Heytesbury Underground Gas Storage (HUGS) Pipeline

Attachment G – Part 1

Noise Impact Assessment

Vipac Engineers and Scientists Limited
42/34 Ralph Street, Alexandria, NSW, 2015 Australia
Private Bag 16, Port Melbourne, VIC 3207, Australia
t. +61 2 9422 4222 | **e.** sydney@vipac.com.au
w. www.vipac.com.au | A.B.N. 33 005 453 627 | A.C.N. 005 453 627

Lochard Energy

HUGS Pipeline

Noise Impact Assessment

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Prepared For:	**Prepared By:**
Lochard Energy Iona Gas Plant 285 Waare Road Port Campbell, Victoria, 3269, Australia **Contact:** Hannah Prosser **Tel:** 0497415964	Vipac Engineers and Scientists Limited 42/34 Ralph Street, Alexandria, NSW, 2015 Australia **Tel:** +61 2 9422 4222

Author:	Nick Lynar 08 Mar 2024	Senior Engineer
Reviewer:	Jackson Yu 8 Mar 2024	Principal Acoustic Consultant, Team Leader (B.I.E.)
Issued By:	Kelvin Matthew Mandado 8 Mar 2024	Graduate Engineer

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1 Introduction

Vipac Engineers & Scientists was commissioned by Lochard Energy (Iona Operations) to undertake a Noise Impact Assessment to be prepared for the proposed Heytesbury Underground Gas Storage (HUGS Project), which will expand the storage capacity of the Iona Gas Storage Facility (IGSF).

Lochard Energy is the proponent of the Heytesbury Underground Gas Storage (HUGS Project), which will expand the storage capacity of the Iona Gas Storage Facility (IGSF). The HUGS Project will provide additional security of supply and reliability to the growing demands for energy storage in the eastern Australian energy market, which will help support the transition to a lower carbon future.

This assessment considers, pipeline construction noise at the HUGS only.

2 References

The following references were used in this assessment.

- Victorian EPA protocol for noise (Publication 1826.3)
- Victoria EPA - Noise from Industry In Regional Victoria (NIRV), Publication 1411, dated October 2011.
- Australian Standard AS 1055-1997- "*Acoustics Description and Measurement of Environmental Noise, Part 1-General Procedure*";
- Drawing plans in Section 3.1.

3 Project Description

Lochard Energy is the proponent of the Heytesbury Underground Gas Storage (HUGS Project), which will expand the storage capacity of the Iona Gas Storage Facility (IGSF). The HUGS Project will provide additional security of supply and reliability to the growing demands for energy storage in the eastern Australian energy market, which will help support the transition to a lower carbon future.

Underground storage capacity of the IGSF will be increased through the development of the existing Heytesbury depleted gas fields. The Heytesbury depleted gas fields are all natural sandstone formations that have had pre-existing natural gas extracted and are therefore ideal as a natural geological reservoir for the storage of gas. The HUGS Project will develop a new wellsite which will access three depleted gas fields being Mylor, Fenton Creek, and Tregony (referred to as the MFCT wellsite). The current plan is to develop the Mylor field with 1-2 new gas storage well(s).

In order to connect the MFCT wellsite to the Iona facility, a new pipeline is required. This proposed new pipeline (the HUGS Pipeline) will transport gas and potentially hydrogen in the future, to and from the proposed new wellsite and underground gas storage fields**.** The HUGS Pipeline will be an extension to Lochard's existing pipeline network from North Paaratte Production Station (NPPS).

The HUGS Project is currently in the planning stage and is subject to ongoing studies and approval. However, the proposed construction timeframe is for some works to start in 2024, with construction scheduled to be completed in 2025.

3.1 Working Hours and Activities

Construction of the pipeline is expected to occur during working hours as follows:

- 0700 – 1800hrs, 7 days a week;
- Night works – By emergency exception only;

The approximate construction phases and work schedule as provided by the client is provided in Table 3-1.

Table 3-1 Construction Phases Schedule

Construction Phase	Activities	Dates
Pipeline Construction (Phase 1)	HUGS Pipeline Construction Along Whole Row	Q1 2025
Pipeline Construction (Phase 2)	HUGS Pipeline Construction - MFCT SMP/E&I (high noise equipment)	

- *Figure 3-1 – Presents the Proposed HUGS Pipeline;*
- *Figure 3-2 – Presents the Proposed HUGS Pipeline – Construction Area;*
- *Appendix B – Presents the Noise Catchment Areas & Noise Receiver Locations.*

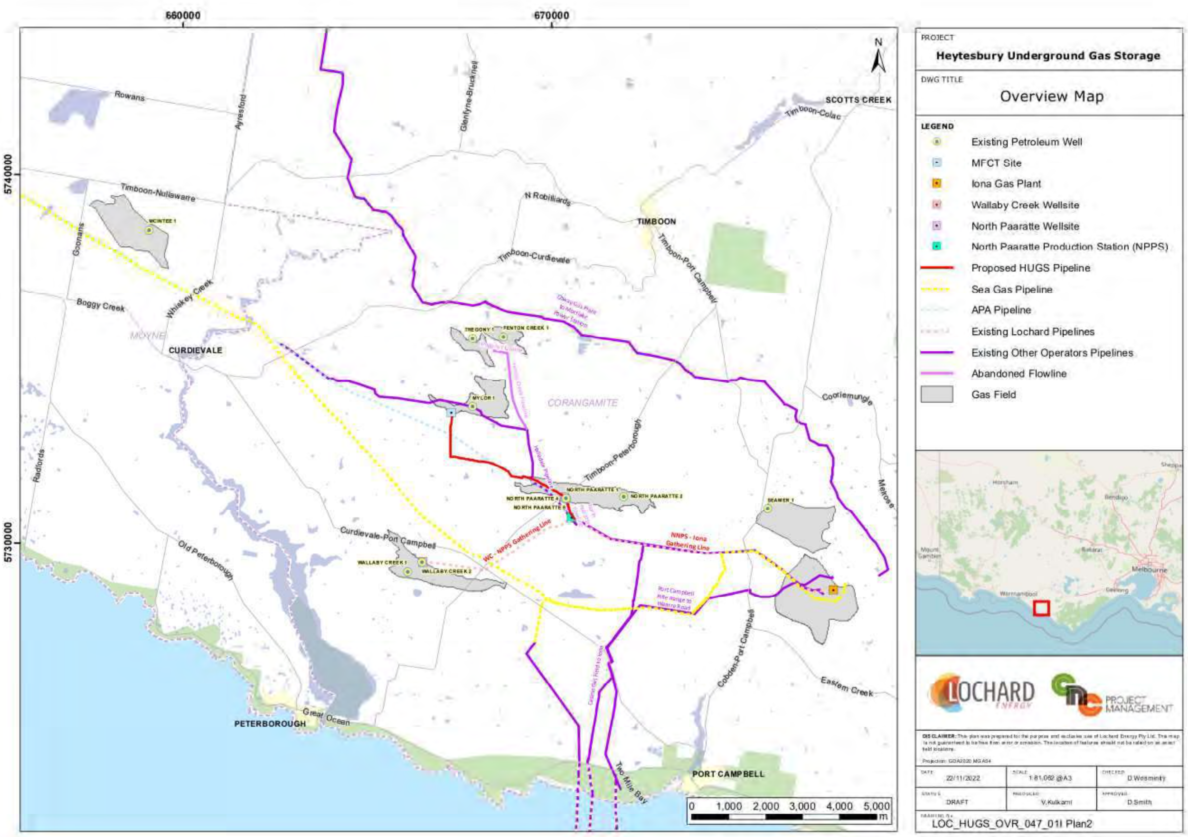

Figure 3-1:Proposed HUGS Pipeline

Figure 3-2:Proposed HUGS Pipeline – Construction Area

3.2 Construction Activities

The construction methodology would be reviewed and updated during detailed design of the project. Any changes in methodology that have not been addressed in this noise and vibration assessment would be subject to further assessment prior to the works commencing.

Pipeline Construction (Phase 1) – Along the whole ROW

- 35t Excavator x4;
- Road Grader – Cat 12H x3;
- Loader – Vovlo L60F x1;
- Typical prime mover and semi-trailer to float in and out equipment and string pipeline x1;
- Typical NDD rig x1;
- HDD Rig – Vermeer D220x300 Navigator x1 (worst case) **Specific Locations:**
    - Timboon – Peterborough Rd, drill rig placed on Rylance Property;
    - Boundary Rd, drill rig placed on Whitehead's Property on the goat bridge side;
    - Potential for HDD at APA and HV Cable crossing;
- Trencher – Vermeer T755III x1;
- Typical grinding noise x2;
- Various generators x2;
- Hydro equipment – Air operated diaphragm pump x1;
- Pipeline drying - Atlas Copco 1260cfm Diesel air compressor desiccant drier package (Y1260 model) x1;

Pipeline Construction (Phase 2): MFCT SMP/E&I (High noise equipment):

- Typical grinding noise x2;
- Various generators and air compressors trailer mounted x2;
- Franna MAC25 x1;
- 100t Crane x1;

3.3 Noise Sensitive Receivers

Table 3-2 provides a list of the noise sensitive receivers used as part of the noise predictions along with their respective addresses. Appendix B provides illustrations of these locations.

Table 3-3 provides the measured distances from each noise sensitive receiver to the nearest distance to the pipeline construction.

Table 3-2 - Nearest Noise Sensitive Receiver Details

	Address	Longitude	Latitude
R1	641 Timboon-Peterborough Rd	38°32'56.0"S	142°57'30.0"E
R2	642 Timboon-Peterborough Rd	38°32'53.5"S	142°57'27.1"E
R3	724 Timboon-Peterborough Rd	38°33'05.9"S	142°57'06.2"E
R4	745 Timboon-Peterborough Rd	38°33'14.5"S	142°57'05.7"E
R5	772 Timboon-Peterborough Rd	38°33'17.8"S	142°56'38.9"E
R6	823 Timboon-Peterborough Rd	38°33'33.3"S	142°56'30.5"E
R7	850 Timboon-Peterborough Rd	38°33'34.0"S	142°56'20.4"E
R8	850 Timboon-Peterborough Rd	38°33'36.2"S	142°56'00.9"E
R9	770 Boundary Rd	38°33'30.8"S	142°55'21.6"E
R10	727 or 765 Boundary Rd	38°33'26.1"S	142°55'29.3"E
R11	709 Boundary Rd	38°33'13.7"S	142°55'42.5"E
R12	654 Boundary Rd	38°32'53.8"S	142°55'19.0"E
R13	536 Boundary Rd	38°32'17.1"S	142°55'37.0"E
R14	531 Boundary Rd	38°32'15.2"S	142°55'39.0"E
R15	497 Boundary Rd	38°32'04.3"S	142°55'43.1"E
R16	464 Boundary Rd	38°31'52.8"S	142°55'40.1"E
R17	232 E and W Rd	38°31'27.3"S	142°54'08.0"E
R18	350 Boundary Rd	38°31'17.2"S	142°55'48.1"E
R19	375 Boundary Rd	38°31'26.5"S	142°55'52.3"E
R20	370 Squibbs Rd	38°31'57.7"S	142°56'02.8"E
R21	194 Squibbs Rd	38°32'00.9"S	142°57'12.3"E
R22	173 Squibbs Rd	38°32'10.6"S	142°57'22.1"E
R23	126 Squibbs Rd	38°32'09.6"S	142°57'40.1"E

