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Airborne Rail Noise Effects at Glasnevin during Metrolink Project

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Contents

1. Introduction

This document sets out the assessment of airborne noise impacts relating to the development of the rail interchange at Glasnevin between the existing Iarnród Éireann (IE) rail lines and proposed new Metrolink station during the operational phase of the Metrolink project.

Figure 1 illustrates the layout of the Metrolink station box (in yellow), the metro line (in blue), and its intersection with the Great Southern Western Railway (GSWR) and the Midland Great Western Railway (MGWR) railway lines (in red).

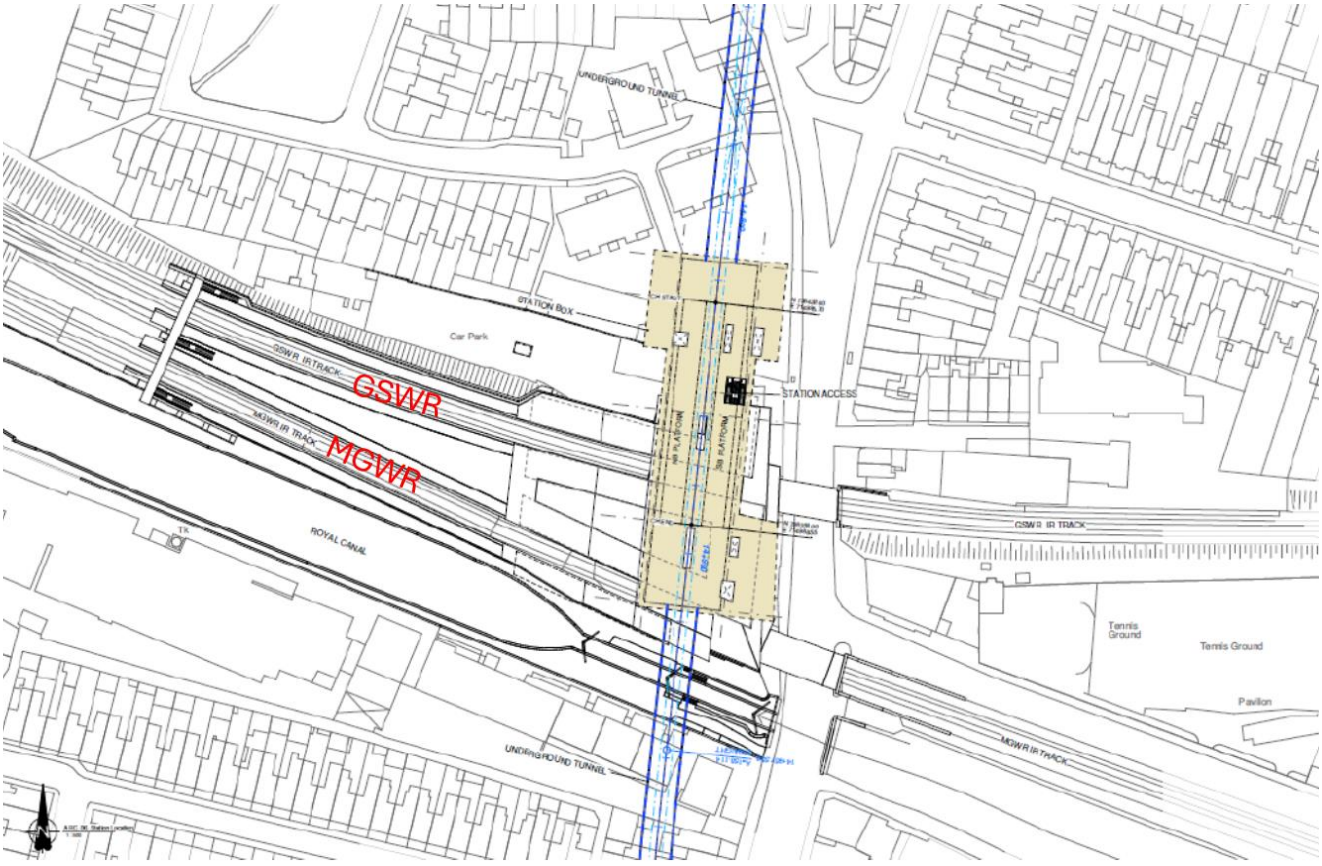

Figure 1 Metrolink Scheme and Irish Rail Line Interchange

1.1 Summary of Metrolink Alterations at Glasnevin

The Glasnevin Station development includes the construction of the new Glasnevin Station, platforms for two IE commuter railways - the Western Commuter Line (MGWR) and the South-Western Commuter Line (GSWR), and a concourse area to connect all three railways together.

