YG-DCO-043-5.3.14E

Yorkshire Green Energy Enablement (GREEN) Project

Volume 5

Document 5.3.14E ES Chapter 14 Appendix 14E - Overhead Line Noise Assessment

Final Issue A
November 2022

Planning Inspectorate Reference: EN020024

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 Regulation 5(2)(a)

nationalgrid

Page intentionally blank

Contents

Version history

Date	Version	Status	Description/changes
01/11/2022	A	Final	First Issue

Page intentionally blank

1. Overhead Line Noise Assessment

1. Introduction

1.1 Background

1.1.1 National Grid Electricity Transmission plc ("National Grid") is in the process of submitting a Development Consent Order (DCO) application for the Yorkshire Green Energy Enablement (GREEN) Project (referred to as Yorkshire GREEN or the Project).

1.1.2 Yorkshire GREEN comprises the installation of new electricity infrastructure and works to existing infrastructure. A summary description of the Project is provided in **Section 14.1 of ES Chapter 14: Noise and Vibration (Volume 5, Document 5.2.14),** which this appendix supports, and a more detailed description is provided in **ES Chapter 3: Description of the Project (Volume 5, Document 5.2.3).**

1.2 Purpose of this report

1.2.1 This document details the assessment of overhead line noise which is summarised in the **ES Chapter 14 Noise and Vibration, Volume 5, Document 5.2.14**.

1.3 Description of Project – new and realigned overhead lines

Twin Conductor Bundle 400 kV Line

1.3.1 New Twin Conductor Bundle 400 kV YN overhead line will be constructed between the proposed Overton Substation and the existing 2TW/YR 400kV overhead line.

Single and Twin Conductor Bundle 275 kV Line

1.3.2 The majority of the new overhead line will be Single Conductor Bundle 275 kV line or Twin Conductor Bundle 275 kV line. The new sections of overhead lines will connect to the proposed Overton Substation.

1.3.3 Temporary sections 275 kV overhead line will be used during construction of the Project to maintain continuity of electricity supply.

Page intentionally blank

2. Technical guidance

2.1.1 For the purposes of defining the scope of the baseline including the methodology for the sound and noise surveys for the Proposed Development, the guidance and Standards listed in **Table 2.1** are of specific relevance.

Table 2.1 – Technical Standards and Guidance

Guidance reference	Summary
BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound[1]	BS 4142:2014 + A1:2019 describes methods for rating and assessing sound of an industrial nature (using outdoor sound levels), such as from factories, industrial premises, or fixed installations affecting people who might be inside or outside a dwelling. BS 4142:2014 + A1:2019 does not apply to noise associated with the passage of vehicles on public roads and railway systems.
ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation[2]	Defines a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at distances from a source.
National Grid Policy Statement PS(T)134[3] (2021) Operational Audible Noise Policy for Overhead Lines	Applies to environmental noise due to the operation of new overhead power lines, reconductoring, diversion and uprating projects for overhead lines operated at 275kV and 400kV. The policy describes a three-tier assessment process and sets noise impact criteria taking into account worst-case wet noise (Tier 1), wet noise and dry noise in combination (Tier 2), and dry noise and wet noise separately following the principles of BS4142:2014 (Tier 3). PS(T)134 supersedes TR(T)94 which has been withdrawn as a live National Grid technical report.
National Grid Technical Report TR(E)564[4] (2021)	Documents the need for a clear policy stance on acceptable noise levels from overhead lines and explains

[1] British Standards Institution (2019). BS 4142:2014 + A1:2019 Methods for rating and assessing industrial and commercial sound. BSI, London.
[2] International Standards Organization (1996). ISO 9613-2:1996 Acoustics – Attenuation of sound during propagation outdoors. Part 2: General method of calculation. ISO, Geneva.
[3] National Grid (2021). Policy Statement PS(T)134, Issue 2 (June 2021) - Operational Audible Noise Policy for Overhead Lines. National Grid, London.
[4] National Grid (2021). Technical Report TR(E)564, Issue 1 (February 2021) - Development of Method for Assessing the Impact of Noise from Overhead Lines (New Build, Reconductoring, Diversion and Uprating). National Grid, London.

Guidance reference	Summary
Development of Method for Assessing the Impact of Noise from Overhead Lines (New Build, Reconductoring, Diversion and Uprating)	how the noise criteria presented in PS(T)134 were developed, taking into account the UK noise policy context and UK national and international guidance, including World Health Organisation guidelines and evidence for health effects.
National Grid Technical Guidance Note TGN(E)322 (2021)[5]	Provides guidance on the practical implementation of PS(T)134.
Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Uprating)	The policy suite allows for noise impact (and hence significance of effect) to be reported according to the specific requirements of an EIA submitted as part of a DCO application.
World Health Organization (WHO) (1999) Guidelines for Community Noise[6]	Presents guideline noise levels for community noise in specific residential environments, e.g., outdoor living areas.
WHO (2009) Night Noise Guidelines for Europe[7]	Presents guideline noise levels for community noise at night.
WHO (2018) Environmental Noise Guidelines for the European Region[8]	Provides recommendations for protecting human health from exposure to environmental noise from various sources.

[5] National Grid (2021). Technical Guidance Note TGN(E)322 Issue 2, (June 2021) - Operational Audible Noise Assessment Process for Overhead Lines (New Build, Reconductoring, Diversion and Uprating). National Grid, London.
[6] World Health Organization (1999). Guidelines for community noise. WHO, Geneva.
[7] World Health Organization (2009). Night noise guidelines for Europe. WHO, Copenhagen.
[8] World Health Organization (2018). Environmental Noise Guidelines for the European Region. (online). (Accessed 26 August 2021).

3. Methodology

3.1 Operational noise assessment methodology

Proposed new 275kV and 400kV overhead lines

3.1.1 For overhead lines, noise (where observed) is usually generated by a mechanism called corona discharge. Most transmission line conductors are designed to operate below the threshold at which corona discharge is predicted to occur in dry conditions with uncontaminated conductors, so usually operate quietly in dry weather conditions. However, noise can sometimes occur in dry conditions, where it is referred to as 'dry noise'; it is normally described as a crackle.