	Address	Longitude	Latitude
R24	197 Boundary Rd	38°30'31.5"S	142°56'02.4"E
R25	231 Boundary Rd	38°30'41.6"S	142°55'59.8"E
R26	288 Boundary Rd	38°30'58.8"S	142°55'52.7"E
R27	836 Boundary Rd	38°33'50.3"S	142°55'17.1"E
R28	937 Curdievale-Port Campbell Rd	38°33'50.2"S	142°55'04.0"E
R29	999 Curdievale-Port Campbell Rd	38°33'53.4"S	142°54'33.9"E
R30	1011 Curdievale-Port Campbell Rd	38°33'46.7"S	142°54'32.1"E
R31	1151 Curdievale-Port Campbell Rd	38°33'40.9"S	142°53'35.1"E
R32	1161 Curdievale-Port Campbell Rd	38°33'41.0"S	142°53'32.9"E
R33	1233 Curdievale-Port Campbell Rd	38°33'40.1"S	142°53'00.9"E
R34	30 Crofts Rd	38°33'45.8"S	142°52'54.1"E
R35	6 Crofts Rd	38°33'36.0"S	142°52'56.8"E
R36	1292 Curdievale-Port Campbell Rd	38°33'19.8"S	142°52'55.3"E
R37	1354 Curdievale-Port Campbell Rd	38°33'01.3"S	142°52'42.1"E
R38	1440 Curdievale-Port Campbell Rd	38°32'38.4"S	142°52'21.0"E
R39	1461 Curdievale-Port Campbell Rd	38°32'47.4"S	142°52'04.9"E
R40	1499 Curdievale-Port Campbell Rd	38°32'31.9"S	142°51'58.6"E
R41	1529 Curdievale-Port Campbell Rd	38°32'25.4"S	142°51'51.6"E
R42	1560 Curdievale-Port Campbell Rd	38°32'09.5"S	142°51'57.1"E
R43	1549 Curdievale-Port Campbell Rd	38°32'19.3"S	142°51'43.3"E
R44	1609 Curdievale-Port Campbell Rd	38°32'03.2"S	142°51'29.2"E
R45	1357 Timboon-Curdievale Rd	38°31'06.5"S	142°52'07.8"E
R46	1286 Timboon-Curdievale Rd	38°30'50.4"S	142°52'30.7"E
R47	1257 Timboon-Curdievale Rd	38°30'49.0"S	142°52'43.1"E
R48	1233 Timboon-Curdievale Rd	38°30'46.3"S	142°52'49.0"E
R49	1056 Timboon-Curdievale Rd	38°30'41.7"S	142°52'53.9"E
R50	1189 Timboon-Curdievale Rd	38°30'42.2"S	142°53'03.3"E
R51	1155 Timboon-Curdievale Rd	38°30'35.6"S	142°53'20.9"E
R52	33 Clovers Rd	38°30'31.4"S	142°53'34.0"E
R53	1096 Timboon-Curdievale Rd	38°30'18.0"S	142°53'35.3"E
R54	1056 Timboon-Curdievale Rd	38°30'17.0"S	142°53'48.1"E
R55	1049 Timboon-Curdievale Rd	38°30'20.9"S	142°53'53.5"E
R56	970 Timboon-Curdievale Rd	38°30'15.3"S	142°54'14.7"E

	Address	Longitude	Latitude
R57	971 Timboon-Curdievale Rd	38°30'35.7"S	142°54'30.5"E
R58	928 Timboon-Curdievale Rd	38°30'20.0"S	142°54'41.7"E
R59	871 Timboon-Curdievale Rd	38°30'37.1"S	142°55'04.6"E

Table 3-3 Nearest Noise Sensitive Receivers Distance to Nearest Pipeline Construction

Receiver	Distance to Nearest Point of the Pipeline (m)
R1	398
R2	381
R3	216
R4	383
R5	836
R6	1345
R7	1440
R8	1566
R9	1797
R10	1606
R11	1211
R12	675
R13	670
R14	750
R15	835
R16	705
R17	1690
R18	1444
R19	1311
R20	1275
R21	1636
R22	1458
R23	1522
R24	2820
R25	2518
R26	1982
R27	2447
R28	2484
R29	2689
R30	2529
R31	3108

Receiver	Distance to Nearest Point of the Pipeline (m)
R32	3175
R33	3766
R34	3992
R35	3797
R36	3574
R37	4462
R38	4056
R39	4056
R40	4587
R41	4742
R42	4607
R43	4887
R44	5291
R45	4626
R46	4308
R47	4074
R48	3993
R49	3966
R50	3768
R51	3571
R52	3416
R53	3748
R54	3438
R55	3404
R56	3308
R57	2571
R58	2956
R59	2362

4 Environmental Noise Survey

An Unattended and attended noise survey was conducted at the site and nearest noise sensitive receivers to capture and observe the existing ambient noise levels in the area. Although a noise survey was not required by the noise protocol, this has been included for future reference and planning purposes.

Instrumentation used throughout the noise monitoring are provided in Table 4-1.

Table 4-1 Noise Logging Equipment Used

Equipment	Serial Number	Calibration Due
DUO Fusion – Environmental Noise Logger Kit (L2)	12567	11/08/2025
DUO Fusion – Environmental Noise Logger Kit (L1)	15268	11/05/2025
DUO Fusion – Environmental Noise Logger Kit (Handheld)	10271	11/05/2025

4.1 Unattended Noise Survey

Unattended noise monitoring was conducted over a representative period of seven days to determine the background noise levels L_{A90}, eliminating noise not representative according to the weather conditions following the procedures set out in the Victorian Noise Protocol. The noise logger was configured to measure instantaneous noise levels with a "Fast" time "A" frequency weighting. The noise logger was checked for calibration before and after the logging period with no drift.

- The two noise loggers (L1 and L2) were recording from 31st of January 2024 to 6th of February 2024;
- The coordinate for each logger is provided in Table 4-2;
- The location of the noise loggers is marked on the aerial photo in Figure 4-1;

A full set of graph and noise survey data summary for L1 and L2 is provided in Appendix E.

Table 4-2: Unattended Noise Logger Locations

Logger	Location Coordinates
L1	38°31'51.77"S 142°55'8.71"E
L2	38°31'51.91"S 142°55'39.19"E

Figure 4-1 Unattended Noise Logging Location

Measurement results obtained from the noise logger have been analysed in accordance with the procedures set out in the Victorian EPA policy for determining background noise levels of the area and are presented in Table 4-3 and Table 4-4.

The time periods are defined as:

Day	0700 - 1800hrs
Evening	1800 - 2200hrs
Night	2200 - 0700hrs

Table 4-3: Unattended Noise Logger Results – Logger L1

Logger	Period	Time Period	L_{A90}	$L_{eq, period}$	L90
L1	Day	0700-1800hrs	36	51	44
	Evening	1800-2200hrs	30	46	40
	Night	2200-0700hrs	29	40	37

Table 4-4: Unattended Noise Logger Results – Logger L2

Logger	Period	Time Period	L_{A90}	$L_{eq, period}$	L90
L2	Day	0700-1800hrs	35	48	42
	Evening	1800-2200hrs	31	44	40
	Night	2200-0700hrs	27	39	34

4.2 Attended Noise Survey

A 15-minute attended noise measurement was conducted at one of the nearest residential noise sensitive receiver location.

The purpose of these noise measurements was to verify the noise logging data from the unattended noise logger (L1 & L2).

- The coordinate of each logger is provided in Table 4-5;
- The location of the logger is marked on the plan in Figure 4-2;
- A summary of the measured noise levels is provided in Table 4-6;

Table 4-5: Attended Noise Logger Locations

Logger	Location Coordinates
N1	38°33'5.42"S 142°57'6.14"E

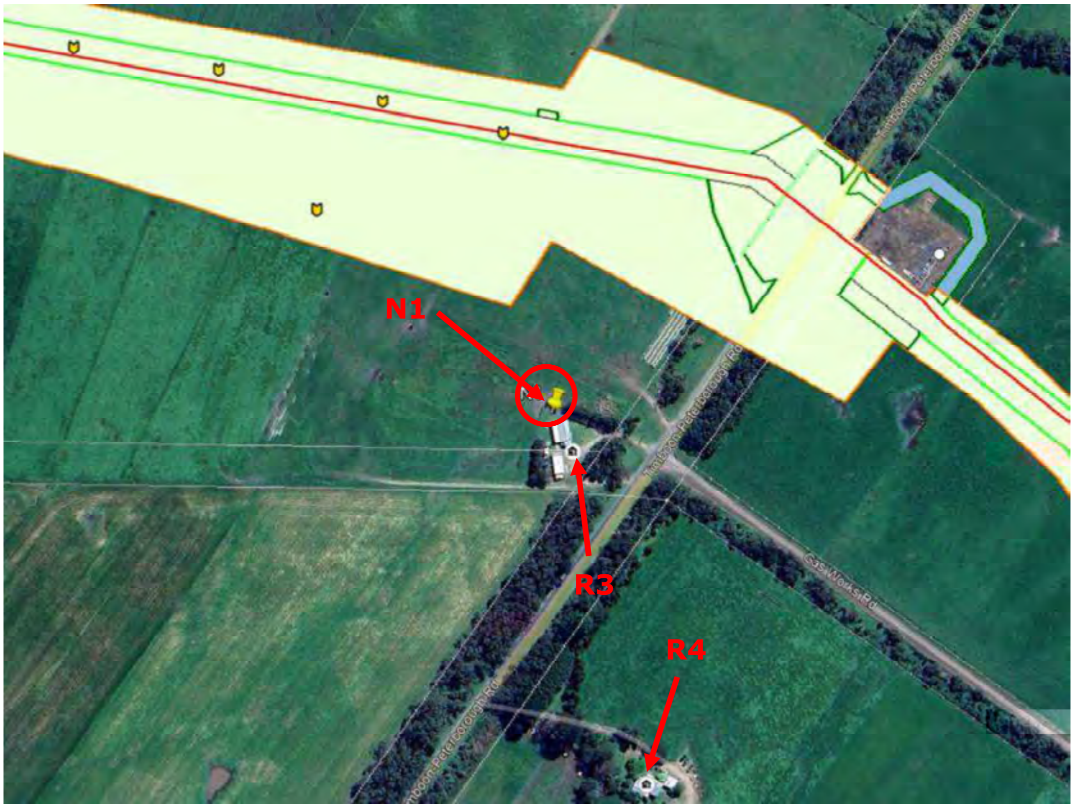

Figure 4-2 Attended Noise Measurement Locations

Table 4-6 Attended Noise Survey Summary

Logger	Period	Time Period	RBL L_{A90}	$L_{Aeq, period}$	Notes/Observations
N1	Day	1008-1024	27	37	The test was conducted adjacent to the residential dwelling of receiver R3, located just off the main road. Throughout the 15-minute period there was typical traffic with a vehicle passing on the main road every 1 to 2 minutes. The ambient noise environment was characterised by quiet rural noise with presence of occasional wildlife such as birds and many insects.

5 Noise Criteria

5.1 EPA Victoria – Noise Protocol

Noise criteria for noise generating uses in Victoria is determined in accordance with the Noise limit and assessment protocol for the control of noise from commercial, industrial and trade premises and entertainment venues' (Publication 1826.4, May 2021). The 'Noise Protocol' stipulates noise limits for 'earth resources' premises, such as quarries, in Section 2.7. Noise limits in rural areas for earth resources are determined as follows:

2. Noise Limits – Rural area method

2.1 Noise limits in rural areas for commercial, industrial and trade premises other than utilities and earth resources

(16) Use this section of the Noise Protocol to determine the noise limits for commercial, industrial and trade premises in a rural area, other than utilities (clauses 29 to 32) and earth resources (clauses 33 to 36). The values of the noise limits must be whole numbers, rounded to the nearest decibel

(17) Determine the zone level and distance-adjusted level for each period using the method in clauses 19 and 20.

(18) For each period, the noise limit is the greater of the distance-adjusted level and base noise level in Regulation 118(2)(b), unless a background level assessment has been conducted in accordance with clauses 21 to 23.

B. in this case of noise emitted in rural area –

(i) during the day period, 45dB(A); or

(ii) during the evening period, 37dB(A); or

(iii) during the night period, 32dB(A).

2.2 Zone level and distance -adjusted levels

(19) Determine the zone levels for each of the day, evening and night periods using Annex B to this Noise Protocol.