As a consequence of the proposed MetroLink works, there is a requirement to modify the IE track layout and alignment at this location to create the platforms for the interchange with MetroLink. In summary, this will involve:

- Lowering a large section of the track on both lines, by up to 2m;
- Transitioning the lowering of the track on both lines over 190m to the west from Prospect Road Bridge;
- To achieve the lowering for platforms on the Western Commuter Line, completing the demolition and removal of:
    - OBD221 – Maintenance Bridge.
    - OBD222 – Cross Guns Bridge, to the edge of Prospect Road

- Further work is required to transition the lowered sections of track on both lines through the platform areas into the existing rail lines either side of the proposed station; and
- Modifications to the existing junction between the Western Commuter Line and the South-Western Commuter Line located to the west of the proposed station platforms into a diamond crossover between the lines.

A cross section of the new platform level at Glasnevin is illustrated in Figure 2

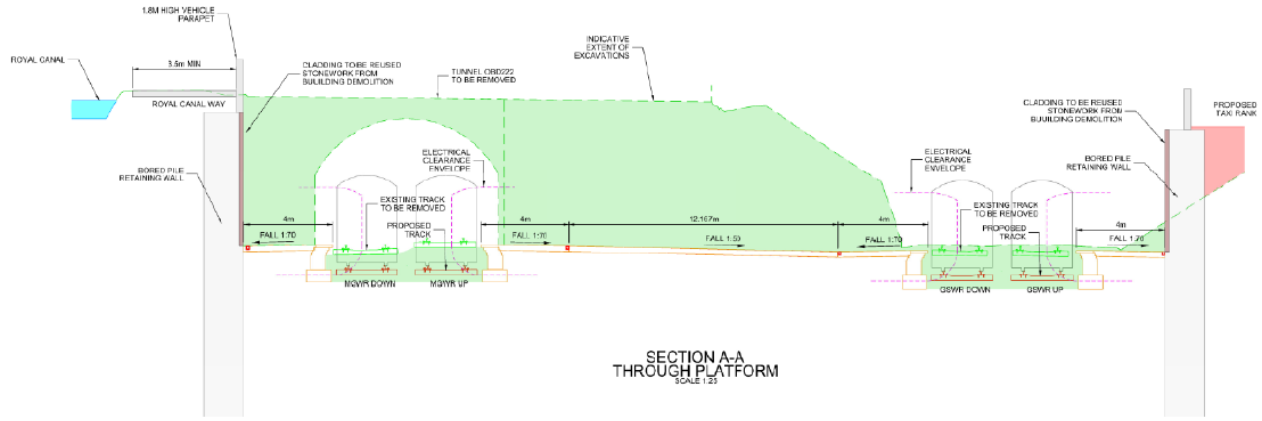

Figure 2: Cross Section Through New Surface Platform at Glasnevin

2. Airborne Noise Assessment

A noise model was developed for the DART + West Railway Order EIAR which calculated noise levels associated with the existing rail lines and those associated with the proposed DART +West project. This noise model was prepared by AWN Consulting.

This model has been used to determine the existing noise scenario at Glasnevin without the MetroLink project and has been updated to assess the noise impacts associated with the Metrolink Interchange Station at Glasnevin incorporating the changes associated with the removal of the OBD221 and OBD222 structures, track lowering and new platform areas.

The specifics in terms of the noise model and input parameters are included in the DART +West EIAR. The selected software, SoftNoise *Predictor*, calculates rail noise levels in accordance with the RMR methodology, the Dutch calculation methodology which was used for both the DART West and the Metrolink project for airborne rail noise. The base noise model for the Do Nothing scenario was prepared using 3D rail alignment drawings for the existing rail lines, topographical data, Ordnance Survey mapping and train numbers.

The calculations have been performed taking into account the relevant factors which feed into the noise model, namely, the train categories defined from RMR, train numbers and speeds, in addition to the factors which affect the propagation of rail noise (vertical alignment, screening, ground factors etc.).

The current GSWR and MGWR railway lines both operate Diesel Multiple Unit DMU trains (i.e. the Do Nothing scenario).

The DART + West EIAR modelled the future scenario associated with electrifying the GSWR and MGWR, which included all rail fleet associated with the DART + West and DART + South West proposals. This scenario will replace all commuter DMUs along the MGWR with DART electric multiple units (EMUs). Along the GSWR, all commuter trains to Maynooth will be replaced with EMUs, with a portion of Intercity DMUs trains remaining along this line.