3.1.2 The highest noise levels generated in operation for overhead lines generally occur during rainfall. Noise generated under these circumstances is referred to as 'wet noise' which is generally described as a crackle, but which can be accompanied by a tonal 'hum'.

3.1.3 Detailed operational noise predictions for the new 275kV and 400kV overhead lines follow the principles of BS 4142:2014 + A1:2019[1] using the noise prediction method described in National Grid Policy Statement PS(T)134 and its supporting technical guidance. These documents are included as **Appendix 14F, 14G and 14H (Volume 5, Document 5.3.14F to 5.3.14H)** to support the **Noise and Vibration ES Chapter 14 (Volume 5, Document 5.2.14)** to facilitate stakeholders' understanding of the guidance reported herein.

3.1.4 PS(T)134 (**Appendix 14F, Volume 5, Document 5.3.14F**) describes methods for predicting the environmental impact at receptors due to audible noise caused by new, reconductored, diverted or uprated overhead transmission lines. The method uses internationally recognised line noise prediction methodology to calculate noise emission levels based on operating voltage, conductor design and pylon geometry. Prediction of overhead line noise levels at noise sensitive receivers along the route of the proposed new lines has been carried out.

3.1.5 The tonal hum which sometimes occurs during wet weather conditions is typically more annoying than crackle alone. Consequently, people tend to have a higher tolerance for dry noise than wet noise before finding it annoying, although this varies from person to person. It should be noted that neither wet noise nor dry noise would occur all the time.

3.1.6 According to the requirements of BS 4142:2014 + A1:2019[1], PS(T)134[3] applies a +3dB character correction to dry noise to account for the subjective 'crackle', while a +6dB character correction is applied to predicted wet noise levels to account for the additional 'hum' from the audible noise during worst case wet weather conditions.

3.1.7 National Grid Technical Report TR(E)564 (**Appendix 14G, Volume 5, Document 5.3.14G**) explains the reasoning behind the noise criteria set out in PS(T)134 (**Volume 5, Document 14F**). Noise criteria have been set taking account of the UK policy context and evidence from multiple sources, including the World Health Organisation[6,7,8] and BS 4142:2014 + A1:2019[1], for noise and associated health impacts. The criteria have been developed by National Grid based on health impact data associated with the night-time

period. The night-time period is considered more sensitive than the daytime, as background sound levels are normally lower, and people are trying to sleep.

3.1.8 The overhead line noise assessment process follows a three-tier approach based on predicted noise source level and receptor distance. If predicted noise levels fail the Tier 1 test, a Tier 2 assessment is undertaken and if the Tier 2 test suggests that adverse impact is possible, a Tier 3 assessment is undertaken. The three-tier approach comprises the following steps designed to screen receptors out of further assessment where there would be no adverse impact:

- **Tier 1**: A primary screening step based on 'worst-case' absolute wet noise effects and the pre-determined assessment criteria set out in PS(T) 134[3], reproduced in **Table 3.1**;
- **Tier 2**: A further screening step based on combined absolute wet noise and dry noise effects and recalculated assessment criteria. This step takes account of the fact that wet noise occurs during periods of wet weather and therefore does not occur all the time; and
- **Tier 3**: Full assessment following the principles of BS 4142:2014 + A1:2019[1] for both wet noise and dry noise.

3.1.9 For the assessment of wet noise, knowledge of typical rainfall rates based on Meteorological Office data for the Project location is required. Miller curves[9] are used to estimate the background noise level due to the effect of rainfall.

3.1.10 The Tier 1 (wet noise) screening has been carried out against the relevant criteria presented in PS(T)134 (**Volume 5, Document 5.3.14F**) Based on these criteria and for the purpose of this tier of the assessment, for residential receptors the LOAEL is considered to be 34dB(A) and the SOAEL, 44dB(A).

3.1.11 In the process of using the screening and assessment tools for overhead line noise a colour coding is used. Where the predicted noise levels fall within the green criteria, no further assessment is required, and the overhead line noise will not be significant at that receptor. Predictions within red or amber criteria require progression in the tiered system up to the final assessment within Tier 3.

Table 3.1 – Tier 1 noise criteria

Use	No adverse impact Screened out	Further assessment necessary Tier 2 assessment required
Vulnerable groups	< 29dB(A)	≥ 29dB(A)
Residential	< 34dB(A)	≥ 34 (A)
Schools and hotels	< 39dB(A)	≥39 (A)

3.1.12 The Tier 2 screening, where required, determines whether the combined wet and dry noise impact is acceptable. Where the Tier 2 assessment suggests that there may be the potential for an adverse impact, a Tier 3 assessment is required.

[9] Miller L N, (1978). Sound Levels of Rain and of Wind in the Trees, Noise Control and Engineering, vol 11, no 3, pp 101-109

3.1.13 A Tier 2 assessment requires:

- recalculation of the predicted noise level at the façade of the noise sensitive receptor (NSR), accounting for the duration of wet and dry weather; and recalculation of the noise criteria. accounting for the duration of wet and dry weather.

3.1.14 The predicted noise levels for a Tier 2 assessment will be calculated according to guidance provided in TGN(E)322 (**Appendix 14H, Volume 5, Document 5.3.14H**). Developing new Tier 2 criteria requires the logarithmic calculation to take into account the percentage of time that dry and wet noise is likely to occur. TGN(E)322 presents the combined noise criteria to be used in Tier 2 and Tier 3 assessments, which are reproduced here in **Table 3.2**

Table 3.2 – Tier 2 and Tier 3 noise criteria

Use	Rainfall (annual average wet hours)	No Adverse Impact (dB(A))	Adverse Impact (dB(A))	Significant Adverse Impact (dB(A))
Vulnerable groups	450	< 31.9	31.9 – 41.9	> 41.9
	600	< 31.8	31.8 – 41.8	> 41.8
	750	< 31.8	31.8 – 41.8	> 41.8
Residential	450	< 36.9	36.9 – 46.9	> 46.9
	600	< 36.8	36.8 – 46.8	> 46.8
	750	< 36.8	36.8 – 46.8	> 46.8
Schools and Hotels	450	< 41.9	41.9 – 51.9	> 51.9
	600	< 41.8	41.8 – 51.8	> 51.8
	750	< 41.8	41.8 – 51.8	> 51.8

3.1.15 There is no requirement to add character correction penalties to the noise levels above, as penalties have already been considered in the setting of the criteria. A 6dB tonal penalty has been considered in the setting of the criterion for wet noise levels and a 3dB character penalty has been considered for dry noise levels.