(20) Adjust the zone levels determined under clause 19 by accounting for the distance between the zone where the noise generator is located and the location of the noise receiver in the noise sensitive area

A. if the noise generator and receiver are covered by the same contiguous zone, the distance adjustment is 0 dB

Table B.1: Zone levels (dB(A)) for rural area method for commercial, industrial and trade premises

Receiving zone → / Generating Zone ↓	Period	Green Wedge A GWAZ, Rural Conservation RCZ, Rural Living RLZ Group E CDZ, SUZ & UGZ (*)	Low Density Residential LDRZ Public Conservation and Resource PCRZ Public Park and Conservation PPCZ Public Use 2 & 5 PUZ2 & PUZ5 Urban Floodway UFZ	Farming Zone FZ Green Wedge GW General Residential Zone GRZ Neighbour Residential Zone NRZ Residential Growth Zone RGZ, Rural Activity Zone RAZ, Township Zone TZ Urban Growth Zone before an incorporated precinct structure plan UGZ Group B CDZ, SUZ & UGZ (*)
Low Density Residential LDRZ Public Conservation and Resource PCRZ Public Park and Conservation PPCZ Public Use 2,5 PUZ2 & PUZ5 Urban Floodway UFZ Group E CDZ, SUZ & UGZ (*)	Day	45	45	45
	Evening	37	39	40
	Night	32	34	35
Farming FZ (*) Green Wedge GWZ, Green Wedge A GWAZ Public Use 2 & 5 PUZ2, PUZ5 Rural Activity RAZ Rural Conservation RCZ Rural Living RLZ Urban Growth Zone before an incorporated precinct structure plan (UGZ) Group B CDZ, SUZ & UGZ (*)	Day	45	45	46
	Evening	38	40	41
	Night	33	35	36

Considering all NCAs are within the Farming 1 Zone (FZ1), and the fact the site and noise sensitive receivers are not considered to be in a background relevant area, the applicable noise limits are detailed in Table 5-1.

Table 5-1 Project Specific Noise Limits

Time of day	Earth Resources Noise Limits, L_{Aeq}, dB(A)
Day	46
Evening	41
Night	36

6 Noise Impact Assessment

Noise predictions were conducted using SoundPLAN 3D noise modelling software. The CONCAWE noise prediction method was implemented throughout all calculations within SoundPLAN. The use of the software and referenced modelling methodology is accepted for use in the state of Victoria by Victoria EPA for environmental noise modelling purposes. As a conservative approach, 2-3 m/s wind has been assumed for all calculations in this report.

6.1.1 Modelling Data and Assumptions

The following data and assumptions were used as part of the noise model:

- Terrain data was obtained from Google Earth;
- All receivers are 1.5m above ground level;
- Terrain co-efficient is 0.6;
- Calculation standard used is CONCAWE;
- Temperature 10ºC;
- Pressure 1013.3mbar;
- Percentage humidity 70%;
- Table 6-1 provides a summary of the plant equipment at the pipeline during excavation and construction, daily percentage of use as provided by client and sound power levels used to model emissions. The typical sound levels of the plant and equipment were extracted from relevant sources and Vipac past projects and standards AS 2436 and BS 5228;
- Table 6-2 provides a summary of the plant equipment at the pipeline during the pipe laying, daily percentage of use as provided by client and sound power levels used to model emissions. The typical sound levels of the plant and equipment were extracted from relevant sources and Vipac past projects and standards AS 2436 and BS 5228;
- All sources modelled as point sources;
- Predictions were carried out for night-time operation only.

Table 6-1 Pipeline Construction (Phase 1) – MFCT SMP/E&I (high noise equipment)- Details of Equipment Used

Machinery	Qty	Plant Description	A-weighted Sound Power Level (LwA) dB	Midpoint Sound Power Level (LwA) dB	% working per day
35t Excavator	4	Excavator	97-117	107	80%
Road Grader – Cat 12H	3	Grader	105-115	110	50%
Loader – Volvo L60F	1	Front end loader	110-115	113	100%
Typical prime mover and semi-trailer	1	Truck (general)	107	107	50%
Typical NDD rig	1	Excavator	97-117	107	75%

HDD Rig – Vermeer D220x300 Navigator	1	Machine mounted pneumatic drill **(Zone 2 & 5 Only)**	110-121	116	75%
Trencher – Vermeer T755III	1	Excavator	97-117	107	80%
Typical grinding noise	1	Angle Grinder	85-95	90	50%
Various generators	2	Generator	84-113	99	100%
Hydro equipment	1	Hydro Equipment	84-113	99	100%
Pipeline drying	2	Compressor	84-113	99	100%

Table 6-2 Pipeline Construction (Phase 2) – Along the whole ROW - Details of Proposed Equipment Used

Machinery	Qty	Plant Description	A-weighted Sound Power Level (LwA) dB	Midpoint Sound Power Level (LwA) dB	% working per day
Typical grinding noise	2	Angle Grinder	85-95	90	50%
Various generators and air compressors trailer mounted	2	Generator/Compressor	84-113	99	100%
Franna MAC25	1	Crane	95-113	104	100%
100t crane	1	Crane	95-113	104	100%

6.1.2 Noise Impact Predictions

For the purpose of this assessment the construction has been separated into 10 'zones' along the pipeline and are marked on the aerial image presented in Figure 6-1. Each zone is approximately 500 metres in length as Lochard have advised Vipac the average work area along the pipeline will be 500 metres as they move from west to east to completion.

During Phase 1 the construction of the pipeline, Zone 1, and Zone 6 complies with the daytime noise level of 46dB. Whilst phase 2 during the pipe laying, Zone 1, 2, 3, 4, 5, 6, 7, & 10 complies with the daytime noise level of 46dB.

On phase 1, there are eight receivers that will exceed the daytime criteria of 46 dB during the construction phase of the pipeline. The range of exceedance will be between +1dB to +11dB, which will be non-compliant. The most affected receivers are R1, R2, R3, & R4 during construction in Zone 7 to 10, and R12, R13 & R14 during construction in Zone 2 to 5.

On phase 2, there are two receivers that will exceed the daytime criteria of 46 dB during the pipe laying phase of the pipeline. The range of exceedance will be between +1dB to +4dB, which will be non-compliant. The most affected receivers are R3 during pipe laying construction in Zone 8 to 9, and R4 during Zone 9.

It is recommended to refer to Section 6.3 for construction noise control practices, and Section 6.4 for resolving any complaints from affected residents.

A full set of construction noise prediction tables are provided in Appendix D, please refer for exact values of exceedance per phase, zone & receiver.

Construction noise prediction for all 'zones' and 'construction phases' are as follows:

Pipeline Construction (Phase 1) – along the whole ROW

i. Zone 1 – See **Table 7-3**, Appendix D.1.1;

ii. Zone 2 – See **Table 7-4**, Appendix D.1.2;

iii. Zone 3 – See **Table 7-5**, Appendix D.1.3;

iv. Zone 4 – See **Table 7-6**, Appendix D.1.4;

v. Zone 5 – See **Table 7-7**, Appendix D.1.5;

vi. Zone 6 – See **Table 7-8**, Appendix D.1.6;

vii. Zone 7 – See **Table 7-9**, Appendix D.1.7;
viii. Zone 8 – See **Table 7-10**, Appendix D.1.8;
ix. Zone 9 – See **Table 7-11**, Appendix D.1.9;
x. Zone 10 – See **Table 7-12**, Appendix D.1.10;

Pipeline Construction (Phase 2) – MFCT SMP/E&I

i. Zone 1 – See **Table 7-13**, Appendix D.2.1;
ii. Zone 2 – See **Table 7-14**, Appendix D.2.2;
iii. Zone 3 – See **Table 7-15**, Appendix D.2.3;
iv. Zone 4 – See **Table 7-16**, Appendix D.2.4;
v. Zone 5 – See **Table 7-17**, Appendix D.2.5;
vi. Zone 6 – See **Table 7-18**, Appendix D.2.6;
vii. Zone 7 – See **Table 7-19**, Appendix D.2.7;
viii. Zone 8 – See **Table 7-20**, Appendix D.2.8;
ix. Zone 9 – See **Table 7-21**, Appendix D.2.9;
x. Zone 10 – See **Table 7-22**, Appendix D.2.10;

Figure 6-1: Construction Work Locations: Well Pad Site & Zones 1 to 10

6.2 Mechanical Plant

The final external mechanical services design, i.e. equipment selections and locations are not available for the pipeline at this stage. Mechanical services must be designed such that the overall noise emission from the new development complies with the noise criteria established for noise levels at the nearest noise sensitive premises in accordance with the Victoria EPA Noise Protocol noise criteria. It is envisaged that some of the control measures will require screening and/or the installation of appropriate attenuators to enable the project specific noise limits to be achieved. A review is recommended once mechanical plant selection is made to ensure noise impact internally and externally is not a concern.

6.3 Noise Control

6.3.1 Construction Noise Control

The following feasible and reasonable work practices should be implemented where practicable to minimise noise impacts. Additional to the above work practices, best practice noise mitigation measures for construction and demolition noise has been sourced from AS2436:2010.

The following steps from ICNG should be followed when selecting work practices to minimise construction noise:

Step 1: Identify work practices likely to be major contributors of noise.

Step 2: Select feasible and reasonable work practices relevant to the project (**Section 0**).

Step 3: Apply the applicable universal work practices (**Section 6.3.3**), as well as the selected feasible and reasonable work practices (**Section 0**).

6.3.2 Feasible and Reasonable Work Practices

Use quieter equipment:

- Examine different types of machines that perform the same function and compare the noise level data to select the least noisy machine. For example, rubber wheeled excavators can be less noisy than steel tracked plant.
- When renting, select quieter items of plant and equipment where feasible and reasonable.
- When purchasing, select, where feasible and reasonable, the most effective mufflers, enclosures and low-noise tool bits and blades. Always seek the manufacturer’s advice before making modifications to plant to reduce noise.
- Use alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electric controlled units where feasible and reasonable. Where there is no electricity supply, use an electrical generator located away from residences.

Operate construction plant in a quiet and efficient manner:

- Reduce throttle setting and turn off equipment when not being used.
- Examine and implement, where feasible and reasonable, the option of reducing noise from metal chutes and bins by placing damping material in the bin.

Maintain plant equipment regularly:

- Regularly inspect and maintain equipment to ensure it is in good working order. Also check the condition of mufflers.
- Equipment must not be operated until it is maintained or repaired, where maintenance or repair would address the annoying character of noise identified.
- For machines with enclosures, check that doors and door seals are in good working order and that the doors close properly against the seals.
- Return any hired equipment that is causing noise that is not typical for the equipment – the increased noise may indicate the need for repair.
- Ensure air lines on pneumatic equipment do not leak.

Plant location:

- Place as much distance as possible between the plant or equipment and residences/other sensitive land uses.
- Restrict areas in which mobile plant can operate so that it is away from residences/other sensitive land uses at particular times.
- Locate site vehicle entrances away from residences and other sensitive land uses.
- Carry out noisy fabrication work at another site (for example, within enclosed factory premises) and then transport to site.

Alternatives to reversing alarms:

- Avoid use of reversing alarms by designing site layout to avoid reversing.
- Install where feasible and reasonable less annoying alternatives to the typical ‘beeper’ alarms, such as broadband quackers, that emit noise over a wide range of frequencies.

Enclosures, barriers and acoustic shielding:

- Reuse existing structures rather than demolish and reconstruct.
- Use temporary site buildings and materials stockpiles as noise barriers.
- Schedule construction of permanent walls to be used as early as possible as noise barriers.
- Note large reflecting surfaces on and off site that might increase noise levels, and avoid placing noise-producing equipment in locations where reflected noise will increase noise exposure or reduce the effectiveness of mitigation measures.
- Installation and use of 3.0m temporary plywood hoardings around the site.

Schedule activities to minimise noise impacts:

- Organise work to be undertaken during the recommended standard hours where possible.
- Schedule noisy work during periods when people are least affected. Provide respite periods while performing these works.
- Schedule work to avoid times when there are special events, such as international sporting competitions, if the construction site is in the vicinity of the venue. When works outside the recommended standard hours are planned, avoid scheduling on Sundays or public holidays. Acquire approval for such works from Council.
- Consult with affected neighbours about scheduling activities to minimize noise impacts.
- Consult with affected schools to ensure that noise-generating construction works in the vicinity of affected school buildings are not scheduled to occur during examination or other sensitive periods, unless other arrangements (such as relocation to an alternative location) acceptable to the affected schools can be made.

Organise deliveries and access:

- Nominate an off-site truck parking area, away from residences, for trucks arriving prior to gates opening.
- Amalgamated loads can lead to less noise and congestion in nearby streets.
- Optimise the number of vehicle trips to and from the site – movements can be organised to amalgamate loads rather than using a number of vehicles with smaller loads.
- Designate access routes to the site, through consultation with potentially noise-affected residences and other sensitive land uses, and make drivers aware of nominated vehicle routes.
- Provide on-site parking for staff and on-site truck waiting areas away from residences and other sensitive land uses. Truck waiting areas may require bundling or walls to minimise noise.
- Schedule deliveries to nominated hours only.

