

ENVIRONMENTAL STATEMENT (VOLUME II)

Chapter 14 – Noise and Vibration

Padeswood Carbon Dioxide Spur Pipeline Proposed Development

Town and Country Planning Act 1990

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TABLE OF CONTENTS

ENVIRONMENTAL STATEMENT (VOLUME II)	1
14. NOISE AND VIBRATION	1
14.1. Introduction	1
14.2. Legislative and Policy Framework	1
14.3. Scoping Opinion and Consultation	5
14.4. Scope of the Assessment	7
14.5. Assessment Methodology and Significance Criteria	8
14.6. Sensitive Receptors	26
14.7. Design Development, Impact Avoidance and Embedded mitigation	28
14.8. Preliminary Assessment of Likely Impacts and Effects	28
14.9. Mitigation and Enhancement measures	35
14.10. Assessment of Likely Significant Effects	36
14.11. Monitoring	40
14.12. Residual Effects	40
REFERENCES	44

TABLES

Table 14.1 - Summary of Consultation Undertaken	6
Table 14.2 - Elements Scoped Out of the Assessment	7
Table 14.3 – List of Noise Survey Locations	10
Table 14.4 – Construction Activity and Noise Sensitive Receptors	12
Table 14.5 - Threshold of Potential Significant Effect at Dwellings	14
Table 14.6 - Construction Noise Magnitude of Impact	15
Table 14.7 - Construction Vibration (Human) Magnitude of Impact	15
Table 14.8 - Transient Vibration Guide Values for Cosmetic Damage	16
Table 14.9 - Construction Vibration (Building) Magnitude of Impact	17
Table 14.10 – Magnitude of Road Traffic Impact in the Short Term	18
Table 14.11 – Operational Noise Level Assumptions	19
Table 14.12 – Operational Magnitude of Impact Noise	20
Table 14.13 – Indoor Ambient Noise Criteria for Dwellings	21
Table 14.14 –Description of Noise Climate at Monitoring Locations	23
Table 14.15 –Summary of Ambient Noise Levels	24
Table 14.16 –Summary of Background Noise Levels	25
Table 14.17: Noise Sensitive Receptors and Associated Noise Monitoring Location	26
Table 14.18: Magnitude of Impact from Open Trenching Construction Activity, Daytime (Unmitigated)	29

Table 14.19: Magnitude of Impact from Trenchless Crossings Activity, Daytime (Unmitigated).....	30
Table 14.20: Magnitude of Impact from Trenchless Crossings Activity, Evening (Unmitigated).....	30
Table 14.21: Magnitude of Impact from Trenchless Crossings Activity, Night-Time (Unmitigated).....	31
Table 14.22 - Predicted Set Back Distances for Vibratory Piling	32
Table 14.23 - Predicted Set Back Distances for Ground Compaction	32
Table 14.24 - Operational Noise Assessment - Daytime	34
Table 14.25 - Operational Noise Assessment - Night-time	34
Table 14.26 - Ambient Daytime Noise Assessment	35
Table 14.27 - Ambient Night-time Noise Assessment.....	35
Table 14.28: Magnitude of Impact from Open Trenching Construction Activity, Daytime (Mitigated)	36
Table 14.29: Magnitude of Impact from Trenchless Crossings Activity, Daytime (Mitigated).....	37
Table 14.30: Magnitude of Impact from Trenchless Crossings Activity, Evening Time (Mitigated).....	37
Table 14.31: Magnitude of Impact from Trenchless Crossings Activity, Night-Time (Mitigated).....	38
Table 14.32 - Summary of Residual Effects.....	41

14. NOISE AND VIBRATION

14.1. INTRODUCTION

- 14.1.1. This Chapter reports the assessment of the likely significant effects of the Padeswood Spur Pipeline Proposed Development from Noise and Vibration. and describes:
- Relevant, legislation, policy and guidance;
 - Consultation undertaken;
 - Assessment methodology;
 - Baseline conditions;
 - Potential effects of the Construction, Operational and Decommissioning Stages of the Padeswood Spur Pipeline Proposed Development;
 - Potential design, mitigation and enhancement measures;
 - Residual effects; and
 - Next steps.
- 14.1.2. This chapter (and its associated figures and appendices) is intended to be read as part of the wider ES, with particular reference to Chapter 18 – Combined and Cumulative Effects (Document Reference: PW.3.2.18).

14.2. LEGISLATIVE AND POLICY FRAMEWORK

- 14.2.1. A summary of the international, national, and local legislation, planning policy and guidance relevant to the Noise and Vibration assessment for the Padeswood Spur Pipeline Proposed Development is set out below.

LEGISLATIVE FRAMEWORK

National

The Control of Pollution Act (1974)

- 14.2.2. The principal legislation covering demolition and construction noise is the Control of Pollution Act 1974, Part III (HM Government, 1974). Sections 60 and 61 of the Act give the local authority special powers for controlling noise arising from construction and demolition works, regardless of whether a statutory nuisance has been caused or is likely to be caused. Works within the scope of these provisions include repair and maintenance work and road works. These powers may be exercised either before works start or after they have started.

[The Environmental Noise \(Wales\) \(Amendment\) Regulations 2009](#)

- 14.2.3. The Environmental Noise (Wales) (Amendment) Regulations (HM Government, 2009) relate to the assessment and management of environmental noise in Wales as stipulated in the Directive 2002/49/EC of the European Parliament.

POLICY

National

[Overarching National Policy Statement for Energy \(EN-1\) \(DESNZ, 2024\)](#)

- 14.2.4. The current Overarching National Policy Statement for Energy (Overarching NPS) (Department for Energy Security and Net Zero, 2024) sets out that operational noise including ancillary activities associated with development should be assessed using the principles of the relevant British Standards (BS 4142, BS 6472 and BS 8233) where appropriate. The NPS states that for the prediction, assessment and management of construction noise, reference should be made to BS 5228). It states that a development must be undertaken in accordance with the relevant policy in Wales including Planning Policy Wales, Technical Advice Notes and the Welsh Government's Noise and Soundscape Action Plan.

[Future Wales The National Plan 2040, Welsh Government \(2021\)](#)

- 14.2.5. Future Wales (Welsh Government, 2021) is the national development framework for Wales and is a development plan with a strategy for addressing key national priorities through the planning system.

[Planning Policy Wales, Edition 11 \(Welsh Government, 2021\)](#)

- 14.2.6. Planning Policy Wales (PPW) (Welsh Government, 2021) sets the land use policies of the Welsh Government. It is supplemented by the Technical Advice Notes (TANs) and other documents to provide a policy framework for Wales.

[Noise and Soundscape Action Plan, 2023-2028, Welsh Government](#)

- 14.2.7. The Noise and Soundscape Action Plan (Welsh Government, 2023) sets the plans to meet the obligations described in the Environmental Noise (Wales) (Amendment) Regulations 2009 (HM Government, 2009). It includes national well-being goals related to noise and soundscapes.

[Technical Advice Note \(TAN\) 11: Noise, 1997, Welsh Government](#)

- 14.2.8. TAN 11 (Welsh Government, 1997) outlines some of the main considerations which local planning authorities should consider when determining planning applications for development, which will either generate noise or be exposed to existing noise sources.

- 14.2.9. A draft of an updated version of this document went through consultation in 2023, TAN 11: Air Quality, Noise and Soundscape. A key element of this proposed update is the introduction of good soundscape design as a prerequisite to good placemaking.

Local

[Flintshire Local Development Plan 2015 - 2030 \(Adopted January 2023\)](#)

- 14.2.10. The Flintshire Local Development Plan (Flintshire County Council , 2023) is intended to promote sustainable development over a 15-year period to 2030. It contains policies relevant to the Padeswood Spur Pipeline Proposed Development: Policy STR14 on Climate Change and Environmental Protection and EN18 on Pollution and Nuisance.

GUIDANCE

International

[ISO 9613 \(2024\): Acoustics - Attenuation of sound during propagation outdoors - Part 2: Engineering method for the prediction of sound pressure levels outdoors](#)

- 14.2.11. ISO 9613 (British Standards Institution, 2024) specifies methods of calculating the attenuation of sound propagating outdoors in order to predict the level of environmental noise at distant locations from various sound sources.

National

[BS 7445 \(2003\): Description and Measurement of Environmental Noise](#)

- 14.2.12. BS 7445:2003 (British Standards Institution, 2003) defines and prescribes best practice during recording and reporting of environmental noise. It is inherently applied in all instances when making environmental noise measurements and is applicable to the baseline noise measurements taken to inform this Chapter.