3.1.16 If an adverse or significant adverse impact is identified after the Tier 2 assessment, a Tier 3 assessment is carried out, which takes into account background noise levels in the area of interest.

3.1.17 Dry noise and wet noise would be assessed separately using two different methods based on the principles of BS 4142:2014 + A1:2019[1], as detailed in TGN(E)322[5], and explained in the following paragraphs.

3.1.18 To conduct a Tier 3 dry noise assessment, an assessment in line with BS 4142:2014 + A1:2019[1] is carried out.

3.1.19 Tier 3 criteria are based on the assessment of impact criteria set out in BS 4142:2014 + A1:2019[1] and are shown in **Table 3.3.**

Table 3.3 – Impact magnitudes of operational noise

Assessment Level	Impact	Action
≥ 10dB	Significant adverse impact	Unacceptable (avoid)
5 – 9dB	Adverse impact	Mitigate and minimise
0 – 4dB	Minor impact	May be acceptable depending on the context in which the noise occurs
≤ 0dB	Low impact	Acceptable (no action necessary)

3.2 Overhead line noise assessment

3.2.1 Receptor sensitivities considered in TGN(E)322 (**Appendix 14H, Volume 5, Document 5.3.14H**) are summarised within Table 4 of the document and reproduced below as **Table 3.4**. The Significance of Effect Matrix from the document, reproduced as **Table 3.5** does not exactly accord with the overall project significance matrix used in the noise and vibration chapter, as this is a screening tool and not the complete assessment. **Table 3.8** later in this document is more closely aligned with the matrix used in the overarching ES.

Table 3.4 – TGN(E)322 Table 4: Classification of receptor sensitivity

Sensitivity	Receptor
High	Vulnerable subgroups including hospitals and pre-schools, care homes and hospices
Medium	Residential and schools
Low	Area used primarily for leisure activities, including Public Rights of Way, sites of historic or cultural importance.
Negligible	All other areas such as those used primarily for industrial or agricultural purposes.

Table 3.5 – TGN(E)322 Table 5: Significance of Effect Matrix for Tier 1 and Tier 2 Assessments

Significance of Effect	Sensitivity of Receptor			
Magnitude	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible
No effect	Negligible	Negligible	Negligible	Negligible

3.2.2 For Tier 1 and Tier 2 assessments, the magnitude of effect categories are based on resulting noise levels at the NSR for wet noise (Tier 1) and combined dry and wet noise (Tier 2), with the significance of effect matrix from TGN(E)322 (**Appendix 14H, Volume 5, Document 14H**) presented in **Table 3.6**. The noise criteria have been developed based on health impact data associated with the night-time period.

Table 3.6 – Noise criteria for Tier 1 and Tier 2 assessments and resulting significance of effect

Significance of Effect	Weather Condition	Sensitivity of Receptor			
Magnitude		**High**	**Medium**	**Low**	**Negligible**
High	Wet	>44	>44	>44	>44
	Dry	>47	>47	>47	>47
Medium	Wet	39 - 44	39 – 44	39 – 44	39 – 44
	Dry	42 - 47	42 – 47	42 – 47	42 – 47
Low	Wet	34 - 39	34 – 39	34 – 39	34 – 39
	Dry	37 - 42	37 – 42	37 – 42	37 – 42
Negligible	Wet	29 - 34	29 – 34	29 – 34	29 – 34
	Dry	32 - 37	32 – 37	32 – 37	32 – 37
No effect	Wet	<29	<29	<29	<29
	Dry	<32	<32	<32	<32

3.2.3 Whilst **Table 3.5** suggests a moderate significance of effect on low sensitivity receptors with a high magnitude of effect (based on health data for exposure to noise over a full 16-hour period), the effect is likely to be lower, as lower sensitivity receptors are likely to

be used by people for shorter durations than 16 hours and for lower durations than patients in hospitals or residential properties. These areas are also less likely to be used during wet weather conditions when the highest noise levels from an overhead line occur.

3.2.4 For a Tier 3 assessment, the magnitude of effect categories are based on the difference between overhead line rating noise level and the background sound level in the area with or without the effect of noise from rainfall. The criteria for the Tier 3 assessment are reported in **Table 3.7** sand the significance of effect matrix for Tier 3 assessments presented in **Table 3.8**.

3.2.5 With respect to **Table 3.7** and **Table 3.8**, the Tier 3 assessment dark blue denotes a significant impact, light blue a potentially significant impact and white an impact considered not significant.

Table 3.7 – Noise criteria for Tier 3 assessments and resulting significance of effect

Significance of Effect	Sensitivity of Receptor			
Magnitude	**High**	**Medium**	**Low**	**Negligible**
High	≥ 10dB	≥ 10dB	≥ 10dB	≥ 10dB
Medium	5 – 9dB	5 – 9dB	5 – 9dB	5 – 9dB
Low	0 – 4dB	0 – 4dB	0 – 4dB	0 – 4dB
Negligible	≤ 0dB	≤ 0dB	≤ 0dB	≤ 0dB

Table 3.8 – Significance of effect matrix for Tier 3 assessments

Significance of Effect	Sensitivity of Receptor			
Magnitude	**High**	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

4. Results

4.1 Assessment of operational noise and vibration at receptors

New and realigned operational 275kV/400kV overhead lines

4.1.1 An assessment of overhead line noise has been undertaken following the methodology described above using the following configurations:

- Single conductor bundle (representing the SP overhead line) – L8c Single Araucaria 275 kV.
- Twin conductor bundle (representing the XC overhead line) – L8c Twin Leipzig 275 kV.
- Twin conductor bundle 400 kV (representing the YN overhead line) – L12 Twin Rubus 400 kV.

4.1.2 The assessment provides an indication of adverse impacts. Final selections of design and conductor may vary from those assumed at this stage. As the predictions have been undertaken using representative configurations, any changes in the design would not result in significantly different noise levels.

