Session 3 - NOISE

David Richards - Knotty Green
Bernie Douglas - N. Oxford
Prof. Colin Waters - Chiltern Countryside Group.

HS2 TECHNICAL SEMINARS

Meeting Room 4, 2nd floor, 55 Victoria Street, London, SW1H OEU

Noise
15:00-17:00

15:00 – 15:10	Welcome & Introduction of the Seminar	Miranda Carter (chair)
15:10 – 15:15	**Railway noise sources**	Peter Miller
15:15 – 15:25	Comments and questions	Peter Miller / Sasha Villa
15:25 – 15:45	**Noise and vibration mitigation**	Peter Miller
15:45 – 16:00	Comments and questions	Peter Miller / Sasha Villa
16:00 – 16:20	**Noise and vibration impacts**	Peter Miller
16:20 – 16:35	Comments and questions	Peter Miller / Sasha Villa
16:35 – 16:45	**HS2 Ltd's next steps on noise**	Peter Miller
16:45 – 16:55	Comments and questions	Peter Miller / Sasha Villa
16:55 – 17:00	**Next steps and consultation**	Miranda Carter
	ENDS	

"Pre-consultation"

Noise

Railway Noise Sources

Sounds and vibrations are part of every day life

- Travel through the air
- Pass through the ground
- Travel through buildings

Railway Noise

- Airborne noise arises from
  - The rolling stock – motor & fans
  - The wheel rail interface
  - The trains passing through the air
- Ground-borne noise and vibration arises from
  - The wheel rail interface
  - The type of ground
  - Can propagate through buildings

* Also pantographs (German study shows this is the major feature) but denied by HS2!

QUESTIONS?

- Next gen stock 2-3 db less than current trains.
  - subsequently questioned - they don't know if this will apply to UK hybrid trains.

Noise & Vibration Mitigation

Noise mitigation

- Airborne noise can be reduced through:
  - Noise barriers or earth bunds
  - Improved rolling stock
  - High performance maintenance regime
  - Noise insulation (regulations exist)
- Ground borne noise and vibration can be mitigated through:
  - Resilient track forms
  - Floating track forms

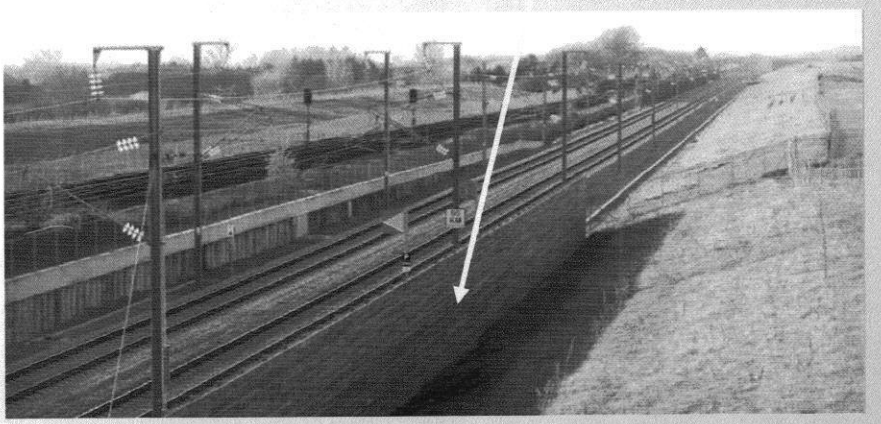
7

e.g. skirts

rough wheels/track make more noise but this is track grinding noise only to be published after consultation

Environmental Impact Assessment – will be a separate consultation on this.

Noise Barriers



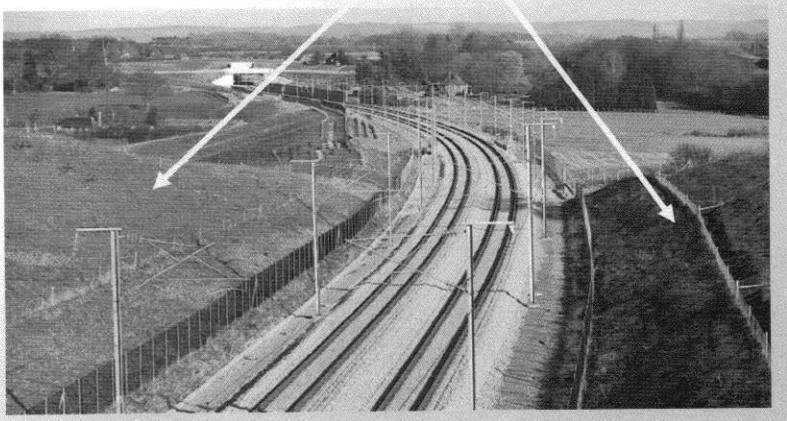
Images HS1 Arup

8

absorb noise as well as reflect.

