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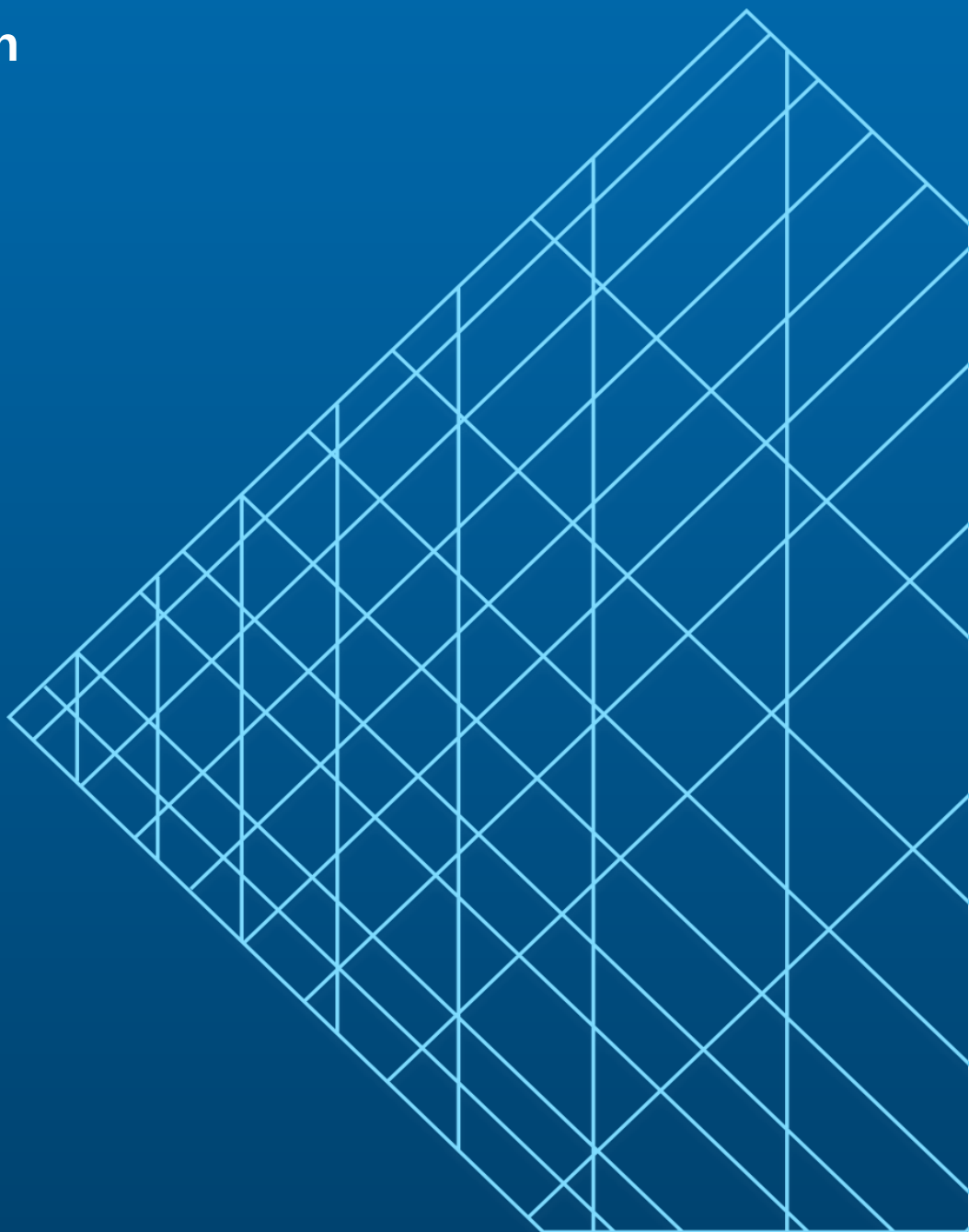
Independent Acoustic Consultancy Practice

Baseline Noise Survey

Project Dragon
Port Talbot

6387/ENS1_Rev1



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Baseline Noise Survey

Project:	**Project Dragon**
Site Address:	Phoenix Wharf Port Talbot SA13 1RB
HA Reference:	6387/ENS1_Rev1
Date:	20/07/2023
Client:	LanzaTech UK Limited c/o Turley 18 Windsor Place Cardiff CF10 3BY
Contact:	ffion.middleton@turley.co.uk

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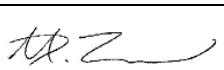
		Signature		
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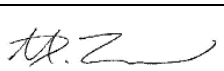
		Signature		
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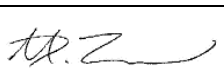
		Name	Meirion Townsend BSc(Hons) MIOA	Paul McGrath BSc(Hons) MIOA
		Signature		

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- Press Alt-left arrow to return to your previous location.

TABLE OF CONTENTS

1. INTRODUCTION

A new facility for the production of sustainable jet fuel known as Project Dragon is proposed at Phoenix Wharf in Port Talbot, SA13 1RB.

This report has been commissioned to establish existing ambient and background sound levels at the nearest identified sound sensitive receptors to the proposed facility.

The survey has been carried out utilising a combination of long-term unattended monitoring locations and manned daytime and night-time sample measurements at locations agreed prior with Neath Port Talbot County Borough Council (NPT CBC) Pollution Control and their acoustical consultant, Red Twin Limited.

The baseline survey has been conducted in line with British Standard 7445-1:2003 'Description and measurement of environmental noise' and British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'.

Acoustic terminology used in this report is explained in Appendix A.

2. SOUND SENSITIVE RECEPTORS

The site plan in Figure B.1 of Appendix B shows the proposed site and surrounding area.

The following sound sensitive receptors (SSRs) have been identified at this stage within a 1.3km radius from the site (which picks up the closest residential receptors in each direction):

Table 2.1 – Sound Sensitive Receptor Locations

ID No.	Description	Approx. Distance to Nearest Site Boundary (m)
SSR1	Dwellings at Mariners Point	890
SSR2	Dwellings at Darwin Rd / Newbridge Rd	900
SSR3	Dwellings on Isaac's Place / Borough St	1090
SSR4	Dwellings on Green Park St	1050
SSR5	Dwellings on Water St / Blanco's Hotel	1150
SSR6	Flats above shops on Station Rd	990
SSR7	Dwellings on Talbot Rd	745
SSR8	Dwellings on Lower West End	575
SSR9	Dwellings on St Alban's Terrace	810
SSR10	Dwellings on Duke St	1000
SSR11	Port Talbot Magistrates' Court	790

In addition to the above, NPT CBC / Red Twin Limited also highlighted the following quiet areas defined in the Neath Port Talbot LDP Policy EN10 as Vivian Park (north-west of the site) and Talbot Memorial park (north-east of the site).

3. ENVIRONMENTAL NOISE SURVEY

3.1 Procedures

3.1.1 Continuous Monitoring

Continuous noise monitoring was carried out from 1200hrs on Wednesday, 31 August 2022 to 1600hrs on Tuesday, 06 September 2022 at positions A-C.

Data including L_{Amax}, L_{Aeq} and background L_{A90} was logged at 1 minute intervals over the monitoring period, along with continuous audio and 100ms data to allow source identification and further detailed analysis of results as required ($L_{Aeq,1hr}$ and $L_{A90,1hr}$ as well as $L_{A90,15min}$ can be determined from data).

The site plan in Figure B.1 of Appendix B shows the development site and continuous monitoring positions used, namely:

Table 3.1 – Continuous Monitoring Location Details

Position	Description
A	On fence outside 27 Mariners Point, 2.5m above ground level. Representative of sound climate at residential receptors on Mariners Point.
B	On top of wall section in council car park adjacent to Blanco's Hotel, approx. 4.5m above ground level. Representative of sound climate at Blanco's Hotel and residential receptors on Water Street / Green Park Street.
C	Along TATA Steel's north-eastern boundary, approx. 36m away from Harbour Way, 1.5m above ground level. Representative of residential receptors on Lower West End.

3.1.2 Sample Measurements

Additional daytime and night-time manned sample measurements were taken on Thursday, 01 September 2022 and on Friday, 02 September 2022.

Parameters recorded include $L_{Amax,F}$, L_{Aeq} and L_{A90} levels including 1/3 octave band spectra.

The site plan in Figure B.1 of Appendix B shows the sample measurement positions used, namely:

Table 3.2 – Sample Measurement Location Details

Position	Description
1	Adjacent to residential dwellings along Newbridge Road
2	In front of residential dwellings along Water Street
3	At the rear of Port Talbot Parkway station car park, approx. 14m from dwellings along Talbot Road
4	At eastern exit of Harbour Way roundabout, approx. 120m from residential dwellings along Prince Street
5	On Harbourside Road, adjacent to HMCTS Port Talbot Justice Centre
6	At northern boundary of proposed site & access road for TATA Steel
7	At southern area of proposed site
8	On Moorland Road, adjacent to entrance to Vivian Park
9	Along Park View, adjacent to rear of Talbot Memorial Park

Note: All microphone positions approximately 1.5m above local ground level.

3.2 Meteorological Conditions

Weather conditions including temperature, wind speed and direction were measured at Position C for the duration of the survey and logged at 5minute intervals using a Davis Vantage Pro2 weather station.

Results are shown in weather history graphs in Figure B.2.

Note: The rainfall sensor had a blockage (debris landed in water tipper) and therefore did not register rain fall during the survey. Periods of rainfall have therefore been taken from an online resource for a weather station located in Port Talbot. This is included in Table B.1 of Appendix B.

To summarise:

- Wind direction was typically northerly from 31/08/2022 to 02/09/2022 and easterly from 03/09/2022 to 06/09/2022.
- Average wind speeds were generally in the region of 1-4m.s^{-1} across the survey period, falling below the 5m.s^{-1} quoted in BS 4142 however regular gusts were measured in the range 5-8m.s^{-1} during the period 03/09/2022-06/09/2022.
- Temperature was typically in the range 15-25°C.
- The monitoring period was predominantly dry with exception of the following periods of rainfall:
    - 03/09/2022 1615hrs – 04/09/2022 0100hrs
    - 04/09/2022 2000hrs – 05/09/2022 0015hrs
    - 06/09/2022 1230hrs – 1500hrs

Weather conditions were calm and dry during sample measurements.

3.3 Measurement Equipment

The following measurement equipment was used during the surveys:

Table 3.3 – Noise Monitoring Equipment List

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
Norsonic AS	Calibrator (113.97dB @ 999.14Hz)	1251	24202	25 August 2022	U41783
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-08723-E0	29 October 2021	TCRT21/1759
	Preamplifier	MA220	1820	29 October 2021	TCRT21/1759
	Filters	XL2-TA	A2A-08723-E0	01 November 2021	TCRT21/1763
	Microphone Capsule	MC230	9381	29 October 2021	TCRT21/1759
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-10021-E0	17 August 2021	TCRT21/1568
	Preamplifier	MA220	5435	17 August 2021	TCRT21/1568
	Microphone Capsule	MC230	8547	17 August 2021	TCRT21/1568
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-13022-E0	18 August 2021	TCRT21/1571
	Preamplifier	MA220	6853	18 August 2021	TCRT21/1571
	Microphone Capsule	MC230	A14127	18 August 2021	TCRT21/1571
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-14577-E0	23 June 2022	TCRT20/1313
	Preamplifier	MA220	7485	23 June 2022	TCRT20/1313
	Microphone Capsule	MC230	A15594	23 June 2022	TCRT20/1313
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-19813-E0	04 November 2021	UK-21-096
	Preamplifier	MA220	10302	04 November 2021	UK-21-096
	Microphone Capsule	MC230A	A21824	04 November 2021	UK-21-096
Larson Davis	Calibrator (94.00dB / 114.03dB @ 1kHz)	CAL200	19047	15 August 2022	44788-19047-CAL200

Measurement systems were calibrated before and after the surveys and no variation occurred.

Note: Copies of traceable calibration certificates for all equipment are available upon request.

4. RESULTS

4.1 Continuous Monitoring

Time history graphs in Figure B.3, Figure B.4 and Figure B.5 of Appendix B show L_{Amax}, L_{Aeq} and L_{A90} sound pressure levels measured at positions A, B and C respectively.

Full $L_{Aeq,1hr}$ and $L_{A90,1hr}$ data for each position is included in Appendix B (Table B.2 to Table B.7) as well night-time $L_{A90,15mins}$.

Ambient L_{Aeq} 16-hr daytime and 8-hr night-time values are summarised below for Positions A – C.

4.1.1 Position A (Mariners Point, West of Site)

The following $L_{Aeq,16hr}$ daytime (0700-2300hrs) and $L_{Aeq,8hr}$ night-time (2300-0700hrs) noise levels were measured at Position A;

Table 4.1 – Position A Summary of Daytime $L_{Aeq,16hr}$ and Night-time $L_{Aeq,8hr}$ Results

Position A (Mariners Point, West of Site)					
Wednesday 11:45 31/08/2022 - Thursday 07:00 01/09/2022	Daytime	$L_{Aeq,11hr}$	=	50	dB
	Night-time	$L_{Aeq,8hr}$	=	49	dB
Thursday 07:00 01/09/2022 - Friday 07:00 02/09/2022	Daytime	$L_{Aeq,16hr}$	=	51	dB
	Night-time	$L_{Aeq,8hr}$	=	51	dB
Friday 07:00 02/09/2022 - Saturday 07:00 03/09/2022	Daytime	$L_{Aeq,16hr}$	=	50	dB
	Night-time	$L_{Aeq,8hr}$	=	48	dB
Saturday 07:00 03/09/2022 - Sunday 07:00 04/09/2022	Daytime	$L_{Aeq,16hr}$	=	53	dB
	Night-time	$L_{Aeq,8hr}$	=	55	dB
Sunday 07:00 – 09:00 04/09/2022 *	Daytime	$L_{Aeq,2hr}$	=	47	dB

At position A, the daytime sound climate was controlled by pedestrians along the nearby footpath, helicopters, sirens from the docks, occasional road traffic noise from the cul-de-sac, continuous faint industrial noise from steelworks and port activity.

The night-time sound climate was controlled by continuous industrial noise from the steelworks and sirens from the port area. A light breeze noise in trees was also audible during the night.

** Note: There was a power failure at Position A on Sunday morning around 0850hrs on 04 September. Wind speeds picked up during the second half of the week-long survey and therefore data from Saturday night onwards is not considered suitable for use in setting limits in any case.*

4.1.2 Position B (Blanco's Hotel, North of Site)

The following $L_{Aeq,16hr}$ daytime (0700-2300hrs) and $L_{Aeq,8hr}$ night-time (2300-0700hrs) noise levels were measured at Position B:

Table 4.2 – Position B Summary of Daytime $L_{Aeq,16hr}$ and Night-time $L_{Aeq,8hr}$ Results

Position B (Blanco's Hotel, North of Site)					
Wednesday 12:00 31/08/2022 - Thursday 07:00 01/09/2022	Daytime	$L_{Aeq,11hr}$	=	53	dB
	Night-time	$L_{Aeq,8hr}$	=	49	dB
Thursday 07:00 01/09/2022 - Friday 07:00 02/09/2022	Daytime	$L_{Aeq,16hr}$	=	55	dB
	Night-time	$L_{Aeq,8hr}$	=	50	dB
Friday 07:00 02/09/2022 - Saturday 07:00 03/09/2022	Daytime	$L_{Aeq,16hr}$	=	54	dB
	Night-time	$L_{Aeq,8hr}$	=	47	dB
Saturday 07:00 03/09/2022 - Sunday 07:00 04/09/2022	Daytime	$L_{Aeq,16hr}$	=	55	dB
	Night-time	$L_{Aeq,8hr}$	=	53	dB
Sunday 07:00 04/09/2022 - Monday 07:00 05/09/2022	Daytime	$L_{Aeq,16hr}$	=	55	dB
	Night-time	$L_{Aeq,8hr}$	=	52	dB
Monday 07:00 05/09/2022 - Tuesday 07:00 06/09/2022	Daytime	$L_{Aeq,16hr}$	=	56	dB
	Night-time	$L_{Aeq,8hr}$	=	51	dB
Tuesday 07:00 – 17:00 06/09/2022	Daytime	$L_{Aeq,10hr}$	=	56	dB

At position B, the daytime sound climate was controlled by industrial noise from works along Dock Road, helicopters, birds and road traffic along Green Park Street and the A4241.

At position B, the night-time sound climate was controlled by distant industrial noise and road traffic along Green Park Street and A4241.

Note: Wind and rain affected results for the latter part of the survey (night-time of Saturday 03/09/2022 until survey end).

4.1.3 Position C (Port Land towards Lower West End, North-east of Site)

The following $L_{Aeq,16hr}$ daytime (0700-2300hrs) and $L_{Aeq,8hr}$ night-time (2300-0700hrs) noise levels were measured at Position C:

Position C (Towards Lower West End, North-east of Site)					
Wednesday 10:45 31/08/2022 - Thursday 07:00 01/09/2022	Daytime	$L_{Aeq,11hr}$	=	58	dB
	Night-time	$L_{Aeq,8hr}$	=	56	dB
Thursday 07:00 01/09/2022 - Friday 07:00 02/09/2022	Daytime	$L_{Aeq,16hr}$	=	59	dB
	Night-time	$L_{Aeq,8hr}$	=	56	dB
Friday 07:00 02/09/2022 - Saturday 07:00 03/09/2022	Daytime	$L_{Aeq,16hr}$	=	59	dB
	Night-time	$L_{Aeq,8hr}$	=	56	dB
Saturday 07:00 03/09/2022 - Sunday 07:00 04/09/2022	Daytime	$L_{Aeq,16hr}$	=	59	dB
	Night-time	$L_{Aeq,8hr}$	=	58	dB
Sunday 07:00 04/09/2022 - Monday 07:00 05/09/2022	Daytime	$L_{Aeq,16hr}$	=	59	dB
	Night-time	$L_{Aeq,8hr}$	=	60	dB
Monday 07:00 05/09/2022 - Tuesday 07:00 06/09/2022	Daytime	$L_{Aeq,16hr}$	=	61	dB
	Night-time	$L_{Aeq,8hr}$	=	59	dB
Tuesday 07:00 – 15:00 06/09/2022	Daytime	$L_{Aeq,8hr}$	=	61	dB

At position C, the daytime and night-time sound climate was controlled by, road traffic noise along Harbour Way and continuous industrial noise from the steelworks.

Note: Wind and rain affected results for the latter part of the survey (night-time of Saturday 03/09/2022 until survey end).

4.1.4 Background Sound Level Summary

Graphs in Figure B.6 to Figure B.21 of Appendix B show statistical analysis of background sound levels measured at positions A, B and C respectively.

The following minimum consistent daytime and night-time background L_{A90} sound levels have been determined (the following exclude bad weather periods from the night of Saturday 02/09/2022 onwards):

Table 4.3 – Minimum Consistent Daytime and Night-time Background L_{A90} Results

Period	Position		
	A	B	C
Daytime (0700-2300hrs) $L_{A90,1hr}$ (dB)	45	49	54
Night-time (2300-0700hrs) $L_{A90,15mina}$ (dB)	45	40	52

4.2 Sample Measurements

Sample measurements were undertaken at positions 1 to 9, as shown on site plan in Figure B.1 of Appendix B. Two 15-minute sample measurements were undertaken at each location during both the daytime and night-time periods.

Results of sample measurements are shown in Table 4.4 below.