The existing and proposed train numbers and train types modelled for the Do Nothing (existing scenario) and Do Something (DART + West and DART + South West proposals) modelled within the DART + West EIAR are summarised in Tables 1 and 2 overleaf.

Do-Nothing Summary Table		Number of trains																	
Section/direction		Daytime (7.00 - 19.00)						Evening (19.00 - 23.00)						Night (23.00 - 7.00)					
		EMU Trains			DMU Trains			EMU			DMU			EMU			DMU		
From	To	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains
North Strand Jct. (GSWR)	Glasnevin	0	0	0	6 (3-car) 31 (4-car) 2 (7-car) 15 (8-car)	1 (5-car)	55	0	0	0	4 (3-car) 6 (4-car) 1 (7-car) 1 (8-car)	0	12	0	0	0	1 (3-car) 1 (4-car) 1 (7-car) 2 (8-car)	1 (3-car) 3 (4-car) 1 (8-car)	10
Glasnevin (GSWR)	North Strand Jct.	0	0	0	6 (3-car) 29 (4-car) 1 (5-car) 3 (7-car) 14 (8-car)	1 (7-car)	54	0	0	0	5 (3-car) 8 (4-car) 4 (8-car)	0	17	0	0	0	1 (3-car) 2 (4-car) 1 (8-car)	1 (3-car) 1 (4-car) 1 (7-car)	7
Docklands (MGWR)	Glasnevin	0	0	0	6 (3-car) 4 (4-car)	2 (4-car)	12	0	0	0	1 (3-car) 1 (4-car)	0	2	0	0	0	0	0	0
Glasnevin (MGWR)	Docklands	0	0	0	(5 3-car) (6 4-car)	1 (7-car)	12	0	0	0	1 (3-car)	0	1	0	0	0	0	0	0

Table 1 Existing Train Numbers and Train Types along GSWR and MGWR lines (Do Nothing Scenario)

Do-Something Summary Table		Number of Trains																	
Section/direction		Daytime (7.00 - 19.00)						Evening (19.00 - 23.00)						Night (23.00 - 7.00)					
		EMU			DMU			EMU			DMU			EMU			DMU		
From	To	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains	Passenger	Technical	Total Trains
North Strand Jct. (GSWR)	Glasnevin	110	0	110	21	0	21	36	7	43	6	0	6	18	6	24	2	0	2
Glasnevin (GSWR)	North Strand Jct.	110	0	110	21	0	21	35	0	35	6	0	6	12	10	22	2	0	2
Spencer Dock (MGWR)	Glasnevin	71	0	71	0	0	0	26	0	26	0	0	0	12	8	20	0	0	0
Glasnevin (MGWR)	Spencer Dock	71	0	71	0	0	0	27	0	27	0	0	0	11	10	21	0	0	0

Table 2 Future Train Numbers and Train Types along GSWR and MGWR lines with DART +West and DART +South West (Future Do Something Scenario)

Using the train numbers and train types set out in Tables 1 and 2 and the revised (lowered) vertical rail alignments and structure removals, noise levels are calculated for the following scenarios in the vicinity of Glasnevin Station:

- Do Nothing Scenario: Continued operation of the GSWR and the MGWR rail lines without Metrolink Project.
- Do Something Scenario with Metrolink Only: Operation of the GSWR and the MGWR rail lines with the reconfigured rail lines at Glasnevin (tracked lowered), tunnel cover removed along the MGWR line and the new surface platforms proposed to facilitate interchange with the Metrolink Station.
- Do Something Scenario with Metrolink and DART +West: Operation of the GSWR and the MGWR rail lines with the reconfigured rail lines at Glasnevin (tracked lowered), tunnel cover removed along the MGWR line, the new surface platforms and the replacement of the existing Diesel Multiple Unit (DMU) fleet with an electrified DART fleet.

For both Do Something scenarios, an idling diesel engine was also modelled at both platforms, assuming a 1 minute period per DMU train over each day and night-time period.

Frequency	31.5	63	125	250	500	1k	2k
L_W	93	96	92	89	88	84	86

Table 3 – Modelled Train Idling Sound Power

2.1 Noise Results

The modelled noise contour results for the 3 scenarios discussed above are presented in Figures 3 to 5 for the daytime 16hr period (07:00 to 23:00hrs) and in Figures 6 to 8 for the night-time 8hr period (23:00 to 07:00hrs). The calculated noise contours are presented for a height of 4m above ground level.

