

File Note

Meeting held at CYP in St Kilda Rd on July 8, 2021

Attendees

- Rob Mair
- Jordan Turner
- Kym Burgemeister
- James Hamilton
- Gary Buck
- Jan Swinburne

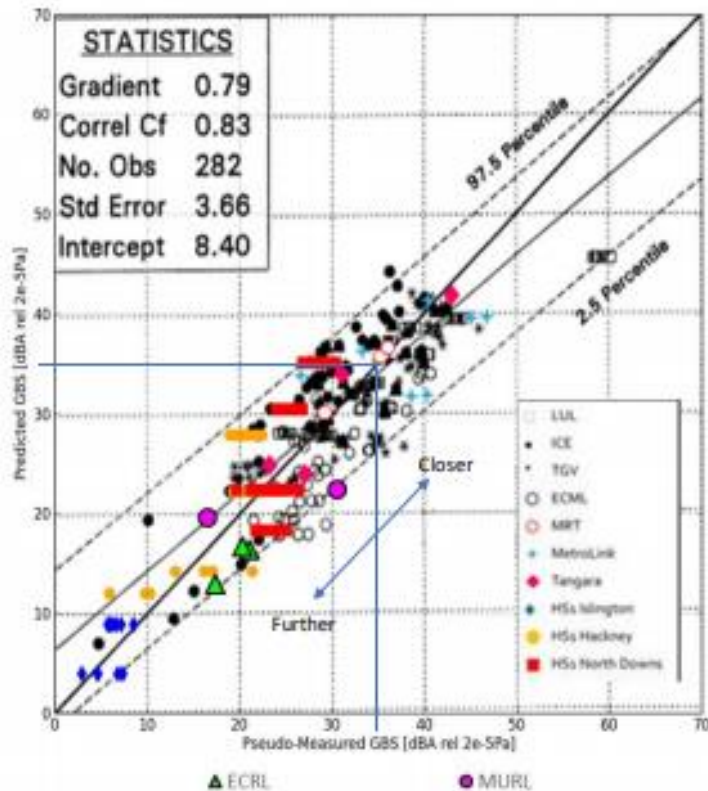
Via Zoom

- Paula Williams
- Shane Brown

Intent of meeting was to understand the operational vibration impacts on The Botanica after the system is commissioned.

Kym walked through a detailed presentation. Points to note

- Late into the negotiations before contract signing, the Government added a more stringent requirement. Required that a reduction was achieved and not just a goal.
 - My take is that this is likely to have added quite a heavy focus from the project team.
 - Would be very interesting to understand 'why' it was added. A reaction to an issue elsewhere perhaps??
- Graham Brown from Aurecon/Jacobs/Mott McDonald JV was major reviewer.
- High level of expertise focused on the noise/vibration issues.
- Modelling done for this project was a development on work done for Channel Tunnel extension / Crossrail and others
 - Area of strong of academic research
 - Kym has published quite a lot with some in this area ([Kym Burgemeister - Google Scholar](#))
 - Showed a slide that demonstrated the model provides sound level of prediction. ie The model actually works well. See chart below



- Based on ISO 14837 standard.
- Modelling done shows that the quality of track has an impact on the resultant ground borne noise and vibration levels.
 - CYP build the track but do not maintain it.
 - Model used the average figure for 'roughness' for all Melbourne lines.
 - V low maintenance is done on commuter lines in Melbourne.
 - There is quite a lot of variation on various lines.

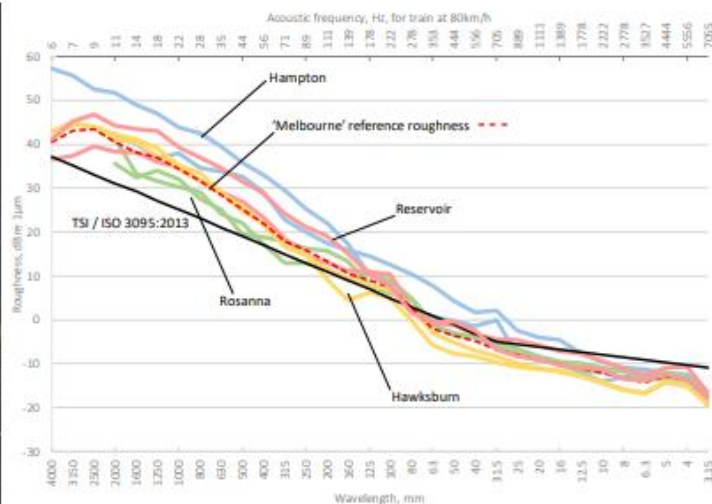


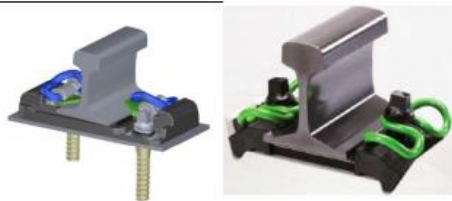
Figure 6: Melbourne network system rail roughnesses, re ISO 3095 (2013).

- My take is that the new line should be materially better than the 'average roughness' and even without any maintenance, maintain a smoothness advantage for some years. This is upside for us.