[BS 4142 \(2014\) + A1 \(2019\): Methods for rating and assessing industrial and commercial sound](#)

- 14.2.13. BS 4142 (British Standards Institution, 2019) provides a method by which to determine the significance of sound of an industrial nature (e.g., the 'specific sound' from proposed new plant units) at nearby noise sensitive receptors.

[BS 5228, Parts 1&2 \(2009\) + A1 \(2014\): Noise and Vibration Control on Construction and Open Sites](#)

- 14.2.14. Part 1 of this BS 5228 (British Standards Institution, 2014) provides the latest recommendations for basic methods of noise control where

there is a need for the protection of persons living and working in the vicinity of, and those working on, construction and open sites. Part 2 (British Standards Institution, 2014) of the Standard provides the latest recommendations for basic methods of vibration control where there is a need for the protection of persons living and working in the vicinity of, and those working on, construction and open sites.

[BS 7385 \(1993\) Part 2: Evaluation and Measurement for Vibration in Buildings](#)

- 14.2.15. BS 7385 Part 2 (British Standards Institution, 1993) provides guidance on the assessment of the possibility of vibration-induced damage in buildings due to a variety of sources. Only the direct effect of vibration on buildings is considered. The indirect effects on the building structure due to ground movement, the movement of loose objects within buildings, the possibility of damage to sensitive equipment and the effect of vibration on people are outside the scope of this Part of BS 7385.

- 14.2.16. The guidance in this document has been used to assess construction impacts due to construction sources.

[BS ISO 4866 \(2010\): Mechanical Vibration and Shock – vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures](#)

- 14.2.17. BS ISO 4866 (British Standards Institution, 2010) establishes principles for carrying out vibration measurement and processing data with regard to evaluating vibration effects on structures. The evaluation of the effects of structural vibration is primarily obtained from the response of the structure, using appropriate analytical methods by which the frequency, duration and amplitude can be defined. ISO 4866 only deals with the measurement of structural vibration and excludes the measurement of airborne sound pressure and other pressure fluctuations, although response to such excitations is taken into consideration.

[BS 8233:2014 Guidance on sound insulation and noise reduction for buildings](#)

- 14.2.18. BS 8233 (British Standards Institution, 2014) provides guidance for the control of noise for new buildings, or refurbished buildings undergoing a change of use. The guidance provided includes appropriate internal and external noise level criteria, which are applicable to dwellings for steady external noise sources.

[Design Manual for Roads and Bridges \(2020\): DMRB LA111 Noise and Vibration](#)

- 14.2.19. LA111 (Highways England, 2020) sets out the requirements for noise and vibration assessments from road projects. The document presents

scoping assessment criteria for operational road traffic noise levels to gain an understanding of the need to undertake a further noise assessment. DMRB advises that the Calculation of Road Traffic Noise (CRTN) (Department of Transport, 1988) method should be used to predict road noise emissions.

[Department of Transport \(1988\) Calculation of Road Traffic Noise \(CRTN\)](#)

- 14.2.20. CRTN (Department of Transport, 1988) memorandum describes the methodology to calculate the road traffic noise at a given distance from the highway. This is referred to as the Basic Noise Level (BNL). The methodology considers the intervening ground cover, road configuration and road layout. The calculation assumes typical traffic (i.e., free flowing) and noise propagation conditions. Noise levels are presented in terms of the noise descriptor LA10, 18h which is the noise level exceeded for just 10 % of the time between 06:00 and 24:00 hours.

[Advisory Council \(1978\). A guide to measurement and prediction of sound level Leq.](#)

- 14.2.21. Advisory Council (Advisory Council, 1978) provides guidance on the evaluation and control of environmental noise in the UK using the noise description equivalent continuous sound level Leq. The document gives general procedures for measurement and prediction of noise.

14.3. SCOPING OPINION AND CONSULTATION

RESPONSE TO THE SCOPING OPINION

- 14.3.1. An EIA Scoping Opinion was received by the Applicant from the Local Planning Authority (LPA) on 8 May, 2024 including formal responses from Statutory Consultees. The responses from the LPA in relation to Noise and Vibration and how these requirements should be addressed by the Applicant are set out in **Appendix 1-3 Scoping Opinion Responses (Volume III)(Document Reference:PW.3.3.1.3).**

CONSULTATION UNDERTAKEN TO DATE

- 14.3.2. **Table 14.1** provides a summary of the consultation undertaken to inform the Noise and Vibration assessment to date.

Table 14.1 - Summary of Consultation Undertaken

Organisation	Meeting dates and form of consultation	Summary of outcome of discussions
Flintshire County Council	22 nd January 2025	The methodologies for the noise survey and noise and vibration assessment were discussed and agreed. It was agreed that the 'ABC' method described in BS 5228 will be used to assess the likely adverse noise and vibration effects during Construction and Decommissioning Stages. Preliminary results of the construction noise assessment were shared to indicate the location of likely adverse effects arising from the trenchless crossing activities. It was agreed that any adverse noise and vibration effects estimated to occur for a duration of less than 10 days or nights will not be considered significant.

14.4. SCOPE OF THE ASSESSMENT

- 14.4.1. The scope of this assessment has been established through an ongoing scoping process. Further information can be found in **Chapter 5: EIA Methodology (Document Reference: PW.3.2.5)** of this ES.
- 14.4.2. This section provides an update to the scope of the assessment and re-iterates the evidence base for scoping out elements following further iterative assessment.

ELEMENTS SCOPED OUT OF THE ASSESSMENT

- 14.4.3. The elements shown in **Table 14.2** are not considered to give rise to likely significant effects as a result of the Padeswood Spur Pipeline Proposed Development and have therefore not been considered within this assessment.

Table 14.2 - Elements Scoped Out of the Assessment

Element Scoped Out	Justification
Road traffic noise impacts arising from the operation of the Padeswood Spur Pipeline Proposed Development	<p>Minimal traffic is expected during the operation of the Padeswood Spur Pipeline. Operational traffic will be occasional and infrequent (once a month or less) visits by maintenance vehicles. Should there be maintenance activities planned, the expected quantum of vehicles would be 1-2 (LGVs).</p> <p>The nearby sensitive receptors (NSRs) within 500 meters of Padeswood AGI include Padeswood Farm, Oak Tree Farm, Padeswood Hall, and residences further northeast. Along the pipeline route, the nearest sensitive receptor is located 50 meters from Mold Road in Mynydd Isa. (Refer to Section 14.6 for further details on Sensitive Receptors).</p> <p>Overall, road traffic movements during the operation of the Padeswood Spur Pipeline are not expected to adversely affect the nearby NSRs mentioned above. The impact on these areas is anticipated to be minimal.</p>
Vibration impacts arising from the	Equipment will be included in the Above Ground Installations (AGI). There is no rotating

Element Scoped Out	Justification
operation of the Padeswood Spur Pipeline Proposed Development	equipment / machinery within the AGI. Therefore, the operation of the AGI is not expected to give rise to a significant effect at the nearest sensitive receptor in terms of vibration.

ELEMENTS SCOPED INTO THE ASSESSMENT

Construction Stage

14.4.4. The following elements are considered to have the potential to give rise to significant effects during the Construction Stage of the Padeswood Spur Pipeline Proposed Development and have therefore been considered within this assessment:

- Airborne noise effects arising from heavy vehicle movements on the local road network associated with the construction traffic; and
- Noise and vibration effects arising from the construction of the Padeswood Spur Pipeline Proposed Development.

Operational Stage

14.4.5. Noise effects arising from the operation of the AGI are considered to have the potential to give rise to significant effects and have therefore been considered within this assessment.

Decommissioning Stage

14.4.6. For the purposes of this assessment, it has been assumed that noise and vibration sources associated with the Decommissioning Stage are equivalent to those assessed for the Construction Stage of the AGI.

14.5. ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

STUDY AREA

14.5.1. The Study Area considered in the noise assessment for the Construction Stage of the Padeswood Spur Pipeline Proposed Development extends as a 300 m buffer from the Red Line Boundary. BS 5228:2009+A1:2014 (British Standards Institution, 2014) states that at distances over 300m noise predictions have to be treated with caution. Therefore, the Study Area for construction has been limited to this distance.

- 14.5.2. The Study Area in the vibration assessment for the Construction Stage of the Padeswood Spur Pipeline Proposed Development is 100 m from the Red Line Boundary. It is anticipated that vibration effects as a result of the construction activities will not be significant beyond these distances, based on professional judgement and results presented later in the Chapter.
- 14.5.3. The Study Area for the operational noise assessment, related to any noise effects arising from the AGI, has been limited to a buffer 500 m from the Red Line Boundary.
- 14.5.4. The Study Area for Noise and Vibration is shown in **Figure 14.1 Noise Monitoring Locations and Constraints (Document Reference: PW.3.4.14.1)**. A description of the NSRs within the Study Area is provided in Section 14.6.