4.1.3 A further assessment will be undertaken if the final design results in a noisier configuration.

4.1.4 A Tier 1 assessment has been undertaken, indicating the distance from the overhead line centreline at which an additional investigation is required, and if NSRs are located below this distance, a Tier 2 assessment is necessary.

4.1.5 The modelling of overhead line noise has been carried out in the EFC400 software using the EPRI calculation method. The calculations were carried out using 0 (zero) ground absorption, standard air absorption (composition, temperature, and pressure, (as per ISO 9613-1[10]) downwind propagation conditions, and straight-line overhead line sections.

4.1.6 The results of the Tier 1 screening assessment are presented in **Table 4.1**.

Table 4.1 – Tier 1 assessment results

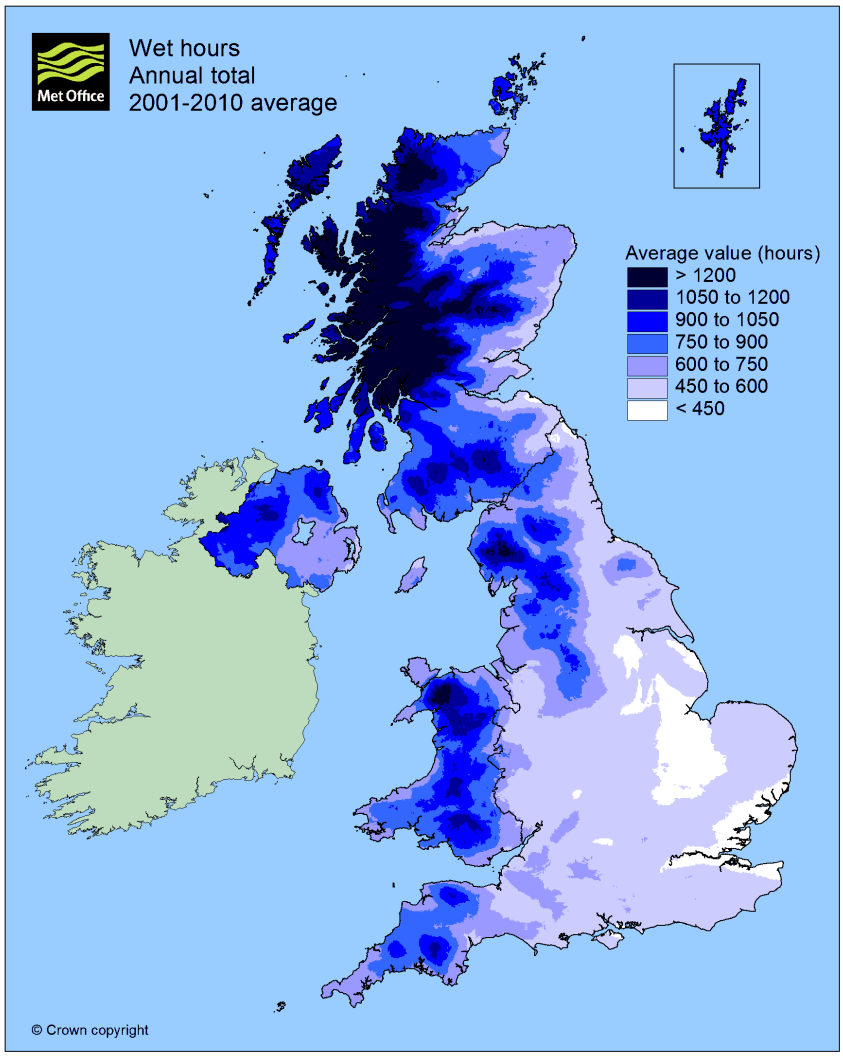
Distance at which no further assessment is necessary (m)	Single conductor bundle 275kV line	Twin conductor bundle 275kV line	Twin conductor bundle 400kV line
Vulnerable subgroups	> 200	116	> 200
Residential	172	50	> 200
Schools and hotels	80	13	> 200

[10] International Standards Organization (1993). ISO 9613-1:1993 Acoustics – Attenuation of sound during propagation outdoors. Part 1: Calculation of the absorption of sound by the environment. ISO; Geneva.

4.1.7 Residential NSRs fall within the distances presented above, so a Tier 2 assessment has been conducted. No permanent vulnerable sub-groups have been identified, however, a Travellers' encampment, which is considered vulnerable, is addressed in paragraph 4.1.17.

4.1.8 For the area of the Project, the rainfall rate charts (shown in **Figure 4.1**), show that the rainfall rate is 450 – 600 hours/year. To conduct an assessment based on the worst-case scenario for rainfall rate, a rate of 600 hours/year has been assumed, and Miller curves created based on this assumption.

Figure 4.1 – Average wet hours rainfall chart



4.1.9 A summary of the results from the assessment is presented in **Table 4.2**.

4.1.10 The assessment draws on the modelled results presented in **Annex 14E.1** of this Appendix.

Table 4.2 – Tier 2 assessment results – residential (medium sensitivity) receptors

	Single conductor bundle 275kV line	Twin conductor bundle 275kV line	Twin conductor bundle 400kV line
Distance at and beyond which no adverse impact is indicated (m)	0	0	53
Distances between which a potential adverse impact is conferred (m)	No adverse impacts predicted	No adverse impacts predicted	0 – 52
Distances between which a potential significant adverse impact is conferred (m)	No significant adverse impacts predicted	No significant adverse impacts predicted	No significant adverse impacts predicted

4.1.11 These results are presented in graphs in Annex 14E.1 of this appendix.

4.1.12 The sensitivity of non-vulnerable residential receptors is defined as medium.

4.1.13 Receptor IDs (e.g. YOR05) are taken from **Table 14.11, ES Chapter 14, Volume 5, Document 5.2.14**.

400kV (YN overhead line)

4.1.14 The sensitivity of the permanent NSRs is defined as medium. The Tier 1 screening distance is greater than 200 m from the YN overhead line, Therefore Tier 2 screening is required. The Tier 2 screening distance is 52m from the YN overhead line, with the closest receptor, YOR05, lying approximately 330m from the centreline, so the predicted effect is of **negligible impact** and therefore considered **not significant** for all permanent NSRs.