Table 4.4 – Sample Measurement Results

Position	Date	Start Time (hh:mm)	Duration (mins)	L_{Aeq} (dB)	L_{AMax} (dB)	L_{A90} (dB)
1	01/09/2022	10:24	15	55	82	46
1	01/09/2022	11:23	15	54	67	46
1	02/09/2022	00:04	15	49	61	47
1	02/09/2022	00:16	15	48	55	46
2	01/09/2022	11:04	15	64	86	49
2	01/09/2022	12:04	15	66	89	53
2	02/09/2022	00:27	15	53	77	42
2	02/09/2022	01:39	15	50	73	42
3	01/09/2022	15:26	15	57	75	49
3	01/09/2022	17:11	15	53	70	49
3	02/09/2022	01:19	15	45	58	42
3	02/09/2022	02:03	15	44	53	42
4	01/09/2022	14:44	15	59	76	53
4	01/09/2022	16:12	15	60	72	55
4	02/09/2022	00:56	15	59	78	46

4	02/09/2022	01:41	15	51	69	46
5	01/09/2022	15:05	15	54	69	51
5	01/09/2022	16:33	15	53	68	51
5	02/09/2022	00:53	15	52	67	44
5	02/09/2022	02:01	15	45	53	44
6	01/09/2022	13:18	15	63	81	51
6	01/09/2022	13:56	15	64	79	52
6	01/09/2022	23:56	15	57	74	51
6	02/09/2022	00:32	15	55	76	51
7	01/09/2022	13:37	15	51	60	49
7	01/09/2022	14:14	15	53	62	51
7	01/09/2022	23:37	15	53	62	51
7	02/09/2022	00:14	15	53	62	51
8	02/09/2022	10:44	15	55	78	41
8	02/09/2022	11:44	15	56	75	42
9	01/09/2022	15:48	15	56	67	54
9	01/09/2022	17:33	15	59	79	53

The observed sound climate at each position were as follows

Table 4.5 – Observations of Soundscape at Sample Measurement Locations

Position	Daytime Soundscape	Night-time Soundscape
1	Road traffic, harbour activity from steelworks, birdsong	Steelwork noise, alarms from steelworks, road traffic, train, trees, helicopter
2	Road traffic controlled	Steelwork noise, road traffic, light breeze
3	Road traffic, steelworks, train	Road traffic and train, trees, low frequency at steelworks
4	Train, road traffic, steelworks plant, wind turbine or substation low frequency	Road traffic and train, trees, low frequency at steelworks
5	Road traffic, steelworks, train	Industrial noise, distant road traffic, wind, bushes, trees, train
6	Controlled by a nearby stack to the east and HGV pass-bys	Breeze in trees, HGV pass-bys and industrial fan
7	Controlled by a nearby industrial fan/stack to the east	Controlled by a nearby industrial fan/stack to the east
8	Pedestrians in park, dogwalkers, plane traffic, trees	-
9	Children playing on field, road traffic	-

5. CONCLUSION

A baseline environmental noise survey has been carried out for a proposed new facility for the production of sustainable fuel known as Project Dragon at Phoenix Wharf, Port Talbot, SA13 1RB.

Surrounding sound sensitive receptors (SSRs) are identified on site plan in Figure B.1 of Appendix B.

The survey has been carried out utilising a combination of long-term unattended monitoring locations and manned daytime and night-time sample measurements at locations agreed prior with Neath Port Talbot Pollution Control and their consultant, Red Twin Limited.

Results from this baseline survey are to be used in any forthcoming noise impact assessments for the proposed development.

APPENDIX A - ACOUSTIC TERMINOLOGY

Human response to noise depends on a number of factors including loudness, frequency content and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'.

The following units have been used in this report:

dB(A)	The sound pressure level A-weighted to correspond with the frequency response of the human ear and therefore a persons' subjective response to frequency content.
L_{eq}	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L_{max}	The highest instantaneous sound level recorded during the measurement period.
L_{10}	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1 hour measurement - used as a measure of background noise.
L_{90}	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1 hour measurement - used as a measure of background noise.
$L_{Ar,Tr}$	The 'rating' level, as described in BS 4142:2014 – the specific noise plus any adjustment for the characteristic features of the noise.
SSR	Sound sensitive receptor

APPENDIX B - DIAGRAMS, GRAPHS AND TABLES

Figure B.1 – Site Plan Showing Monitoring Locations

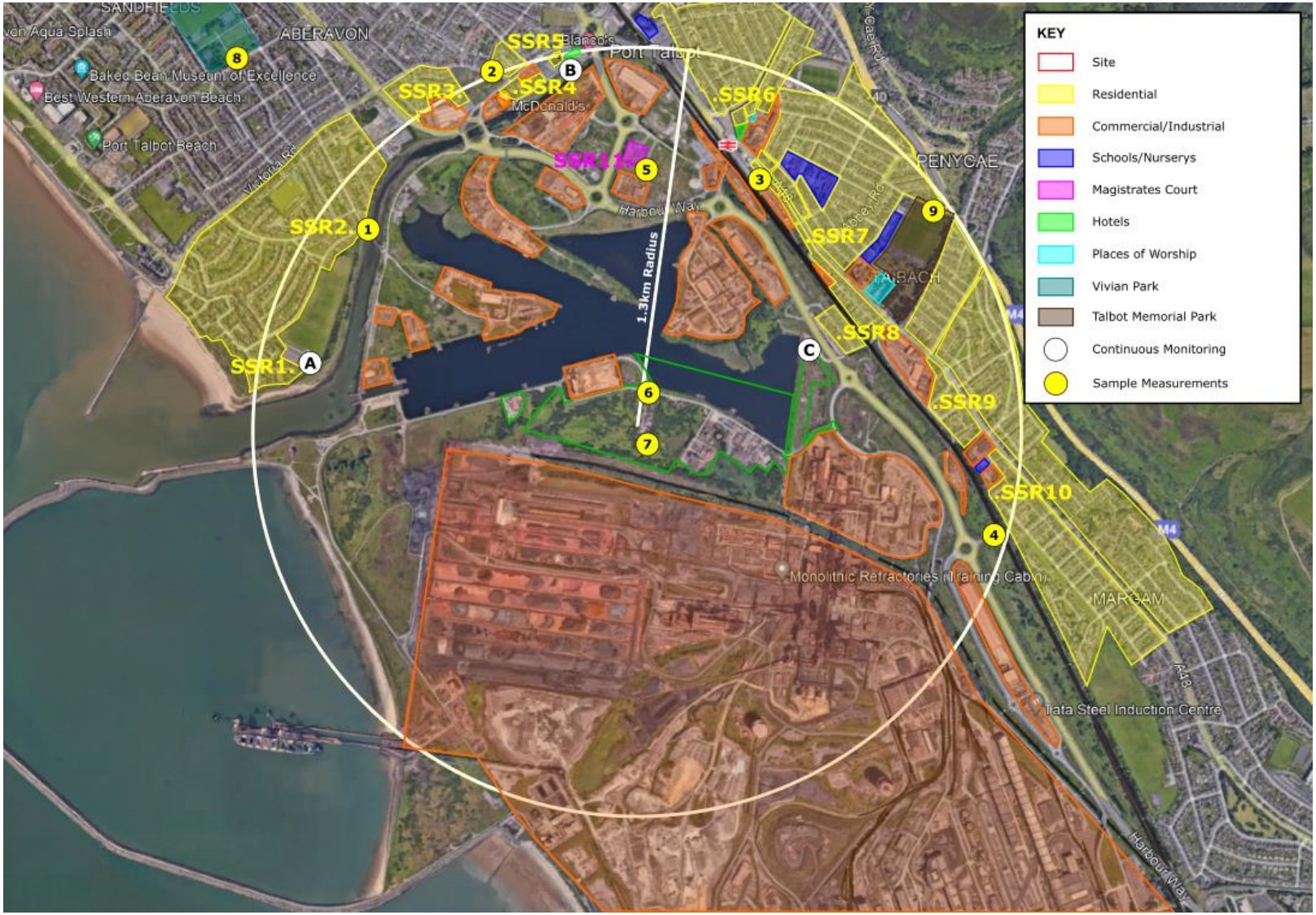


Figure B.2 – Temperature and Wind History for Wednesday 31st July 2022 to Tuesday 6th September 2022

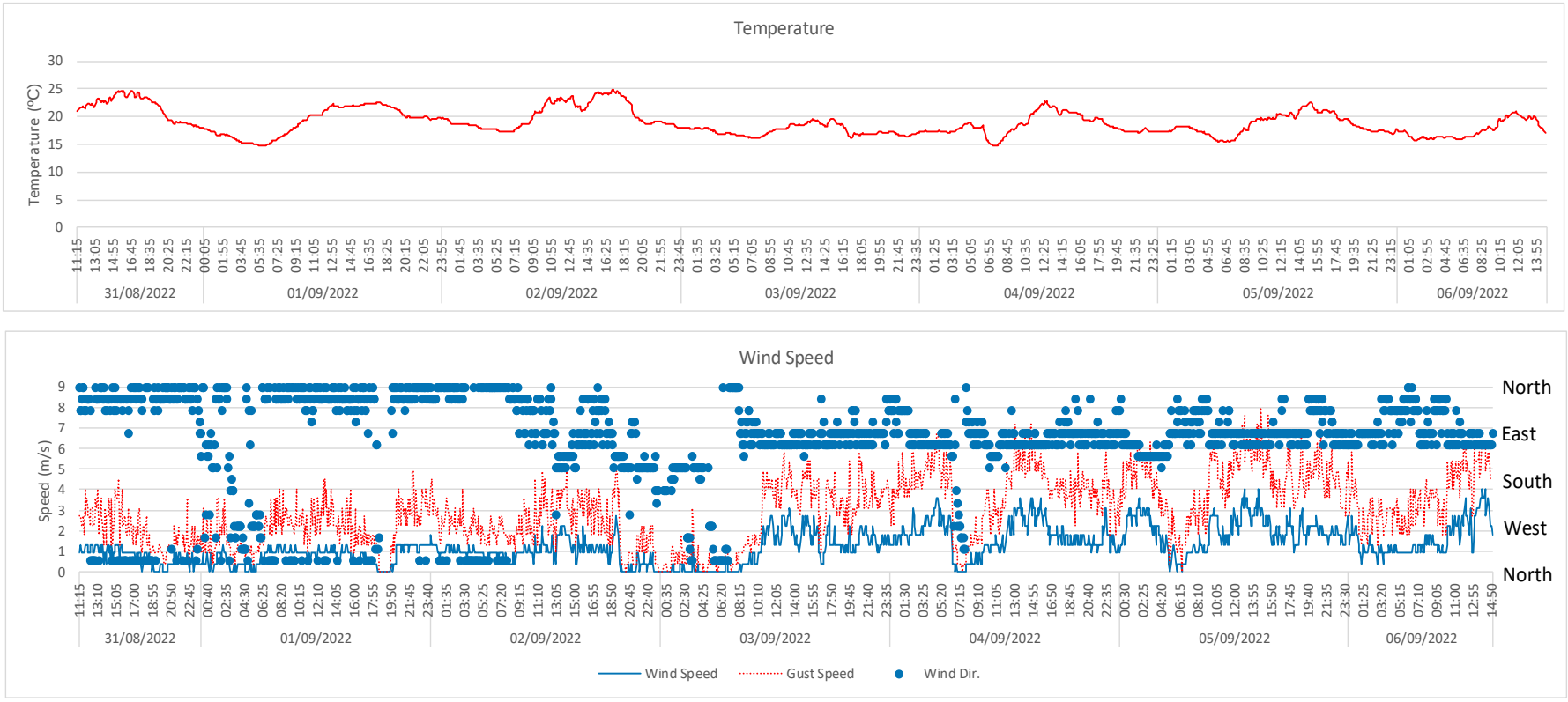
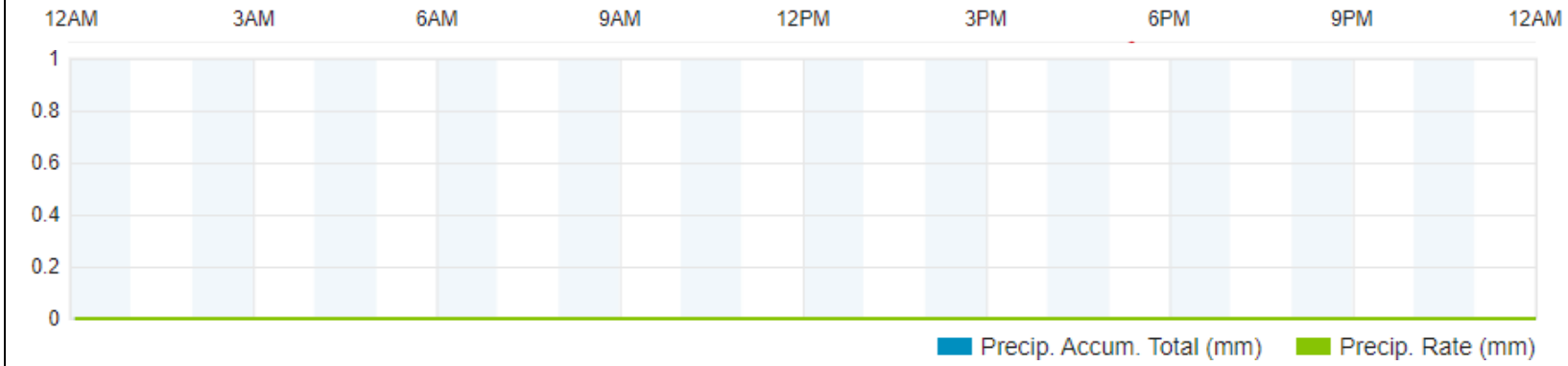
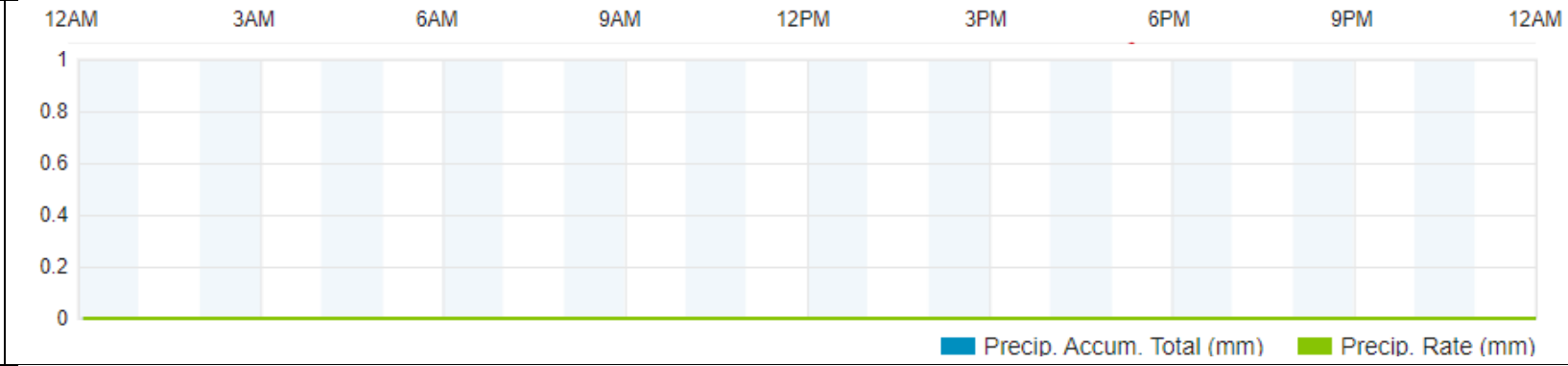
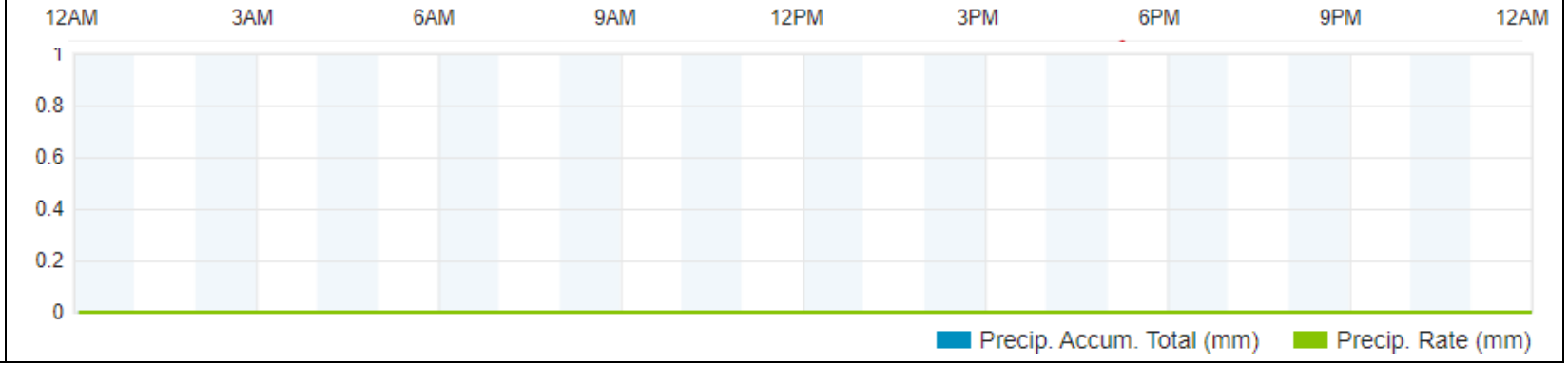
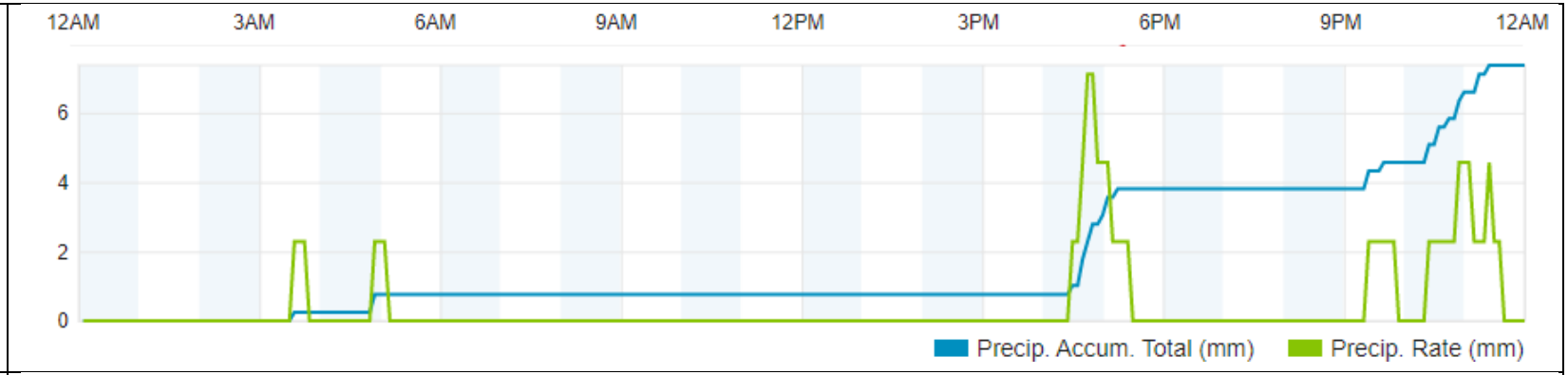
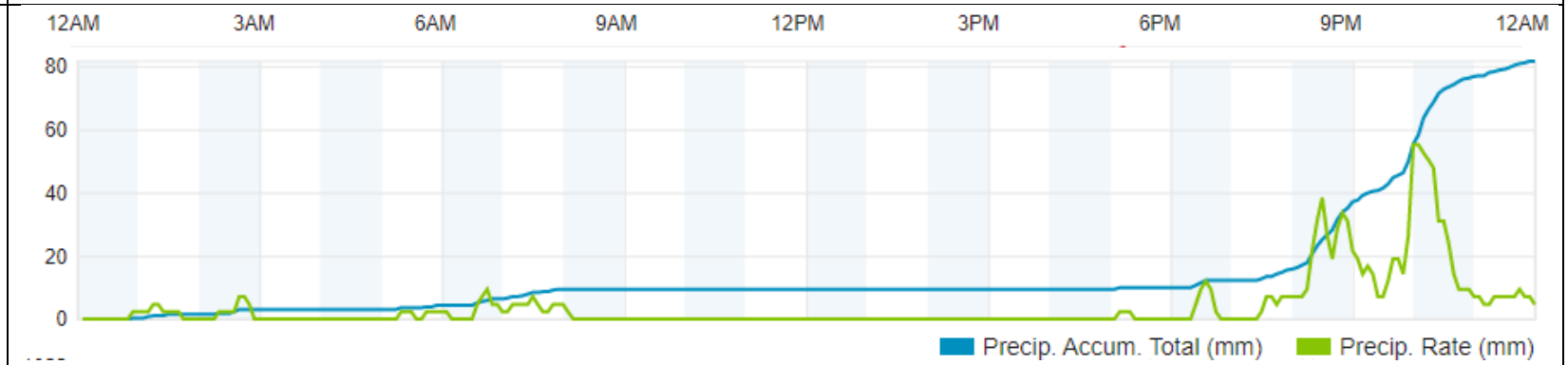
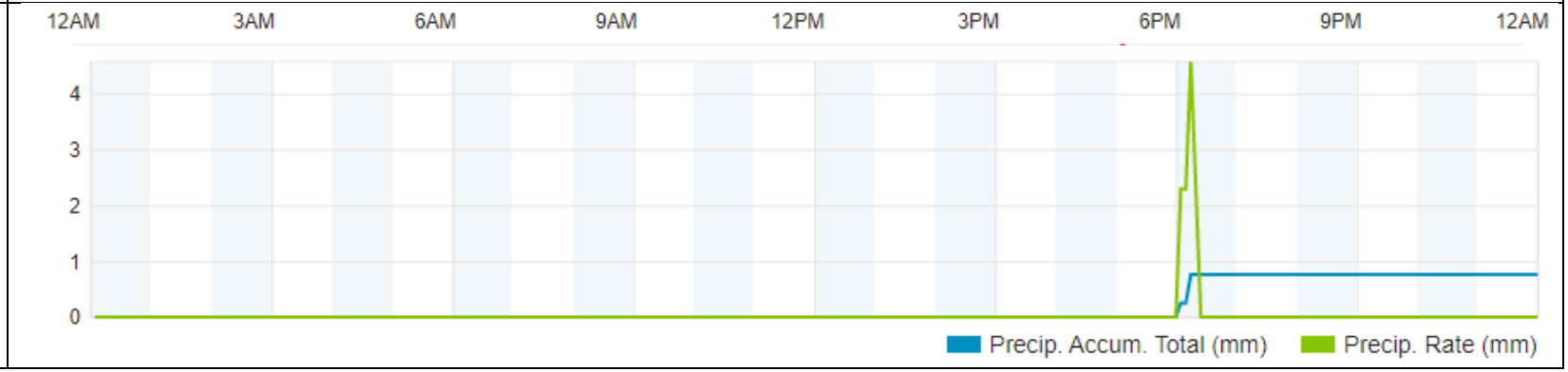
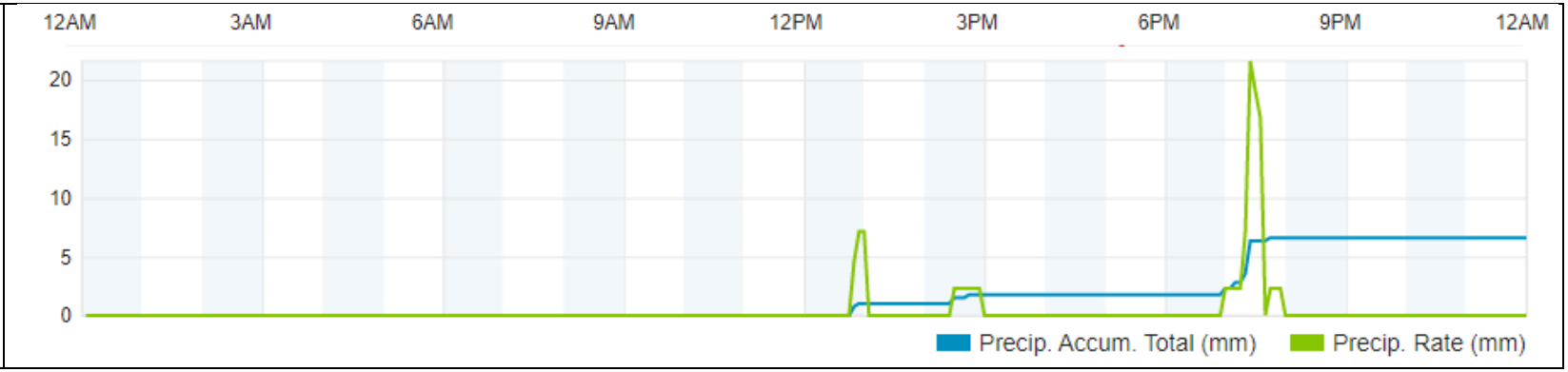