- can now be green!

Noise Bunds

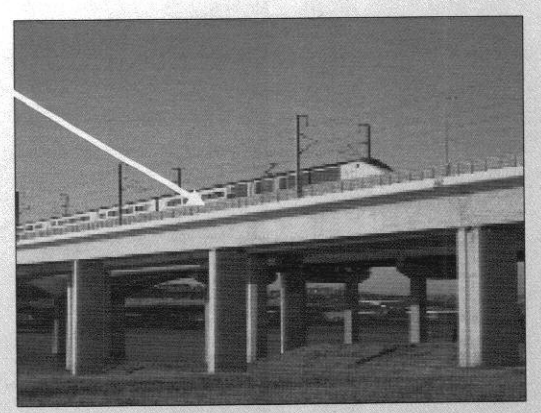


Images HS1 Arup

9

Structures

Low Barriers

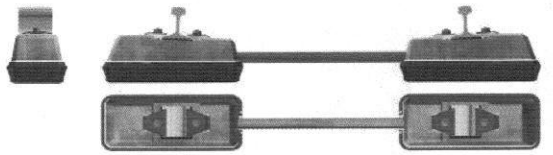


Images HS1 Arup

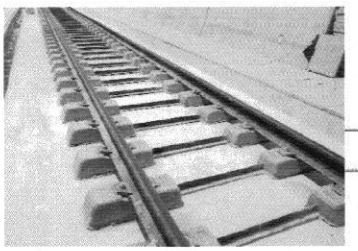
10

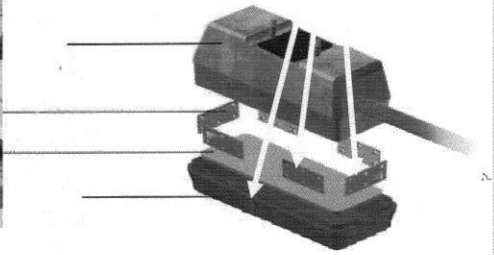
(Medway crossing)

Resilient Track

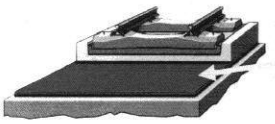


Resilient Material

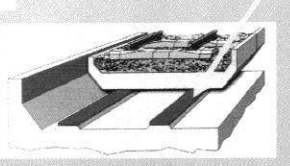


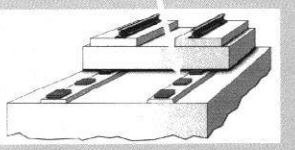


Floating Slab Track



Resilient Bearings





Images Arup

HS1 experience

- Barriers and earth bunds incorporated
- Noise insulation provided
- Resilient track in tunnels
- Airborne noise minimised
- Very few complaints about noise and vibration

Model for HS1 has not been compared with actual performance from HS1

13

Tunnel boom
320kdata for HS1 can be provided.
HS1 travels slower ∴
a) Why have they not assessed this?
b) How do they extrapolate for HS2?

- Noise reductions - actual improvements from HS1 will be provided

* HS2 will provide details of what will be included in both the ~~AOS~~ and the EIA.

- max reduction from absorbant barrier range from 5 -15 db.

QUESTIONS?

- N.B. HS1 has a much lower usage frequency. Didn't know actual frequency of HS1.
- Resilient track is generally only used in tunnels & structures (not level running) -should consider this as a potential mitigating factor.

14

4

Noise & Vibration Impacts

Method 1

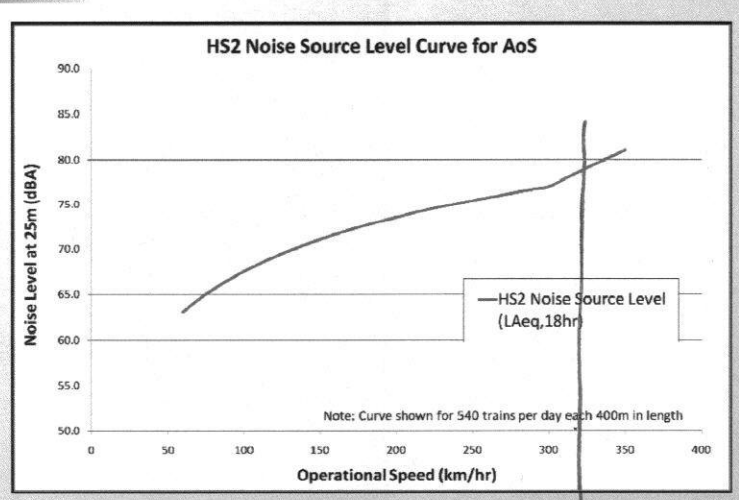
- Railway noise experts have advised us
- Experts are actively involved with railway noise research in the UK, Europe and Worldwide
- Approach is based upon tried methods and recognised criteria
- Studies are informed by real examples
- Computer noise modelling has been undertaken