METHOD OF BASELINE DATA COLLECTION

Desk Study

- 14.5.5. A desktop study has been undertaken to identify Noise Action Plan Priority Areas (NAPPAs) (Welsh Government, 2017) based on the 3rd round noise mapping for the Environmental Noise Directive (END) (European Commission, 2002), legally in force in Wales through the Environmental Noise (Wales) Regulations (HM Government, 2009).
- 14.5.6. The following NAPPAs have been identified within 500m from Red Line Boundary:
- Proximity Area ID 595, A541, owned by Flintshire County Council (FCC).
 - Proximity Area ID 1323, A541 Mold, owned by FCC.
 - Proximity Area ID 1321, A5119 Mold, owned by FCC.
 - Proximity Area ID 1322, A5119 New Brighton, owned by FCC.
 - Proximity Area, ID 1318, A55 Northop Hall, owned by FCC.
 - Priority Area (Roads) ID 398, A494(T) Alltami, owned by FCC.
- 14.5.7. All NAPPAs are outside the Red Line Boundary. Priority Area (Roads) ID 398, Proximity Area ID 1322 and Proximity Area ID 1323 are located within the Study Area.
- 14.5.8. Analysis of an address database has been undertaken to assist the identification of NSRs. The following noise sensitive receptors have been considered in the assessment:
- Dwellings; and
 - Hospitals, schools, nurseries, elderly homes and places of worship.

Site Visits and Surveys

- 14.5.9. A baseline noise survey was undertaken between 3 and 18 June 2024 at representative locations near the Padeswood Spur Pipeline Proposed Development. The purpose of the noise survey was to establish the existing noise climate at locations representative of the NSRs potentially affected by the Padeswood Spur Pipeline Proposed Development. All survey locations are within the Study Area.
- 14.5.10. The baseline noise survey was undertaken in accordance with BS 7445:2003 (British Standards Institution, 2003), BS 4142:2014+A1:2019 (British Standards Institution, 2019) and BS 5228:2009+A1:2014 (British Standards Institution, 2014).
- 14.5.11. Noise measurements were taken across 8 locations at 1.2m above the ground level in free field conditions. The survey consisted of continuous noise measurements over seven days at each location. Monitoring locations are shown in **Figure 14.1 - Environmental Noise Survey Locations and Noise Constraints** (Document Reference: PW.3.3.14.1).
- 14.5.12. **Table 14.3** present the list of noise monitoring locations and their associated Ordnance Survey (OS) coordinates. A description of the location has been included with information on their spatial context in relation to the sections defined in **Chapter 3 Description of the Padeswood Spur Pipeline Proposed Development** (Document Reference:PW.3.2.3) and shown on **Figure 3.2 - Padeswood Spur Pipeline Proposed Development** (Document Reference: PW.3.4.3.2).

Table 14.3 – List of Noise Survey Locations

Location	X Coordinate	Y Coordinate	Description
LT1	326859	363522	Southwest of Buckley, approximately 40 m southwest of Well Street
LT2	325456	363656	South of Mynydd Isa, approximately 200 m south of A549 and 420 m east of A541
LT3	324457	364275	East of Mold, approximately 320 m west of Mold Bypass (A491) and 350 m west of A541/A5119 Mold roundabout

Location	X Coordinate	Y Coordinate	Description
LT4	325128	364010	West of Mynydd Isa, approximately 220 m north of A549 and 320 m east of Mold Bypass (A491)
LT5	328850	363326	Southwest of Lane End, approximately 700 m north of A5119 and 270 m west of Bannel Lane
LT6	325667	365997	North of New Brighton and Alltam, approximately 580 m north of A494/A5119/ Mold Bypass (A491) roundabout
LT7	325804	367111	Southwest of Northop Hall, approximately 510 m southwest of A55 North Wales Expressway
LT8	325712	368096	Northwest of Northop Hall, approximately 250 m east of A55 North Wales Expressway and 20 m from B5125
Baseline Conditions are presented in Table 14.4 and Table 14.5 Noise Sensitive Receptors and its association with a noise monitoring location is presented in Table 14-17 under Section 14.6			

- 14.5.13. The noise parameters measured included L_{10} , L_{90} , L_{eq} and L_{max} over 15-minute logging intervals.
- 14.5.14. Weather data was logged throughout the noise monitoring using a weather station. Data from the unattended monitoring during periods of precipitation and in which wind speed exceeded 5 m/s have been excluded from the analysis.
- 14.5.15. Noise monitoring forms including time periods, time history graphs, statistical analysis, details of the equipment and photographs of the Site are included in **Appendix 14.1 Baseline Noise Data (Document Reference: PW.3.3.14.1)**. Equipment calibration certificates are also

available on request. A calibration check on site was undertaken before and after measurements with no significant drift observed.

IMPACT ASSESSMENT METHODOLOGY

Construction Noise and Vibration

- 14.5.16. A quantitative assessment has been undertaken to determine the potential construction noise adverse effects following the guidance set out in BS 5228-1:2009+A1:2014 (British Standards Institution, 2014).
- 14.5.17. A 3D computer noise model built using CadnaA 2024 software and ArcGIS 10.8.1 has been used to determine the predicted construction noise levels associated with the Padeswood Spur Pipeline Proposed Development. Modelling scenarios were prepared with a typical configuration of plant items for key activities of the Construction Stage. The configuration of plant items and associated noise levels assumed for the key construction activities are presented in **Appendix 14.2 Assumptions for Construction Noise and Vibration Assessment (Document Reference: PW.3.3.14.2)**. The configuration of plant including noise levels and ‘on-time’ duration for each of the key construction activities assessed in the ES is also presented the appendix.
- 14.5.18. **Table 14.4** presents the construction activities included in the noise model. The table also describes the NSRs potentially affected by the activity. Further details are presented in **Figure 14.1 Noise Monitoring Locations and Constraints (Document Reference: PW.3.4.14.1)**.

Table 14.4 – Construction Activity and Noise Sensitive Receptors

Construction Activity	Operational Time	Noise Sensitive Receptors
Open Cut Trenching	Daytime (12 hours)	NSRs within 300 meters of the red line boundary have the potential to be affected. This is detailed in Section 14.6. It is assumed that the work, involving open trenching, will take place during the daytime along the entire route.
Trenchless Installation Methods	Day, Evening, Night (24hours)	NSRs within 300 meters of the red line boundary have the potential to be affected.

Construction Activity	Operational Time	Noise Sensitive Receptors
(Trenchless Compounds)		This is detailed in Section 14.6. It is assumed that only one trenchless crossing activity will take place at a time.
Centralised and Localised Construction Compounds	Daytime (12 hours)	NSRs within 300 meters of the red line boundary have the potential to be affected. This is detailed in Section 14.6 The construction compounds will operate during the daytime.
Padeswood AGI	Daytime (12 hours)	NSRs within 300 meters from the red line boundary have the potential to be affected and considered in the assessment. These are outlined in Section 14.6.

- 14.5.19. The trenchless installation techniques noise assessment has been based on the use of horizontal directional drilling (HDD), guided (GAB) and unguided auger boring (UAG) and micro-tunnelling methods, as described in **Table 3-1 of Chapter 3: Description of the Padeswood Spur Pipeline Proposed Development (Document Reference:PW.3.2.3)**. This is the only activity that has been included in the evening and night-time periods.
- 14.5.20. Topographical data in LiDAR 1m grid format has been used within the Study Area.
- 14.5.21. Construction noise levels are predicted based on sound pressure levels at 10 m from plant likely to be used for construction. The noise propagation is then calculated at each sensitive receptor as an equivalent continuous noise level averaged over a one-hour period ($L_{Aeq,1h}$), it has then been assumed that this value is representative of the respective day, evening and night periods, where applicable, to account for the variations in noise due to plant-on and plant-off time. The assessment has been based on façade noise levels. The distance between the geometrical centre of the noise source and the assessment location is taken into account in the calculations.

- 14.5.22. Construction noise levels at the sensitive receptors have been assessed over the daytime, evening and night-time period using the ABC method described in BS 5228-1:2009+A1:2014 (British Standards Institution, 2014) to determine the significance of effect at each receptor. All noise predictions in the assessment correspond to noise levels at 4m high.
- 14.5.23. The ABC method defines thresholds of potentially significant effects based on the baseline ambient noise level, categories for which are presented in **Table 14.5**.