The results for the daytime periods at all building heights indicate that, buildings located south of the MGWR along the Royal Canal, will experience a rail noise level increase between 3 dB and 7 dB above the Do Nothing scenario with the Metrolink Interchange in operation but without DART +West electrification. At buildings north of the GSWR, the increase in rail noise is a or below 3dB. At all locations under this modelled scenario, the daytime rail noise level is below 55 dB $L_{Aeq,16hr}$ and hence is below the significance rating for daytime rail noise (55dB $L_{Aeq,16hr}$) at the closest noise sensitive buildings to the rail lines.

The results for the daytime periods indicate that, with Metrolink and DART + West and DART + Southwest in operation, buildings located south of the MGWR along the Royal Canal will experience a rail noise level increase between 3 dB and 6 dB above the Do Nothing scenario. At buildings north of the GSWR, the increase in rail noise is at or below 3dB. At all locations under this modelled scenario, the daytime rail noise level is below 55 dB $L_{Aeq,16hr}$ and are of the order of 1 to 2 dB lower than the scenario without electrification of the commuter fleet.

During night-time periods, buildings located south of the MGWR along the Royal Canal will experience a noise level increase between 4 dB and 7 dB above the Do Nothing with the Metrolink Interchange in operation but without DART +West electrification. At residential buildings north of the GSWR, the increase in rail noise is at or below 3dB. At all locations under this modelled scenario, the night-time rail noise level is at or below 45 dB $L_{Aeq,8hr}$ and hence does not exceed the significance rating for night-time rail noise (45dB $L_{Aeq,8hr}$) at the closest noise sensitive buildings to the rail lines.

During night-time periods with Metrolink and DART + West and DART + Southwest in operation, buildings located south of the MGWR line along the Royal Canal will experience a noise level increase between 3 dB and 6 dB during night-time periods. At residential buildings north of the GSWR, the increase in rail noise is at or below 3dB. At all locations under this modelled scenario, the night-time rail noise level is below 45 dB $L_{Aeq,16hr}$ and are of the order of 0 to 3 dB lower than the scenario without electrification of the commuter fleet.