6.3.3 Universal Work Practices

Work practices at any time of day:

- Use toolbox talks to discuss ways to minimise noise.
- Ensure site managers periodically check the site and nearby residences and other sensitive land uses for noise problems so that solutions can be quickly applied.
- Include in tenders, employment contracts, subcontractor agreements and work method statements clauses that require minimisation of noise and compliance with directions from management to minimise noise.
- Avoid the use of radios or stereos outdoors where neighbours can be affected.
- Avoid shouting, and minimise talking loudly and slamming vehicle doors.
- Keep truck drivers informed of designated vehicle routes, parking locations, acceptable delivery hours or other relevant practices (for example, minimising the use of engine brakes, and no extended periods of engine idling).
- Develop simple signage and display in clearly visible locations around the site that relate to relevant work practices and noise control.

It is also important to interact with the community to ensure a good working relationship between the proponent and the community, receive feedback on the project's environmental performance, and work cooperatively towards the outcomes to benefit the project.

Table 6-3 gives a guideline approach to community consultation, notification, and complaint handling. This guide is adopted from the Interim Construction Noise Guideline, and it also provides measures such as letter box drops, project specific respite offers, phone calls and specific notification.

Table 6-3 Consultation and Notification Guideline Adopted from the ICNG.

Notification before and during construction
• Provide, reasonably ahead of time, information such as total building time, what works are expected to be noisy, their duration, what is being done to minimise noise and when respite periods will occur. For works outside

Notification before and during construction
standard hours, inform affected residents and other sensitive land use occupants between 5 and 14 days before commencement. • Provide information to neighbours before and during construction through media such as letterbox drops, meetings or individual contact. In some areas, the proponent will need to provide notification in languages other than English. A website could also be established for the project to provide information. • Use a site information board at the front of the site with the name of the organisation responsible for the site and their contact details, hours of operation and regular information updates. This signage should be clearly visible from the outside and include afterhours emergency contact details. • Maintain good communication between the community and project staff. • Appoint a community liaison officer where required. • For larger projects consider a regular newsletter with site news, significant project events and timing of different activities. • Provide a toll-free contact phone number for enquiries during the works. • Facilitate contact with people to ensure that everyone can see that the site manager understands potential issues, that a planned approach is in place and that there is an ongoing commitment to minimise noise.
Complaints handling
• Provide a readily accessible contact point, for example, through a 24-hour toll-free information and complaints line. • Give complaints a fair hearing. • Have a documented complaints process, including an escalation procedure so that if a complainant is not satisfied there is a clear path to follow. • Call back as soon as possible to keep people informed of action to be taken to address noise problems. Call back at night-time only if requested by the complainant to avoid further disturbance. • Provide a quick response to complaints, with complaint handling staff having both a good knowledge of the project and ready access to information. • Implement all feasible and reasonable measures to address the source of complaint. • Keep a register of any complaints, including details of the complaint such as date, time, person receiving complaint, complainant's contact number, person referred to, description of the complaint, work area (for larger projects), time of verbal response and timeframe for written response where appropriate.

6.3.4 Site Induction

All site personnel should undergo site induction training that includes raising awareness of noise and vibration issues, including but not limited to:

- Standard Construction Hours, including the respite period of all high intensive noise activities.
- Ensure machinery on site to be regularly serviced and maintained; this minimises additional noise generated from machines.
- Adhere to complaint handling instructions, as shown in Table 6-3.
- Ensure site personnel are aware of recent noise and vibration complaints and provide advice on additional noise control measures that can be implemented.
- Site personnel need to be made aware of the noise control measures found in Section 6.3 of this report.

6.3.5 Noise Monitoring Program

A monthly 15-minute attended noise measurement at each of the identified noise sensitive areas should be undertaken during phases of work with high noise emissions. A provision of a monthly noise monitoring report should also be provided and include the following:

- The noise monitoring locations and description of the noise monitoring methodology.
- The noise results represented in L_{Aeq} and a summary of the noise sources during the measurement at each location.
- If noise monitoring results indicate noise exceedance, then further noise control recommendations should be provided to the client.

Additional attended noise monitoring should be conducted when noise complaints arise from nearby receivers. This should either be done during the monthly noise monitoring assessment or on an individual complaint basis.

6.3.6 AS2436:2010 Noise Reductions of Mitigation Methods

Table 6-4 has been sourced directly from AS 2436:2010 (Table C3) and details the potential noise reduction of standard mitigation measures typically utilised on construction and demolition sites.

Table 6-4 Relative Effectiveness of Various Forms of Noise Control

Control By	Nominal Noise Reduction Possible, in total A -weighted sound pressure level, dB
Distance	Approximately 6 for each doubling of distance
Screening	Normally 5 to 10, maximum 15
Enclosure	Normally 15 to 25, maximum 50
Silencing	Normally 5 to 10, maximum 20

6.4 Complaint Management

Upon receiving any complaint regarding construction activities, the nominated contact must investigate the source of the complaint. The aim would be for a Project representative to initiate a complaint investigation and to respond to all complaints as soon as possible. Where practicable a visit should be made to the complainant to verify the nature of the complaint and if justified appropriate action should be taken to cease or amend the activity causing the complaint.

A Complaint Management Plan would be developed and implemented by the contractor engaged for the Construction Works. The Complaint Management Plan would at a minimum include provisions for the recommendations outlined above.

7 Conclusion

Vipac was commissioned to carry out a construction noise and vibration management plan (CNVMP) of the proposed construction Heytesbury Underground Gas Storage "HUGS" Project, to expand the existing storage capacity of the Iona Gas Storage Facility (IGSF), located at Timboon West, Victoria.

Based on information provided to Vipac, relevant data for typical equipment provided, usage percentages and potential worst-case scenarios at different sections of works. Noise modelling was used to predict levels based on percentage of operation equipment working during each phase of the construction over the relevant day period. Predicted levels were compared to limits obtained using the City of Melbourne noise and vibration guidelines.

This prediction is used as an indication of the expected average noise emitted during each phase of the construction to the nearest receiver. Predicted noise levels to the sensitive receivers will change as sources are moved within each section of works.

Predicted noise results show that, during Phase 1 only two zones will comply during the construction phase, while the eight other zones will not comply with the daytime noise criteria of 46 dB. The most affected receivers are R1, R2, R3, & R4 during construction in Zone 7 to 10, and R12, R13 & R14 during construction in Zone 2 to 5.

During phase 2, there are only two receivers that will exceed the daytime criteria of 46 dB during the pipe laying phase of the construction. The most affected receivers are R3 & R4 during construction in Zone 8 to 9.

It is recommended to refer to noise control section to limit or eliminate noise coming from the site, and complaint management section for any disputes with the affected receivers.

Due to the predicted exceedances, temporary hoarding should be considered (with heights selected to block/screen line of sight to noise sources from receiver) for works in conjunction with additional recommendations provided in Section 6.3 for all work phases where exceedances are expected. Temporary hoarding can be moved from zone to zone as the HUGs pipeline progresses along each zone. It is envisigned that up to 3m temporary hoarding will be required in some areas to block line of site and assist with reducing noise disturbance with neighbours.

It should be noted that if the assumptions, locations of worst case, equipment used, daily usage percentages or modelled situations differ from the ones listed in this report the predicted values will need to be reassessed to include any new information and results updated accordingly.

Appendix A Glossary of Terminology

Decibel, dB:

Unit of acoustic measurement. Measurements of power, pressure and intensity. Expressed in dB relative to standard reference levels.

dB (A):

Unit of acoustic measurement weighted to approximate the sensitivity of human hearing to sound frequency.

Sound Pressure Level, L_p (dB), of a sound:

20 times the logarithm to the base 10 of the ratio of the r.m.s. sound pressure to the reference sound pressure of 20 micro Pascals. Sound pressure level is measured using a microphone and a sound level meter, and varies with distance from the source and the environment.

Sound Power Level, L_W (dB), of a source:

10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 Pico Watt. Sound power level cannot be directly measured using a microphone. Sound power level does not change with distance. The sound power level of a machine may vary depending on the actual operating load.

Ambient Sound:

Of an environment: the all-encompassing sound associated with that environment, being a composite of sounds from many sources, near and far.

Background noise:

The underlying level of noise present in the ambient noise, excluding the noise source under investigation, when extraneous noise is removed.

Percentile Level - L_{90}, L_{10}, etc:

A statistical measurement giving the sound pressure level which is exceeded for the given percentile of an observation period, e.g. L_{90} is the level which is exceeded for 90% of a measurement period. L_{90} is commonly referred to as the "background" sound level.

$L_{AEQ,T}$:

Equivalent continuous A-weighted sound pressure level. The value of the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval T, has the same A-weighted sound energy as the actual time-varying sound.

Rating Background Level – RBL:

Method for determining the existing background noise level which involves calculating the tenth percentile from the L_{A90} measurements. This value gives the Assessment Background Noise Level (ABL). Rating Background Level is the median of the overall ABL.

Appendix B Noise Sensitive Receivers

Figure 7-1 below, presents an aerial image of all noise sensitive receivers within approximately 5km of the well pad site.

For the purpose of this assessment the noise sensitive receivers have been split into 4 areas as shows in Figure 7-1.

Figure 7-2, Figure 7-3, Figure 7-4 & Figure 7-5 show the receiver numbers for each noise sensitive receiver that has been assessed throughout this noise impact assessment.

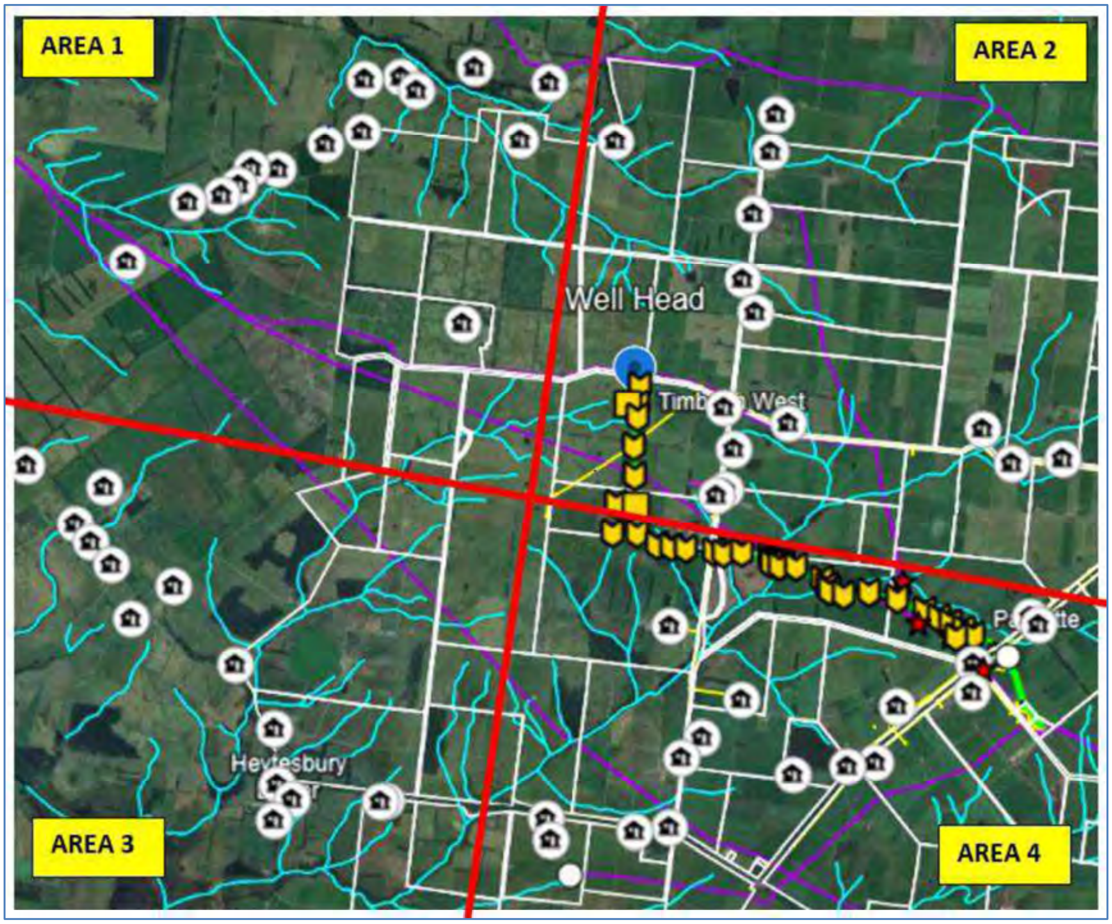

Figure 7-1: Paaratte Residential Receiver Locations Approximately 5 KM Radius of Site (Area 1, 2, 3 & 4)