Table B.1 – Approximate Precipitation History for Wednesday 31st July 2022 to Tuesday 6th September 2022

Date	Precipitation
Weds 31/08/2022	
Thurs 01/09/2022	
Fri 02/09/2022	

Sat 03/09/2022	
Sun 04/09/2022	
Mon 05/09/2022	

Tue 06/09/2022	

Note: Taken from www.wunderground.com - weather station IPORTT9 located in Ynysygwas [Elev 29 m, 51.61 °N, 3.76 °W]

Figure B.3 – Time History at Position A (Wednesday, 31 August 2022 to Tuesday, 06 September 2022)

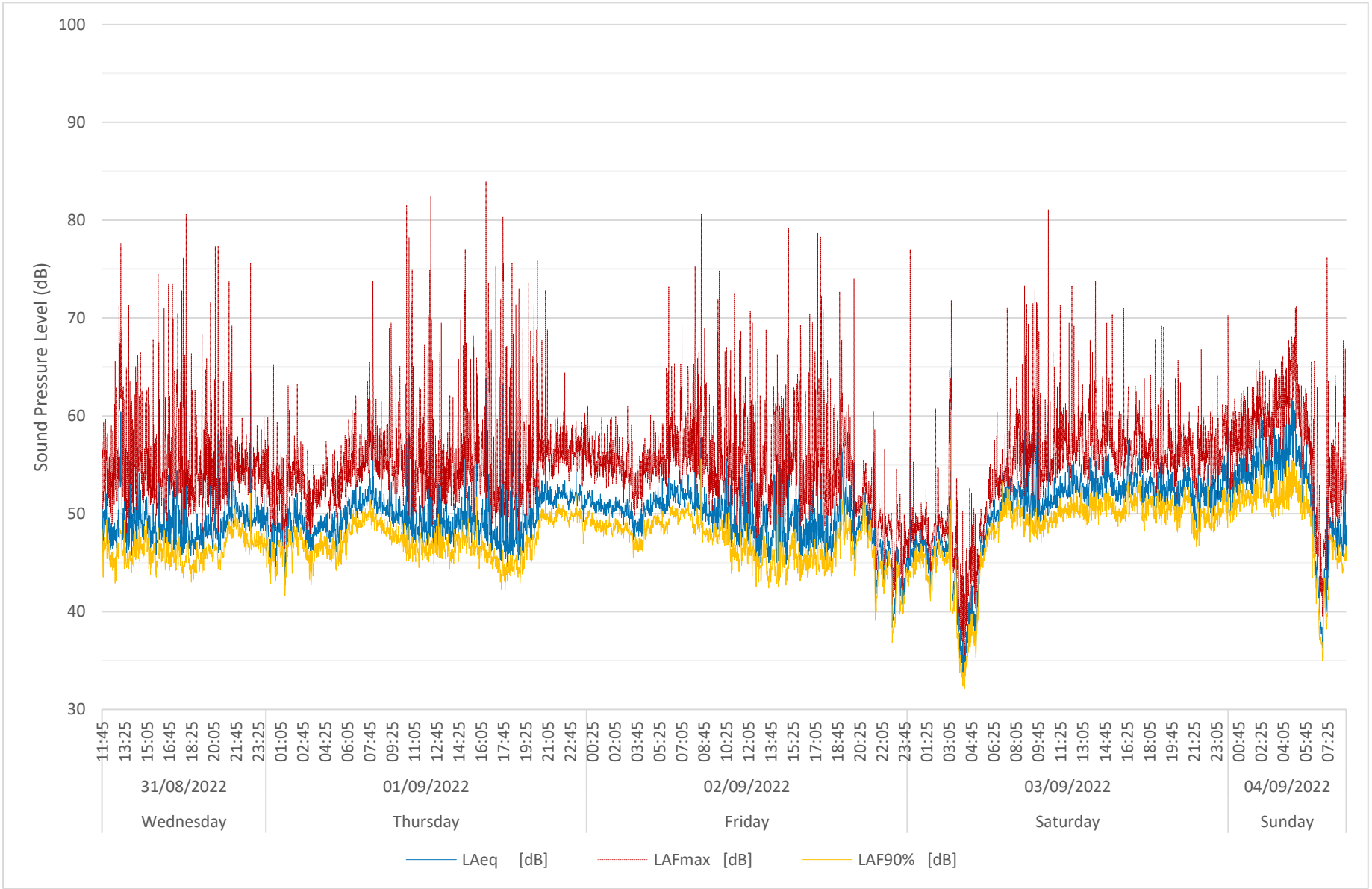


Figure B.4 – Time History at Position B (Wednesday, 31 August 2022 to Tuesday, 06 September 2022)

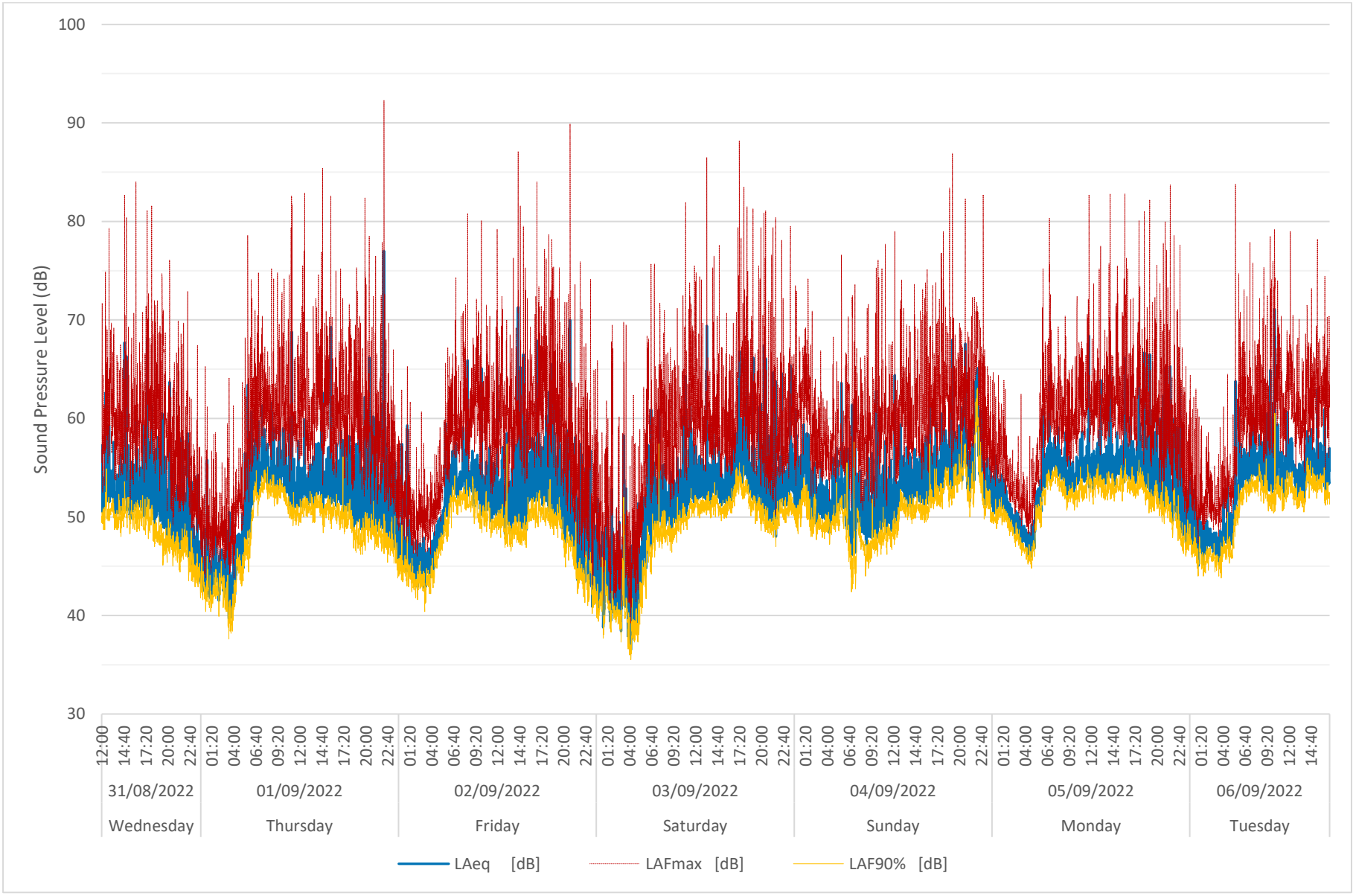


Figure B.5 – Time History at Position C (Wednesday, 31 August 2022 to Tuesday, 06 September 2022)

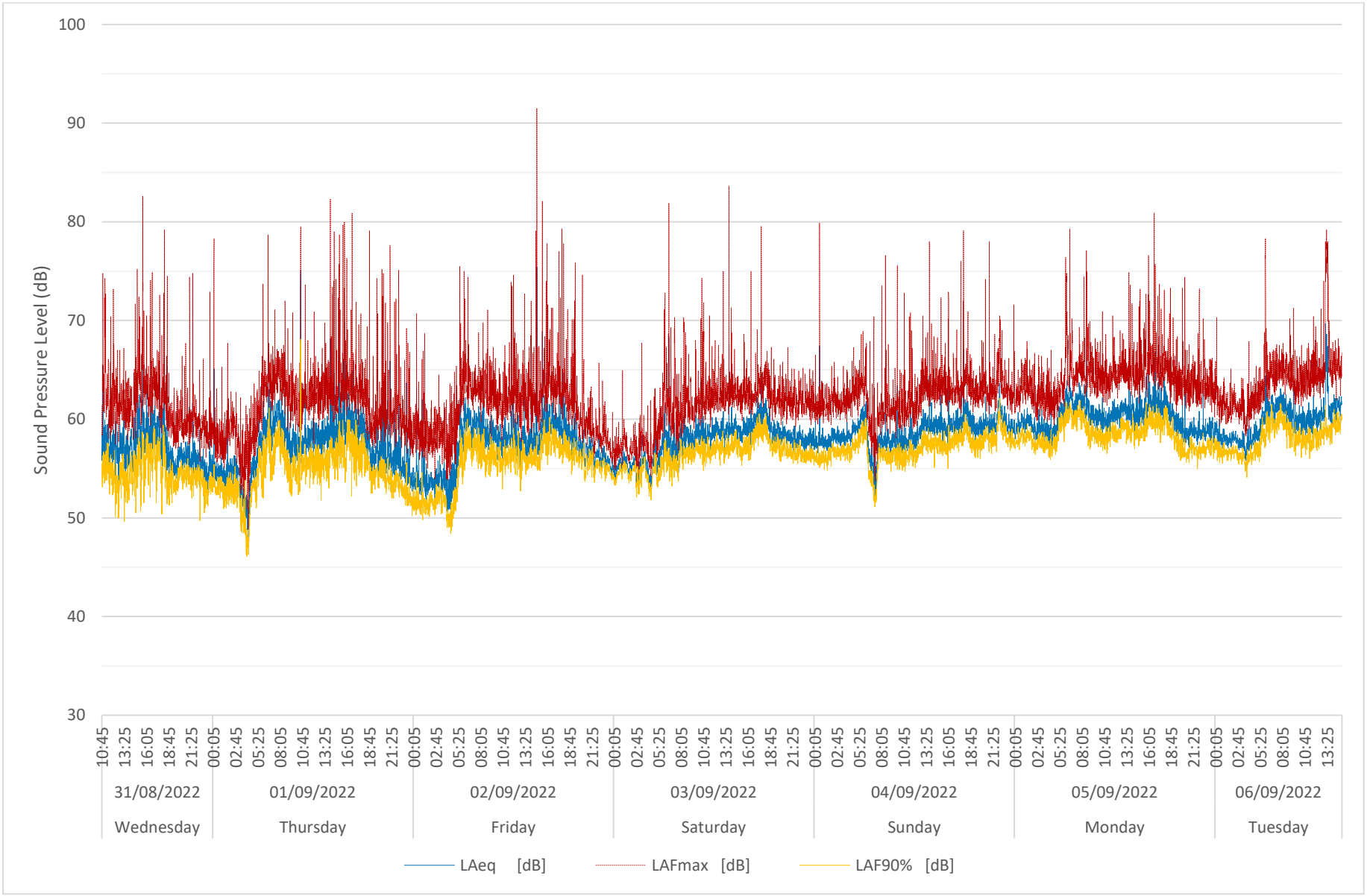


Table B.2 – Position A, Hourly Log

Start	Duration	$L_{Amax,F}$ (dB)	L_{Aeq} (dB)	L_{A90} (dB)
31/08/2022 12:00	1:00:00	65.6	48.6	45.5
31/08/2022 13:00	1:00:00	77.6	51.9	45.7
31/08/2022 14:00	1:00:00	66.5	49.8	46.4
31/08/2022 15:00	1:00:00	74.5	50.4	45.6
31/08/2022 16:00	1:00:00	73.5	48.9	45.9
31/08/2022 17:00	1:00:00	76.2	49.8	45.3
31/08/2022 18:00	1:00:00	80.6	49.2	45.0
31/08/2022 19:00	1:00:00	71.6	48.7	45.8
31/08/2022 20:00	1:00:00	77.3	49.4	45.9
31/08/2022 21:00	1:00:00	73.8	50.5	48.2
31/08/2022 22:00	1:00:00	75.6	51.4	47.4
31/08/2022 23:00	1:00:00	60.0	49.6	47.2
01/09/2022 00:00	1:00:00	65.2	48.0	44.9
01/09/2022 01:00	1:00:00	63.1	48.4	45.0
01/09/2022 02:00	1:00:00	63.2	49.6	47.2
01/09/2022 03:00	1:00:00	56.5	47.8	45.3
01/09/2022 04:00	1:00:00	57.4	48.7	46.7
01/09/2022 05:00	1:00:00	58.0	48.8	46.1
01/09/2022 06:00	1:00:00	62.1	50.9	48.6
01/09/2022 07:00	1:00:00	65.5	51.6	49.6
01/09/2022 08:00	1:00:00	73.8	51.6	49.1
01/09/2022 09:00	1:00:00	69.5	50.4	48.0
01/09/2022 10:00	1:00:00	81.5	51.0	46.7
01/09/2022 11:00	1:00:00	67.3	49.3	46.4
01/09/2022 12:00	1:00:00	82.5	50.1	46.5
01/09/2022 13:00	1:00:00	69.5	49.3	46.4
01/09/2022 14:00	1:00:00	77.1	49.9	47.1
01/09/2022 15:00	1:00:00	68.2	50.0	46.6
01/09/2022 16:00	1:00:00	84.0	50.7	46.0
01/09/2022 17:00	1:00:00	80.3	50.3	44.5
01/09/2022 18:00	1:00:00	75.6	48.9	44.6
01/09/2022 19:00	1:00:00	73.6	49.0	45.5
01/09/2022 20:00	1:00:00	75.9	52.8	48.1
01/09/2022 21:00	1:00:00	68.8	51.7	49.9
01/09/2022 22:00	1:00:00	64.4	51.9	50.0
01/09/2022 23:00	1:00:00	60.3	51.6	49.5
02/09/2022 00:00	1:00:00	61.0	51.2	49.3
02/09/2022 01:00	1:00:00	59.9	50.6	48.8
02/09/2022 02:00	1:00:00	60.0	50.6	48.8
02/09/2022 03:00	1:00:00	61.0	49.4	47.3
02/09/2022 04:00	1:00:00	60.1	50.2	48.0
02/09/2022 05:00	1:00:00	64.9	51.1	49.2
02/09/2022 06:00	1:00:00	73.2	52.1	49.7
02/09/2022 07:00	1:00:00	69.4	52.0	50.1
02/09/2022 08:00	1:00:00	80.6	52.0	48.6
02/09/2022 09:00	1:00:00	74.8	50.1	48.0
02/09/2022 10:00	1:00:00	67.0	50.6	46.9
02/09/2022 11:00	1:00:00	72.6	49.5	46.0