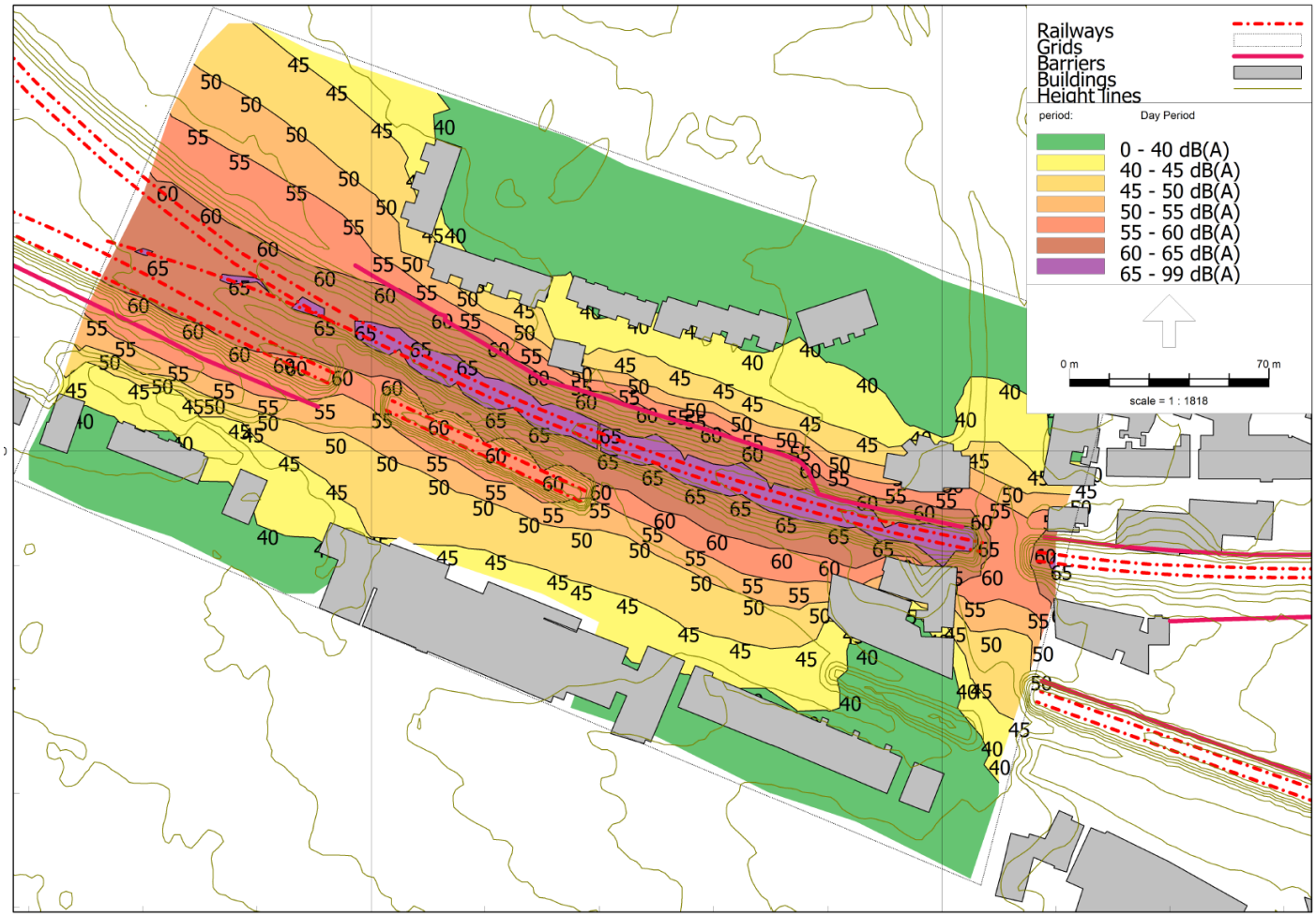

Figure 3: Do Nothing Scenario (Existing Situation) – Daytime

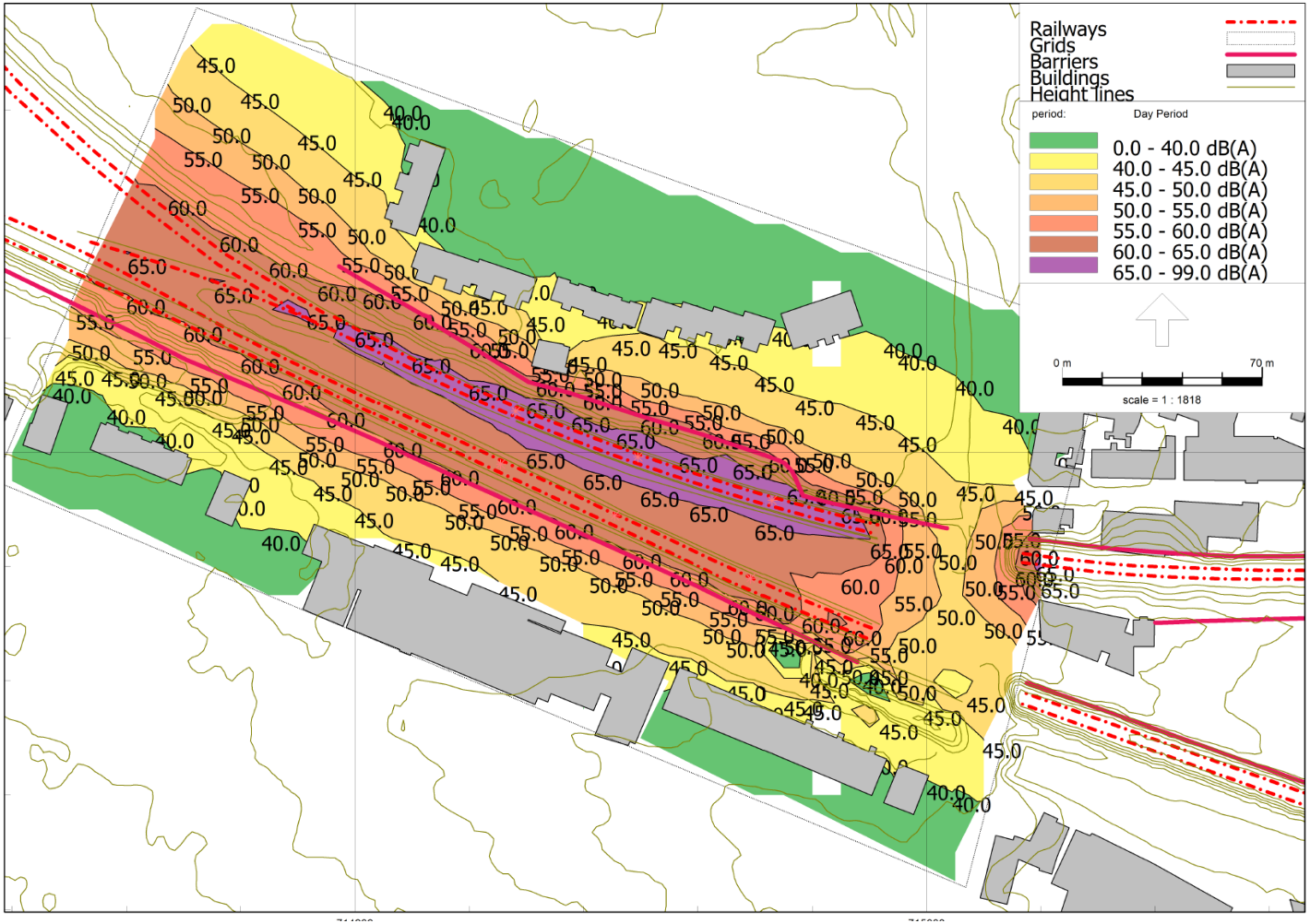

Figure 4: Do Something Scenario (Metrolink