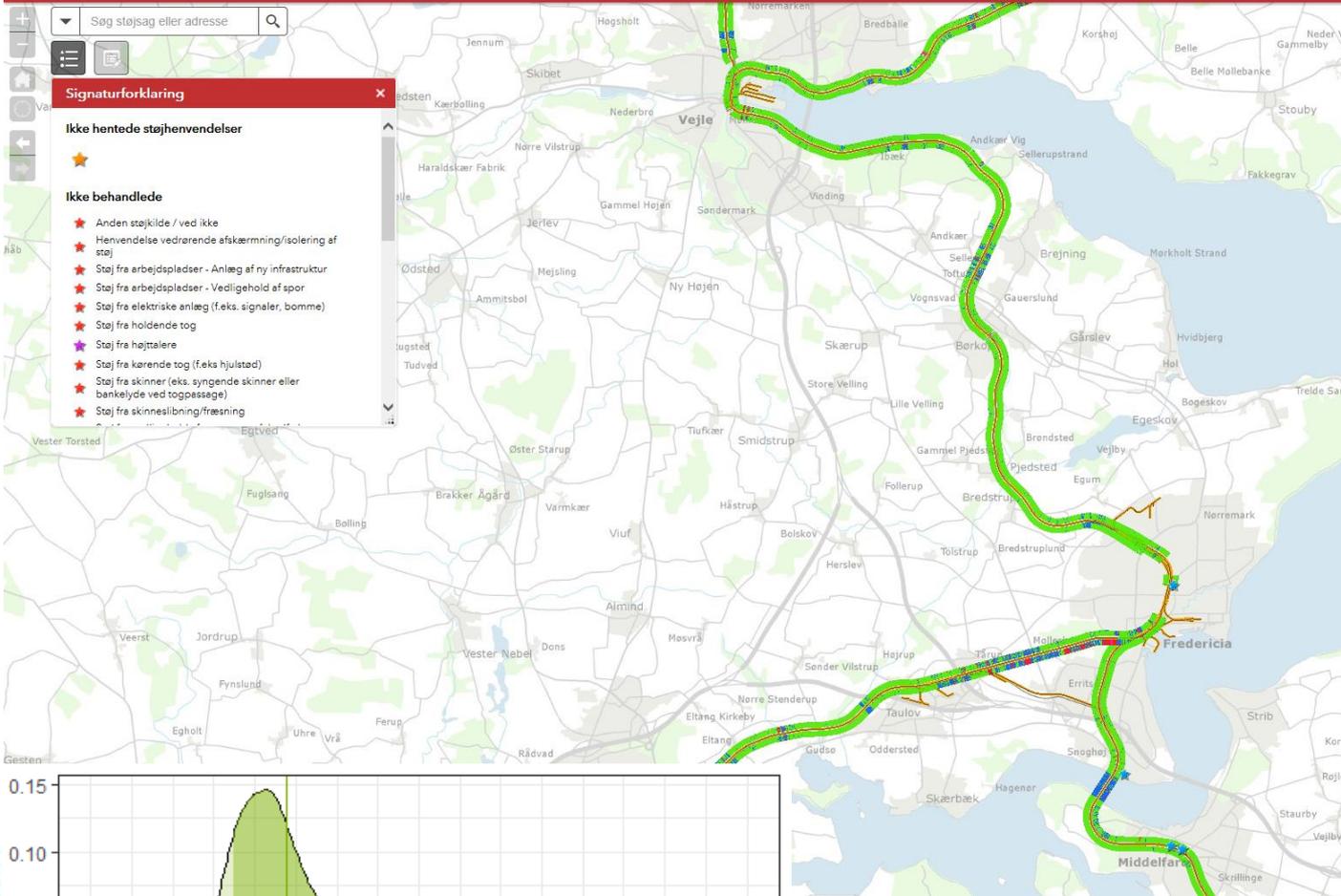


# Roughness measurements in BDK – EU noise mapping END



I eksemplet her fra Bredballe viser de nye målinger at der 37 % flere boliger end hidtil antaget, der er støjbelastede