02/09/2022 12:00	1:00:00	70.7	49.2	45.2
02/09/2022 13:00	1:00:00	68.8	47.8	44.5
02/09/2022 14:00	1:00:00	66.3	51.1	44.2
02/09/2022 15:00	1:00:00	79.2	49.9	45.5
02/09/2022 16:00	1:00:00	70.4	48.4	45.1
02/09/2022 17:00	1:00:00	78.7	49.4	45.2
02/09/2022 18:00	1:00:00	72.7	48.9	45.3
02/09/2022 19:00	1:00:00	67.7	51.5	47.3
02/09/2022 20:00	1:00:00	74.0	49.7	46.8
02/09/2022 21:00	1:00:00	60.5	47.4	42.1
02/09/2022 22:00	1:00:00	56.6	45.3	39.8
02/09/2022 23:00	1:00:00	54.6	43.8	40.7
03/09/2022 00:00	1:00:00	77.0	46.8	44.0
03/09/2022 01:00	1:00:00	52.4	46.1	43.5
03/09/2022 02:00	1:00:00	60.7	46.9	45.5
03/09/2022 03:00	1:00:00	71.8	51.6	37.0
03/09/2022 04:00	1:00:00	52.6	38.3	34.1
03/09/2022 05:00	1:00:00	51.3	45.5	38.2
03/09/2022 06:00	1:00:00	60.4	49.8	48.2
03/09/2022 07:00	1:00:00	71.1	52.1	50.1
03/09/2022 08:00	1:00:00	73.3	52.1	49.5
03/09/2022 09:00	1:00:00	72.9	52.5	48.6
03/09/2022 10:00	1:00:00	81.1	51.6	49.2
03/09/2022 11:00	1:00:00	71.3	52.3	50.2
03/09/2022 12:00	1:00:00	73.3	53.0	50.7
03/09/2022 13:00	1:00:00	67.8	53.0	50.4
03/09/2022 14:00	1:00:00	73.8	53.5	50.9
03/09/2022 15:00	1:00:00	70.4	52.9	50.5
03/09/2022 16:00	1:00:00	71.0	53.2	50.7
03/09/2022 17:00	1:00:00	63.8	53.5	50.5
03/09/2022 18:00	1:00:00	67.8	52.7	50.5
03/09/2022 19:00	1:00:00	69.2	52.7	50.6
03/09/2022 20:00	1:00:00	65.7	52.6	50.1
03/09/2022 21:00	1:00:00	66.8	52.1	48.7
03/09/2022 22:00	1:00:00	61.4	52.1	49.5
03/09/2022 23:00	1:00:00	70.3	53.1	50.1
04/09/2022 00:00	1:00:00	64.9	53.6	50.7
04/09/2022 01:00	1:00:00	63.0	54.5	51.8
04/09/2022 02:00	1:00:00	65.7	56.0	52.1
04/09/2022 03:00	1:00:00	65.6	55.3	51.4
04/09/2022 04:00	1:00:00	68.1	57.8	52.6
04/09/2022 05:00	1:00:00	71.2	55.4	51.3
04/09/2022 06:00	1:00:00	65.6	50.0	38.4
04/09/2022 07:00	1:00:00	76.2	46.6	38.0
04/09/2022 08:00	0:49:55.8	67.7	48.1	45.3

Note: Power pack failed at 08:49:55 on Sunday 04/09/2022 however weather conditions were not conducive to noise monitoring after this time in any case.

Table B.3 – Position A, Night-time $L_{A90,15min}$ Log

Time (hh:mm)	Weds 31/08/22 $L_{A90,15mins}$ (dB)	Thurs 01/09/22 $L_{A90,15mins}$ (dB)	Fri 02/09/22 $L_{A90,15mins}$ (dB)	Sat 03/09/22 $L_{A90,15mins}$ (dB)	Sun 04/09/22 $L_{A90,15mins}$ (dB)	Mon 05/09/22 $L_{A90,15mins}$ (dB)
23:00	47.5	50.2	39.5	49.6	-	-
23:15	47.2	50.1	41.5	50.2	-	-
23:30	47.1	49.5	40.8	51.0	-	-
23:45	47.0	48.5	42.1	50.4	-	-
00:00	46.1	49.9	43.4	50.4	-	-
00:15	44.7	49.5	44.6	50.3	-	-
00:30	44.4	49.1	45.4	51.2	-	-
00:45	44.9	49.0	45.3	51.5	-	-
01:00	46.3	48.9	45.8	52.1	-	-
01:15	43.0	48.6	44.7	51.9	-	-
01:30	45.2	49.1	42.5	51.7	-	-
01:45	46.5	48.6	43.5	51.5	-	-
02:00	47.4	49.1	44.8	52.2	-	-
02:15	47.5	48.9	46.2	53.1	-	-
02:30	47.8	48.6	45.6	52.0	-	-
02:45	46.7	48.7	45.4	51.6	-	-
03:00	45.8	48.2	42.7	51.5	-	-
03:15	43.9	47.8	40.7	50.8	-	-
03:30	45.4	46.9	38.4	51.9	-	-
03:45	46.6	47.0	35.3	52.0	-	-
04:00	47.1	47.1	33.5	51.8	-	-
04:15	46.9	48.5	33.5	52.5	-	-
04:30	46.6	48.8	36.8	53.4	-	-
04:45	46.3	48.8	37.8	53.7	-	-
05:00	46.0	49.7	36.6	52.8	-	-
05:15	45.6	49.5	40.9	51.9	-	-
05:30	46.1	49.0	45.3	50.5	-	-
05:45	47.1	48.8	46.6	51.3	-	-
06:00	47.6	49.0	48.0	50.3	-	-
06:15	48.5	50.4	48.1	44.7	-	-
06:30	49.5	50.2	48.5	41.5	-	-
06:45	49.0	49.8	48.6	37.4	-	-

Table B.4 – Position B, Hourly Log

Start	Duration	$L_{Amax,F}$ (dB)	L_{Aeq} (dB)	L_{A90} (dB)
31/08/2022 12:00	1:00:00	79.3	54.2	50.2
31/08/2022 13:00	1:00:00	69.7	52.7	49.9
31/08/2022 14:00	1:00:00	82.7	55.8	49.9
31/08/2022 15:00	1:00:00	70.7	52.7	49.7
31/08/2022 16:00	1:00:00	84.0	53.3	50.0
31/08/2022 17:00	1:00:00	81.1	55.0	49.2
31/08/2022 18:00	1:00:00	81.6	53.5	48.3
31/08/2022 19:00	1:00:00	74.7	52.9	47.0
31/08/2022 20:00	1:00:00	76.1	51.7	47.0
31/08/2022 21:00	1:00:00	69.9	50.6	46.2
31/08/2022 22:00	1:00:00	72.9	49.9	45.2
31/08/2022 23:00	1:00:00	67.4	46.9	43.9
01/09/2022 00:00	1:00:00	65.3	45.9	42.2
01/09/2022 01:00	1:00:00	58.6	44.5	41.7
01/09/2022 02:00	1:00:00	55.5	44.6	42.3
01/09/2022 03:00	1:00:00	64.1	43.5	39.4
01/09/2022 04:00	1:00:00	57.0	46.3	43.0
01/09/2022 05:00	1:00:00	78.6	50.9	45.6
01/09/2022 06:00	1:00:00	74.1	54.4	50.1
01/09/2022 07:00	1:00:00	74.8	55.5	52.7
01/09/2022 08:00	1:00:00	75.2	55.1	52.6
01/09/2022 09:00	1:00:00	74.8	54.9	52.4
01/09/2022 10:00	1:00:00	79.4	54.3	51.1
01/09/2022 11:00	1:00:00	82.6	55.9	50.1
01/09/2022 12:00	1:00:00	82.9	53.7	50.7
01/09/2022 13:00	1:00:00	72.2	53.4	50.6
01/09/2022 14:00	1:00:00	85.4	54.5	50.7
01/09/2022 15:00	1:00:00	82.6	55.9	50.4
01/09/2022 16:00	1:00:00	75.2	53.5	50.3
01/09/2022 17:00	1:00:00	72.2	53.5	49.6
01/09/2022 18:00	1:00:00	75.3	53.2	48.3
01/09/2022 19:00	1:00:00	82.4	53.3	47.6
01/09/2022 20:00	1:00:00	78.5	54.7	48.7
01/09/2022 21:00	1:00:00	76.5	51.9	47.9
01/09/2022 22:00	1:00:00	92.3	60.0	47.2
01/09/2022 23:00	1:00:00	67.0	49.7	46.0
02/09/2022 00:00	1:00:00	62.9	47.7	44.4
02/09/2022 01:00	1:00:00	65.3	47.3	43.7
02/09/2022 02:00	1:00:00	60.7	45.3	43.1
02/09/2022 03:00	1:00:00	57.5	45.3	43.0
02/09/2022 04:00	1:00:00	57.2	47.4	44.4
02/09/2022 05:00	1:00:00	67.2	51.0	47.6
02/09/2022 06:00	1:00:00	74.3	54.0	51.0
02/09/2022 07:00	1:00:00	70.9	54.1	51.5
02/09/2022 08:00	1:00:00	80.8	55.1	51.5
02/09/2022 09:00	1:00:00	72.1	54.0	50.3
02/09/2022 10:00	1:00:00	80.1	53.9	49.8
02/09/2022 11:00	1:00:00	79.2	53.4	49.1

02/09/2022 12:00	1:00:00	72.4	52.4	48.7
02/09/2022 13:00	1:00:00	76.3	52.7	48.1
02/09/2022 14:00	1:00:00	87.1	56.4	48.1
02/09/2022 15:00	1:00:00	79.5	54.5	48.5
02/09/2022 16:00	1:00:00	84.0	55.2	50.2
02/09/2022 17:00	1:00:00	77.2	54.4	50.5
02/09/2022 18:00	1:00:00	78.7	55.8	49.7
02/09/2022 19:00	1:00:00	75.3	53.1	48.9
02/09/2022 20:00	1:00:00	89.9	54.7	46.9
02/09/2022 21:00	1:00:00	73.6	48.9	44.4
02/09/2022 22:00	1:00:00	75.9	49.1	43.4
02/09/2022 23:00	1:00:00	74.1	47.6	41.9
03/09/2022 00:00	1:00:00	65.9	44.1	39.9
03/09/2022 01:00	1:00:00	69.5	45.5	40.1
03/09/2022 02:00	1:00:00	67.1	42.6	39.6
03/09/2022 03:00	1:00:00	69.8	46.2	38.7
03/09/2022 04:00	1:00:00	62.4	42.4	37.3
03/09/2022 05:00	1:00:00	63.2	46.2	40.4
03/09/2022 06:00	1:00:00	75.7	51.6	46.1
03/09/2022 07:00	1:00:00	75.7	52.9	48.0
03/09/2022 08:00	1:00:00	71.0	51.5	48.2
03/09/2022 09:00	1:00:00	71.2	51.4	48.3
03/09/2022 10:00	1:00:00	81.9	53.8	49.6
03/09/2022 11:00	1:00:00	75.5	54.8	50.6
03/09/2022 12:00	1:00:00	74.8	54.0	51.0
03/09/2022 13:00	1:00:00	86.5	55.5	50.9
03/09/2022 14:00	1:00:00	77.6	54.0	51.2
03/09/2022 15:00	1:00:00	70.7	52.7	50.6
03/09/2022 16:00	1:00:00	70.8	54.1	51.3
03/09/2022 17:00	1:00:00	88.2	58.0	53.0
03/09/2022 18:00	1:00:00	81.5	55.6	51.8
03/09/2022 19:00	1:00:00	81.3	55.4	50.5
03/09/2022 20:00	1:00:00	81.1	55.2	49.5
03/09/2022 21:00	1:00:00	80.4	54.2	48.8
03/09/2022 22:00	1:00:00	78.1	53.8	50.3
03/09/2022 23:00	1:00:00	79.5	54.9	50.7
04/09/2022 00:00	1:00:00	73.5	54.1	49.9
04/09/2022 01:00	1:00:00	74.2	55.7	50.6
04/09/2022 02:00	1:00:00	70.9	51.9	49.0
04/09/2022 03:00	1:00:00	66.9	51.6	49.0
04/09/2022 04:00	1:00:00	68.3	51.4	48.8
04/09/2022 05:00	1:00:00	76.6	53.6	49.9
04/09/2022 06:00	1:00:00	70.3	51.9	46.3
04/09/2022 07:00	1:00:00	73.6	53.1	45.5
04/09/2022 08:00	1:00:00	71.2	50.5	46.5
04/09/2022 09:00	1:00:00	75.3	52.7	46.7
04/09/2022 10:00	1:00:00	76.1	52.3	47.5
04/09/2022 11:00	1:00:00	77.7	51.6	47.9
04/09/2022 12:00	1:00:00	79.0	53.7	48.9
04/09/2022 13:00	1:00:00	74.1	53.9	50.9
04/09/2022 14:00	1:00:00	73.6	53.7	50.6

04/09/2022 15:00	1:00:00	73.8	53.6	50.5
04/09/2022 16:00	1:00:00	75.1	54.8	51.1
04/09/2022 17:00	1:00:00	76.8	55.8	51.8
04/09/2022 18:00	1:00:00	83.4	56.0	52.9
04/09/2022 19:00	1:00:00	86.9	56.8	52.9
04/09/2022 20:00	1:00:00	82.3	57.9	54.3
04/09/2022 21:00	1:00:00	72.3	55.8	52.0
04/09/2022 22:00	1:00:00	82.7	59.8	52.9
04/09/2022 23:00	1:00:00	67.0	53.2	50.9
05/09/2022 00:00	1:00:00	64.7	52.2	49.9
05/09/2022 01:00	1:00:00	63.9	51.8	49.9
05/09/2022 02:00	1:00:00	56.8	49.8	48.3
05/09/2022 03:00	1:00:00	62.5	48.7	47.0
05/09/2022 04:00	1:00:00	58.2	47.5	45.8
05/09/2022 05:00	1:00:00	65.0	51.2	47.7
05/09/2022 06:00	1:00:00	80.3	56.2	52.3
05/09/2022 07:00	1:00:00	72.6	55.8	53.8
05/09/2022 08:00	1:00:00	70.4	55.2	52.8
05/09/2022 09:00	1:00:00	65.4	53.8	51.9
05/09/2022 10:00	1:00:00	72.4	54.8	52.2
05/09/2022 11:00	1:00:00	82.7	56.5	52.8
05/09/2022 12:00	1:00:00	73.7	55.4	53.0
05/09/2022 13:00	1:00:00	77.5	55.6	52.7
05/09/2022 14:00	1:00:00	82.8	56.0	52.7
05/09/2022 15:00	1:00:00	75.5	55.6	53.1
05/09/2022 16:00	1:00:00	82.8	56.8	53.3
05/09/2022 17:00	1:00:00	80.1	56.3	52.9
05/09/2022 18:00	1:00:00	81.0	56.5	52.6
05/09/2022 19:00	1:00:00	82.2	55.5	51.5
05/09/2022 20:00	1:00:00	77.8	54.3	50.8
05/09/2022 21:00	1:00:00	83.7	55.2	50.1
05/09/2022 22:00	1:00:00	78.6	53.8	48.6
05/09/2022 23:00	1:00:00	67.2	50.3	47.1
06/09/2022 00:00	1:00:00	64.4	49.2	46.4
06/09/2022 01:00	1:00:00	60.2	47.5	45.2
06/09/2022 02:00	1:00:00	58.6	47.8	46.0
06/09/2022 03:00	1:00:00	59.1	47.2	45.2
06/09/2022 04:00	1:00:00	64.5	48.8	46.5
06/09/2022 05:00	1:00:00	83.8	53.2	47.5
06/09/2022 06:00	1:00:00	73.1	54.6	52.1
06/09/2022 07:00	1:00:00	77.9	55.2	53.1
06/09/2022 08:00	1:00:00	75.3	55.4	53.0
06/09/2022 09:00	1:00:00	78.5	56.0	51.8
06/09/2022 10:00	1:00:00	79.2	58.5	52.0
06/09/2022 11:00	1:00:00	70.4	55.2	52.0
06/09/2022 12:00	1:00:00	79.0	55.5	52.5
06/09/2022 13:00	1:00:00	70.1	53.7	51.6
06/09/2022 14:00	1:00:00	73.2	56.0	53.3

Table B.5 – Position B, Night-time $L_{A90,15min}$ Log

Time (hh:mm)	Weds 31/08/22 $L_{A90,15mins}$ (dB)	Thurs 01/09/22 $L_{A90,15mins}$ (dB)	Fri 02/09/22 $L_{A90,15mins}$ (dB)	Sat 03/09/22 $L_{A90,15mins}$ (dB)	Sun 04/09/22 $L_{A90,15mins}$ (dB)	Mon 05/09/22 $L_{A90,15mins}$ (dB)
23:00	44.5	47.2	42.2	50.4	50.8	47.0
23:15	44.1	46.3	42.9	50.7	51.5	47.5
23:30	43.8	46.4	41.2	51.3	51.4	46.8
23:45	43.5	45.1	42.0	50.9	50.1	47.6
00:00	42.5	44.8	40.6	49.9	49.9	47.4
00:15	42.5	44.3	40.3	49.3	49.8	46.6
00:30	41.5	44.2	41.1	50.6	49.6	46.5
00:45	42.2	44.4	38.6	50.2	50.5	45.7
01:00	41.2	43.9	41.5	52.1	50.4	45.3
01:15	41.5	44.2	41.2	51.6	50.1	45.7
01:30	42.3	43.7	39.6	50.4	49.9	44.9
01:45	42.8	43.2	39.4	49.6	49.5	45.0
02:00	42.0	42.9	40.2	48.8	48.9	46.0
02:15	43.1	42.8	39.8	49.0	48.7	46.1
02:30	43.1	43.5	39.6	49.0	48.2	46.0
02:45	41.7	43.3	39.0	49.2	47.8	45.8
03:00	41.1	42.4	39.3	49.2	47.8	45.2
03:15	39.2	42.9	40.8	48.7	47.3	45.4
03:30	39.0	43.6	40.4	48.8	46.7	44.9
03:45	39.5	43.1	37.3	49.2	46.8	45.6
04:00	41.7	43.6	36.4	49.0	46.4	46.8
04:15	43.7	44.2	37.9	47.9	45.7	46.5
04:30	44.8	45.5	38.6	49.1	45.8	46.9
04:45	43.9	46.5	38.4	49.3	45.6	46.1
05:00	44.2	46.9	38.8	49.5	46.7	46.4
05:15	46.3	47.4	41.1	49.5	49.4	48.1
05:30	46.8	48.9	42.2	51.3	50.4	50.1
05:45	46.5	48.5	44.1	50.3	49.8	50.3
06:00	48.3	49.9	45.0	50.3	51.2	51.5
06:15	50.3	51.4	46.6	48.8	52.1	52.1
06:30	52.4	51.7	45.4	46.9	53.2	52.7
06:45	51.5	51.8	47.5	44.5	53.9	52.7