with Existing IE DMU fleet) – Daytime

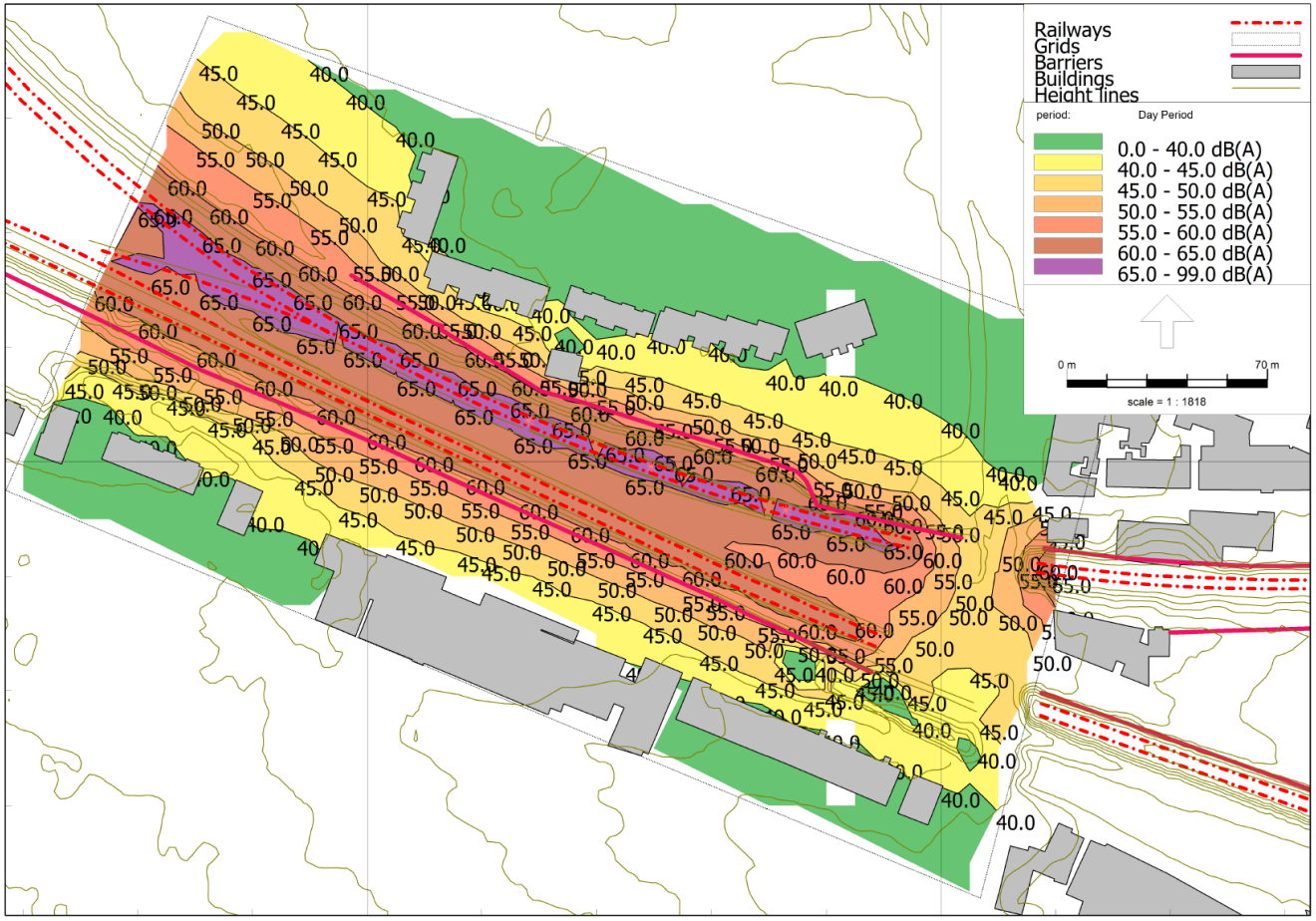

Figure 5: Do Something Scenario (Metrolink with DART + West & DART + South West Fleet) – Daytime