De nye målinger gør at Banedanmark kan planlægge, prioritere og dokumentere indsatsen mod nabostøj langt mere effektivt end før



**Signaturforklaring**

Ikke hentede støjhenvendelser

★

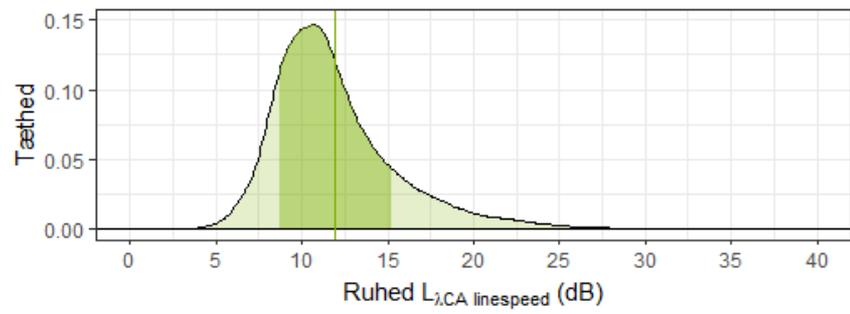
Ikke behandlede

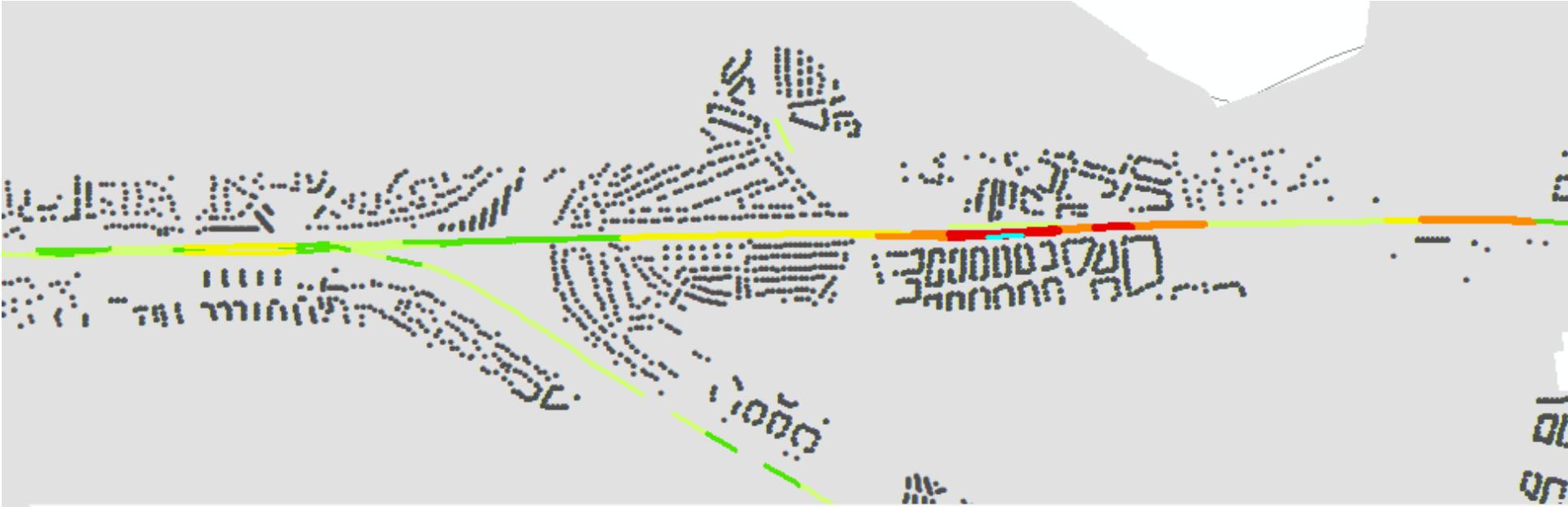
- ★ Anden støjkilde / ved ikke
- ★ Henvendelse vedrørende afskærmning/isolering af støj
- ★ Støj fra arbejdspladser - Anlæg af ny infrastruktur
- ★ Støj fra arbejdspladser - Vedligehold af spor
- ★ Støj fra elektriske anlæg (f.eks. signaler, bomme)
- ★ Støj fra holdende tog
- ★ Støj fra højttalere
- ★ Støj fra kørende tog (f.eks. hjulstød)
- ★ Støj fra skinner (eks. syngende skinner eller bankelyde ved togpassage)
- ★ Støj fra skinneslibning/fresning