Table 14.5 - Threshold of Potential Significant Effect at Dwellings

Evaluation Period	Assessment Category (dB L _{Aeq})		
	A	B	C
Night-time (23:00-07:00)	45	50	55
Evening and Weekends*	55	60	65
Daytime (07:00-19:00)	65	70	75
<p>* 19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays.</p> <p>Category A: threshold values to use when ambient Noise levels (when rounded to the nearest 5 dB) are less than these values.</p> <p>Category B: threshold values to use when ambient Noise levels (when rounded to the nearest 5 dB) are the same as Category A values.</p> <p>Category C: threshold values to use when ambient Noise levels (when rounded to the nearest 5 dB) are higher than Category A values.</p> <p>The Category (A, B or C) is to be determined separately for each time period and the lowest Noise category is then used throughout the 24-hour cycle, for example, a site which is category A by day and category B or C in the evening and night will be treated as category A for day, evening, and night.</p>			

- 14.5.24. The magnitude of impact for construction noise have been informed by the guidance in BS 5228-1 (British Standards Institution, 2014) and impact can be defined as described in **Table 14.6**.

Table 14.6 - Construction Noise Magnitude of Impact

Magnitude of Impact	Construction Noise Level
High	Exceedance of ABC threshold value by more than 5 dB
Medium	Exceedance of ABC threshold value between 0-5 dB
Low	Equal to or up to 5 dB below the ABC threshold value
Negligible	Below the ABC threshold value by 5 dB

14.5.25. The methodologies described in BS 5228-2 (British Standards Institution, 2014) have been used to predict the propagation of vibration from construction activities relating to the Padeswood Spur Pipeline Proposed Development. BS 5228-2 describes significance criteria for determining effects on human receptors, and refers to BS 7385: Part 2, 1993 (British Standards Institution, 2003) to determine the impact on structures.

14.5.26. For human receptors the threshold of perception is typically in the range of 0.14 millimetre/second (mm/s) to 0.3 mm/s. As vibration increases above this threshold they may disturb, cause annoyance, or interfere with work activities. **Table 14.7** presents the magnitude of impact for construction vibration and relates to vibration levels at which minimal adverse comment is likely as described in BS 5228-2 (British Standards Institution, 2014).

Table 14.7 - Construction Vibration (Human) Magnitude of Impact

Magnitude of Impact	Construction Vibration Level
High	Above or equal to 10 mm/s Peak Particle Velocity (PPV)
Medium	Above and equal to 1 mm/s and below 10 mm/s PPV
Low	Above or equal to 0.3 mm/s and below 1 mm/s
Negligible	Below 0.3 mm/s

14.5.27. Adverse health impacts relating to a significant effect is more difficult to quantify and BS 5228-2 (British Standards Institution, 2014) notes the following:

“Guidance on the effects on physical health of vibration at sustained high levels is given in BS 6841, although such levels are unlikely to be encountered as a result of construction and demolition activities.”

- 14.5.28. Significance of effect is therefore related to the duration and frequency of construction activities as well as the time period the activities will be experienced.
- 14.5.29. Construction vibration impacts to human perception can normally be tolerated if prior warning is given, and exposure is limited. The duration and time of day that exposure occurs is therefore considered when determining the significance of any vibration impacts to human perception. This is described further under the heading **Significance Criteria** in paragraph 14.5.51.
- 14.5.30. BS 5228-2 (British Standards Institution, 2014) references BS 7385-2 (British Standards Institution, 1993). The criteria shown in **Table 14.8** relates to the thresholds of cosmetic damage due to vibration and is based upon systematic studies using a carefully controlled vibration source in the vicinity of buildings.

Table 14.8 - Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
NOTE 1: Values referred to are at the base of the building. NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

- 14.5.31. BS 7385-2 (British Standards Institution, 1993)) states that the probability of damage from transient vibration tends towards zero at 12.5 mm/s peak component particle velocity. For continuous vibration, such as from vibratory rollers, the threshold is around half this value.
- 14.5.32. BS 7385-2 (British Standards Institution, 1993) states that minor damage is possible at vibration magnitudes that are greater than twice those given in **Table 14.8** and major damage to a building structure can occur at values greater than four times the tabulated values. The descriptions to these damage categories are described in BS ISO 4866:2010 (British Standards Institution, 2010):
- Cosmetic: The formation of hairline cracks on drywall surfaces, or the growth of existing cracks in plaster or drywall surfaces; in addition, the formation of hairline cracks in mortar joints of brick / concrete block construction.
 - Minor: The formation of large cracks or loosening and falling of plaster or drywall surfaces, or cracks through bricks / concrete blocks.
 - Major: The damage to structural elements of the structure, cracks in support columns, loosening of joints, splaying of masonry cracks, etc.
- 14.5.33. **Table 14.9** describes the magnitude of impact for continuous vibration given the descriptions provided in BS 7385-2 (British Standards Institution, 1993) and BS ISO 4866 (British Standards Institution, 2010).

Table 14.9 - Construction Vibration (Building) Magnitude of Impact

Magnitude of Impact	Peak Particle Velocity (PPV) level (mm/s)	Damage Category
High	≥ 30	Major
Medium	≥ 15	Minor
Low	≥ 7.5	Cosmetic
Negligible	< 7.5	-

- 14.5.34. A scoping assessment was undertaken to determine the likely significance of the traffic generated by the Padeswood Spur Pipeline Proposed Development during the Construction Stage. This methodology has been based upon advice in DMRB LA111 (Highways England, 2020). The scoping assessment has been based on noise predictions at source as a first step to understand the likely effects. This is on the basis that the likely change in noise levels and significance of effects will not be worse at the receptors.

- 14.5.35. The scoping assessment was based on a comparison of Basic Noise Levels (BNLs) for road links, which is the noise level at 10 m calculated from traffic flows. On links where the flows were outside the scope of CRTN (Department of Transport, 1988), due to low traffic flows, then the noise levels were calculated using advice on the document Noise Advisory Council: A guide to measurement and prediction of the equivalent sound level Leq (Advisory Council, 1978). The assessment is based on a peak year of construction traffic activity which is assumed to be 2027. The assessment compares the noise levels with and without construction traffic, then the results are assessed using the short-term magnitude of noise impact described in **Table 14.10** adopted from DMRB LA111.

Table 14.10 – Magnitude of Road Traffic Impact in the Short Term

Magnitude of Impact	Noise change, $L_{A10,18h}$ dB
High	5+
Medium	3 – 4.9
Low	1 – 2.9
Negligible	0.1 – 0.9
No change	0

Operational Noise

- 14.5.36. A quantitative noise assessment has been undertaken in line with guidance described in BS 4142:2014+A1:2019 (British Standards Institution, 2019) to assess the potential impact of the AGI on nearby sensitive receptors. The method in this standard uses outdoor sound levels to assess the likely effects of sound on people due to the operation of industrial or commercial premises.
- 14.5.37. A noise model using CadnaA 2024 has been prepared to determine the likely noise impacts arising from the Padeswood AGI of the Padeswood Spur Pipeline Proposed Development. The noise source data within the model has been ascertained through consultation with the Applicant's design team. The only constant noise sources from the Padeswood Spur Pipeline Proposed Development will be the air conditioning units and fans on the electric and instrumentation kiosk (E&I kiosk). No additional noise-generating equipment is required at Northop AGI. The Padeswood AGI and additional equipment required at Northop Hall AGI are further defined in **Chapter 3 Description of the Padeswood Spur Pipeline Proposed Development** (Document Reference: PW.3.2.3)

and shown on Figure 3.2 - Padeswood Spur Pipeline Proposed Development (Document Reference: PW.3.4.3.2).

- 14.5.38. The mitigation embedded in the assessment requires that the rating noise levels for normal mode of operation predicted at 1m from the façade of NSRs as listed in **Table 14.24** and **Table 14.25** will not be exceeded.
- 14.5.39. The assumed noise levels presented in **Table 14.11** or a similar configuration of values as appropriate will be achieved through mitigation defined during Detailed Design. It is anticipated that these will be achieved through measures such as selection of low noise plant, orientation of noise sources, acoustic enclosures, acoustic louvres among others.
- 14.5.40. The assumed noise levels in **Table 14.11** correspond to permanent noise sources only. There will be noise arising from maintenance activities such as pigging and this has not been assessed on the basis that they will occur very infrequently and during daytime only. Therefore, this has not been assessed.