Figure 6: Do Nothing Scenario (Existing Situation) – Night-time

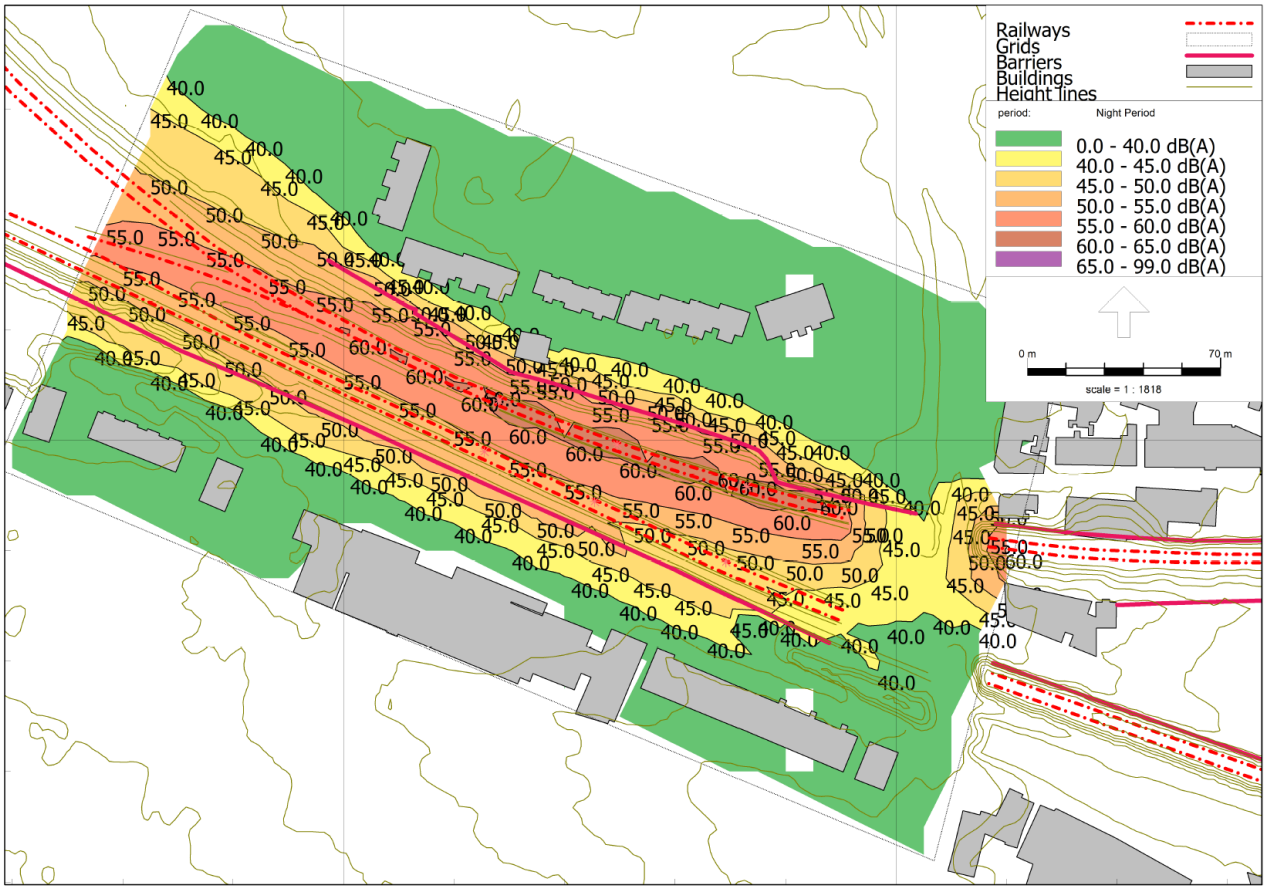

Figure 7: Do Something Scenario (Metrolink with Existing IE DMU fleet) – Night-time