275kV (SP line)

4.1.15 All permanent NSRs fall outside of the Tier 1 screening distance (172m from the 275kV SP line) with the closest receptor, YOR07, lying approximately 230m from the centreline. Furthermore, the Tier 2 screening distance is 0m from the centreline, so even considering Limits of Deviation, the predicted effect is of **negligible impact** and therefore considered **not significant** for all permanent NSRs

275kV (XC overhead line)

4.1.16 All permanent NSRs fall outside of the Tier 1 screening distance (50m from the 275kV XC overhead line) with the closest receptor, HAR03, lying approximately 130m from the centreline, so the predicted effect is of **negligible impact** and therefore considered **not significant** for all permanent NSRs.

4.1.17 The Travellers' encampment (represented by SEL16 and SEL17) is situated near to the Monk Fryston substation. The Traveller encampment does not benefit from planning consent, however it is recognised that the encampment is located beneath (i.e. close to 0m from the centreline of) the existing overhead line and will be located under the proposed overhead line route. Whilst the receptors within the encampment are within the Tier 1 screening distance for vulnerable receptors (118m from the centreline), a Tier

2 assessment suggests that adverse impact would not arise from the proposed twin conductor arrangement (Tier 2 screening distance of 0m). The proposed XC overhead line should result in lower electrical stress than the existing arrangement, therefore at these receptors, this change in conductor and realignment is considered to be of **negligible magnitude** at the worst or a **minor beneficial** change, and as such the change is **not significant**.

5. Summary

5.1.1 Following the Tier 1 and Tier 2 screening process undertaken in accordance with relevant criteria presented in National Grid Policy Statement PS(T)134 (**Volume 5, Document 5.3.14F**) and National Grid Technical Report TR(E)564 (**Volume 5, Document 5.3.14G**).

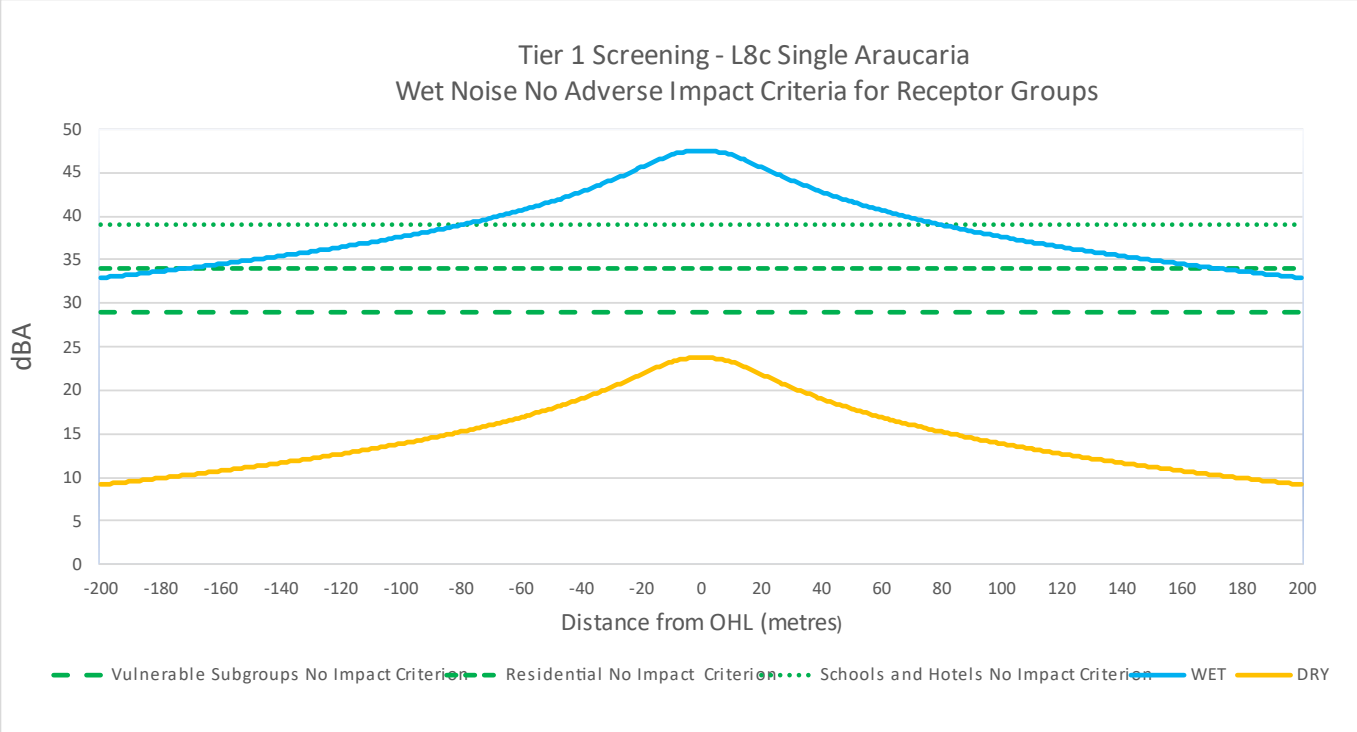
5.1.2 The screening found that all permanent receptors were outside the screening distance above which adverse impacts are unlikely and therefore, noise from all new overhead lines, 275 kV and 400kV, is **not significant** at these receptors.