Table 14.11 – Operational Noise Level Assumptions

Plant	Location	Noise Level, $L_{Aeq,T}$ dB
One air conditioning unit per kiosk	1 m from unit	65
One extraction fan per kiosk	1 m from unit	65

- 14.5.41. The noise propagation has been calculated in line with ISO 9613 Part 2 (British Standards Institution, 2024) and assessed against guidance in BS 4142:2014+A1:2019 (British Standards Institution, 2019) for human receptors. Noise predictions have been undertaken at the nearest residential receptor to the AGI.
- 14.5.42. The method described in BS 4142 (British Standards Institution, 2019) compares the rating level of the sound source with the background sound level. Typical background noise levels have been determined from the baseline data presented in **Appendix 14.1 Baseline Noise Data** (Document Reference:PW.3.3.14.1).
- 14.5.43. The standard refers to the rating level, which describes the specific source level corrected by acoustic features, where appropriate.
- 14.5.44. The difference in levels established is taken as an initial estimate of the magnitude of the impact:

- *“Typically, the greater this difference, the greater the magnitude of the impact;*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”.*

14.5.45. Certain acoustic characteristics can increase the significance of the impact over that expected from a direct comparison between the specific sound level of the source and the background sound level. Characteristics that may attract attention include tonality, impulsivity, and intermittency.

14.5.46. **Table 14.12** describes the magnitude of impact for operational noise based on the initial estimate of the impact of the specific sound by subtracting the measured background sound level.

Table 14.12 – Operational Magnitude of Impact Noise

Magnitude of Impact	BS 4142 descriptor	Excess of rating over background sound level
High	Indication of a significant adverse impact, depending on the context.	Around +10 dB
Medium	Indication of an adverse impact, depending on the context.	Around +5 dB
Low	Not defined in BS4142	Between 0 and 5 dB
Negligible	Indication of a low impact, depending on the context	≤0 dB

14.5.47. Following determination of the initial estimate, BS 4142 states in Clause 11 that the final significance is dependent on both the margin by which the rating level of the specific sound source exceeds the background sound level and also the context in which the sound occurs.

- 14.5.48. Factors taken into consideration for the context may include:
- The absolute sound level at the individual receptor;
 - The character and level of the residual sound compared to the character and level of the specific sound; and
 - The sensitivity of the receptor and whether dwellings already incorporate noise mitigation measures.

14.5.49. For residential receptors, indoor ambient noise criteria for dwellings BS 8233:2014 (British Standards Institution, 2014) can be used to provide absolute sound levels for context as part of the assessment. These levels have been derived from exposure-response studies involving transportation noise and generally not applicable for sounds of an industrial nature, however they serve as a useful means of providing context to assessments of similar broadband noise sources.

14.5.50. **Table 14.13** reproduces Table 4 from BS 8233:2014 (British Standards Institution, 2014) and outlines the internal ambient noise criteria appropriate for dwellings.

Table 14.13 – Indoor Ambient Noise Criteria for Dwellings

Activity	Location	Daytime, 07:00 – 23:00	Nighttime, 23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dinning room/area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$

SIGNIFICANCE CRITERIA

Construction Noise and Vibration

- 14.5.51. Construction noise and vibration effects may be considered significant where it is determined that a medium or high magnitude of impact will occur at a sensitive receptor for a duration longer than:
- 10 or more days or nights in any 15 consecutive days or nights; or
 - A total number of days exceeding 40 in any six consecutive months.

Operational Noise

- 14.5.52. Operational noise effects may be considered significant depending on both the margin by which the rating level of the specific sound source

exceeds the background sound level and also the context in which the sound occurs. Magnitude of impacts described as medium or high in **Table 14.12** may be considered significant, depending on the context.

ASSUMPTIONS AND LIMITATIONS

- 14.5.53. The construction of the Padeswood Spur Pipeline Proposed Development assessed in this Chapter comprise various stages in sequence. The assessment has been based on a single activity resulting in the highest noise level at 10m. It is acknowledged that sensitive receptors will be exposed to the predicted construction noise levels for a short period of time. Most of the time during the Construction Stage, the noise levels and associated impacts are expected to be lower than those predicted in this study.
- 14.5.54. It has been assumed that the secondary noise mitigation during the Construction Stage will achieve a minimum noise attenuation of 10 dB(A) at all sensitive receptors.
- 14.5.55. The assessment is based upon a reasonable worst-case, where the Padeswood Spur Pipeline is located centrally within the Red Line Boundary to ensure that likely significant effects are assessed. Although minor variations are expected during detailed design, the conclusions on this assessment are considered to be valid if the locations of the open trench activities and trenchless compounds vary slightly within the Red Line Boundary.
- 14.5.56. A worst-case assessment has been undertaken for the trenchless crossing construction activities. The assessment assumes that items of plant shown in **Table 2 of Appendix 14.2 Assumptions for Construction Noise and Vibration Assessment (Volume III) (Document Reference: PW.3.3.14.2)** are in operation during construction at both the drive and exit pits of the trenchless crossings. Noise sources in the model represent the likely combination of plant in each of the pits.
- 14.5.57. It has been assumed that trenchless crossing construction activities will not occur simultaneously. Therefore, potential cumulative effects due to simultaneous trenchless crossing methods have not been assessed. In practice, trenchless crossing activities occurring further apart will not lead to cumulative adverse effects. However, simultaneous night-time activities at trenchless crossings 2, 3, 4 and 5 and trenchless crossings 6 and 7 should be avoided due to their proximity.
- 14.5.58. Noise surveys undertaken for this assessment have been carried out on the basis that the noise climate during the EIA process will be representative of the typical baseline conditions in the future.

14.5.59. Construction working methodologies are indicative at this stage.

BASELINE CONDITIONS

EXISTING BASELINE

14.5.60. **Table 14.14** describes the noise climate and dominant noise sources at the noise monitoring locations. **Table 14.15** presents the representative ambient noise levels (L_{Aeq}) at each long-term noise monitoring location. The data have been used to determine the ABC threshold category in accordance with BS 5228-1 (British Standards Institution, 2014).

14.5.61. **Table 14.16** presents the background noise level (L_{A90}), selected based on a statistical analysis of the measured sound levels during the monitoring period. Generally, the selection process aimed at choosing low background noise level events which occurred for a reasonable proportion of the measurement period. For the purpose of this assessment, a typical background noise levels has been chosen as the L_{A90} noise level value which was exceeded 70% of the measurement period.

14.5.62. Data have been processed to remove any events occurring during unsuitable weather conditions or localised noise climate events that was not considered representative, such as fireworks and intensive periods of farming.

14.5.63. Daytime, evening and night-time periods are as follows:

- Daytime: 07:00 – 19:00;
- Evening: 19:00 – 23:00; and
- Night-time: 23:00 – 07:00.

Table 14.14 –Description of Noise Climate at Monitoring Locations

Location	Description
LT1	The main noise source is road traffic from A549 (Mold Road). Other noises include livestock, rustling foliage and occasional road traffic on Well Street. There is also potential for agricultural noise, though none was noted during the site visit.
LT2	The main noise source is road traffic from A549 (Mold Road). Other noises include livestock and hedgerow rustling in the wind. There is also potential for agricultural noise.

Location	Description
LT3	The main noise source is road traffic from A5119. Other noises include traffic from A541 and A494.
LT4	The main noise source is road traffic from A494. Other noises include trees rustling in the wind, a slight buzz from an overhead line, and faint running water to the north.
LT5	The main noise source is road traffic from A549. Other noises include livestock, kennel noise to the south-west, and industrial noise from Padeswood Cement Works.
LT6	The main noise sources are trees rustling and traffic noise from A494/A5119. Other noises include domestic noise and agricultural noise.
LT7	The main noise source is road traffic from A55 (North Wales Express Way). Other noises include aircraft noise, livestock, occasional agricultural noise and noise from the golf club.
LT8	The main noise source is road traffic from A55. Other noises include agricultural noise and rustling foliage.

Table 14.15 –Summary of Ambient Noise Levels

Location	Average Ambient Noise Level (dB L _{Aeq})		
	Daytime	Evening	Night-time
LT1	45	40	39
LT2	50	47	47
LT3	47	45	45
LT4	58	51	54
LT5	45	39	39
LT6	44	40	41
LT7	50	49	46
LT8	65	63	58

Table 14.16 –Summary of Background Noise Levels

Location	Period, T	Typical $L_{A90,T}$ (dB)
LT1	Daytime (07:00 – 23:00)	36
	Night-time (23:00 – 07:00)	30
LT2	Daytime (07:00 – 23:00)	45
	Night-time (23:00 – 07:00)	36
LT3	Daytime (07:00 – 23:00)	43
	Night-time (23:00 – 07:00)	34
LT4	Daytime (07:00 – 23:00)	44
	Night-time (23:00 – 07:00)	36
LT5	Daytime (07:00 – 23:00)	38
	Night-time (23:00 – 07:00)	32
LT6	Daytime (07:00 – 23:00)	37
	Night-time (23:00 – 07:00)	30
LT7	Daytime (07:00 – 23:00)	47
	Night-time (23:00 – 07:00)	37
LT8	Daytime (07:00 – 23:00)	56
	Night-time (23:00 – 07:00)	46

- 14.5.64. More information on Baseline Noise Monitoring is provided in **Appendix 14.1 (PW.3.2.14.1 Baseline Noise Monitoring Data)**.