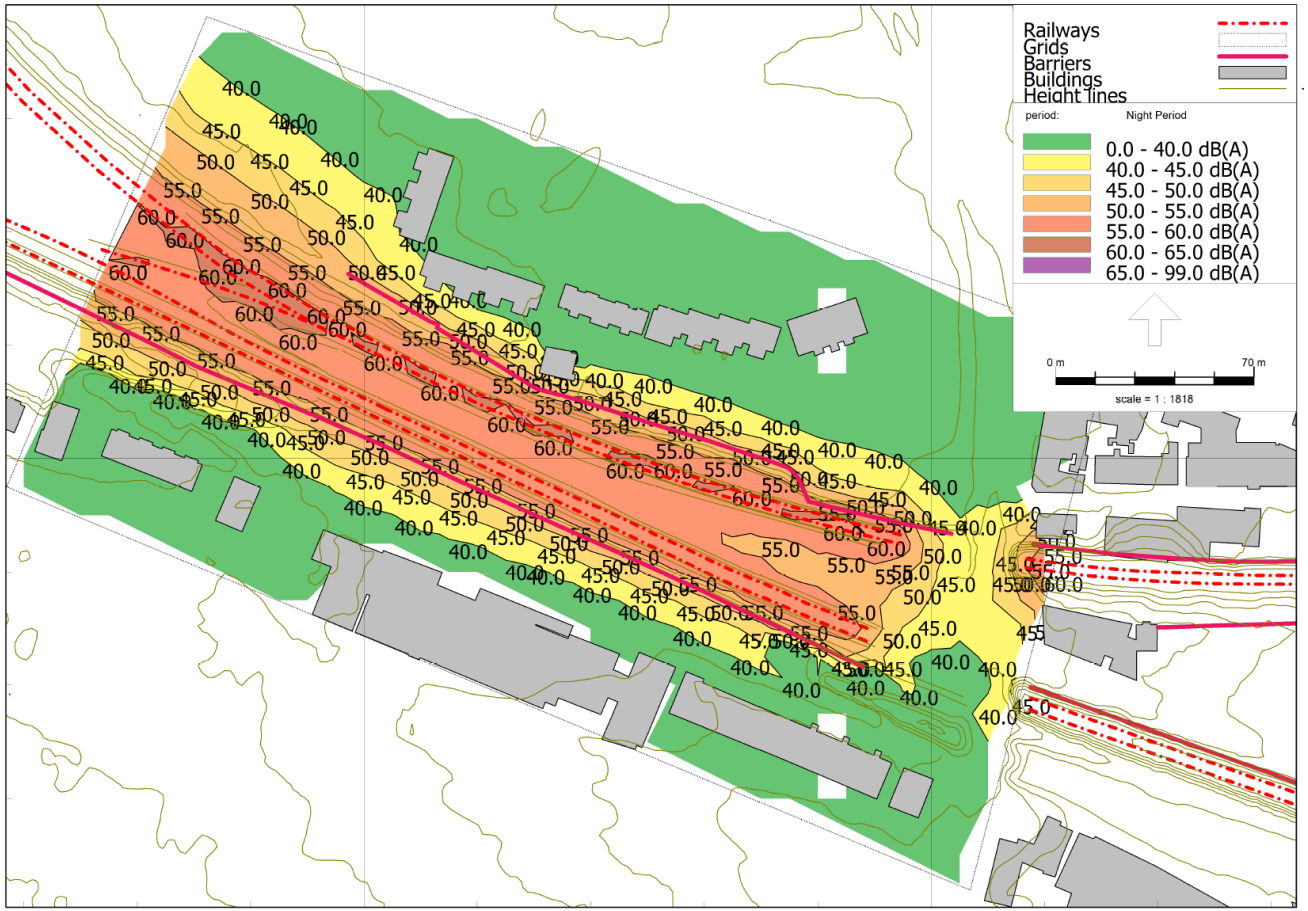

Figure 8: Do Something Scenario (Metrolink with DART + West & DART + South West Fleet) – Night-time

3. Conclusion

The analysis undertaken in relation to rail noise in the vicinity of the proposed Glasnevin Interchange associated with the proposed Metrolink project has shown that an increase in rail noise levels between the existing (Do Nothing) scenario and the two Do Something scenarios will be experienced at buildings south and north of the IE rail lines. The specific rail noise level are below the significance thresholds for rail noise set out within both the DART + West and Metrolink EIARs for day and night-time periods. This is largely due to the low volume of rail traffic along the MGWR rail line and the lowering of the vertical alignment at the section where the OBD221 and OBD222 structures will be removed.