- The model also is based on the new rollingstock.
 - This is OK as older rollingstock cannot be run on the new line.
 - If this was not the case, I'd be concerned that the vibrations may be caused by poor quality rollingstock being used. That gear is also likely to cause premature degradation of the track. Not an issue now.
- The contractual requirement has different standards. The standard for the Parkville Hospital precinct (with very sensitive equipment) is much higher than required for other areas.
- To deliver the contractual levels required, it is a balance of reliability, availability, maintenance and safety (and cost)
 - There is a large variety of track base, rail and fastening systems. Cost variation is around 3-5 times higher in the highest spec system.
 - One type of fastening system changes the frequency of the noise/vibration. This moves it to a frequency that is lower than the human hearing range and so is great for residential. This is not however suitable in areas with electron microscopes which will still 'feel' the low frequencies.
- Modelling has been done for hundreds of points along the track
 - Track treatment is one of three levels (details in the chart below)
 - Standard (under parkland and industrial)
 - High (under residential like The Botanica)
 - Very high (under Parkville)

Table 1: Trackform options

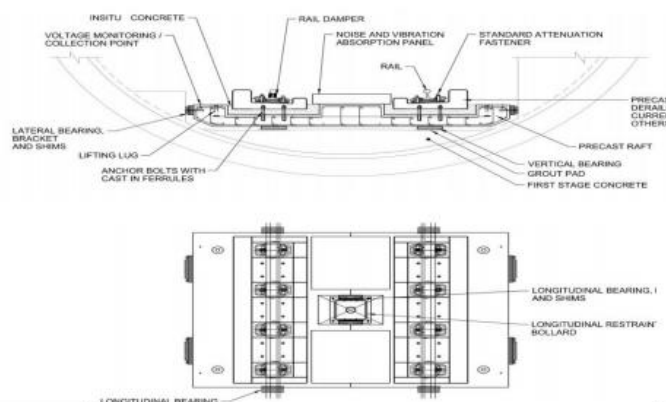
Standard Performance
eg. Deltor Alt-1
Pandrol Vipa
Vossloh 300



High Performance
eg. Deltor Egg
Vossloh 336



Very High Performance
Floating Slab Track (FST)



- Typically in buildings the floor most impacted is the first floor
 - Does not have the solid earth like the ground floor (basement in our case).

- Does not have the absorption that is achieved as you go up a building.
- Our building has been modelled and is comfortably under the contractual levels. We are one of the green dots above the Black A adjacent to the 12500 mark on the next chart.

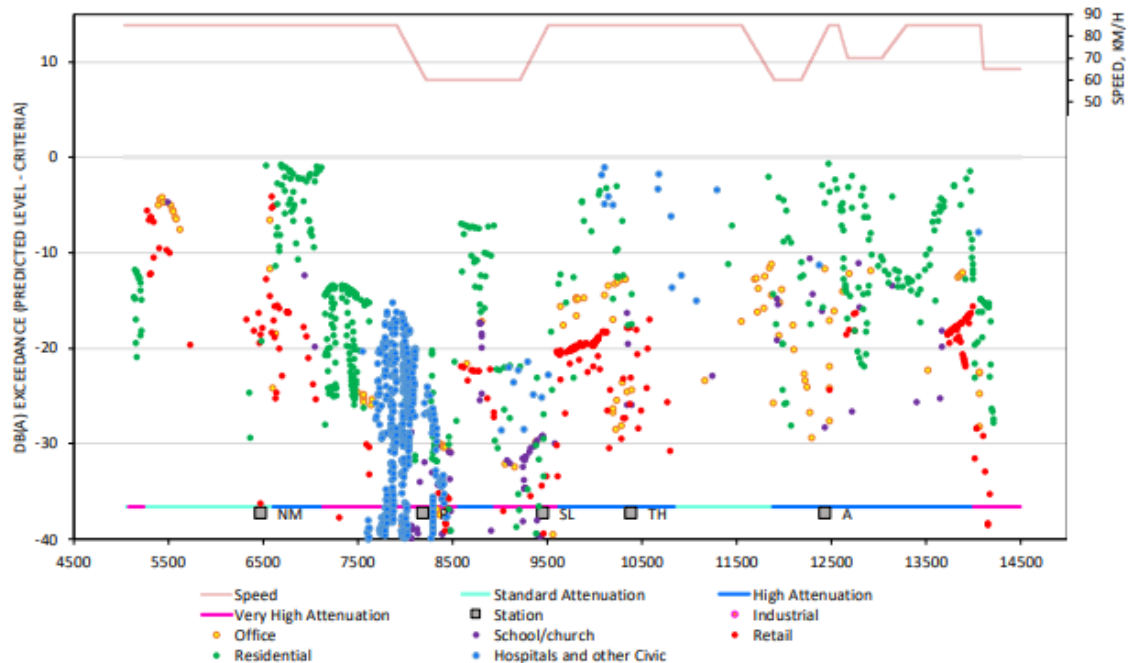


Figure 7: Alignment wide GBN predictions with optimised track design.

- Contractually they only have to meet the standard on 95% of occasions – allows for trains with flat spotted wheels etc.

I asked if my assumption was right that being at a station reduced the vibration. Kym agreed it was likely but that did not seem to show through in the model – or minor at best.

I asked what happens if the contractual levels are not achieved when the system is fully commissioned. Kym noted that it would be prohibitively expensive to replace rail infrastructure. It would also be difficult to mitigate via modifications to our building. Most likely solution would be a speed limitation on track.