5.1.3 A vulnerable sub-group of receptors is present at a Travellers' encampment near Monk Fryston. The Traveller's encampment is within the Tier 1 screening distance for assessment of adverse impact, but not the Tier 2 (as screening distance is 0 m for the 275 kV lines), as such the impact is **negligible** and **not significant.**

Page intentionally blank

Annex 14E.1
EFC-400 Modelled Results

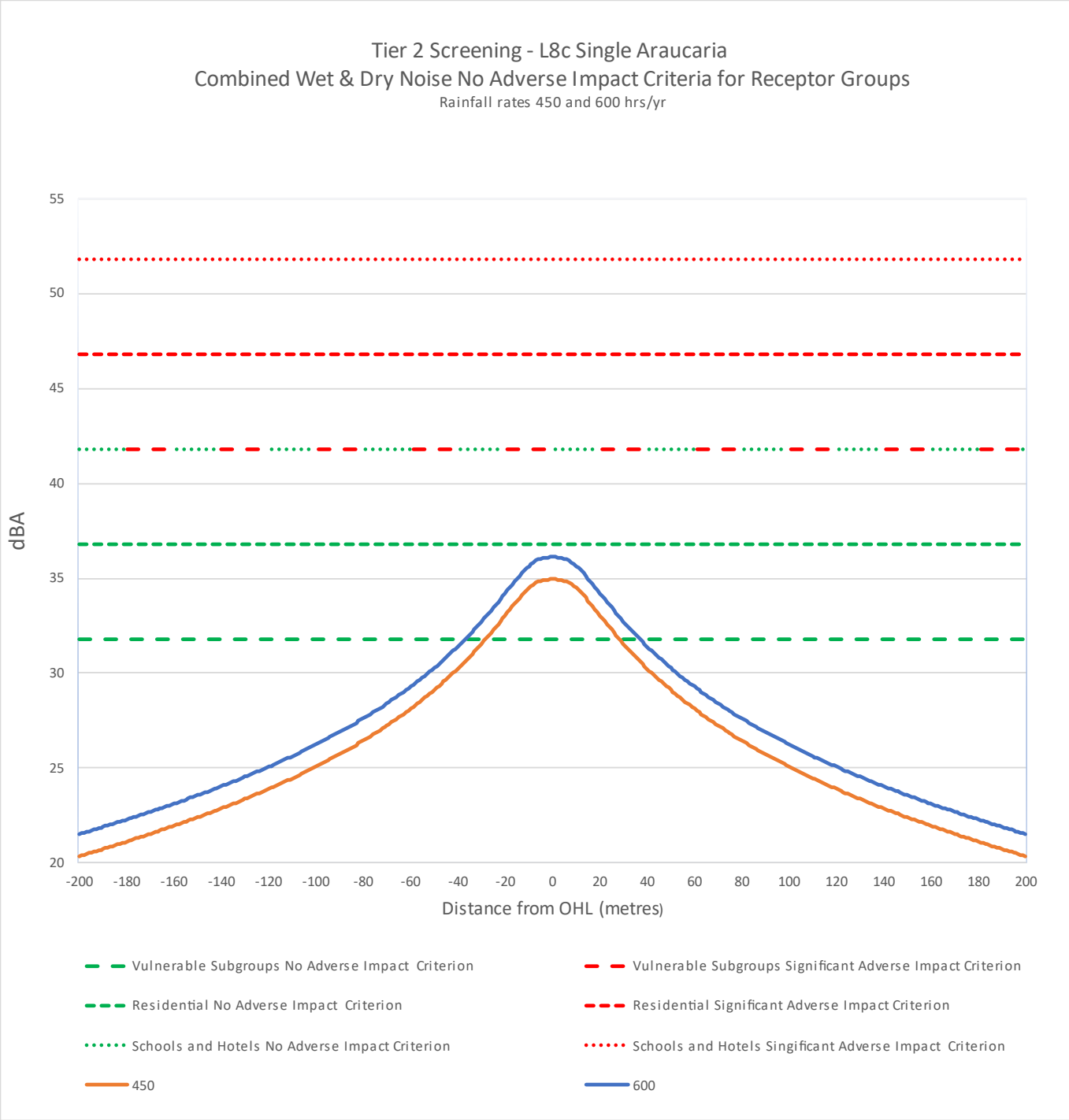
Figure 14E1.1 – 275 kV Single Araucaria (SP overhead line) Tier 1 Graph



E.1.1 The chart above shows the EFC-400 Tier 1 screening curve for the 275kV SP overhead line. The horizontal axis shows the distance in metres either side of the overhead line, with the overhead line centreline (0m) in the centre of the chart. The vertical axis shows the predicted wet and dry noise value in dBA for this overhead line design. The dashed lines show the Tier 1 'No Adverse Impact' screening criteria from **Table 3.1** for Schools and Hotels (<39 dBA), Residential (<34 dB) and Vulnerable Sub-groups (<29).

E.1.2 The curve exceeds the screening criteria for Residential and Vulnerable Sub-groups.

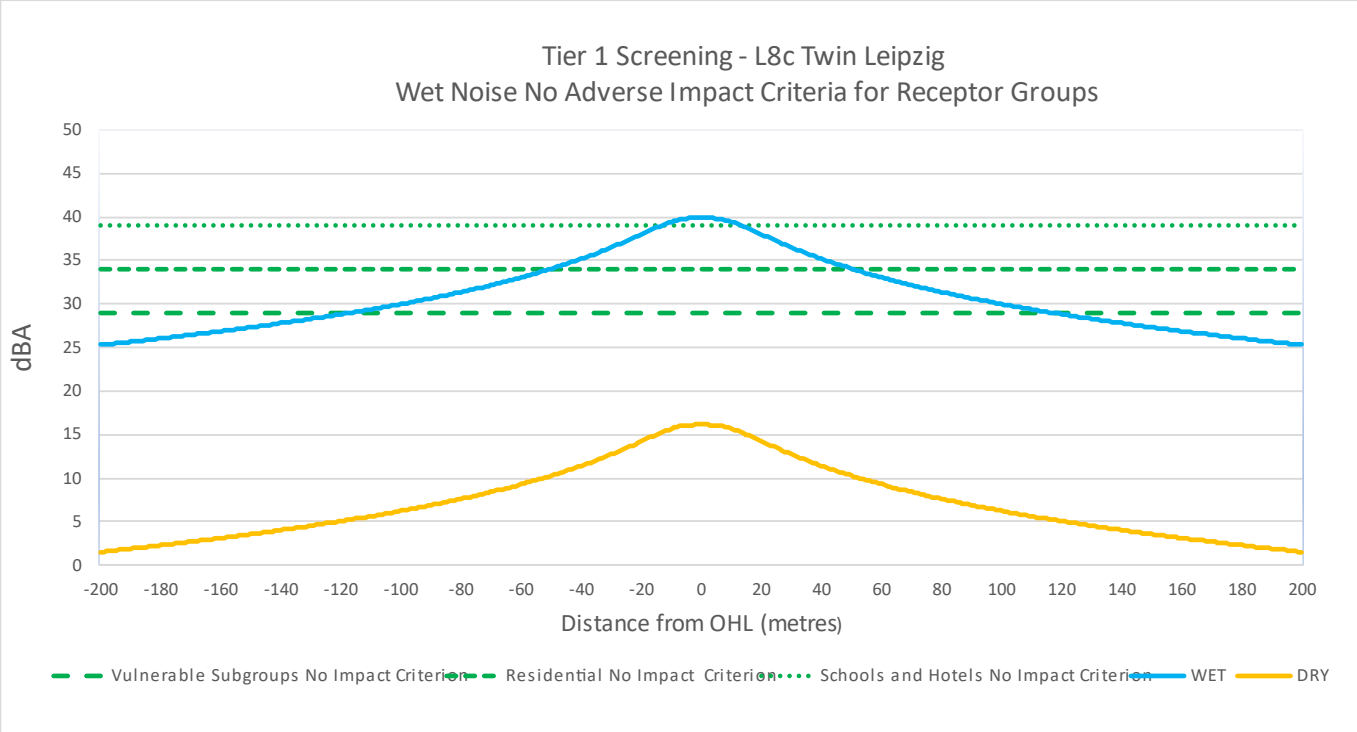
Figure 14E1.2 – 275 kV Single Araucaria (SP overhead line) Tier 2 Graph