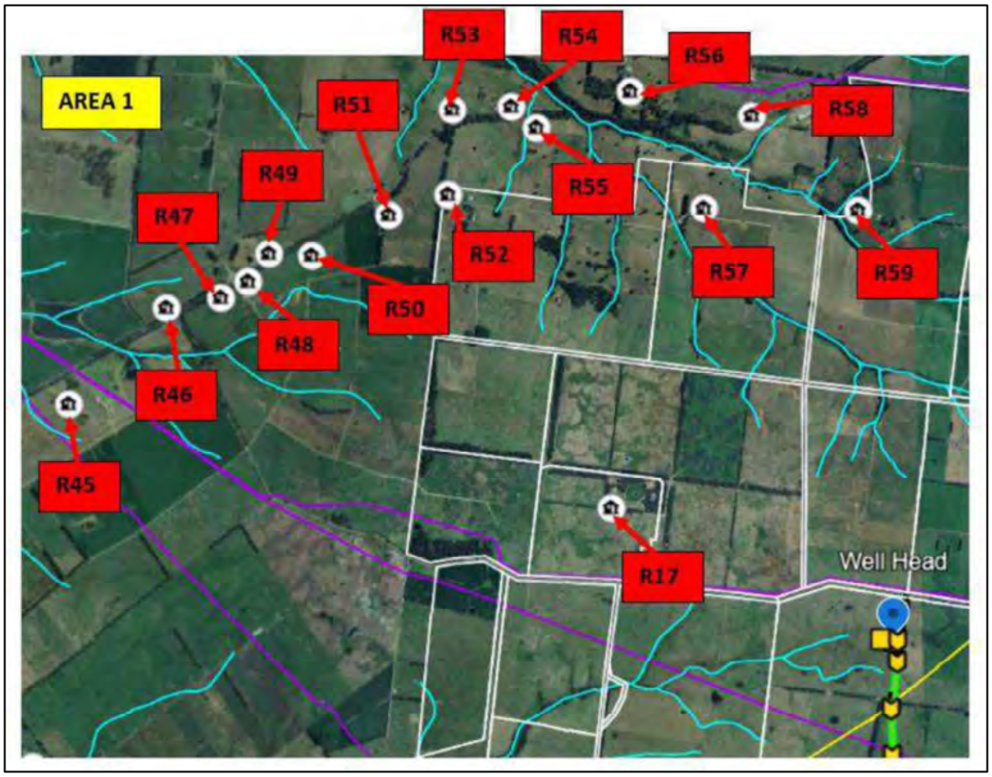

Figure 7-2: Area 1 - Noise Sensitive Receivers R17 & R45 to R59

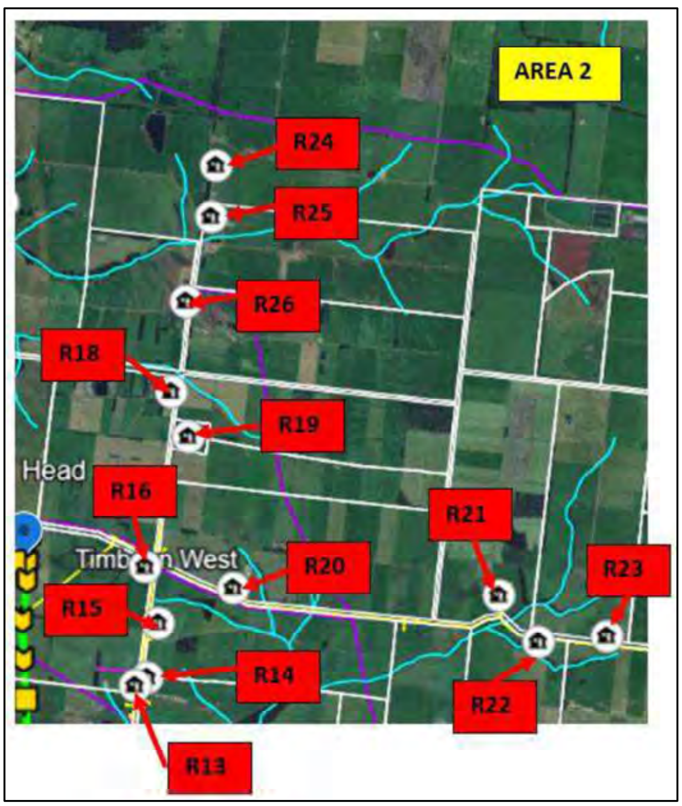

Figure 7-3: Area 2 - Noise Sensitive Receivers R13 to R16, & R18 to R26

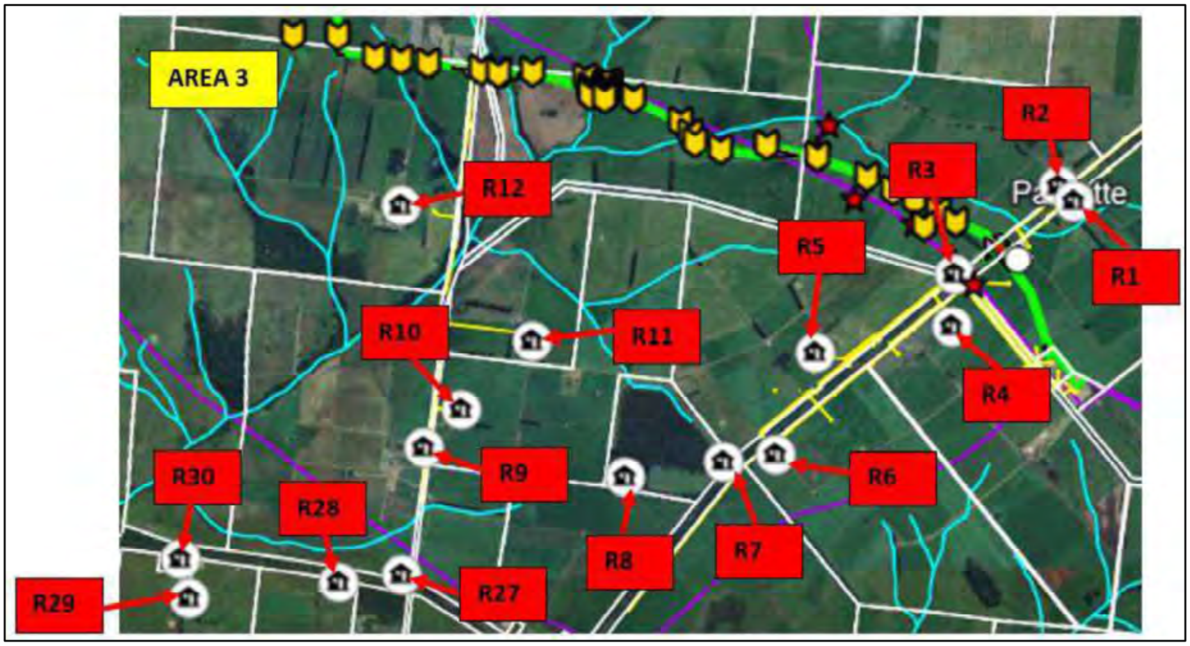

Figure 7-4: Area 3 - Noise Sensitive Receivers R1 to R12 & R27 to R30

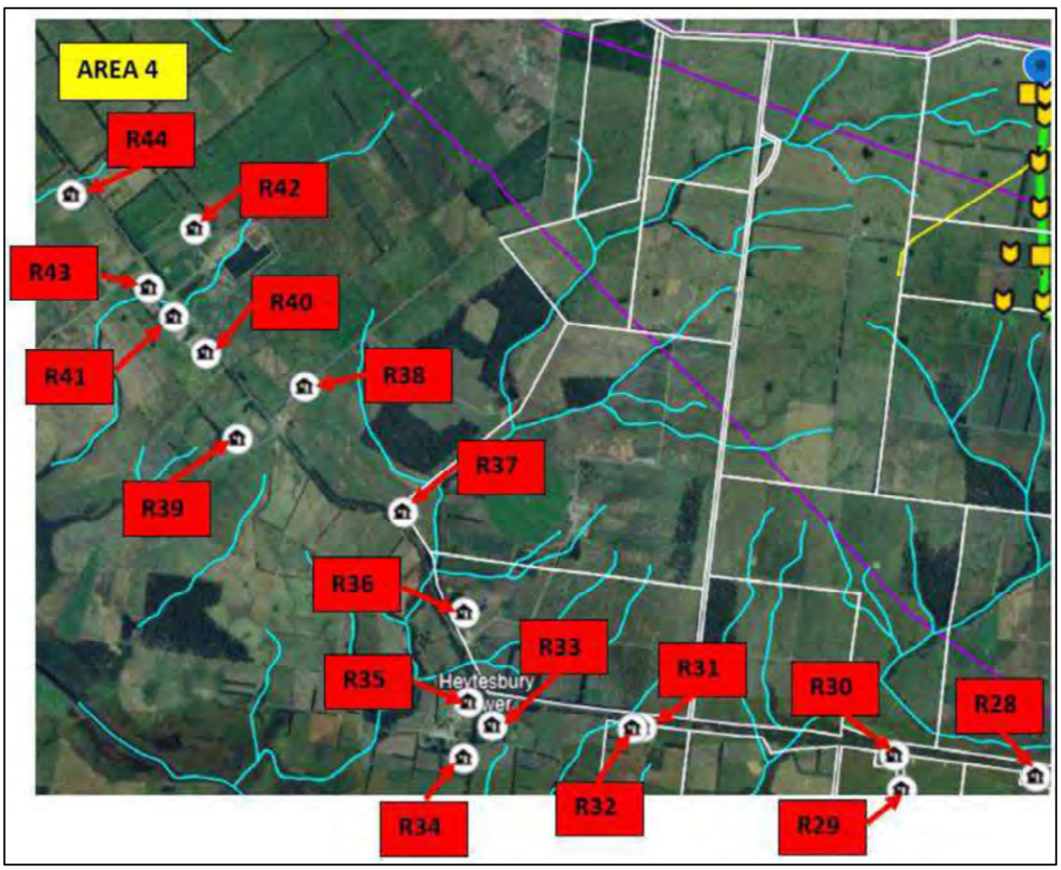

Figure 7-5: Area 4 - Noise Sensitive Receivers R31 to R44

Appendix C Environmental Noise Survey Data

Table 7-1 Environmental Noise Survey Summary L1 – dB(A)

Date	Leq			L90		
	Day	Evening	Night	Day	Evening	Night
31/01/24	47	41	36	39	35	34
01/02/24	58	54	46	49	47	43
02/02/24	46	37	38	42	34	37
03/02/24	44	38	35	40	36	33
04/02/24	42	42	43	37	40	39
05/02/24	47	40	36	43	37	33
06/02/24	45	39	26	41	35	23
Average	**51**	**46**	**40**	**44**	**40**	**37**

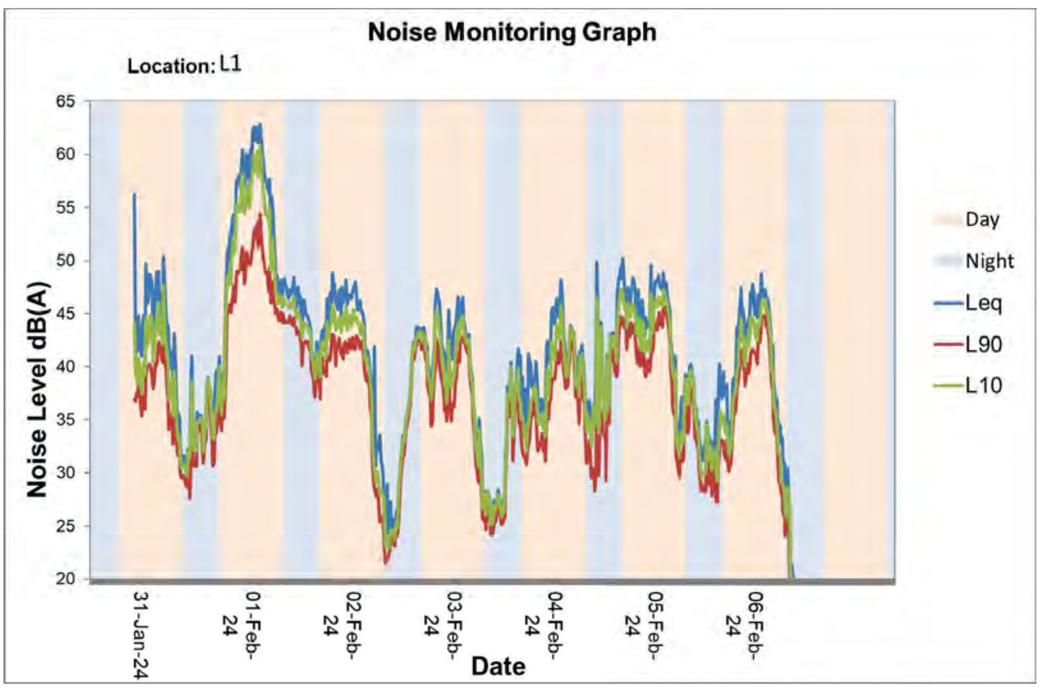

Figure 7-6 Time Histogram of Noise Level Recorded on L1

Table 7-2: Environmental Noise Survey Summary L2 – dB(A)