Table B.6 – Position C, Hourly Log

Start	Duration	$L_{Amax,F}$ (dB)	L_{Aeq} (dB)	L_{A90} (dB)
31/08/2022 11:00	1:00:00	74.3	57.9	54.8
31/08/2022 12:00	1:00:00	73.2	57.1	53.1
31/08/2022 13:00	1:00:00	67.2	56.9	53.2
31/08/2022 14:00	1:00:00	75.2	57.7	54.1
31/08/2022 15:00	1:00:00	82.6	59.3	54.9
31/08/2022 16:00	1:00:00	74.9	59.4	56.0
31/08/2022 17:00	1:00:00	72.6	58.9	55.3
31/08/2022 18:00	1:00:00	79.2	58.4	53.6
31/08/2022 19:00	1:00:00	63.2	55.6	53.3
31/08/2022 20:00	1:00:00	67.7	56.3	54.3
31/08/2022 21:00	1:00:00	74.8	56.5	53.8
31/08/2022 22:00	1:00:00	66.1	55.8	53.5
31/08/2022 23:00	1:00:00	72.9	55.1	52.7
01/09/2022 00:00	1:00:00	78.3	55.6	53.1
01/09/2022 01:00	1:00:00	67.7	54.6	52.4
01/09/2022 02:00	1:00:00	62.8	54.9	52.6
01/09/2022 03:00	1:00:00	62.2	52.8	49.7
01/09/2022 04:00	1:00:00	63.6	53.3	48.3
01/09/2022 05:00	1:00:00	66.4	56.9	53.6
01/09/2022 06:00	1:00:00	78.7	59.9	56.0
01/09/2022 07:00	1:00:00	71.1	60.0	56.6
01/09/2022 08:00	1:00:00	72.0	59.4	56.2
01/09/2022 09:00	1:00:00	70.8	57.6	54.1
01/09/2022 10:00	1:00:00	79.5	61.7	54.5
01/09/2022 11:00	1:00:00	73.6	58.2	55.4
01/09/2022 12:00	1:00:00	70.9	58.1	54.9
01/09/2022 13:00	1:00:00	69.8	58.4	55.3
01/09/2022 14:00	1:00:00	82.3	59.7	56.1
01/09/2022 15:00	1:00:00	80.0	60.9	56.6
01/09/2022 16:00	1:00:00	80.9	60.1	57.0
01/09/2022 17:00	1:00:00	71.9	59.3	56.3
01/09/2022 18:00	1:00:00	79.1	58.2	55.1
01/09/2022 19:00	1:00:00	74.3	56.4	54.0
01/09/2022 20:00	1:00:00	75.2	57.6	54.0
01/09/2022 21:00	1:00:00	77.6	56.8	53.5
01/09/2022 22:00	1:00:00	75.1	55.9	53.0
01/09/2022 23:00	1:00:00	69.2	54.9	51.8
02/09/2022 00:00	1:00:00	70.7	54.3	51.4
02/09/2022 01:00	1:00:00	68.7	54.1	51.2
02/09/2022 02:00	1:00:00	61.9	53.7	51.6
02/09/2022 03:00	1:00:00	64.5	53.9	51.7
02/09/2022 04:00	1:00:00	64.8	53.1	49.8
02/09/2022 05:00	1:00:00	75.5	57.7	52.7
02/09/2022 06:00	1:00:00	75.0	59.9	57.0
02/09/2022 07:00	1:00:00	68.8	59.5	56.8
02/09/2022 08:00	1:00:00	71.1	58.9	56.1
02/09/2022 09:00	1:00:00	67.3	58.6	56.0
02/09/2022 10:00	1:00:00	67.5	57.8	55.3

02/09/2022 11:00	1:00:00	73.9	58.3	56.0
02/09/2022 12:00	1:00:00	74.6	58.3	55.2
02/09/2022 13:00	1:00:00	72.7	57.9	55.6
02/09/2022 14:00	1:00:00	91.5	61.2	55.9
02/09/2022 15:00	1:00:00	82.1	59.9	56.4
02/09/2022 16:00	1:00:00	77.8	60.0	57.5
02/09/2022 17:00	1:00:00	79.3	59.8	57.0
02/09/2022 18:00	1:00:00	77.8	59.2	56.5
02/09/2022 19:00	1:00:00	75.8	58.0	56.0
02/09/2022 20:00	1:00:00	74.6	56.9	55.1
02/09/2022 21:00	1:00:00	63.3	56.6	55.0
02/09/2022 22:00	1:00:00	65.7	56.2	55.1
02/09/2022 23:00	1:00:00	60.7	55.5	54.4
03/09/2022 00:00	1:00:00	59.7	55.0	54.0
03/09/2022 01:00	1:00:00	64.9	55.6	54.5
03/09/2022 02:00	1:00:00	59.7	55.1	53.6
03/09/2022 03:00	1:00:00	67.7	55.7	54.0
03/09/2022 04:00	1:00:00	63.1	54.9	53.1
03/09/2022 05:00	1:00:00	64.7	56.5	54.3
03/09/2022 06:00	1:00:00	81.9	58.7	55.3
03/09/2022 07:00	1:00:00	70.3	57.1	55.1
03/09/2022 08:00	1:00:00	70.3	58.1	56.3
03/09/2022 09:00	1:00:00	68.0	58.2	56.5
03/09/2022 10:00	1:00:00	74.3	58.7	56.6
03/09/2022 11:00	1:00:00	70.5	58.4	56.5
03/09/2022 12:00	1:00:00	68.0	58.9	57.0
03/09/2022 13:00	1:00:00	83.6	59.3	56.9
03/09/2022 14:00	1:00:00	71.3	59.2	57.3
03/09/2022 15:00	1:00:00	68.6	58.8	56.9
03/09/2022 16:00	1:00:00	75.0	59.4	57.4
03/09/2022 17:00	1:00:00	79.5	60.5	58.6
03/09/2022 18:00	1:00:00	67.3	60.1	57.9
03/09/2022 19:00	1:00:00	66.1	58.8	57.0
03/09/2022 20:00	1:00:00	67.3	58.3	56.7
03/09/2022 21:00	1:00:00	65.1	58.1	56.4
03/09/2022 22:00	1:00:00	65.2	58.0	56.3
03/09/2022 23:00	1:00:00	65.1	57.9	56.2
04/09/2022 00:00	1:00:00	79.9	58.2	55.9
04/09/2022 01:00	1:00:00	63.6	57.6	56.0
04/09/2022 02:00	1:00:00	65.8	58.3	56.7
04/09/2022 03:00	1:00:00	65.4	58.1	56.6
04/09/2022 04:00	1:00:00	67.3	58.6	56.8
04/09/2022 05:00	1:00:00	68.9	59.7	57.7
04/09/2022 06:00	1:00:00	67.9	58.3	54.5
04/09/2022 07:00	1:00:00	70.4	56.0	52.5
04/09/2022 08:00	1:00:00	76.6	58.1	56.2
04/09/2022 09:00	1:00:00	75.6	57.9	55.9
04/09/2022 10:00	1:00:00	72.8	57.7	55.8
04/09/2022 11:00	1:00:00	70.8	58.1	56.2
04/09/2022 12:00	1:00:00	66.2	58.5	56.5
04/09/2022 13:00	1:00:00	78.0	59.7	57.5

04/09/2022 14:00	1:00:00	69.7	59.4	57.3
04/09/2022 15:00	1:00:00	72.3	59.3	57.2
04/09/2022 16:00	1:00:00	72.9	59.6	57.4
04/09/2022 17:00	1:00:00	79.1	60.2	58.0
04/09/2022 18:00	1:00:00	70.9	60.4	58.0
04/09/2022 19:00	1:00:00	65.4	59.1	57.3
04/09/2022 20:00	1:00:00	78.0	59.9	57.9
04/09/2022 21:00	1:00:00	68.6	59.5	57.8
04/09/2022 22:00	1:00:00	70.5	60.9	59.0
04/09/2022 23:00	1:00:00	71.6	59.2	57.7
05/09/2022 00:00	1:00:00	66.1	59.3	57.7
05/09/2022 01:00	1:00:00	67.9	59.8	58.2
05/09/2022 02:00	1:00:00	66.7	59.0	57.4
05/09/2022 03:00	1:00:00	66.4	58.9	57.3
05/09/2022 04:00	1:00:00	67.0	58.8	57.0
05/09/2022 05:00	1:00:00	66.2	60.4	58.4
05/09/2022 06:00	1:00:00	79.3	62.2	60.3
05/09/2022 07:00	1:00:00	69.3	61.8	60.0
05/09/2022 08:00	1:00:00	77.1	61.6	59.1
05/09/2022 09:00	1:00:00	69.9	60.3	58.2
05/09/2022 10:00	1:00:00	70.9	60.1	58.0
05/09/2022 11:00	1:00:00	70.5	60.2	58.1
05/09/2022 12:00	1:00:00	69.0	60.7	58.6
05/09/2022 13:00	1:00:00	74.9	60.9	58.8
05/09/2022 14:00	1:00:00	72.0	60.6	58.4
05/09/2022 15:00	1:00:00	73.2	61.2	58.8
05/09/2022 16:00	1:00:00	80.9	62.1	59.7
05/09/2022 17:00	1:00:00	73.7	61.7	59.3
05/09/2022 18:00	1:00:00	73.3	61.3	58.9
05/09/2022 19:00	1:00:00	70.3	59.6	57.4
05/09/2022 20:00	1:00:00	74.4	58.8	56.4
05/09/2022 21:00	1:00:00	68.7	58.8	56.9
05/09/2022 22:00	1:00:00	73.2	58.9	56.8
05/09/2022 23:00	1:00:00	66.2	58.9	57.0
06/09/2022 00:00	1:00:00	70.3	58.4	56.6
06/09/2022 01:00	1:00:00	65.1	58.0	56.5
06/09/2022 02:00	1:00:00	63.6	57.9	56.4
06/09/2022 03:00	1:00:00	64.2	57.4	55.7
06/09/2022 04:00	1:00:00	67.9	58.0	56.3
06/09/2022 05:00	1:00:00	68.8	59.4	57.2
06/09/2022 06:00	1:00:00	78.3	61.4	59.1
06/09/2022 07:00	1:00:00	67.6	61.4	59.5
06/09/2022 08:00	1:00:00	70.2	61.2	59.1
06/09/2022 09:00	1:00:00	71.3	60.2	57.9
06/09/2022 10:00	1:00:00	67.5	59.8	57.7
06/09/2022 11:00	1:00:00	70.4	60.0	57.8
06/09/2022 12:00	1:00:00	71.2	60.2	58.0
06/09/2022 13:00	1:00:00	79.2	63.5	58.6
06/09/2022 14:00	1:00:00	68.2	61.3	59.3

Table B.7 – Position C, Night-time $L_{A90,15min}$ Log

Time (hh:mm)	Weds 31/08/22 $L_{A90,15mins}$ (dB)	Thurs 01/09/22 $L_{A90,15mins}$ (dB)	Fri 02/09/22 $L_{A90,15mins}$ (dB)	Sat 03/09/22 $L_{A90,15mins}$ (dB)	Sun 04/09/22 $L_{A90,15mins}$ (dB)	Mon 05/09/22 $L_{A90,15mins}$ (dB)
23:00	52.4	52.3	54.6	56.0	57.8	57.3
23:15	52.1	51.7	55.0	56.1	57.6	56.9
23:30	53.2	52.0	54.4	56.3	57.7	57.0
23:45	53.1	51.4	54.2	56.3	57.6	56.8
00:00	53.4	51.6	53.7	56.0	57.4	57.3
00:15	52.8	51.7	53.8	55.8	57.6	56.7
00:30	52.9	51.4	54.6	56.1	57.8	56.5
00:45	53.2	51.2	54.8	55.9	58.4	56.3
01:00	53.1	51.3	54.6	56.0	58.0	56.6
01:15	51.9	51.1	55.0	56.0	57.8	56.6
01:30	52.2	51.3	54.6	55.7	58.6	56.4
01:45	52.8	51.1	54.1	56.2	58.3	56.4
02:00	52.7	51.8	54.4	56.7	57.7	56.8
02:15	52.4	51.6	54.9	56.8	57.4	56.7
02:30	52.9	51.5	53.6	56.6	57.1	56.6
02:45	52.5	51.7	53.0	56.6	57.5	56.0
03:00	52.4	52.0	53.2	56.4	57.6	56.1
03:15	50.0	51.7	54.1	56.8	57.4	56.1
03:30	49.8	51.8	55.2	56.7	57.1	55.3
03:45	48.8	51.4	54.5	56.5	57.3	55.4
04:00	47.6	49.6	53.5	56.8	56.9	56.0
04:15	47.7	49.6	52.6	56.3	57.0	56.1
04:30	52.0	49.7	53.2	57.1	57.0	56.5
04:45	53.2	50.9	54.9	57.2	57.4	56.6
05:00	52.6	51.4	54.0	57.4	57.5	56.6
05:15	53.7	53.2	54.0	57.3	58.8	57.1
05:30	55.7	55.8	54.4	58.5	59.5	58.5
05:45	54.4	55.1	55.5	58.3	59.1	58.1
06:00	54.5	55.9	55.8	58.9	60.2	58.6
06:15	56.2	57.3	55.4	56.5	60.0	59.1
06:30	57.8	57.8	55.3	54.4	60.6	59.3
06:45	56.3	57.0	55.1	53.8	60.4	59.7

Figure B.6 – Statistical Analysis of Background Sound Levels Measured at Position A (Wednesday, 31 August 2022 to Thursday, 01 September 2022)

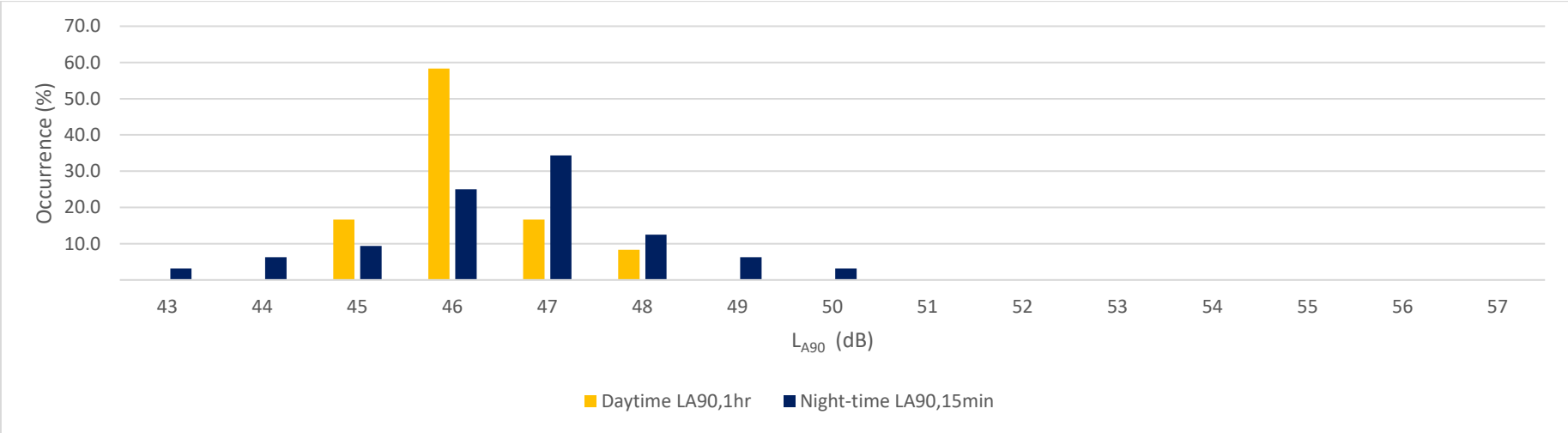


Figure B.7 – Statistical Analysis of Background Sound Levels Measured at Position A (Thursday, 01 September 2022 to Friday, 02 September 2022)

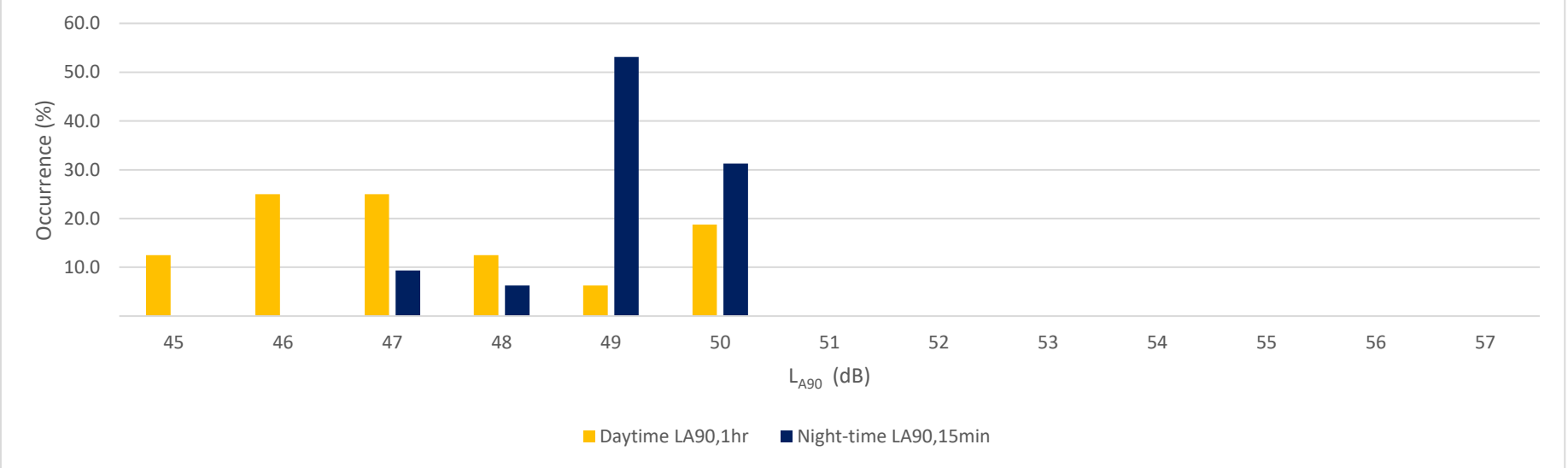


Figure B.8 – Statistical Analysis of Background Sound Levels Measured at Position A (Friday, 02 September 2022 to Saturday, 03 September 2022)