E.1.3 The chart above shows the EFC-400 Tier 2 screening curve for the 275kV SP overhead line. The horizontal axis shows the distance in metres either side of the overhead line, with the overhead line centreline (0m) in the centre of the chart. The vertical axis shows the predicted combined wet and dry noise value in dBA for this overhead line design. The dashed lines show the Tier 2 'No Adverse Impact' screening criteria from Table 3.2 for Schools and Hotels (41.9 dBA), Residential (36.9 dB) and Vulnerable Sub-groups (31.9 dB).

E.1.4 The curve does not exceed the screening criteria even at 0m distance, concluding that all receptors are screened out of Tier 3 assessment.

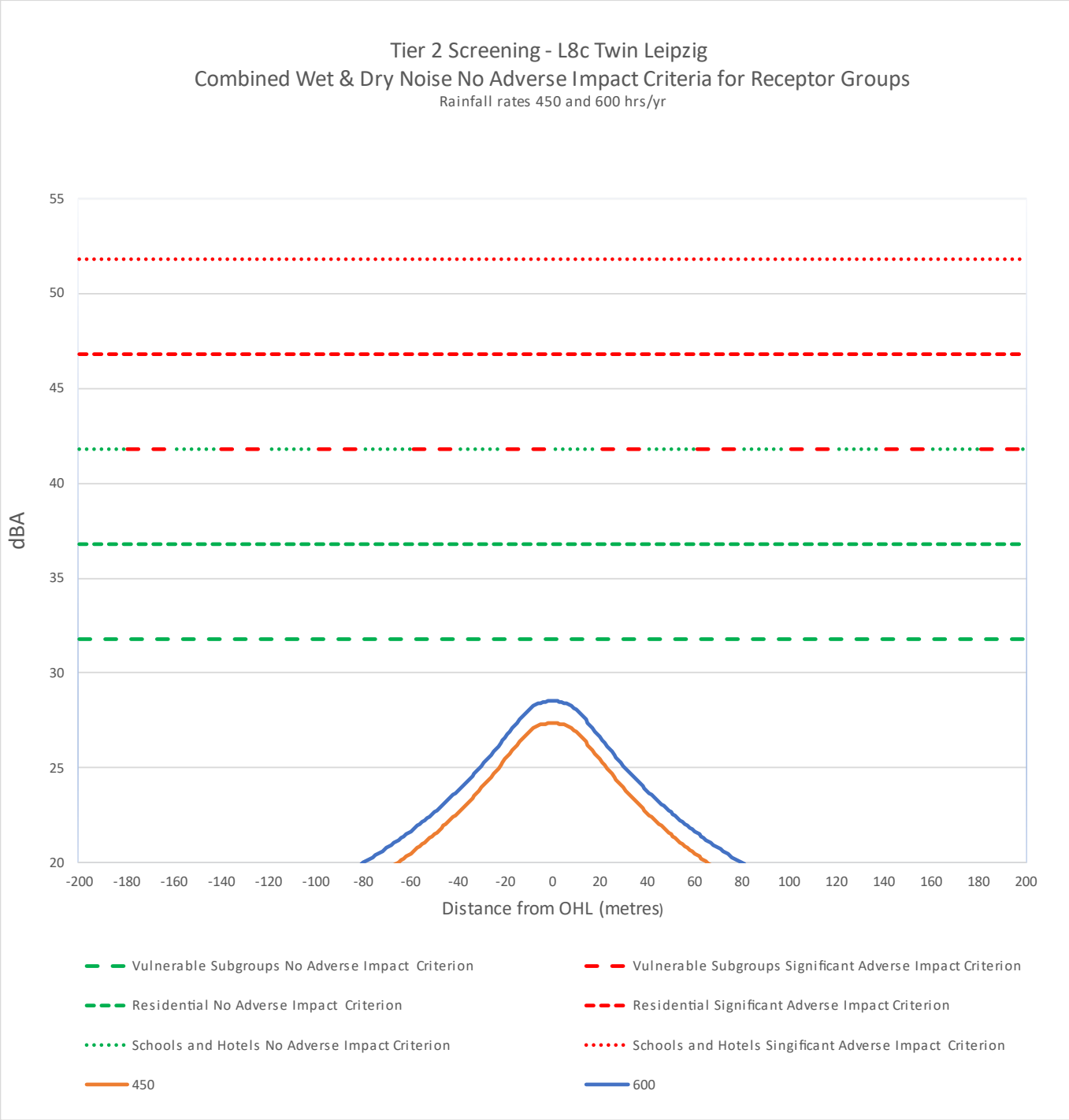
Figure 14E1.3 – 275 kV Twin Leipzig (XC overhead line) Tier 1 Graph



E.1.5 The chart above shows the EFC-400 Tier 1 screening curve for the 275kV XC overhead line. The horizontal axis shows the distance in metres either side of the overhead line, with the overhead line centreline (0m) in the centre of the chart. The vertical axis shows the predicted wet and dry noise value in dBA for this overhead line design. The dashed lines show the Tier 1 'No Adverse Impact' screening criteria from **Table 3.1** for Schools and Hotels (<39 dBA), Residential (<34 dB) and Vulnerable Sub-groups (<29).