Date	Leq			L90		
	Day	Evening	Night	Day	Evening	Night
31/01/24	47	41	34	38	34	28
01/02/24	52	49	42	49	45	39
02/02/24	45	43	37	40	34	33
03/02/24	47	43	39	38	39	31
04/02/24	42	44	43	35	39	39
05/02/24	46	40	35	41	35	26
06/02/24	45	41	33	38	35	28
Average	**48**	**44**	**39**	**42**	**40**	**34**

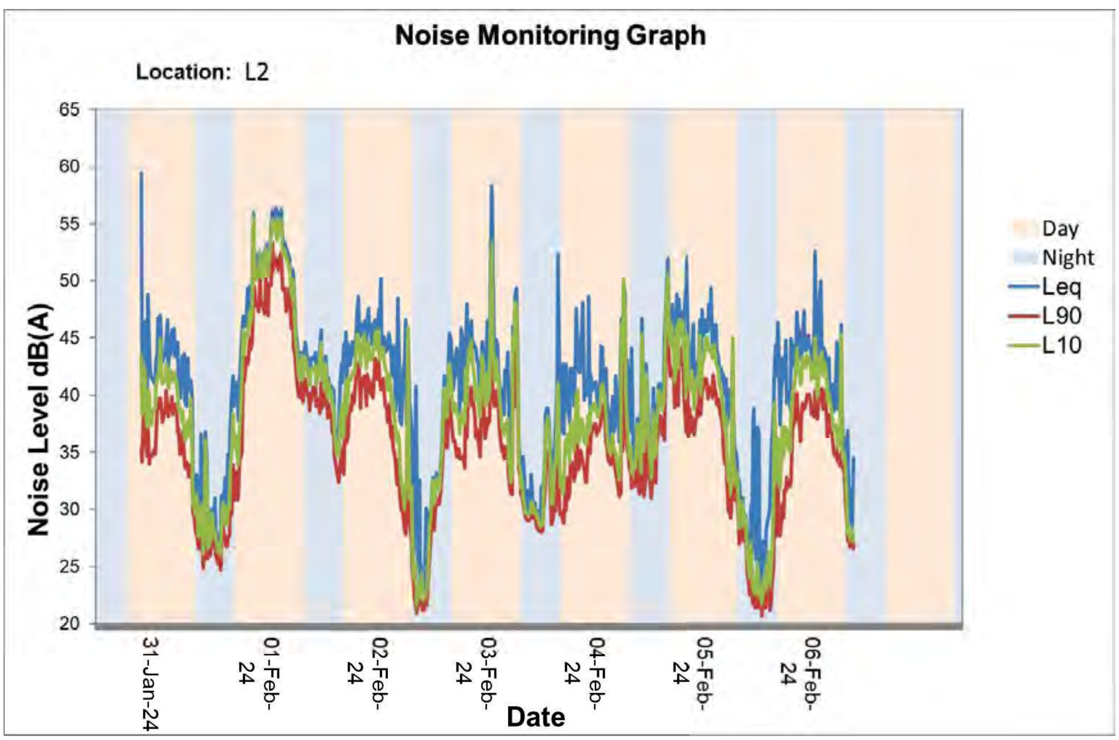

Figure 7-7 Time Histogram of Noise Level Recorded on L2

Appendix D Noise Impact Predictions

Construction noise prediction for all 'zones' and 'construction phases' are as follows:

Pipeline Construction (Phase 1) – along the whole ROW

i. Zone 1 – See **Table 7-3**
ii. Zone 2 – See **Table 7-4**
iii. Zone 3 – See **Table 7-5**
iv. Zone 4 – See **Table 7-6**
v. Zone 5 – See **Table 7-7**
vi. Zone 6 – See **Table 7-8**
vii. Zone 7 – See **Table 7-9**
viii. Zone 8 – See **Table 7-10**
ix. Zone 9 – See **Table 7-11**
x. Zone 10 – See **Table 7-12**

Pipeline Construction (Phase 2) – MFCT SMP/E&I

i. Zone 1 – See **Table 7-13**
ii. Zone 2 – See **Table 7-14**
iii. Zone 3 – See **Table 7-15**
iv. Zone 4 – See **Table 7-16**
v. Zone 5 – See **Table 7-17**
vi. Zone 6 – See **Table 7-18**
vii. Zone 7 – See **Table 7-19**
viii. Zone 8 – See **Table 7-20**
ix. Zone 9 – See **Table 7-21**
x. Zone 10 – See **Table 7-22**

D.1 Construction Noise Predictions Pipeline Construction (Phase 1) – Along the Whole ROW

D.1.1 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 1

Table 7-3 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 1**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	24	46	-22
R2	25	46	-22
R3	26	46	-20
R4	25	46	-21
R5	27	46	-19
R6	26	46	-20
R7	27	46	-20
R8	27	46	-19
R9	30	46	-16
R10	31	46	-15
R11	32	46	-14
R12	38	46	-8
R13	46	46	0
R14	46	46	-1
R15	46	46	-1
R16	46	46	0
R17	36	46	-10
R18	36	46	-10
R19	38	46	-8
R20	40	46	-6
R21	28	46	-18
R22	27	46	-19
R23	25	46	-21
R24	28	46	-19
R25	29	46	-17
R26	32	46	-14
R27	27	46	-19
R28	26	46	-20
R29	26	46	-20
R30	27	46	-20
R31	24	46	-22
R32	24	46	-22
R33	22	46	-24
R34	21	46	-25

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R35	22	46	-24
R36	23	46	-23
R37	23	46	-23
R38	22	46	-24
R39	21	46	-26
R40	20	46	-26
R41	20	46	-26
R42	21	46	-26
R43	19	46	-27
R44	18	46	-28
R45	20	46	-26
R46	21	46	-25
R47	22	46	-24
R48	23	46	-23
R49	23	46	-23
R50	24	46	-22
R51	24	46	-22
R52	25	46	-21
R53	23	46	-23
R54	24	46	-22
R55	25	46	-21
R56	25	46	-21
R57	29	46	-17
R58	27	46	-19
R59	30	46	-16

D.1.2 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 2

Table 7-4 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 2**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	27	46	-20
R2	27	46	-19
R3	29	46	-17
R4	28	46	-18
R5	31	46	-15
R6	30	46	-17
R7	31	46	-16
R8	32	46	-14
R9	35	46	-11
R10	36	46	-10
R11	37	46	-9
R12	45	46	-1
R13	49	46	+3
R14	48	46	+2
R15	45	46	-1
R16	43	46	-3
R17	35	46	-11
R18	35	46	-11
R19	36	46	-10
R20	40	46	-6
R21	29	46	-17
R22	28	46	-18
R23	26	46	-20
R24	27	46	-19
R25	28	46	-18
R26	31	46	-15
R27	31	46	-15
R28	31	46	-15
R29	30	46	-16
R30	31	46	-15
R31	28	46	-18
R32	28	46	-18
R33	25	46	-21
R34	24	46	-22
R35	25	46	-21

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	26	46	-20
R37	26	46	-20
R38	25	46	-21
R39	23	46	-23
R40	22	46	-24
R41	22	46	-24
R42	22	46	-24
R43	21	46	-25
R44	19	46	-27
R45	21	46	-25
R46	22	46	-24
R47	23	46	-23
R48	23	46	-23
R49	23	46	-23
R50	24	46	-22
R51	24	46	-22
R52	25	46	-21
R53	23	46	-23
R54	24	46	-23
R55	24	46	-22
R56	25	46	-22
R57	28	46	-18
R58	26	46	-20
R59	29	46	-17

D.1.3 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 3

Table 7-5 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 3**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	27	46	-19
R2	28	46	-18
R3	30	46	-17
R4	29	46	-17
R5	32	46	-14
R6	31	46	-15
R7	32	46	-14
R8	33	46	-13
R9	36	46	-10
R10	37	46	-9
R11	39	46	-7
R12	48	46	+2
R13	51	46	+5
R14	49	46	+3
R15	44	46	-2
R16	40	46	-6
R17	30	46	-16
R18	32	46	-15
R19	33	46	-13
R20	39	46	-7
R21	29	46	-17
R22	28	46	-18
R23	26	46	-20
R24	24	46	-22
R25	25	46	-21
R26	28	46	-18
R27	31	46	-15
R28	31	46	-15
R29	29	46	-17
R30	30	46	-16
R31	26	46	-20
R32	26	46	-20
R33	23	46	-23
R34	22	46	-24
R35	23	46	-23

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	24	46	-22
R37	23	46	-23
R38	22	46	-25
R39	20	46	-26
R40	19	46	-27
R41	19	46	-27
R42	19	46	-27
R43	18	46	-28
R44	16	46	-30
R45	17	46	-29
R46	18	46	-28
R47	19	46	-27
R48	19	46	-27
R49	19	46	-27
R50	20	46	-26
R51	20	46	-26
R52	21	46	-25
R53	19	46	-27
R54	20	46	-27
R55	20	46	-26
R56	21	46	-26
R57	24	46	-22
R58	22	46	-24
R59	25	46	-21

D.1.4 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 4

Table 7-6 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 4**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	30	46	-16
R2	30	46	-16
R3	32	46	-14
R4	32	46	-14
R5	35	46	-11
R6	33	46	-13
R7	34	46	-12
R8	35	46	-12
R9	36	46	-10
R10	37	46	-9
R11	41	46	-5
R12	47	46	+1
R13	51	46	+5
R14	51	46	+5
R15	45	46	-1
R16	40	46	-6
R17	28	46	-18
R18	32	46	-14
R19	34	46	-13
R20	41	46	-5
R21	31	46	-15
R22	31	46	-15
R23	28	46	-18
R24	24	46	-22
R25	25	46	-21
R26	28	46	-18
R27	32	46	-15
R28	31	46	-15
R29	29	46	-18
R30	29	46	-17
R31	25	46	-21
R32	25	46	-22
R33	22	46	-24
R34	21	46	-25
R35	21	46	-25

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	22	46	-24
R37	21	46	-25
R38	20	46	-27
R39	18	46	-28
R40	17	46	-29
R41	17	46	-29
R42	17	46	-29
R43	16	46	-30
R44	14	46	-32
R45	16	46	-30
R46	16	46	-30
R47	17	46	-29
R48	17	46	-29
R49	17	46	-29
R50	18	46	-28
R51	19	46	-27
R52	19	46	-27
R53	18	46	-28
R54	18	46	-28
R55	19	46	-27
R56	20	46	-26
R57	23	46	-23
R58	21	46	-25
R59	24	46	-22

D.1.5 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 5

Table 7-7 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 5**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	35	46	-12
R2	35	46	-11
R3	38	46	-8
R4	37	46	-9
R5	40	46	-6
R6	37	46	-9
R7	38	46	-8
R8	38	46	-8
R9	37	46	-9
R10	39	46	-7
R11	43	46	-3
R12	44	46	-2
R13	47	46	+1
R14	47	46	+1
R15	44	46	-3
R16	40	46	-6
R17	26	46	-21
R18	32	46	-14
R19	34	46	-12
R20	42	46	-4
R21	35	46	-11
R22	35	46	-11
R23	32	46	-14
R24	25	46	-21
R25	27	46	-19
R26	29	46	-17
R27	33	46	-13
R28	32	46	-14
R29	29	46	-17
R30	30	46	-16
R31	25	46	-21
R32	25	46	-22
R33	22	46	-25
R34	21	46	-25
R35	21	46	-25