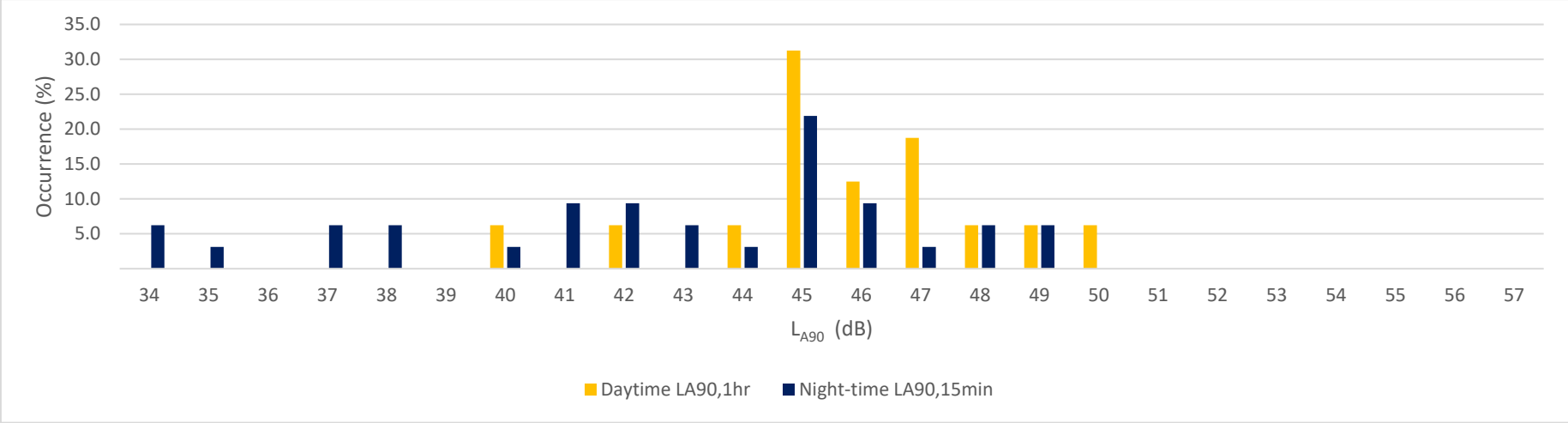


Figure B.9 – Statistical Analysis of Background Sound Levels Measured at Position A (Saturday, 03 September 2022 to Sunday, 04 September 2022)

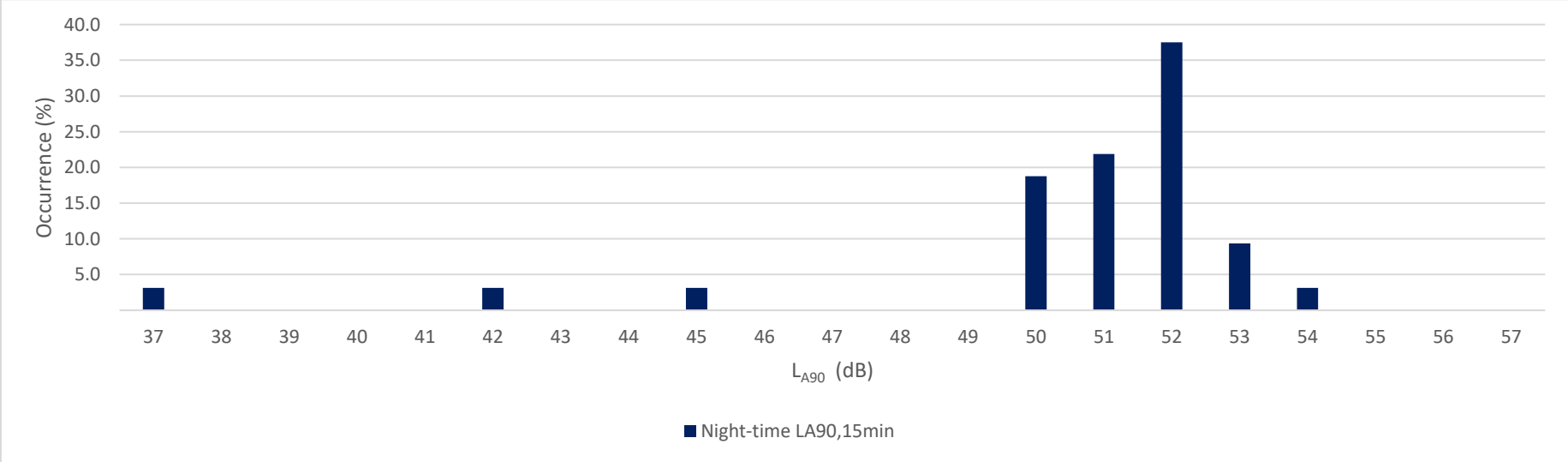


Figure B.10 – Statistical Analysis of Background Sound Levels Measured at Position B (Wednesday, 31 August 2022 to Thursday, 01 September 2022)

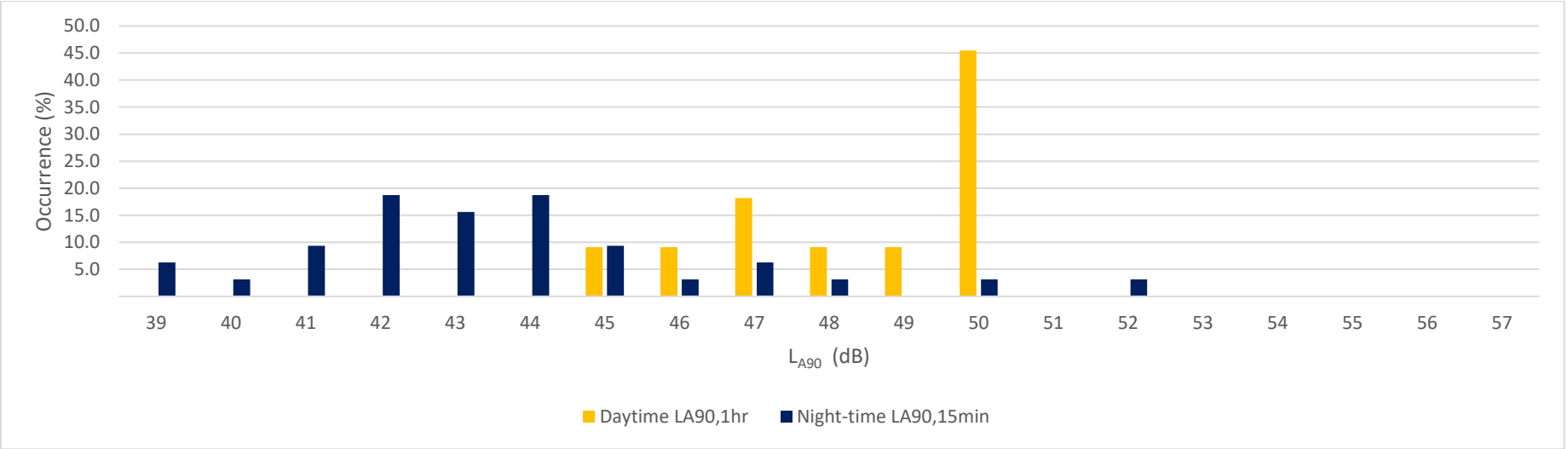


Figure B.11 – Statistical Analysis of Background Sound Levels Measured at Position B (Thursday, 01 September 2022 to Friday, 02 September 2022)

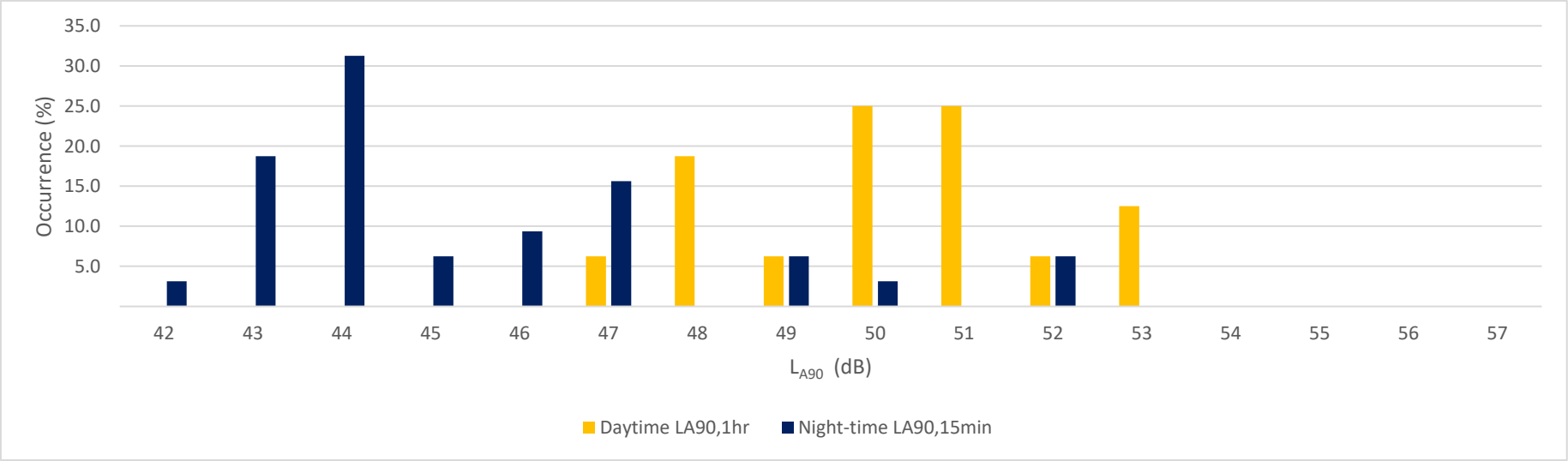


Figure B.12 – Statistical Analysis of Background Sound Levels Measured at Position B (Friday, 02 September 2022 to Saturday, 03 September 2022)

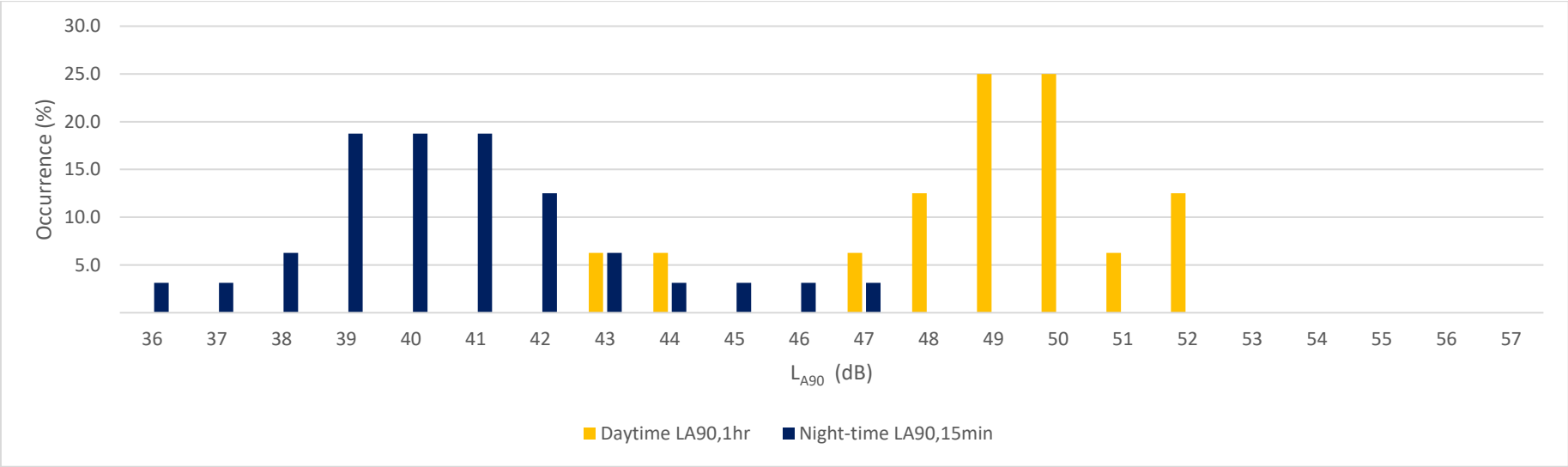


Figure B.13 – Statistical Analysis of Background Sound Levels Measured at Position B (Saturday, 03 September 2022 to Saturday, 03 September 2022)

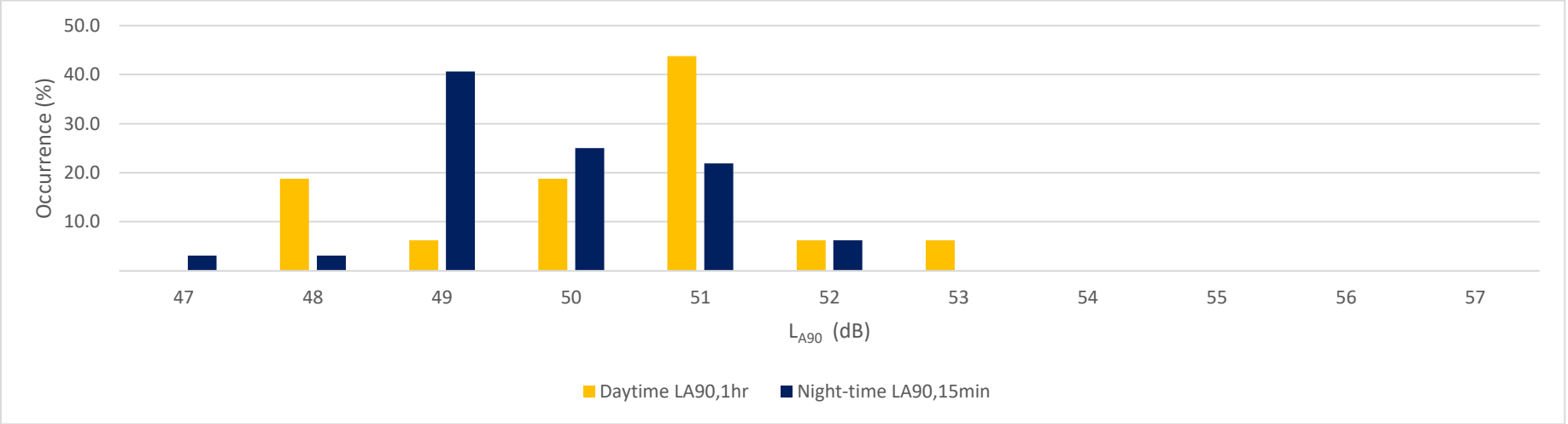


Figure B.14 – Statistical Analysis of Background Sound Levels Measured at Position B (Sunday, 04 September 2022 to Monday, 05 September 2022)

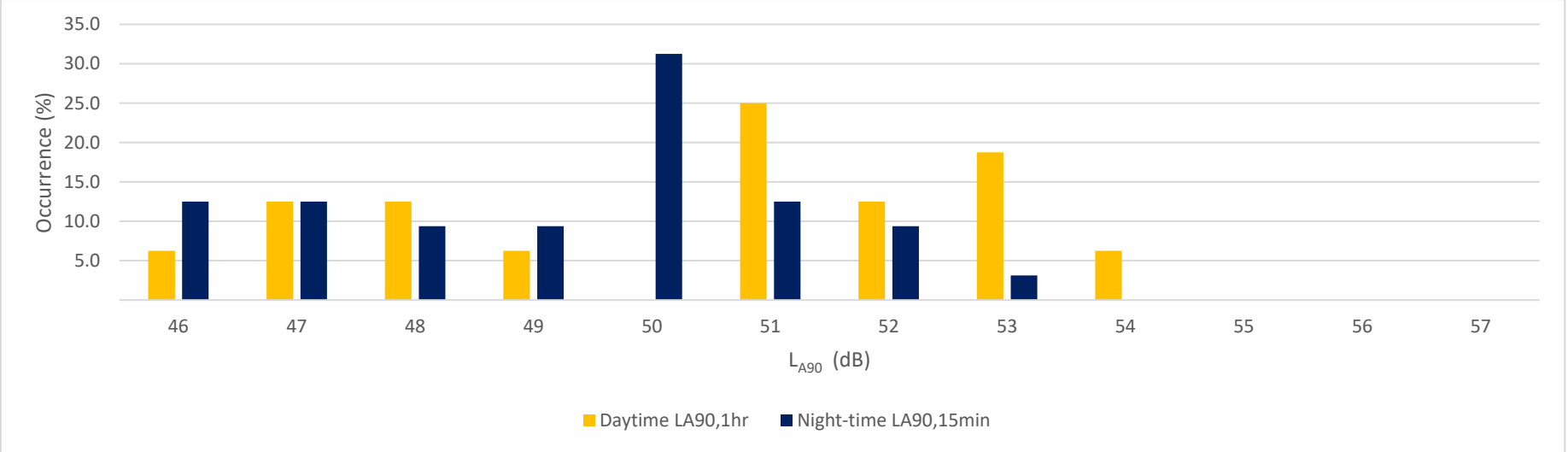


Figure B.15 – Statistical Analysis of Background Sound Levels Measured at Position B (Monday, 05 September 2022 to Tuesday, 06 September 2022)

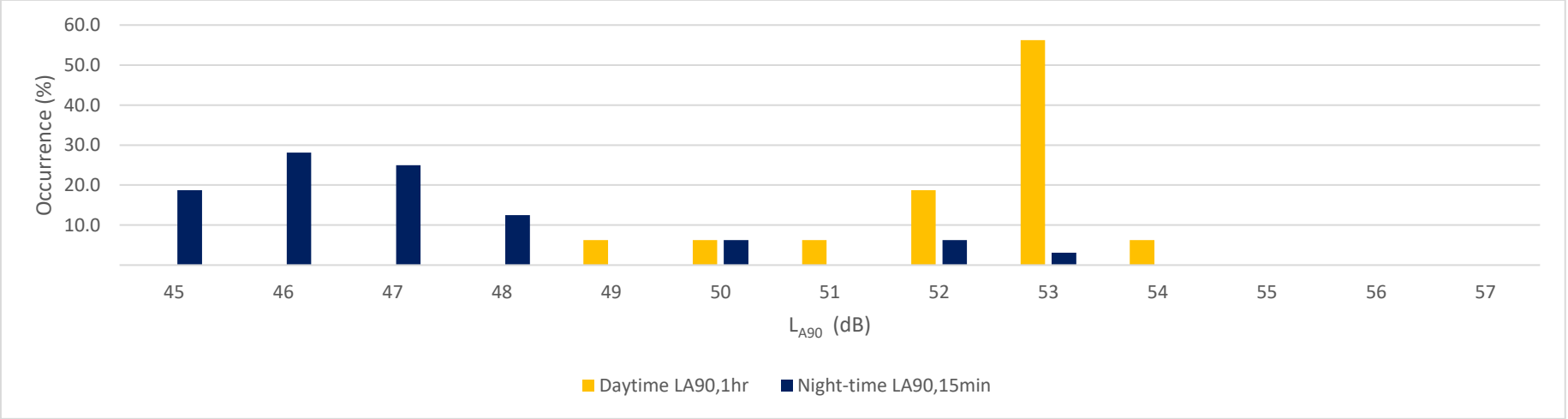


Figure B.16 – Statistical Analysis of Background Sound Levels Measured at Position C (Wednesday, 31 August 2022 to Thursday, 01 September 2022)