Method 2

- HS2 Ltd has published an Explanatory Note for Noise
- Strategic noise assessment
- CadnaA Software
- UK method for noise prediction of railway noise + international standard for noise in built up areas
- Includes noise levels of currently operated high speed trains
- Includes current noise level requirements for new trains from European Specifications
- HS2 Ltd's project specification – number, length and frequency of HS2 service
- HS2 Ltd's assumption on train speeds on different sections of the route
- Existing rail noise levels based on Government noise maps
- The HS2 alignment, including proposed embankments, cuttings, tunnels, viaducts and surrounding topography

17

Noise source level



HS2 Ltd Explanatory Note - Noise

18

28 per hour

LMax

LAEQ 18hr

5

* No targets ∴ there are no parameters that can be used to determine the acceptability of the noise for this project.

320 Km average with current technology
360 Km maximum speed " "
320 Km in tunnel

Noise effects

- for people adjacent to the route noise increases would be noticeable without mitigation
- with mitigation those experiencing a noticeable noise increase would reduce
- HS2 Ltd is considering how to mitigate the most affected locations
- some dwellings would require further insulation to counter high noise levels

19

Noise insulation regulations
68 bb +1
63db +1

HS2 Noise Predictions

Recommended Route (March)

Unmitigated:-

- Noticeable noise increase c.21000 properties
- Residual high noise levels c.350 properties

Recommended Route (March)

Mitigated:-

- Noticeable noise increase improves c.9700 properties
- Residual high noise levels c.50

20

What were the assumptions? 3m high barriers on relevant sides.
3db reduction in source level as a result
Comparison of existing railway noise to HS2?
Noise maps will be included in AOS.

Work since March

- Route refined
  - Brackley-Turweston
  - Wormleighton – Ladbroke/Southam
  - Stoneleigh
- Route lowered
  - Boddington-Wormleighton + Tunnel at Chipping Warden
  - Covered through Burton Green
  - Lowered near Hints
- Noise impacts would further reduce
- HS2 Ltd continues to refine the route to minimise potential noise impacts

Cut & Cover Tunnel

Images HS1 Arup

Vibration Initial Findings

- London Tunnel (clay) – based on HS1 & US experience
  - beyond 100m of tunnels vibration is highly unlikely to be an issue
  - within 100m properties could experience vibration if no mitigation
  - application of resilient track forms provides effective mitigation
- Chilterns Tunnel (chalk) – based on HS1 & US experience
  - beyond 200m of tunnels vibration is highly unlikely to be an issue
  - within 200m properties could experience vibration if no mitigation
  - application of resilient track forms would mitigate effects
- HS2 vibration and ground borne noise would be mitigated

- Is this the same as HS1? Seems so.
- Did it work? "few complaints" no complaints of vibration.
- taken advice from HS1 engineers. N+V is not an issue. (Rupert Taylor + Richard Grieg)

Is HS2 Ltd committed to reduce noise and vibration?

- Noise has been considered from the outset
- Noise is and remains a priority for mitigation
- Mitigation options will be discussed with local people to provide local solutions
- An Appraisal of Sustainability will be published to reflect the updated route and it's performance
- Noise studies form part of the Appraisal of Sustainability

- What is an acceptable level? There is no figure.
- Take away the fact that there is no target.

? 15mm particle deviation?

QUESTIONS?

25

HS2 Ltd's Next Steps on Noise

26

7

Consultation

- Noise maps and explanation will be provided
- We will simplify a complex subject so that the results are accessible to all
- Noise specialists will be available to assist you
- We intend to provide demonstrations of acoustics to help understand railway noise

27

Next steps

- Following Consultation the Secretary of State would announce the final route
- A detailed design would be developed
- An Environmental Impact Assessment would be commissioned
- The Scope and Methodology of the EIA would be consulted upon
- The EIA would include detailed noise assessments (including Noise Insulation Regulations)
- Results would be published
- Local people will be consulted

28

"New Year"
4-6 months
(minimum is 3 months)
End of 2011

EHS did fall within guidelines of Cab. office.
Philip Hammond statement.