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	22	46	-24
R37	21	46	-25
R38	19	46	-27
R39	18	46	-28
R40	17	46	-29
R41	16	46	-30
R42	16	46	-30
R43	15	46	-31
R44	13	46	-33
R45	14	46	-32
R46	14	46	-32
R47	16	46	-30
R48	16	46	-30
R49	16	46	-30
R50	17	46	-29
R51	17	46	-29
R52	18	46	-28
R53	16	46	-30
R54	17	46	-29
R55	17	46	-29
R56	18	46	-28
R57	21	46	-25
R58	21	46	-25
R59	24	46	-22

D.1.6 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 6

Table 7-8 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 6**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	37	46	-9
R2	38	46	-8
R3	41	46	-5
R4	40	46	-6
R5	43	46	-3
R6	39	46	-7
R7	39	46	-7
R8	29	46	-18
R9	34	46	-12
R10	36	46	-10
R11	41	46	-5
R12	38	46	-8
R13	39	46	-7
R14	40	46	-7
R15	38	46	-9
R16	35	46	-11
R17	23	46	-23
R18	29	46	-17
R19	31	46	-16
R20	38	46	-8
R21	35	46	-11
R22	36	46	-11
R23	33	46	-13
R24	22	46	-24
R25	24	46	-22
R26	25	46	-21
R27	31	46	-15
R28	30	46	-16
R29	26	46	-20
R30	27	46	-19
R31	22	46	-24
R32	21	46	-25
R33	19	46	-28
R34	18	46	-28
R35	18	46	-28

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	19	46	-27
R37	18	46	-28
R38	16	46	-30
R39	15	46	-32
R40	14	46	-32
R41	13	46	-33
R42	14	46	-33
R43	13	46	-33
R44	11	46	-35
R45	12	46	-34
R46	13	46	-33
R47	14	46	-32
R48	14	46	-32
R49	14	46	-32
R50	15	46	-31
R51	15	46	-31
R52	16	46	-30
R53	14	46	-32
R54	15	46	-31
R55	16	46	-30
R56	17	46	-29
R57	20	46	-27
R58	19	46	-28
R59	21	46	-25

D.1.7 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 7

Table 7-9 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 7**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	42	46	-4
R2	43	46	-3
R3	48	46	+2
R4	45	46	-1
R5	45	46	-1
R6	39	46	-7
R7	38	46	-8
R8	30	46	-17
R9	32	46	-14
R10	34	46	-12
R11	37	46	-9
R12	34	46	-12
R13	35	46	-11
R14	36	46	-10
R15	34	46	-12
R16	32	46	-14
R17	21	46	-25
R18	27	46	-19
R19	29	46	-17
R20	35	46	-11
R21	37	46	-9
R22	38	46	-8
R23	35	46	-11
R24	22	46	-25
R25	23	46	-23
R26	25	46	-21
R27	29	46	-17
R28	28	46	-19
R29	24	46	-22
R30	25	46	-21
R31	20	46	-26
R32	19	46	-27
R33	17	46	-29
R34	16	46	-30
R35	16	46	-30

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	17	46	-29
R37	16	46	-30
R38	14	46	-32
R39	13	46	-33
R40	12	46	-34
R41	12	46	-34
R42	12	46	-34
R43	11	46	-35
R44	10	46	-36
R45	11	46	-35
R46	11	46	-35
R47	12	46	-34
R48	13	46	-34
R49	13	46	-34
R50	13	46	-33
R51	14	46	-32
R52	14	46	-32
R53	13	46	-33
R54	14	46	-32
R55	15	46	-31
R56	15	46	-31
R57	18	46	-28
R58	17	46	-29
R59	20	46	-26

D.1.8 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 8

Table 7-10 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 8**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	50	46	+4
R2	51	46	+5
R3	60	46	+14
R4	52	46	+6
R5	46	46	0
R6	40	46	-6
R7	38	46	-8
R8	35	46	-11
R9	30	46	-16
R10	32	46	-15
R11	35	46	-11
R12	31	46	-15
R13	32	46	-15
R14	32	46	-14
R15	31	46	-15
R16	29	46	-17
R17	19	46	-27
R18	25	46	-21
R19	27	46	-19
R20	32	46	-14
R21	36	46	-10
R22	38	46	-8
R23	36	46	-10
R24	20	46	-26
R25	21	46	-25
R26	23	46	-23
R27	28	46	-18
R28	26	46	-20
R29	23	46	-23
R30	23	46	-23
R31	18	46	-28
R32	18	46	-28
R33	15	46	-31
R34	15	46	-32
R35	15	46	-31

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	15	46	-31
R37	14	46	-32
R38	12	46	-34
R39	11	46	-35
R40	11	46	-35
R41	10	46	-36
R42	10	46	-36
R43	10	46	-36
R44	<10	46	-38
R45	<10	46	-37
R46	<10	46	-37
R47	11	46	-35
R48	11	46	-35
R49	11	46	-35
R50	12	46	-35
R51	12	46	-34
R52	13	46	-33
R53	11	46	-35
R54	12	46	-34
R55	13	46	-33
R56	14	46	-32
R57	16	46	-30
R58	16	46	-31
R59	18	46	-28

D.1.9 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 9

Table 7-11 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 9**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	53	46	+7
R2	52	46	+6
R3	60	46	+14
R4	57	46	+11
R5	44	46	-2
R6	40	46	-7
R7	38	46	-9
R8	34	46	-12
R9	29	46	-17
R10	30	46	-16
R11	32	46	-14
R12	29	46	-17
R13	29	46	-18
R14	29	46	-17
R15	28	46	-18
R16	27	46	-20
R17	17	46	-29
R18	23	46	-23
R19	24	46	-22
R20	29	46	-17
R21	34	46	-12
R22	36	46	-10
R23	35	46	-11
R24	18	46	-28
R25	19	46	-27
R26	21	46	-25
R27	27	46	-19
R28	26	46	-21
R29	22	46	-24
R30	22	46	-24
R31	17	46	-29
R32	17	46	-29
R33	14	46	-32
R34	13	46	-33
R35	14	46	-32

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	14	46	-32
R37	13	46	-33
R38	11	46	-35
R39	<10	46	-36
R40	<10	46	-37
R41	<10	46	-37
R42	<10	46	-37
R43	<10	46	-38
R44	<10	46	-39
R45	<10	46	-38
R46	<10	46	-38
R47	<10	46	-37
R48	<10	46	-37
R49	<10	46	-37
R50	10	46	-36
R51	11	46	-36
R52	11	46	-35
R53	10	46	-36
R54	11	46	-35
R55	11	46	-35
R56	12	46	-34
R57	14	46	-32
R58	14	46	-32
R59	16	46	-30

D.1.10 Construction Noise Predictions Pipeline Construction (Phase 1) – Zone 10

Table 7-12 Construction Noise Impacts During – Pipeline Construction (Phase 1) at **Zone 10**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	48	46	+2
R2	47	46	+1
R3	51	46	+5
R4	53	46	+7
R5	42	46	-4
R6	39	46	-7
R7	37	46	-9
R8	34	46	-12
R9	28	46	-18
R10	29	46	-17
R11	31	46	-15
R12	27	46	-19
R13	27	46	-19
R14	27	46	-19
R15	26	46	-20
R16	25	46	-21
R17	15	46	-31
R18	21	46	-25
R19	23	46	-24
R20	27	46	-19
R21	31	46	-15
R22	34	46	-13
R23	33	46	-13
R24	17	46	-29
R25	18	46	-28
R26	19	46	-27
R27	27	46	-19
R28	25	46	-21
R29	22	46	-24
R30	22	46	-24
R31	17	46	-29
R32	16	46	-30
R33	14	46	-32
R34	13	46	-33
R35	13	46	-33

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	13	46	-33
R37	12	46	-34
R38	10	46	-36
R39	<10	46	-37
R40	<10	46	-37
R41	<10	46	-38
R42	<10	46	-38
R43	<10	46	-38
R44	<10	46	-40
R45	<10	46	-39
R46	<10	46	-39
R47	<10	46	-38
R48	<10	46	-38
R49	<10	46	-38
R50	<10	46	-37
R51	10	46	-37
R52	10	46	-36
R53	<10	46	-38
R54	10	46	-36
R55	10	46	-36
R56	11	46	-35
R57	13	46	-33
R58	13	46	-34
R59	15	46	-31

D.2 Construction Noise Predictions Pipeline Construction (Phase 2) – MFCT SMP/E&I

D.2.1 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 1

Table 7-13 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 1**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	14	46	-32
R2	15	46	-32
R3	16	46	-30
R4	15	46	-31
R5	17	46	-29
R6	16	46	-30
R7	16	46	-30
R8	17	46	-29
R9	20	46	-26
R10	20	46	-26
R11	22	46	-24
R12	28	46	-19
R13	36	46	-10
R14	35	46	-11
R15	35	46	-11
R16	36	46	-10
R17	26	46	-20
R18	27	46	-19
R19	28	46	-18
R20	30	46	-16
R21	18	46	-28
R22	17	46	-29
R23	15	46	-31
R24	18	46	-28
R25	20	46	-27
R26	23	46	-23
R27	17	46	-30
R28	16	46	-30
R29	16	46	-30
R30	17	46	-30
R31	14	46	-32
R32	14	46	-32
R33	12	46	-34
R34	11	46	-35

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R35	12	46	-34
R36	13	46	-33
R37	14	46	-32
R38	13	46	-33
R39	11	46	-35
R40	11	46	-35
R41	10	46	-36
R42	11	46	-35
R43	10	46	-36
R44	<10	46	-38
R45	11	46	-35
R46	12	46	-35
R47	13	46	-33
R48	13	46	-33
R49	13	46	-33
R50	14	46	-32
R51	15	46	-31
R52	16	46	-31
R53	14	46	-32
R54	15	46	-32
R55	15	46	-31
R56	16	46	-30
R57	20	46	-27
R58	17	46	-29
R59	21	46	-25

D.2.2 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 2

Table 7-14 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 2**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	15	46	-31
R2	16	46	-30
R3	17	46	-29
R4	17	46	-29
R5	20	46	-27
R6	18	46	-28
R7	19	46	-27
R8	21	46	-25
R9	24	46	-22
R10	25	46	-21
R11	26	46	-20
R12	34	46	-12
R13	38	46	-8
R14	36	46	-10
R15	34	46	-13
R16	32	46	-14
R17	23	46	-23
R18	23	46	-23
R19	24	46	-22
R20	28	46	-18
R21	18	46	-28
R22	17	46	-29
R23	15	46	-31
R24	15	46	-31
R25	16	46	-30
R26	19	46	-27
R27	20	46	-26
R28	20	46	-26
R29	19	46	-27
R30	20	46	-26
R31	17	46	-29
R32	17	46	-29
R33	14	46	-32
R34	13	46	-33
R35	14	46	-32

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	15	46	-31
R37	15	46	-31
R38	13	46	-33
R39	11	46	-35
R40	11	46	-35
R41	10	46	-36
R42	11	46	-35
R43	10	46	-36
R44	<10	46	-38
R45	<10	46	-37
R46	10	46	-36
R47	11	46	-35
R48	11	46	-35
R49	11	46	-35
R50	12	46	-34
R51	13	46	-34
R52	13	46	-33
R53	11	46	-35
R54	12	46	-34
R55	13	46	-33
R56	13	46	-33
R57	16	46	-30
R58	14	46	-32
R59	17	46	-29

D.2.3 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 3

Table 7-15 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 3**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	17	46	-29
R2	18	46	-28
R3	20	46	-26
R4	19	46	-27
R5	22	46	-24
R6	21	46	-25
R7	22	46	-24
R8	23	46	-23
R9	26	46	-20
R10	27	46	-19
R11	29	46	-17
R12	39	46	-8
R13	41	46	-5
R14	39	46	-7
R15	34	46	-12
R16	31	46	-15
R17	20	46	-26
R18	22	46	-24
R19	24	46	-23
R20	29	46	-17
R21	19	46	-27
R22	19	46	-28
R23	16	46	-30
R24	14	46	-32
R25	16	46	-31
R26	18	46	-28
R27	22	46	-24
R28	21	46	-25
R29	20	46	-27
R30	20	46	-26
R31	16	46	-30
R32	16	46	-30
R33	13	46	-33
R34	12	46	-34
R35	13	46	-33