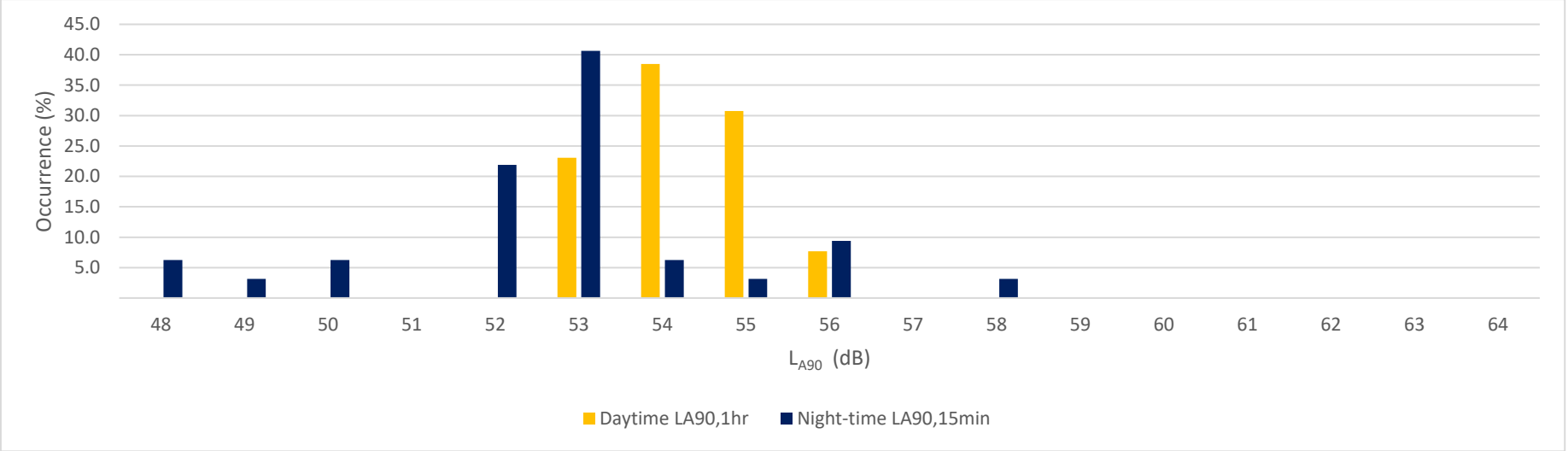


Figure B.17 – Statistical Analysis of Background Sound Levels Measured at Position C (Thursday, 01 September 2022 to Friday, 02 September 2022)

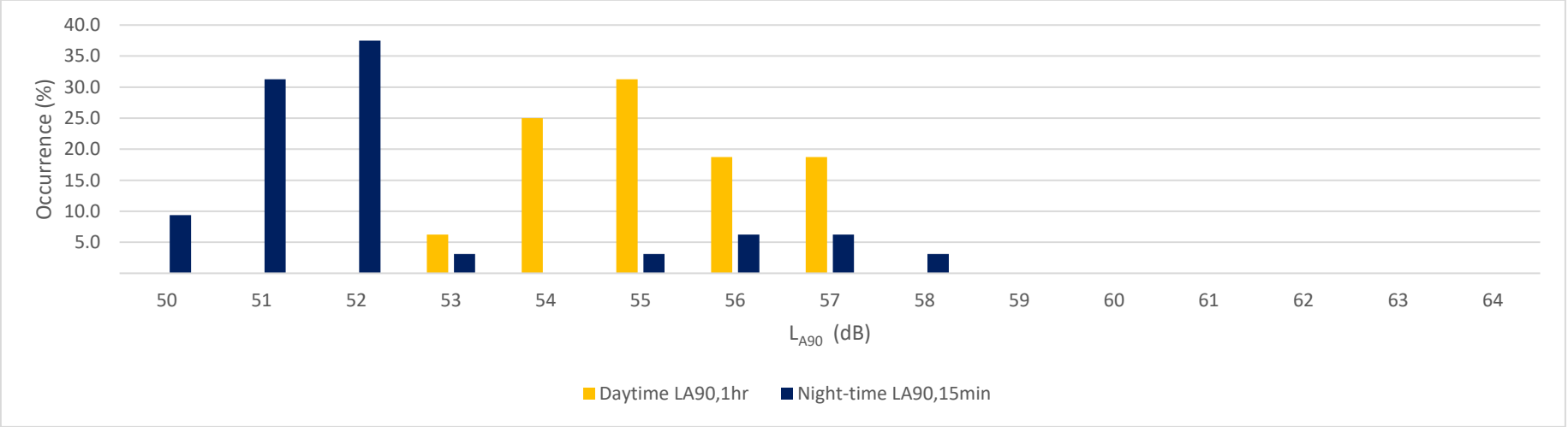


Figure B.18 – Statistical Analysis of Background Sound Levels Measured at Position C (Friday, 02 September 2022 to Saturday, 03 September 2022)

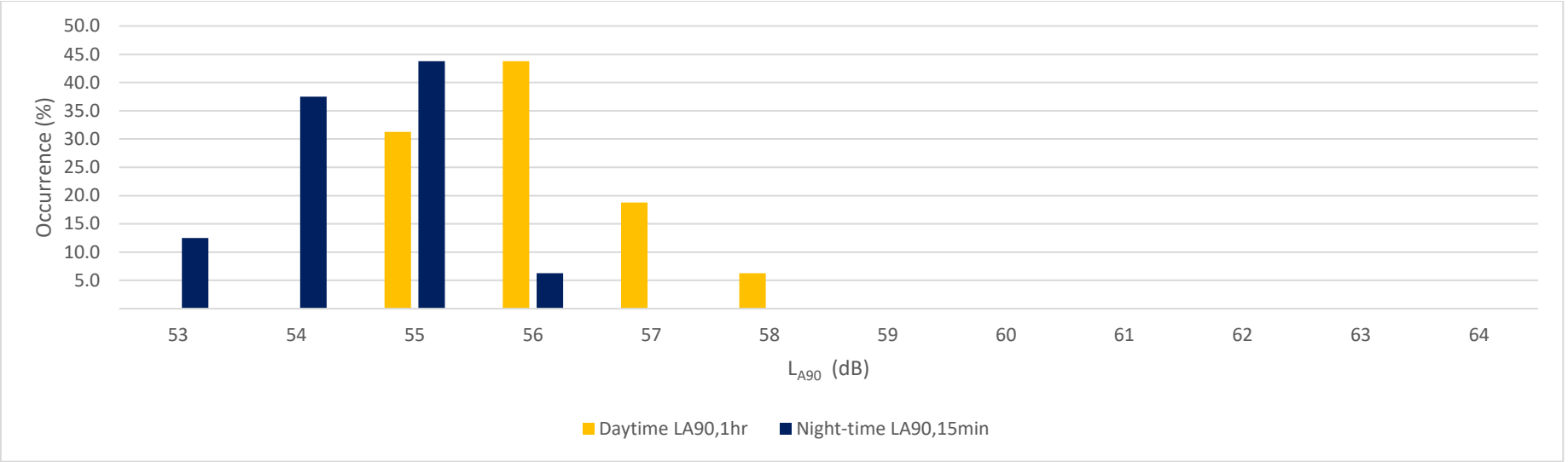


Figure B.19 – Statistical Analysis of Background Sound Levels Measured at Position C (Saturday, 03 September 2022 to Saturday, 03 September 2022)

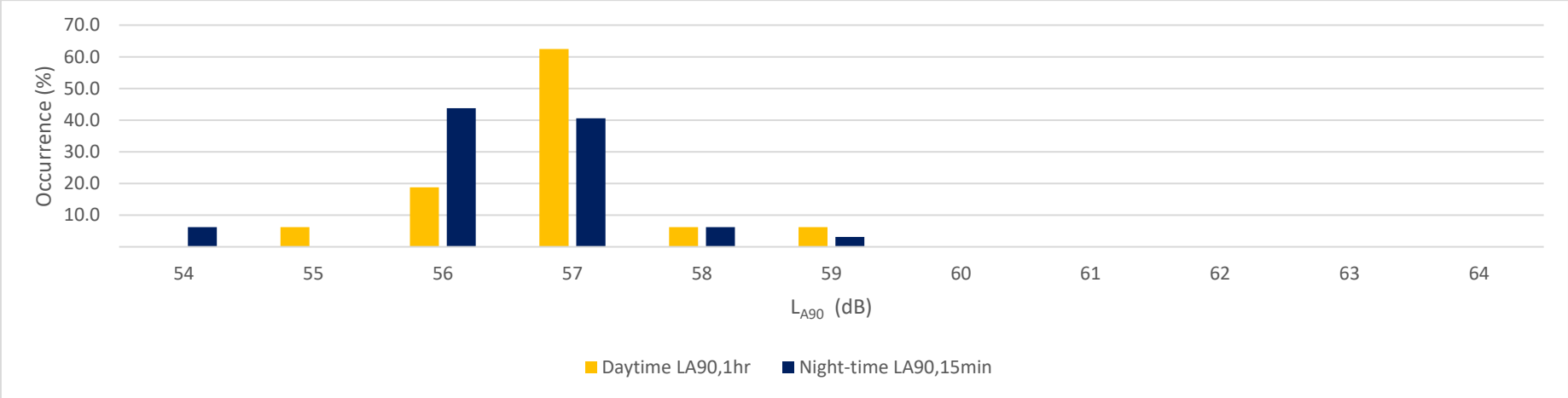


Figure B.20 – Statistical Analysis of Background Sound Levels Measured at Position C (Sunday, 04 September 2022 to Monday, 05 September 2022)

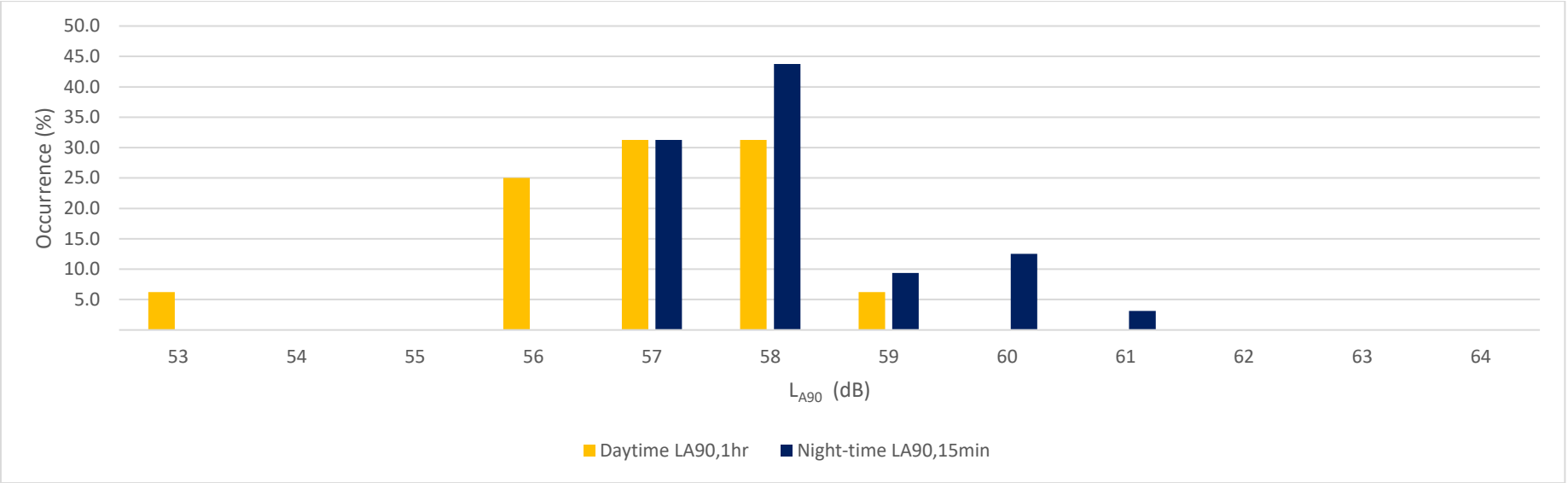
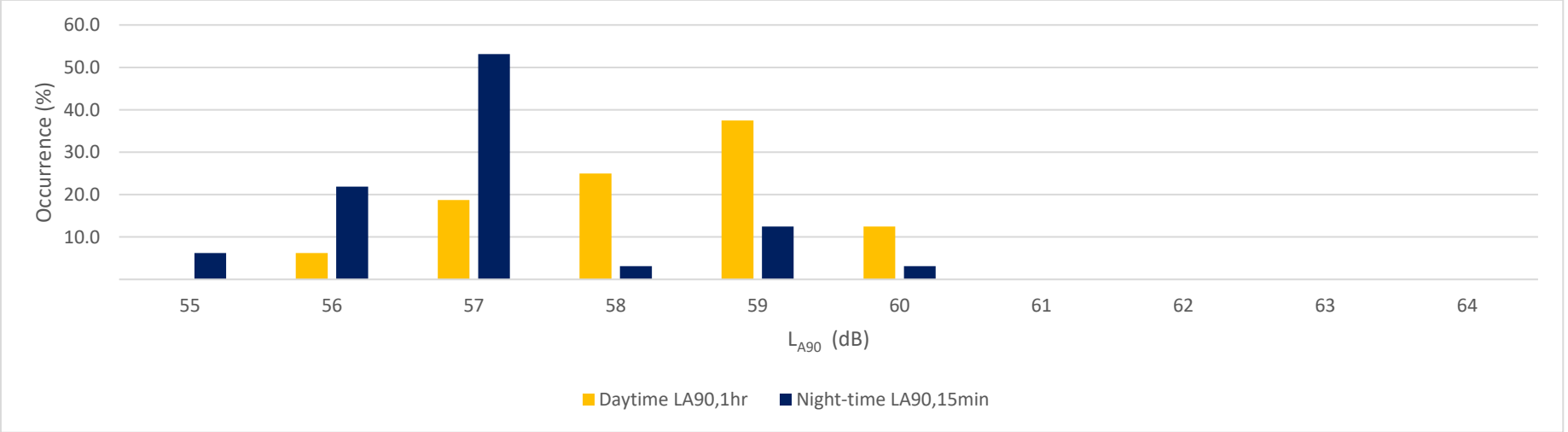


Figure B.21 – Statistical Analysis of Background Sound Levels Measured at Position C (Monday, 05 September 2022 to Tuesday, 06 September 2022)



APPENDIX C - DRAWING LISTS

The following ABP Port drawings have been used in our assessment;

Table C.1 – Drawing List

Drawing Title	Drawing Number	Rev	Date
Phoenix Wharf - Port Talbot	PT_Phoenix_Wharf	-	05/10/2021

Hunter ACOUSTICS

Independent Acoustic Consultancy Practice

Operational Noise Impact Assessment

Project DRAGON
Port Talbot

6387/NIA1_DRAFT4

Hunter ACOUSTICS

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e: enquiries@hunteracoustics.co.uk

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Operational Noise Impact Assessment

Project:	**Project DRAGON**
Site Address:	Land at Crown Wharf Port Talbot
HA Reference:	6387/NIA1_DRAFT4
Date:	11/08/2023
Client:	LanzaTech c/o Turley 18 Windsor Place Cardiff CF10 3BY
Contact:	jadine.berry@turley.co.uk

ISSUE / REVISION

Rev	Date			
-	11 August 2023	**Filename**	23.6387_NIA1_Draft4	
		Description	Draft for comment	
			Prepared by:	**Checked by:**
		Name	Meirion Townsend BSc(Hons) MIOA	Paul McGrath BSc(Hons) MIOA
		Signature		

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- Zoom in or out by holding down CTRL and turning the mouse wheel.
- CTRL and click on the table of contents or references to tables/figures/sections to navigate.
- Press CTRL and Home key to return to the top of the document.
- Press Alt-left arrow to return to your previous location.

TABLE OF CONTENTS

1. INTRODUCTION

A new industrial development known as Project DRAGON is proposed on Land at Crown Wharf, Port Talbot Docks.

The Proposed Scheme is to comprise a new facility for the production of sustainable aviation fuel (SAF) using "LanzaJet^{TM} ATJ technology" [ATJ] and processes developed and licenced by the Applicant.

An operational noise impact assessment has been carried out as part of an Environmental Statement (ES) to be submitted in support of a forthcoming planning application. Furthermore, this operational noise impact assessment is intended to be submitted as a technical appendices to the ES and therefore should be read in conjunction with the ES.

It should be noted that a further construction noise impart assessment has been completed and submitted separately.

A baseline noise survey has been carried out and is included in Hunter Acoustics report 6387/ENS1_Rev1 dated 15/05/2023, also provided as a technical appendices to the submitted ES.

This report has therefore been commissioned to predict noise levels from proposed activities and plant, allowing an assessment of the impact to be made.

1.1 Pre-application Discussions

Pre-application consultation was undertaken with the Local Planning Authority's acoustician (Red Twin Limited) and Natural Resources Wales (NRW) as set out below:

Date	Consultation	Summary
14th June 2022	Hunter Acoustics (HA) Letter	HA note on assessment methodology and receptor locations
8th July 2022	Red Twin (RT) Limited Technical Note	Response to methodology. Broadly agreed however additional receptor locations including 'quiet areas' identified in the LDP highlighted as well as request for assessment to Mumbles to be scoped, as well baseline survey to be conducted at different times of the year.
22nd July 2022	HA Letter	Rebuttal of request for assessment to Mumbles due to distance (13km) and critical receptors much closer and also of repeating baseline surveys at different times of the year
25th May 2023	Teams Meeting (HA, NPT, RT, NRW, Turley, LanzaTech)	Methodology of assessment and scenarios to be modelled discussed. HA and LanzaTech explained change to enclosed ground flare, demonstrating good acoustic design. Red Twin confirmed they had not received Scoping Report at this stage.
2nd June 2023	HA email to Red Twin / NPT	Request for feedback on review of scoping report.
7th June 2023	Email from NRW to Turley	Confirm NRW have no further comments on noise chapter other than what was discussed at the meeting

2. CRITERIA

2.1 Planning Policy Wales

The Welsh Government's Planning Policy Wales (Edition 11) dated February 2021 sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters which together with PPW provide the national planning policy framework for Wales.

Reference to noise is made in Paragraph 6.74: Framework for Addressing Air Quality and Soundscape, which states that:

"6.74 The planning system should maximise its contribution to achieving the well – being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution. In doing so, it should consider the long – term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution".

Reference is also made to noise in Paragraphs 6.7.15 - 17:

"Location of Commercial, Industrial and other Potentially Polluting Development

6.7.15 For the purposes of this section, potentially polluting development includes commercial, industrial, energy and agricultural or transport infrastructure. Such development should be located in areas where there is low potential for public exposure, or where its impact can be minimised. Novel or new development types may potentially cause pollution and should be carefully considered, and where appropriate, decisions should be based on the precautionary principle.

6.7.16 Relevant considerations in making planning decisions for potentially polluting development are likely to include:

- *location, including the reasons for selecting the chosen site itself;*
- *impact on health and amenity;*
- *effect of pollution on the natural and built environment and the enjoyment of areas of landscape and historic and cultural value;*
- *impact on groundwater and surface water quality;*
- *effect on biodiversity and ecosystem resilience, including where there may be cumulative impacts on air or water quality which may have adverse consequences for biodiversity and ecosystem resilience;*
- *the risk and impact of potential pollution from the development, insofar as this might lead to the creation of, or worsen the situation in, an air quality*

management area, a noise action planning priority area or an area where there are sensitive receptors; and

- *impact on the road and other transport networks, and in particular on traffic generation, particularly where the proposed development is not transport infrastructure itself.*

6.7.17 The location of potentially polluting development adjacent to sensitive receptors will be unacceptable where health and amenity impacts cannot be minimised through appropriate design and mitigation measures. It is the overall expectation that levels of pollution should be reduced as far as possible and for this reason the location of potentially polluting development should be taken into account as part of overall strategies in development plans to ensure it can be appropriately located and maximum environmental benefits can be gained through measures such as green infrastructure."