E.1.6 The curve exceeds the screening criteria for all receptor groups.

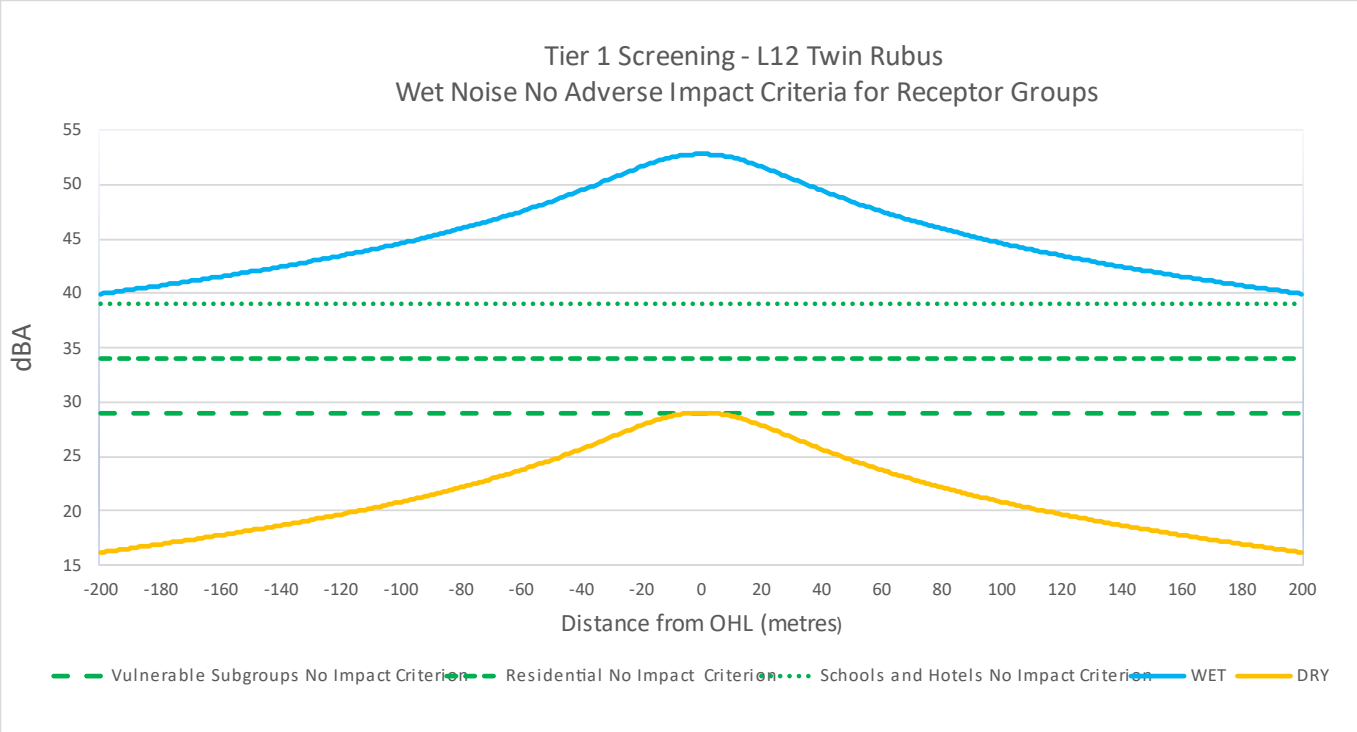
Figure 14E1.4 – 275 kV Twin Leipzig (XC overhead line) Tier 1 Graph



E.1.7 The chart above shows the EFC-400 Tier 2 screening curve for the 275kV XC overhead line. The horizontal axis shows the distance in metres either side of the overhead line, with the overhead line centreline (0m) in the centre of the chart. The vertical axis shows the predicted combined wet and dry noise value in dBA for this overhead line design. The dashed lines show the Tier 2 'No Adverse Impact' screening criteria from **Table 3.2** for Schools and Hotels (41.9 dBA), Residential (36.9 dB) and Vulnerable Sub-groups (31.9 dB).

E.1.8 The curve does not exceed the screening criteria even at 0m distance, concluding that all receptors are screened out of Tier 3 assessment.

Figure 14E1.5 – 400kV Twin Rubus (YN overhead line) Tier 1 Graph



E.1.9 The chart above shows the EFC-400 Tier 1 screening curve for the 400 kV overhead line. The horizontal axis shows the distance in metres either side of the overhead line, with the overhead line centreline (0m) in the centre of the chart. The vertical axis shows the predicted wet and dry noise value in dBA for this overhead line design. The dashed lines show the Tier 1 'No Adverse Impact' screening criteria from **Table 3.1** for Schools and Hotels (<39 dBA), Residential (<34 dB) and Vulnerable Sub-groups (<29).

E.1.10 The curve exceeds the screening criteria for all receptor groups.

Figure 14E1.6 – 400kV Twin Rubus (YN overhead line) Tier 2 Graph

E.1.11 The chart above shows the EFC-400 Tier 2 screening curve for the 400 kV overhead line. The horizontal axis shows the distance in metres either side of the overhead line, with the overhead line centreline (0m) in the centre of the chart. The vertical axis shows the predicted combined wet and dry noise value in dBA for this overhead line design. The dashed lines show the Tier 2 'No Adverse Impact' screening criteria from **Table 3.2** for Schools and Hotels (41.9 dBA), Residential (36.9 dB) and Vulnerable Sub-groups (31.9 dB).

E.1.12 The curve exceeds the adverse screening criteria for Residential receptors at 52 m distance, The nearest residence is approximately 300 m from the proposed line

concluding that all receptors are screened out of Tier 3 assessment. There are no Vulnerable sub-groups identified near the new 400 kV line.

National Grid plc
National Grid House,
Warwick Technology Park,
Gallows Hill, Warwick.
CV34 6DA United Kingdom

Registered in England and Wales
No. 4031152