FUTURE BASELINE

- 14.5.65. Variations in the existing baseline conditions will depend on the local road network and changes in the operation of local industrial developments. It is expected that the baseline sound climate will not change significantly in the future.
- 14.5.66. The traffic data for the 2024 baseline and future baseline year 2027 have been compared. The BNL have been calculated in **Appendix 14-3 Noise and Vibration Assessment Results (Document Reference: PW.3.3.14.3)** at road links within the Study Area and the results indicate that there will be a negligible change in road traffic noise levels between these two years.

14.6. SENSITIVE RECEPTORS

- 14.6.1. **Table 14.17** presents a description of the NSRs included in the assessment. The table also shows the noise monitoring location which has been used to best represent their existing baseline noise conditions.

Table 14.17: Noise Sensitive Receptors and Associated Noise Monitoring Location

Representative Sensitive Receptors	Associated Noise Monitoring Location
NSRs located in areas south of A549 (Mold Road) in Buckley. Also, areas along Well Street and other similar surroundings.	LT1
NSRs located in areas south of A549 (Mold Road) in Mynydd Isa. Also, NRS within Proximity Area 1322 and Priority Area 398 located in New Brighton, along A5119, and towards Alttami, along A494, are represented by LT2.	LT2

Representative Sensitive Receptors	Associated Noise Monitoring Location
NSRs located 350 meters west of Mold, near A549. Dwellings along Leadhull, Floridd Argoed, Wood Green, Woodlands Close and Proximity Area 1323, located in Mold, are represented by LT3.	LT3
NSR located 225 meters north of A549. Dwellings along Westview Drive, East Close in Mynydd Isa, Woodlands Road, and dwellings along Wood Green are represented by LT4.	LT4
NSR located approximately 425 meters away from A549. Dwellings along Spon Green, Brickfields, Delamere Avenue, Swan Avenue, Westbury close are represented by LT5.	LT5
Isolated properties such as Lylwyn Offa Cottage and any other properties are represented by LT6.	LT6
Isolated properties such as Beaver Creek House west off the pipeline section near Northhop AGI are represented by LT7.	LT7

- 14.6.2. Noise-sensitive areas are scattered along A5119 and major roads like Padeswood Road South, Mold Road, A494, and A541. Additionally, there are clusters in neighbourhoods to the South of Buckley, Southwest of Mynydd Isa, East of Mold, North of Bryn-y-Bal, New Brighton, and North of Northop AGI. Several noise-sensitive areas are also found along the pipeline route near smaller roads.

14.7. DESIGN DEVELOPMENT, IMPACT AVOIDANCE AND EMBEDDED MITIGATION

14.7.1. Mitigation during the Construction and Decommissioning Stages of the Padeswood Spur Pipeline Proposed Development will include Best Practicable Means (BPM). At the appropriate stages, a Construction Environmental Management Plan (CEMP) and a Decommissioning Environmental Management Plan (DEMP) will be produced describing the embedded mitigation measures during the Construction and Decommissioning Stages.

14.7.2. Examples of such measures are presented below:

- Consultation will be undertaken with Flintshire County Council before undertaking any construction activities outside the working hours agreed in this Application. The methodology and requirements for noise mitigation, where necessary, will be agreed prior to the works.
- Contact details for nominated site contact for local residents to deal with complaints and engaging with local residents.
- Selection of quiet and low noise equipment and methodologies.
- Optimal location of acoustic screening to minimise noise adverse effects, if/where required to comply with council requirements.
- Optimal location of equipment on site to minimise noise disturbance.
- The provision of acoustic enclosures around static plant, where necessary.
- Use of less intrusive alarms, such as broadband vehicle reversing warnings, wherever possible.

14.7.3. During the Operational Stage, the noise levels of the equipment in the AGI will be limited to avoid the potential for adverse significant effects at the nearest noise sensitive receptors. This Chapter presents, in **Table 14.11**, an example of how this will be achieved.

14.8. PRELIMINARY ASSESSMENT OF LIKELY IMPACTS AND EFFECTS

14.8.1. This Section details the preliminary assessment of predicted impacts and effects for the Padeswood Spur Pipeline Proposed Development during the Construction, Operational and Decommissioning Stages.

CONSTRUCTION STAGE

- 14.8.2. The likely significant effects for noise and vibration associated with the Construction Stage are set out below.

OPEN TRENCH PIPELINE CONSTRUCTION (UNMITIGATED)

- 14.8.3. **Table 14.18** the number of noise sensitive receptors subject to a magnitude of impact associated with construction noise during open trenching activities before application of additional mitigation measures. This scenario also includes construction noisy activities associated with the compounds and AGI. These results are outcome of noise modelling without any mitigation measures.

Table 14.18: Magnitude of Impact from Open Trenching Construction Activity, Daytime (Unmitigated)

Magnitude of Impact	Number of NSRs
Negligible	9
Low	484
Medium	371
High	310

- 14.8.4. Most areas will experience negligible, low, or medium noise impact. However, medium or high noise impact from open trenching is expected along A5119, especially south of Buckley. Other affected areas will include Padeswood Road South, Mold Road (south of Mynydd Isa), Well Street, Rose Lane (east of Mold), Woodlands Road, Chester Road, Woodlands Grove (north of Bryn Y Baal), Erw Goed, Hoel Fammau, Chambers Lane, Bryn Lane, Moor Croft, A494, Alltami Road, Greenbank Lane, and north of Northop AGI.
- 14.8.5. It is noted that the construction activity for open cut trenching is proposed for daytime only. Although the assessment results exhibit a medium or high magnitude of impact on the receptors, it is not considered to be a significant effect due to the short duration of this activity at each individual receptor. For this, it has been assumed that receptors will be subject to either a medium or high adverse noise impact for a duration no longer than the periods stated in **paragraph 14.5.51** i.e. 10 or more days or nights in any 15 consecutive days or nights; or a total number of days exceeding 40 in any six consecutive months.
- 14.8.6. It is observed that most receptors within Proximity Area 1322 will experience a medium adverse noise impact, without secondary mitigation. This is mainly attributed to the proximity of the Centralised Compound, near New Brighton Roundabout.

- 14.8.7. Noise sensitive receptors located within Priority Area 398 are likely to experience a high adverse noise impact, without secondary mitigation.
- 14.8.8. Noise sensitive receptors located within Proximity Area 1323 are likely to experience a medium adverse noise impact, without secondary mitigation.

TRENCHLESS CROSSINGS (UNMITIGATED)

- 14.8.9. **Table 14.19, Table 14.20 and Table 14.21** provide the number of noise sensitive receptors subject to a magnitude of impact for each trenchless crossing individually, unmitigated. The tables present the number of sensitive receptors subject to a magnitude of impact during daytime, evening and night-time.

Table 14.19: Magnitude of Impact from Trenchless Crossings Activity, Daytime (Unmitigated)

Trenchless Crossings	Negligible	Low	Medium	High
TRX01	1172	2	0	0
TRX02	1067	106	1	0
TRX03	1031	143	0	0
TRX04	1150	24	0	0
TRX05	1112	61	0	1
TRX06	1063	107	3	1
TRX07	1101	54	9	10
TRX08	1099	75	0	0
TRX09	989	183	2	0
TRX10	1049	124	1	0
TRX11	1137	35	2	0
TRX12	1163	11	0	0

Table 14.20: Magnitude of Impact from Trenchless Crossings Activity, Evening (Unmitigated)

Trenchless Crossings	Negligible	Low	Medium	High
TRX01	1087	84	2	1
TRX02	1017	142	8	7
TRX03	1006	117	46	5
TRX04	1003	164	6	1

Trenchless Crossings	Negligible	Low	Medium	High
TRX05	976	189	6	3
TRX06	878	236	43	17
TRX07	1017	113	12	32
TRX08	987	155	23	9
TRX09	837	229	66	42
TRX10	930	222	21	1
TRX11	969	201	2	2
TRX12	1156	15	3	0

Table 14.21: Magnitude of Impact from Trenchless Crossings Activity, Night-Time (Unmitigated)

Trenchless Crossings	Negligible	Low	Medium	High
TRX01	1063	107	3	1
TRX02	1007	58	52	57
TRX03	999	32	27	116
TRX04	990	160	12	12
TRX05	973	139	47	15
TRX06	767	241	94	72
TRX07	945	110	67	52
TRX08	823	209	86	56
TRX09	769	90	166	149
TRX10	870	78	120	106
TRX11	886	88	188	12
TRX12	1155	8	6	5

- 14.8.10. Noise sensitive receptors within Proximity Area 1322 are unlikely to experience an either medium or high adverse noise impact from the construction of trenchless crossing number 10 (TRX10), without secondary mitigation. A high adverse noise impact is predicted within Priority Area 398, without secondary mitigation.
- 14.8.11. Proximity Area 1323, along A541, in Mold is near trenchless crossing number 7 (TRX07). It is predicted that some noise sensitive receptors

will be subject to either medium or high adverse noise impact, without secondary mitigation.

