Welcome

Noise Production Ceilings

How Dutch environmental legislation affects railway planning

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https://www.youtube.com/watch?v=vK57j7Kmp3I
The Netherlands
Agenda

- About ProRail
- Noise legislation
  - Noise production ceilings
- Business implications
  - Railway planning
  - Asset management information
- GIS aspects
Our Mission

ProRail connects people, cities and businesses by a dense, intensively used rail network.

ProRail provides a secure, reliable, punctual and sustainable rail network and comfortable stations, in conjunction with operators and partners.

Our professionals work efficiently and cost-consciously on a rail network focused on pleasant passenger travel and unobstructed freight transport.

ProRail. Certainly on the track.
Our Ambition

Safe rail
Zero avoidable accidents

Reliable rail
Zero avoidable disruptions - 30%

Punctual rail
Further increase in punctuality

Sustainable rail
- Less energy consumption
- Highest rung on the CO₂ performance ladder
What we do

Managing stations

Maintaining existing rail network

Construction laying new track, building new stations

Informing operators

Controlling all rail traffic

Allocating the space on the track
Our product: a ‘train path’
Noise

Sound pressure level as function of train speed

- Traction noise
- Rolling noise
- Aerodynamic noise
- Total

Sound pressure level dB(A)

Train speed [km/h]
Noise effects

Source: Milieubalans ‘97
Legislation – (European) Noise policy

One objective

Nobody should be exposed to noise levels which endanger its health and quality of life
Legislation – *Noise Control Act*

Norm applies to Facade
Legislation – *Noise Production Ceilings*

Norm applies to Reference point
Legislation – *Noise Production Ceilings*

- Norm based on Noise Control Act and average levels of 2006, 2007, and 2008 plus 1.5 dB;
- Focus on ‘Noise Production’ instead of ‘Reception’;
- Monitored each year, nationwide;
- Clear responsibilities; ProRail is responsible for keeping Noise Production within limits;
- Noise limits taken into account in allocating railway capacity;
- ProRail is free to maintain, reconstruct and utilize rail system as long as Noise Production stays within limits;
Legislation – *Noise Production Ceilings*

‘Noise production as one of the dimensions in a multidimensional capacity analysis’

\[ \Delta := \begin{pmatrix} \delta_{1,1} & \delta_{1,2} & \cdots & \delta_{1,I} \\ \delta_{2,1} & \delta_{2,2} & \cdots & \delta_{2,I} \\ \vdots & \vdots & \ddots & \vdots \\ \delta_{I,1} & \delta_{I,2} & \cdots & \delta_{I,I} \end{pmatrix}. \]
Impact on business

Capacity claims

Capacity Management Department
4. plan
2. allocate
3. monitor

Year before (T-1) 
This year (T) 
Year after (T+1)

1. Report Compliance

Infra Change

5. plan
construct

Infra Maintenance

AM
plan and construct
GIS challenges

- Data needed for noise modeling
- Combining all the data
- Updating models
- Organization
GIS challenges – Data needed

- Noise barriers
- Tracks and track properties
- Railway usage
- Digital terrain model
- Bridges
- Tunnels
- Fly-overs
- Heights
GIS data – Track Geometry

Source: Topographic basemap

Quality aspect: Timeliness: updated once a year by aerial imagery

http://railmaps.prorail.nl/
http://mapservices.prorail.nl/ArcGIS/rest/
GIS data – Track Height

Source: SIGMA - High precision Track Geometry and height

Quality aspect: completeness, not all routes available
GIS data – Equipment properties (SAP)

Source: SAP EAM – Enterprise Asset Management

Quality aspect: Free-of-error, errors in required data

Track superstructure
• Rail Type
• Rail fastening
• Sleeper type
• Ballast
• Rail dampers

Linear assets registration
• line-id, mileage
GIS data – Digital Terrain Model

Source: Third Party, based on stereo images

Quality aspect: Precision (~ 5 cm, σ 15 cm)
GIS challenge – Combining all the data

http://youtu.be/Imwpf6R3a_k
GIS challenge – Updating models
GIS challenge – Finetuning norms

- Analyse non-compliance
- Correct norm
- Analyse compliance
- Report compliance
Challenge – Organization

ProRail

Asset Management

AM Information
Recap

• Dutch Infra manager ProRail:
  • Maintains rail infra system;
  • Operates rail traffic;
  • Allocates space;

• Noise Production Ceilings
  • New responsibilities for ProRail.;
  • Focus on production instead of reception of noise;

• Noise Modeling / GIS
  • High data requirements;
  • Need for integration / combination;
  • Organizational challenges
Questions?