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	14	46	-32
R37	13	46	-33
R38	12	46	-35
R39	10	46	-36
R40	<10	46	-37
R41	<10	46	-38
R42	<10	46	-37
R43	<10	46	-38
R44	<10	46	-40
R45	<10	46	-39
R46	<10	46	-38
R47	<10	46	-37
R48	<10	46	-37
R49	<10	46	-37
R50	10	46	-37
R51	10	46	-36
R52	11	46	-36
R53	<10	46	-37
R54	10	46	-37
R55	10	46	-36
R56	11	46	-36
R57	14	46	-32
R58	12	46	-34
R59	15	46	-31

D.2.4 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 4

Table 7-16 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 4**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	20	46	-26
R2	21	46	-25
R3	23	46	-23
R4	22	46	-24
R5	25	46	-21
R6	23	46	-23
R7	24	46	-22
R8	25	46	-21
R9	26	46	-20
R10	28	46	-18
R11	31	46	-15
R12	36	46	-10
R13	41	46	-5
R14	41	46	-5
R15	35	46	-11
R16	31	46	-15
R17	18	46	-28
R18	22	46	-24
R19	24	46	-22
R20	31	46	-15
R21	22	46	-24
R22	21	46	-25
R23	19	46	-27
R24	14	46	-32
R25	16	46	-30
R26	18	46	-28
R27	22	46	-24
R28	21	46	-25
R29	19	46	-27
R30	19	46	-27
R31	15	46	-31
R32	15	46	-32
R33	12	46	-35
R34	11	46	-36
R35	11	46	-35

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	12	46	-34
R37	11	46	-35
R38	<10	46	-37
R39	<10	46	-38
R40	<10	46	-39
R41	<10	46	-39
R42	<10	46	-39
R43	<10	46	-40
R44	<10	46	-42
R45	<10	46	-40
R46	<10	46	-40
R47	<10	46	-39
R48	<10	46	-39
R49	<10	46	-39
R50	<10	46	-38
R51	<10	46	-37
R52	<10	46	-37
R53	<10	46	-38
R54	<10	46	-37
R55	<10	46	-37
R56	10	46	-36
R57	13	46	-33
R58	12	46	-35
R59	14	46	-32

D.2.5 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 5

Table 7-17 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 5**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	24	46	-22
R2	24	46	-22
R3	27	46	-19
R4	26	46	-20
R5	29	46	-17
R6	26	46	-20
R7	27	46	-19
R8	26	46	-20
R9	25	46	-21
R10	27	46	-19
R11	31	46	-15
R12	32	46	-14
R13	34	46	-12
R14	35	46	-11
R15	31	46	-15
R16	28	46	-18
R17	15	46	-31
R18	21	46	-25
R19	23	46	-23
R20	31	46	-16
R21	24	46	-22
R22	24	46	-22
R23	21	46	-25
R24	14	46	-33
R25	15	46	-31
R26	17	46	-29
R27	21	46	-25
R28	20	46	-26
R29	17	46	-29
R30	18	46	-28
R31	13	46	-33
R32	13	46	-33
R33	10	46	-36
R34	<10	46	-37
R35	<10	46	-37

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	10	46	-36
R37	<10	46	-37
R38	<10	46	-39
R39	<10	46	-40
R40	<10	46	-41
R41	<10	46	-41
R42	<10	46	-41
R43	<10	46	-42
R44	<10	46	-43
R45	<10	46	-42
R46	<10	46	-42
R47	<10	46	-41
R48	<10	46	-40
R49	<10	46	-40
R50	<10	46	-40
R51	<10	46	-39
R52	<10	46	-38
R53	<10	46	-42
R54	<10	46	-41
R55	<10	46	-40
R56	<10	46	-38
R57	11	46	-35
R58	10	46	-36
R59	13	46	-33

D.2.6 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 6

Table 7-18 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 6**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	28	46	-19
R2	28	46	-18
R3	32	46	-14
R4	30	46	-16
R5	34	46	-13
R6	29	46	-17
R7	29	46	-17
R8	17	46	-29
R9	24	46	-22
R10	26	46	-20
R11	31	46	-15
R12	28	46	-18
R13	29	46	-17
R14	29	46	-17
R15	27	46	-19
R16	25	46	-21
R17	13	46	-33
R18	19	46	-27
R19	21	46	-25
R20	28	46	-18
R21	26	46	-20
R22	26	46	-20
R23	23	46	-23
R24	12	46	-34
R25	14	46	-32
R26	15	46	-31
R27	21	46	-25
R28	20	46	-26
R29	16	46	-30
R30	17	46	-29
R31	12	46	-35
R32	11	46	-35
R33	<10	46	-38
R34	<10	46	-39
R35	<10	46	-38

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	<10	46	-38
R37	<10	46	-38
R38	<10	46	-40
R39	<10	46	-42
R40	<10	46	-42
R41	<10	46	-43
R42	<10	46	-43
R43	<10	46	-43
R44	<10	46	-45
R45	<10	46	-44
R46	<10	46	-43
R47	<10	46	-42
R48	<10	46	-42
R49	<10	46	-42
R50	<10	46	-41
R51	<10	46	-41
R52	<10	46	-40
R53	<10	46	-42
R54	<10	46	-41
R55	<10	46	-40
R56	<10	46	-39
R57	10	46	-36
R58	<10	46	-37
R59	12	46	-35

D.2.7 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 7

Table 7-19 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 7**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	33	46	-13
R2	34	46	-12
R3	39	46	-8
R4	35	46	-11
R5	36	46	-11
R6	29	46	-17
R7	28	46	-18
R8	20	46	-27
R9	21	46	-25
R10	23	46	-23
R11	27	46	-19
R12	24	46	-22
R13	25	46	-21
R14	26	46	-21
R15	24	46	-22
R16	22	46	-24
R17	11	46	-35
R18	17	46	-29
R19	19	46	-27
R20	25	46	-21
R21	27	46	-19
R22	28	46	-18
R23	26	46	-20
R24	12	46	-34
R25	13	46	-33
R26	15	46	-31
R27	18	46	-28
R28	17	46	-29
R29	14	46	-32
R30	14	46	-32
R31	10	46	-36
R32	<10	46	-37
R33	<10	46	-39
R34	<10	46	-40
R35	<10	46	-40

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	<10	46	-39
R37	<10	46	-40
R38	<10	46	-42
R39	<10	46	-43
R40	<10	46	-44
R41	<10	46	-44
R42	<10	46	-44
R43	<10	46	-45
R44	<10	46	-46
R45	<10	46	-45
R46	<10	46	-45
R47	<10	46	-44
R48	<10	46	-43
R49	<10	46	-43
R50	<10	46	-43
R51	<10	46	-42
R52	<10	46	-42
R53	<10	46	-43
R54	<10	46	-42
R55	<10	46	-41
R56	<10	46	-41
R57	<10	46	-38
R58	<10	46	-39
R59	10	46	-36

D.2.8 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 8

Table 7-20 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 8**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	40	46	-6
R2	42	46	-5
R3	50	46	+4
R4	42	46	-4
R5	36	46	-10
R6	30	46	-16
R7	28	46	-18
R8	25	46	-21
R9	20	46	-26
R10	22	46	-24
R11	25	46	-22
R12	21	46	-25
R13	22	46	-25
R14	22	46	-24
R15	21	46	-25
R16	19	46	-27
R17	<10	46	-37
R18	15	46	-31
R19	17	46	-29
R20	22	46	-24
R21	26	46	-20
R22	28	46	-18
R23	27	46	-19
R24	10	46	-36
R25	11	46	-35
R26	13	46	-33
R27	18	46	-28
R28	17	46	-30
R29	13	46	-33
R30	14	46	-33
R31	<10	46	-38
R32	<10	46	-38
R33	<10	46	-41
R34	<10	46	-41
R35	<10	46	-41

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	<10	46	-41
R37	<10	46	-42
R38	<10	46	-44
R39	<10	46	-45
R40	<10	46	-45
R41	<10	46	-46
R42	<10	46	-46
R43	<10	46	-46
R44	<10	46	-48
R45	<10	46	-47
R46	<10	46	-47
R47	<10	46	-45
R48	<10	46	-45
R49	<10	46	-45
R50	<10	46	-44
R51	<10	46	-44
R52	<10	46	-43
R53	<10	46	-45
R54	<10	46	-44
R55	<10	46	-43
R56	<10	46	-42
R57	<10	46	-40
R58	<10	46	-40
R59	<10	46	-38

D.2.9 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I – Zone 9

Table 7-21 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 9**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	43	46	-3
R2	42	46	-4
R3	50	46	+4
R4	47	46	+1
R5	34	46	-12
R6	30	46	-16
R7	28	46	-18
R8	24	46	-22
R9	19	46	-27
R10	20	46	-26
R11	23	46	-24
R12	19	46	-27
R13	19	46	-27
R14	19	46	-27
R15	18	46	-28
R16	17	46	-30
R17	7	46	-39
R18	13	46	-33
R19	14	46	-32
R20	19	46	-27
R21	24	46	-22
R22	26	46	-20
R23	25	46	-21
R24	<10	46	-38
R25	<10	46	-37
R26	11	46	-35
R27	17	46	-29
R28	16	46	-30
R29	12	46	-34
R30	13	46	-34
R31	<10	46	-39
R32	<10	46	-39
R33	<10	46	-42
R34	<10	46	-42
R35	<10	46	-42

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	<10	46	-42
R37	<10	46	-43
R38	<10	46	-45
R39	<10	46	-46
R40	<10	46	-47
R41	<10	46	-47
R42	<10	46	-47
R43	<10	46	-48
R44	<10	46	-49
R45	<10	46	-48
R46	<10	46	-48
R47	<10	46	-47
R48	<10	46	-47
R49	<10	46	-47
R50	<10	46	-46
R51	<10	46	-45
R52	<10	46	-45
R53	<10	46	-46
R54	<10	46	-45
R55	<10	46	-45
R56	<10	46	-44
R57	<10	46	-42
R58	<10	46	-42
R59	<10	46	-40

D.2.10 Construction Noise Predictions Pipeline Construction (Phase 2) MFCT SMP/E&I - Zone 10

Table 7-22 Construction Noise Impacts During – Pipeline Construction (Phase 2) at **Zone 10**, $L_{Aeq,15min}$ (dBA)

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R1	38	46	-8
R2	37	46	-9
R3	41	46	-6
R4	43	46	-3
R5	32	46	-14
R6	30	46	-17
R7	27	46	-19
R8	24	46	-22
R9	18	46	-28
R10	19	46	-27
R11	21	46	-25
R12	17	46	-29
R13	17	46	-29
R14	17	46	-29
R15	16	46	-30
R16	15	46	-31
R17	<10	46	-40
R18	11	46	-35
R19	13	46	-33
R20	17	46	-29
R21	22	46	-24
R22	24	46	-22
R23	23	46	-23
R24	<10	46	-39
R25	<10	46	-38
R26	<10	46	-37
R27	17	46	-29
R28	15	46	-31
R29	12	46	-34
R30	12	46	-34
R31	<10	46	-39
R32	<10	46	-39
R33	<10	46	-42
R34	<10	46	-43
R35	<10	46	-43

Receiver	Construction Noise Impact Prediction, dB(A)	Noise Criteria, dB(A)	Difference (dB)
R36	<10	46	-43
R37	<10	46	-44
R38	<10	46	-45
R39	<10	46	-46
R40	<10	46	-47
R41	<10	46	-48
R42	<10	46	-48
R43	<10	46	-48
R44	<10	46	-49
R45	<10	46	-49
R46	<10	46	-49
R47	<10	46	-48
R48	<10	46	-47
R49	<10	46	-47
R50	<10	46	-47
R51	<10	46	-46
R52	<10	46	-46
R53	<10	46	-47
R54	<10	46	-46
R55	<10	46	-46
R56	<10	46	-45
R57	<10	46	-43
R58	<10	46	-43
R59	<10	46	-41

Appendix E Noise Contour Maps

The noise contour maps for the following stages are provided overleaf:

1. Noise impacts during HUGS Pipeline Construction Phase 1;
2. Noise impacts during HUGS Pipeline Construction Phase 2;