VIBRATORY PILING

- 14.8.12. A vibration assessment has been undertaken to determine the likely significant effects within the study area. **Table 14.22** and **Table 14.23** present the likely set back distances at which vibration levels at the nearest sensitive receptor are expected to reach a magnitude of impact defined as medium in **Table 14.7**.

Table 14.22 - Predicted Set Back Distances for Vibratory Piling

Magnitude of Impact	Distance from Activity (m)		
	95% Confidence Level	67% Confidence Level	50% Confidence Level
High	16	10	4
Medium	105	60	30

Table 14.23 - Predicted Set Back Distances for Ground Compaction

Magnitude of Impact	Distance from Activity (m)		
	95% Confidence Level	67% Confidence Level	50% Confidence Level
High	10	6	4
Medium	60	40	25

- 14.8.13. Based on a 67% of confidence level, considered to be a reasonable worst-case, significant effects due to vibratory piling or ground compaction are not likely if these activities are not undertaken closer than 60 m from any property.
- 14.8.14. The results in **Table 14.22** and **Table 14.23** show the likely set back distances at which vibration levels at the nearest sensitive receptors are expected to reach a medium magnitude of impact set for human vibration perception, which is more onerous than the criteria for buildings. The criteria for buildings will be exceeded at distances closer than approximately 6 m and there are no buildings within this proximity. Based on the criteria for both humans and buildings presented in **Table 14.7** and **Table 14.8**, at greater distances than shown above, the magnitude of impact will be negligible or low. Furthermore, it is expected that any vibratory piling and compaction activities will not

be undertaken for a period longer than the periods stated in **paragraph 14.5.51**.

- 14.8.15. Therefore, vibration impacts during the Construction and Decommissioning Stage will be not significant.
- 14.8.16. The likely change in noise levels due to the generation of additional traffic movements during construction has been assessed. Guidance in the DMRB LA111, short-term noise impact as presented in **Table 14.10**, has been followed for an assessment in the peak year of construction traffic activity.
- 14.8.17. The results of the assessment, which are provided in **Appendix 14.3 Noise and Vibration Assessment Results (Document Reference: PW.3.3.14.3)**, indicate that the change in road traffic noise levels is predicted to be less than 1 dB at all road links, which is classified as a negligible magnitude of impact or No change as described in **Table 14.10**. Therefore, the construction traffic noise effect will be not significant.

OPERATIONAL STAGE

- 14.8.18. The likely significant noise and vibration effects associated with the Operational Stage are set out below.
- 14.8.19. **Table 14.24** and **Table 14.25** show the magnitude of operational noise impact at each representative noise sensitive receptors with reference to BS 4142:2014+A1:2019 during the daytime and night-time respectively. The tables present the representative background noise levels associated with each noise sensitive receptor and the predicted rating level. The latter allows for a +5 dB correction to account for the potential of tonality and intermittency in the operational noise arising from the Padeswood Spur Pipeline Proposed Development. The final column presents the difference between the rating level and the representative background noise level, to facilitate the initial estimate in accordance with BS 4142:2014+A1:2019.

Table 14.24 - Operational Noise Assessment - Daytime

NSR	X Coordinate	Y Coordinate	Background Noise Level $L_{A90, 15 \text{ min}}$ dB	Predicted Rating Level, $L_{Ar, Tr}$ dB	Difference dB
1	328579	362536	43	17	-26
2	328633	362509	43	18	-25
3	329046	362552	43	11	-32

Table 14.25 - Operational Noise Assessment - Night-time

NSR	X Coordinate	Y Coordinate	Background Noise Level $L_{A90, 15 \text{ min}}$ dB	Predicted Rating Level, $L_{Ar, Tr}$ dB	Difference dB
1	328579	362536	33	17	-16
2	328633	362509	33	18	-15
3	329046	362552	33	11	-22

14.8.20. Based on the initial estimate described in BS4142:2014+A1:2019, the predicted rating levels at the nearest noise sensitive receptors to the AGI are below the typical background noise levels. Using the criteria in **Table 14.12** this equates to a negligible magnitude of noise impact.

14.8.21. Contextual considerations have also been taken into account, including information relating to the likely change in ambient noise levels.

Table 14.26 and **Table 14.27** present the likely change in ambient noise levels expected when the Padeswood Spur Pipeline Proposed Development is in operation. This is derived by logarithmically adding the measured noise levels for daytime (16 hours) and night-time (8 hours) to the specific sound source of the Padeswood Spur Pipeline Proposed Development and then comparing the resulting value against the measured noise levels. It can be seen from both daytime and night-time comparisons, that the ambient noise levels will continue to be dominated by the existing sound climate. Therefore, no significant change in ambient noise levels is expected due to the operation of the Padeswood Spur Pipeline Proposed Development at any sensitive receptor.

Table 14.26 - Ambient Daytime Noise Assessment

NSR	Predicted Specific Noise Level from AGI $L_{Aeq, T}$ dB	Measured Noise Level, $L_{Aeq, 16 h}$ dB	Predicted Noise Level + Measured Noise Level, $L_{Aeq, 16 h}$ dB	Difference dB
1	12	59	59	0
2	13	59	59	0
3	6	59	59	0

Table 14.27 - Ambient Night-time Noise Assessment

NSR	Predicted Specific Noise Level from AGI $L_{Aeq, T}$ dB	Measured Noise Level, $L_{Aeq, 16 h}$ dB	Predicted Noise Level + Measured Noise Level, $L_{Aeq, 16 h}$ dB	Difference dB
1	12	48	48	0
2	13	48	48	0
3	6	48	48	0

DECOMMISSIONING STAGE

- 14.8.22. The number of receptors near the AGI potentially experiencing a significant adverse noise effect, without mitigation, are presented in Appendix 14.3 Noise and Vibration Assessment Results (Document Reference: PW.3.3.14.3).

14.9. MITIGATION AND ENHANCEMENT MEASURES

- 14.9.1. This Section sets out the preliminary avoidance, mitigation and compensation measures which are likely to be required to address the significant effects as assessed in Section 14.8.
- 14.9.2. As part of detailed design, construction activities at locations where there is a potential for significant effects will require careful consideration to include secondary mitigation including measures such as acoustic enclosures for ancillary equipment which is kept above ground for the whole duration of the activity. For the purpose of this assessment, it has been considered that secondary mitigation measures will achieve at least a noise level reduction of 10 dB. These measures will include a combination of measures such as selection of quieter plant items, noise control at source and localised noise barriers.

14.10. ASSESSMENT OF LIKELY SIGNIFICANT EFFECTS

- 14.10.1. This section details the assessment of significant effects taking account of the secondary mitigation detailed in **Section 14.9** above.

CONSTRUCTION STAGE

- 14.10.2. The likely significant effects for noise and vibration associated with the Construction Stage post application of mitigation strategies are set out below.

OPEN TRENCH PIPELINE CONSTRUCTION (MITIGATED)

- 14.10.3. **Table 14.28** presents the number of noise sensitive receptors associated with construction noise during open trenching activities post application of secondary mitigation measures.

Table 14.28: Magnitude of Impact from Open Trenching Construction Activity, Daytime (Mitigated)

Magnitude of Impact	Number of NSRs
Negligible	88
Low	900
Medium	147
High	39

- 14.10.4. After implementation of secondary mitigation measures, the number of noise sensitive receptors subject to a noise impact of magnitude either medium or high has been reduced compared to those results presented in **Table 14.18**.
- 14.10.5. Compared to the unmitigated scenario, the number of noise sensitive receptors predicted to experience a medium or high magnitude of noise impact has reduced from 681 to 186. Sensitive receptors potentially affected are located along A5119, Well Street, Rose Lane, receptors off Mold Road, Wood Grove, few receptors along A541, A494, A5119, single receptors along Alltami Road and Greenbank Lane.
- 14.10.6. Receptors mentioned above will be subject to either a medium or high adverse noise impact for a duration no longer than the periods stated in **paragraph 14.5.51**. Therefore, after implementing secondary mitigation, the effect on the nearby sensitive receptors is not significant.
- 14.10.7. NSRs within Proximity Area 1322, along A5119 in New Brighton, will be subject to medium adverse magnitude of impact. The main activity contributing to this impact is the operation of the central construction

compound. This activity will occur for the whole construction programme, therefore, this impact will lead to a significant effect.