**Lagliste**

**Operationelle lag**

- Ikke behandlede
- Under behandling (Sendt fra team miljø)
- Færdigbehandlede (oprettet i 2018)
- Alle støjhenvendelser 2018
- Alle støjhenvendelser 2017
- Støjmålinger fra Irissys
  - Højre side
  - Venstre side
  - Spor
  - Geo
  - Kørestrøm
  - IT og tele
  - Sikring
  - Overkørsler
  - Først
  - Arealer og bygninger
  - Info





Table



ruhed100m

	AVGR	MAXR	N5AVG	N1AVG	BTRSPOR	M fra	M til	R avg	R max	T pers	T gods	T hast	R korr	B dens	P avg	P max	P econ
▶	16.13	26.79	2	1	102004-SPOR 1.hsp	4200	4300	16,13	26,79	24,2	0,1	90	13,36254	375	2,97872	0	1120
	13.95	15.92	0	0	842016-SPOR H	16600	16700	13,95	15,92	19,1	0	100	12,52234	327	3,41463	0	1120
	11.38	14.26	0	0	012002-SPOR V	4000	4100	11,38	14,26	42,2	0,1	180	17,61133	573	3,48432	0	2000
	12.93	21.46	2	0	832006-SPOR H	6000	6100	12,93	21,46	24,5	0	120	13,87778	291	3,83561	0	1120
	13.43	22.72	2	0	842012-SPOR H	12200	12300	13,43	22,72	19,1	0	100	12,00234	278	4,01433	0	1120
	12.02	15.79	0	0	832006-SPOR H	6400	6500	12,02	15,79	24,5	0	120	12,96778	263	4,24242	0	1120
	13.84	16.55	0	0	842016-SPOR H	16800	16900	13,84	16,55	19,1	0	100	12,41234	258	4,32432	0	1120
	13.73	17.07	0	0	012002-SPOR V	3900	4000	13,73	17,07	42,2	0,1	180	19,96133	547	4,37956	0	2400
	15.52	31.19	6	2	102005-SPOR 2	4809	4900	15,52	31,19	24,2	0,1	90	12,75254	249	4,48	1	1120
	11.79	14.16	0	0	104010-SPOR V	11900	12000	11,79	14,16	15,6	0,1	120	12,77361	249	4,48	0	1120
	14.57	24.35	2	0	833000-SPOR 2	6600	6700	14,57	24,35	24,5	0	120	15,51778	333	4,49101	0	1500
	11.75	14.99	0	0	012002-SPOR H	3900	4000	11,75	14,99	42,2	0,1	180	17,98133	524	4,57142	0	2400
	13.48	19.12	2	0	833000-SPOR 2	6500	6600	13,48	19,12	24,5	0	120	14,42778	321	4,65838	0	1500
	14.09	19.24	1	0	012002-SPOR V	3600	3700	14,09	19,24	42,2	0,1	180	20,32133	514	4,66019	0	2400
	14.41	20.10	1	0	012002-SPOR V	3800	3900	14,41	20,1	42,2	0,1	180	20,64133	513	4,66926	0	2400
	13.48	18.42	0	0	832006-SPOR H	5500	5600	13,48	18,42	24,5	0	120	14,42778	313	4,77707	0	1500
<	14.22	26.68	2	1	842008-SPOR H	6200	6400	14,22	26,68	19,1	0	100	12,80234	322	4,80886	0	1120

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