- 14.10.8. NSRs within Priority Area 398, along A494 towards Alttami, will be subject to a magnitude adverse magnitude of impact. This impact is classified as a not significant effect due to the short-term nature of the open trenching activities.

TRENCHLESS CROSSINGS (MITIGATED)

- 14.10.9. Table 14.29, Table 14.30 and Table 14.31 provide the number of noise sensitive receptors subject to a magnitude of impact for each trenchless crossing individually, after secondary mitigation.

Table 14.29: Magnitude of Impact from Trenchless Crossings Activity, Daytime (Mitigated)

Trenchless Crossings	Negligible	Low	Medium	High
TRX01	1174	0	0	0
TRX02	1163	11	0	0
TRX03	1123	51	0	0
TRX04	1167	7	0	0
TRX05	1165	9	0	0
TRX06	1147	27	0	0
TRX07	1157	17	0	0
TRX08	1162	12	0	0
TRX09	1131	43	0	0
TRX10	1172	2	0	0
TRX11	1170	4	0	0
TRX12	1171	3	0	0

Table 14.30: Magnitude of Impact from Trenchless Crossings Activity, Evening Time (Mitigated)

Trenchless Crossings	Negligible	Low	Medium	High
TRX01	1174	0	0	0
TRX02	1085	88	1	0
TRX03	1055	119	0	0
TRX04	1161	13	0	0

Trenchless Crossings	Negligible	Low	Medium	High
TRX05	1156	17	0	1
TRX06	1120	50	3	1
TRX07	1135	20	9	10
TRX08	1134	40	0	0
TRX09	1069	103	2	0
TRX10	1164	9	1	0
TRX11	1167	5	2	0
TRX12	1168	6	0	0

Table 14.31: Magnitude of Impact from Trenchless Crossings Activity, Night-Time (Mitigated)

Trenchless Crossings	Negligible	Low	Medium	High
TRX01	1172	2	0	0
TRX02	1067	96	6	5
TRX03	1037	86	46	5
TRX04	1153	14	6	1
TRX05	1138	27	6	3
TRX06	1104	51	13	6
TRX07	1122	28	11	13
TRX08	1117	25	23	9
TRX09	1038	46	66	24
TRX10	1107	64	3	0
TRX11	1163	7	2	2
TRX12	1168	6	0	0

14.10.10. Most sensitive receptors will experience a negligible or low noise magnitude of impact. Figures 14.2, 14.3 and 14.4 (Document References: PW.3.4.14.2 – PW.3.4.14.4) show the locations of the noise sensitive receptors subject to either a medium or high magnitude of noise impact during daytime, evening time and night-time after implementation of secondary mitigation measures.

14.10.11. **Table 14.29** shows that there are no NSRs likely to experience a magnitude of impact classified as either medium or high during the

daytime. **Table 14.30** shows that there are 30 NSRs likely to experience a magnitude of impact classified as either medium or high during the evening. **Table 14.31** shows that there are 250 NSRs likely to experience a magnitude of impact classified as either medium or high during the night-time.

14.10.12. The location of NSRs indicated in **Table 14.28**, **Table 14.29**, **Table 14.30** and **Table 14.31** are shown in **Figures 14.2**, **Figure 14.3** and **Figure 14.4**, for magnitude of impact of either medium or high during daytime, evening and night. In the figure illustrates the worst-case magnitude of impact experienced by each NSR for any construction activity.

14.10.13. NSRs within close proximity to TRX03, TRX07 and TRX12, resulting in 19 NSRs during the evening and 75 during the night-time, are likely to experience a noise magnitude of impact classified as either medium or high for a period longer 10 or more days or nights in any 15 consecutive days or nights. Therefore, the adverse effects at these 94 receptors will be significant.

OPERATIONAL STAGE

14.10.14. There are no significant effects expected during Operational Stage, as such, there is no secondary or tertiary mitigation proposed. Therefore, the preliminary assessment of likely impacts and effects reported in **Section 14.10** above remains applicable.

DECOMMISSIONING STAGE

14.10.15. There is no secondary or tertiary mitigation proposed to minimise significant effects during Decommissioning Stage. Therefore, the preliminary assessment of likely impacts and effects reported in **Section 14.10** above remains applicable.

ASSESSMENT AGAINST FUTURE BASELINE

14.10.16. Variations in the existing baseline conditions will depend on the local road network and changes in the operation of local industrial developments. It is expected that the baseline sound climate will not change significantly in the future. The exception to this is for sensitive receptors within the proposed Padeswood Carbon Capture and Storage (CCS) Project, where ambient noise levels are expected to increase by approximately 2 dB(A), based on the Environmental Statement supporting the application. (Application Reference DNS CAS-02009-W1R1Z7).

14.10.17. The traffic data for the 2024 baseline and future baseline year 2027 have been compared. The BNLs have been calculated in Appendix 14.3

Noise and Vibration Assessment Results (Document Reference: PW.3.3.14.3) at road links within the Study Area and the results indicate that there will be a negligible change in road traffic noise levels between these two years.

14.11. MONITORING

- 14.11.1. Based on the conclusions in this chapter, noise and vibration monitoring will be carried out during construction at a sample of locations representative of the nearest sensitive receptors to Padeswood Spur Pipeline Proposed Development. Focus will be given to receptors near trenchless crossing activities.

14.12. RESIDUAL EFFECTS

- 14.12.1. Table 14.31 below summarises the residual effects associated with the Padeswood Spur Pipeline Proposed Development during construction, operation and decommissioning.

Table 14.32 - Summary of Residual Effects

Receptor	Pre-mitigation significance of effects	Mitigation measure	Residual effect
Construction			
Receptors along the A5119, with several situated south of Buckley. Additional receptors on Padeswood Road South, Mold Road (south of Mynydd Isa), Well Street, and Rose Lane to the east of Mold. Other areas potentially affected include Woodlands Road, Chester Road, and Woodlands Grove to the north of Bryn Y Baal, as well as Erw Goed, Hoel Fammau, Chambers Lane, Bryn Lane, and Moor Croft. Towards the end of the route, receptors are also present along the	Either medium or high magnitude of noise impacts arising from open trenching activities and construction of the AGI during daytime.	A combination of secondary noise mitigation measures including, for example, implementation of Best Practicable Means, noise enclosures and / or localised noise barriers, where feasible, to provide a minimum of 10 dB noise level reduction.	Not significant

Padeswood Carbon Dioxide Spur Pipeline Proposed Development

Receptor	Pre-mitigation significance of effects	Mitigation measure	Residual effect
A494, Alltami Road, Greenbank Lane, and north of Northop AGI.			
Receptors within close proximity to trenchless crossing activities	Either medium or high magnitude of noise impacts arising from trenchless crossing activities during daytime, evening and night-time	<p>A combination of secondary noise mitigation measures including, for example, implementation of Best Practicable Means, noise enclosures and / or localised noise barriers, where feasible, to achieve a minimum of 10 dB noise level reduction. The potential significant effects at NSRs near trenchless crossings 3, 7 and 12 will be re-assessed during detailed design. If required, mitigation measures will be agreed with FCC to minimise significant effects where the duration of the crossing activity is expected to be longer than 10 or more days or nights in any 15 consecutive days or nights.</p> <p>Simultaneous night-time activities at trenchless crossings 2, 3, 4 and 5 and trenchless</p>	<p>Moderate Adverse (significant) at 94 noise sensitive receptors.</p> <p>T / I / MT</p>

Receptor	Pre-mitigation significance of effects	Mitigation measure	Residual effect
		crossings 6 and 7 should be avoided due to their proximity.	
Noise sensitive receptors near construction traffic routes	Road traffic noise levels arising from construction traffic	None required other than those considered in embedded mitigation.	Not significant
Receptors 100 m from construction activities.	Potential vibration impact arising from construction activities	None required other than those considered in embedded mitigation including Best Practicable Means.	Not significant
Operation			
Noise sensitive receptors near Padeswood AGI	Noise levels arising from the operation of the AGI	None required other than those considered in embedded mitigation.	Not significant
Decommissioning			
Noise sensitive receptors near Padeswood AGI	Noise levels arising from the decommissioning of the AGI	None required other than those considered in embedded mitigation.	Not significant

Key: Direct/Indirect – D/I; Short / Medium / Long term – ST/MT/LT; Permanent/Temporary – P/T

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