2.2 Technical Advice Note (Wales) 11

The below summarises the advice given TAN11 (1997) regarding new noise generating developments.

"3. This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources.

4. Local authorities should adopt a corporate approach and ensure close co-operation between planning and environmental health departments when considering noise and noise generating developments.

Development Control
Noise generating development
8. Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.

9. Noise characteristics and levels can vary substantially according to their source and the type of activity involved. In the case of industrial development, for example, the character of the noise should be taken into account as well as its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone will require special consideration. In addition to noise from aircraft landing and taking off, noise from aerodromes is likely to result from engine testing as well as ground movements. The impact of noise from sport, recreation and entertainment will depend to a large extent

on frequency of use and the design of facilities. Advice on assessing noise and on factors to consider in relation to the major noise sources including roads, railways, airports, industrial and recreational noise and their measurement is given in Annex B.

Noise from industrial and commercial developments
B17. The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 1987."

TAN11 refers to BS 4142:1997 and BS 8233:1987. These have been superseded by BS 4142:2014+A1:2019 (see Section 2.3 below) and BS 8233:2014 (see Section 2.6 below).

2.3 Local Policy

The following noise related policies are contained within the Neath Port Talbot County Borough Council Local Development Plan (2011-2026), adopted January 2016:

2.3.1 Policy EN 8 'Pollution and Land Stability'

"Proposals which would be likely to have an unacceptable adverse effect on health, biodiversity and/or local amenity or would expose people to unacceptable risk due to the following will not be permitted:

- *Air pollution;*
- *Noise pollution;*
- *Light pollution;*
- *Contamination;*
- *Land instability;*
- *Water (including groundwater) pollution.*

Proposals which would create new problems or exacerbate existing problems detailed above will not be acceptable unless mitigation measures are included to reduce the risk of harm to public health, biodiversity and/or local amenity to an acceptable level."

Paragraph 5.3.46 goes on to state:

"In relation to noise, potentially noisy proposals should not be located close to sensitive uses (such as hospitals, schools and housing) and new noise-sensitive developments should not be located near to existing noisy uses (including industry and existing or proposed transport infrastructure) unless it can be shown that adverse effects can be dealt with through mitigation measures incorporated into the design. Where noise levels are likely to be a significant issue, developers may be required to provide information to show that no nuisance is likely to be caused through increased noise levels at sensitive locations if the development proceeds. Policy EN10 sets out policy relating to designated Quiet Areas."

2.3.2 Policy EN 10 'Quiet Areas'

"In order to protect areas of tranquillity within urban areas, the following 'Quiet Areas' have been identified:

Reference	*Quiet Area*
EN10/1	*Neath Abbey Ruins, Neath*
EN10/2	*Mount Pleasant Park, Neath*
EN10/3	*Skewen Park, Neath*
EN10/4	*Shelone Woods, Neath*
EN10/5	*Victoria Gardens, Neath*
EN10/6	*Church Place, Neath*
EN10/7	*Talbot Memorial Park, Port Talbot*
EN10/8	*Vivian Park, Port Talbot*
EN10/9	*Baglan Park, Port Talbot*
EN10/10	*King George V Park, Pontardawe*

Development proposals that would have unacceptable impacts on the characteristics that led to the designation will be resisted."

2.4 Environment Agency / Natural Resources Wales (NRW)

The latest Guidance 'Noise and vibration management: environmental permits' produced jointly by The Environment Agency, Scottish Environment Protection Agency (SEPA), Natural Resources Wales and Northern Ireland Environment Agency and published 23 July 2021 and updated 31 January 2022.

The guidance states, *"You must use 'BS 4142: Methods for rating and assessing industrial and commercial sound' to quantify the level of environmental noise impact from industrial processes."*

2.5 British Standard 4142:2014+A1:2019

British Standard 4142:2014+A1:2019 "Methods for rating and assessing industrial and commercial sound", provides current guidance for the assessment of industrial noise affecting residential receivers.

This standard describes a rating method comparing L_{Aeq} noise levels from the industrial source with pre-existing background L_{A90} levels at the residential receiver. It advises at a difference (industrial noise - background) of:

- +10dB or higher, likely to be an indication of a significant adverse impact, depending on the context.

- A difference of + 5dB, likely to be an indication of an adverse impact, depending on the context.

- 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.

A sliding scale of penalties can be applied to industrial/commercial sound levels which have acoustically distinguishing characteristics, including tonality, impulsivity and intermittency.

Tonality – A penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible.

Impulsivity – A penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it clearly perceptible, and 9dB where it is highly perceptible.

Other sound characteristics – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied

Intermittency – If intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.

BS 4142:2014 states under section 11;

"Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

1) *The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.*

   Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

   Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/ or commercial nature is likely to be perceived and how people react to it.*

   NOTE 3 Consideration should be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*

   i) facade insulation treatment;
   ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
   iii) acoustic screening."

In addition to the above, the Association of Noise Consultants (ANC) have produced a Technical Note to BS 4142:2014+A1:2019, dated March 2020 (v1.0).

It states under 'Other Contextual Matters' – *"The assessor may also wish to consider matters such as the:*

- *character of a particular neighbourhood;*
- *former uses at or close to a site;*
- *legitimacy of the industrial use, e.g. planning permissions or environmental permits;*
- *implementation of best practicable means for a given process or activity; or*
- *local convention or perceptions.*

When relying on such matters, it is incumbent for the assessor to make clear all elements of context."

It goes on to say, *"There is no theoretical limit to how the context can or should influence the impact assessment, but any alteration of the conclusions of an assessment due to context should be sufficiently explained and justified for the specific circumstances in question."*

2.6 British Standard 8233:2014

British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings' includes internal noise criteria of habitable rooms in residential dwellings, as shown below;

Table 2.1 – BS 8233:2014 Internal Ambient Noise Criteria for Habitable Rooms

Location	Desired		Reasonable *	
	07:00 to 23:00	23:00 to 07:00	07:00 to 23:00	23:00 to 07:00
Living room	35 dB $L_{Aeq,16hr}$	-	40 dB $L_{Aeq,16hr}$	-
Dining room/area	40 dB $L_{Aeq,16hr}$	-	45 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$	40 dB $L_{Aeq,16hr}$	35 dB $L_{Aeq,8hr}$

* *NOTE 7 states "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5dB and reasonable internal conditions still achieved.*

2.7 Best Available Techniques (BAT)

For Best Available Techniques (BAT) we would refer to Reference Document for the Production of Large Volume Organic Chemicals from the Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control), 2017.

Section 2.4.10 'Techniques to reduce noise and vibration' provides the following advice:

The techniques listed below are described in full in the CWW BREF and are considered generally applicable across the LVOC sector.

A combination of techniques can be used to reduce noise and vibration, for example:

- *noise prevention by suitable construction (e.g. prevention of resonant vibration);*
- *selection of equipment with inherently low vibration (e.g. steadily running machines instead of pulsating machines; screw compressors instead of reciprocating compressors);*
- *sound absorbers (e.g. for safety valves, combustion machines);*
- *anti-vibration mountings (e.g. pumps mounted on rubber foundations);*
- *noise control booth / encapsulation of the noise sources (e.g. compactors, centrifuges);*
- *disconnection of vibration sources and surroundings (e.g. separate foundations for reciprocating compressor and any connected pipes); and*
- *consideration at the design stage of proximity to potential receptors (e.g. residential areas).*

The application of the techniques listed above should be informed by the noise management plan, which is part of the environmental management system (EMS) and can include all or a combination of the following elements:

- *a noise management strategy;*
- *protocols for carrying out noise monitoring;*
- *a protocol for response to identified noise complaints;*
- *an ongoing noise prevention and reduction programme;*
- *an implementation plan and timetable;*
- *a reporting programme;*
- *a review programme.*

The Best Available Techniques (BAT) Reference Document for Common Waste Water and Waste Gas Treatment/Management Systems in the Chemical Sector (CWW Bref) by the Industrial Emissions Directive 2010/75/EU (Integrated Pollution Prevention and Control, 2016), states that in order to prevent or, where that is not practicable, to reduce

noise emissions, BAT is to use one or a combination of the techniques given below subject to applicability.

	Technique	Description	Applicability
a	Appropriate location of equipment and buildings	Increasing the distance between the emitter and the receiver and using buildings as noise screens.	For existing plants, the relocation of equipment may be restricted by a lack of space or excessive costs.
b	Operational measures	This includes: i. improved inspection and maintenance of equipment; ii. closing of doors and windows of enclosed areas, if possible; iii. equipment operation by experienced staff; iv. avoidance of noisy activities at night, if possible; v. provisions for noise control during maintenance activities.	Generally applicable.
c	Low-noise equipment	This includes low-noise compressors, pumps and flares.	Applicable only when the equipment is new or replaced.
d	Noise-control equipment	This includes: i. noise-reducers; ii. equipment insulation; iii. enclosure of noisy equipment; iv. soundproofing of buildings.	Applicability may be restricted due to space requirements (for existing plants), health, and safety issues.
e	Noise abatement	Inserting obstacles between emitters and receivers (e.g. protection walls, embankments and buildings).	Applicable only to existing plants, since the design of new plants should make this technique unnecessary. For existing plants, the insertion of obstacles may be restricted by a lack of space.

3. SOUND SENSITIVE RECEPTORS

The site plan in Figure B.1 of Appendix B shows the proposed site and surrounding area.

The following sound sensitive receptors (SSRs) have been identified at this stage within a 1.3km radius from the site (which picks up the closest residential receptors in each direction), agreed with NPT CBC during pre-application discussions:

Table 3.1 – Sound Sensitive Receptor Locations

ID No.	Description	Approx. Distance to Nearest Operational Site Boundary (m)
SSR1	Dwellings at Mariners Point	890
SSR2	Dwellings at Darwin Rd / Newbridge Rd	900
SSR3	Dwellings on Isaac's Place / Borough St	1090
SSR4	Dwellings on Green Park St	1050
SSR5	Dwellings on Water St / Blanco's Hotel	1150
SSR6	Flats above shops on Station Rd	990
SSR7	Dwellings on Talbot Rd	745
SSR8	Dwellings on Lower West End	575
SSR9	Dwellings on St Alban's Terrace	810
SSR10	Dwellings on Duke St	1000
SSR11	Port Talbot Magistrates' Court	790

In addition to the above, consultation with NPT CBC / Red Twin Limited also highlighted the following quiet areas defined in the Neath Port Talbot LDP Policy EN10 as Vivian Park (1.6km north-west of the site) and Talbot Memorial Park (830m north-east of the site).

4. BASELINE NOISE SURVEY

Detailed methodology and results of the baseline noise survey carried out are included in Hunter Acoustics report 6387/ENS1_Rev1 dated 15/05/2023 which consisted of combination of short-term day/night sample measurements and long-term continuous monitoring.

The site plan in Figure B.1 of Appendix B shows the measurement positions used, namely:

Table 4.1 – Continuous Monitoring Location Details

Position	Description
A	On fence outside 27 Mariners Point, 2.5m above ground level. Representative of sound climate at residential receptors on Mariners Point.
B	On top of wall section in council car park adjacent to Blanco's Hotel, approx. 4.5m above ground level. Representative of sound climate at Blanco's Hotel and residential receptors on Water Street / Green Park Street.
C	Along Tata Steel's north-eastern boundary, approx. 36m away from Harbour Way, 1.5m above ground level. Representative of residential receptors on Lower West End.

Table 4.2 – Sample Measurement Location Details

Position	Description
1	Adjacent to residential dwellings along Newbridge Road
2	In front of residential dwellings along Water Street
3	At the rear of Port Talbot Parkway station car park, approx. 14m from dwellings along Talbot Road
4	At eastern exit of Harbour Way roundabout, approx. 120m from residential dwellings along Prince Street
5	On Harbourside Road, adjacent to HMCTS Port Talbot Justice Centre
6	At northern boundary of proposed site & access road for Tata Steel
7	At southern area of proposed site
8	On Moorland Road, adjacent to entrance to Vivian Park
9	Along Park View, adjacent to rear of Talbot Memorial Park

Note: All sample measurement microphone positions approximately 1.5m above local ground level.

The following minimum consistent daytime and night-time background L_{A90} sound levels have been determined in our baseline survey report, repeated below for ease of reference:

Table 4.3 – Minimum Consistent Daytime and Night-time Background L_{A90} Results

Period	Position		
	A	B	C
Daytime (0700-2300hrs) $L_{A90,1hr}$ (dB)	45	49	54
Night-time (2300-0700hrs) $L_{A90,15mina}$ (dB)	45	40	52

Results of sample measurements are also repeated below:

Table 4.4 – Sample Measurement Results

Position	Date	Start Time (hh:mm)	Duration (mins)	L_{Aeq} (dB)	L_{Amax} (dB)	L_{A90} (dB)
1	01/09/2022	10:24	15	55	82	46
1	01/09/2022	11:23	15	54	67	46
1	02/09/2022	00:04	15	49	61	47
1	02/09/2022	00:16	15	48	55	46
2	01/09/2022	11:04	15	64	86	49
2	01/09/2022	12:04	15	66	89	53
2	02/09/2022	00:27	15	53	77	42
2	02/09/2022	01:39	15	50	73	42
3	01/09/2022	15:26	15	57	75	49
3	01/09/2022	17:11	15	53	70	49
3	02/09/2022	01:19	15	45	58	42
3	02/09/2022	02:03	15	44	53	42
4	01/09/2022	14:44	15	59	76	53
4	01/09/2022	16:12	15	60	72	55
4	02/09/2022	00:56	15	59	78	46
4	02/09/2022	01:41	15	51	69	46
5	01/09/2022	15:05	15	54	69	51
5	01/09/2022	16:33	15	53	68	51
5	02/09/2022	00:53	15	52	67	44
5	02/09/2022	02:01	15	45	53	44
6	01/09/2022	13:18	15	63	81	51
6	01/09/2022	13:56	15	64	79	52
6	01/09/2022	23:56	15	57	74	51
6	02/09/2022	00:32	15	55	76	51
7	01/09/2022	13:37	15	51	60	49

7	01/09/2022	14:14	15	53	62	51
7	01/09/2022	23:37	15	53	62	51
7	02/09/2022	00:14	15	53	62	51
8	02/09/2022	10:44	15	55	78	41
8	02/09/2022	11:44	15	56	75	42
9	01/09/2022	15:48	15	56	67	54
9	01/09/2022	17:33	15	59	79	53

The observed sound climate at each position was as follows:

Table 4.5 – Observations of Soundscape at Sample Measurement Locations

Position	Daytime Soundscape	Night-time Soundscape
1	Road traffic, harbour activity from steelworks, birdsong	Steelwork noise, alarms from steelworks, road traffic, train, trees, helicopter
2	Road traffic controlled	Steelwork noise, road traffic, light breeze
3	Road traffic, steelworks, train	Road traffic and train, trees, low frequency at steelworks
4	Train, road traffic, steelworks plant, wind turbine or substation low frequency	Road traffic and train, trees, low frequency at steelworks
5	Road traffic, steelworks, train	Industrial noise, distant road traffic, wind, bushes, trees, train
6	Controlled by a nearby stack to the east and HGV pass-bys	Breeze in trees, HGV pass-bys and industrial fan
7	Controlled by a nearby industrial fan/stack to the east	Controlled by a nearby industrial fan/stack to the east
8	Pedestrians in park, dogwalkers, plane traffic, trees	-
9	Children playing on field, road traffic	-

5. SOURCE SAMPLE MEASUREMENTS OF SHIP ACTIVITY

5.1 Procedure

Hunter Acoustics attended Plymouth's Cattedown Wharves on Wednesday 5th July 2023 from 1830hrs to 0230hrs on Thursday 6th July to undertake source sample measurements of a similar vessel to that proposed to be used at Project Dragon to gather source data for use in the prediction model.

Measurements were undertaken of the vessel with engine running at the dock when manoeuvring and then with pumps running to off-load product.

Parameters logged included duration, $L_{Amax,F}$, L_{Aeq}, L_{A90} and third octave band spectra, along with continuous audio and 100ms data to allow detailed post analysis of results.

Various measurement positions were used, as shown on the plan below, which included near and far-field locations:

Figure 5.1 – Sample Measurement Locations

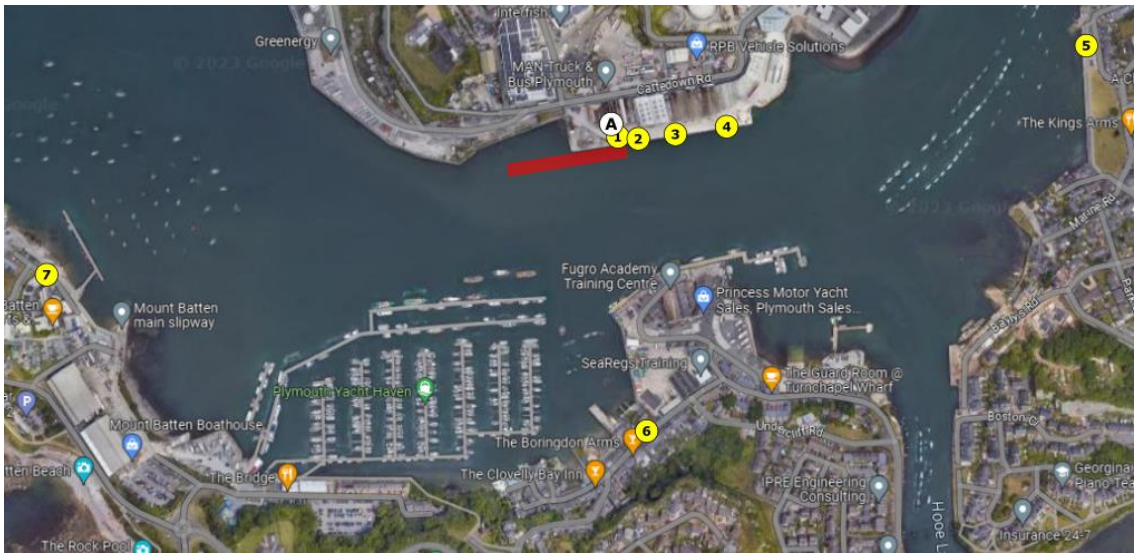


Table 5.1 – Ship Noise Sample Measurement Location Details

Position	Description
A	21m from side of ship at 4m height, line of sight to pumps and engine
1	20m from side of ship at engine
2	20m from rear of ship
3	40m from rear of ship
4	90m from rear of ship
5	South west coast path, 1-2 Cottages at The Quay, approx.. 560m from rear of ship
6	3-4 Boringdon Terrace, approx. 330m from side of ship
7	Mountbatten Centre, approx. 600m from front of ship

All measurement locations at 1.2m above local ground height with exception of Position A which was logging at 4m height.

5.2 Meteorological Conditions

Conditions were calm and dry during sample measurements, with an occasional gentle WSW breeze.

5.3 Equipment Used

The following measurement equipment was used during the surveys:

Table 5.2 – Equipment List

Make	Description	Model	Serial Number	Last Calibrated	Certificate No.
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-08723-E0	29 October 2021	TCRT21/1759
	Preamplifier	MA220	1820	29 October 2021	TCRT21/1759
	Filters	XL2-TA	A2A-08723-E0	01 November 2021	TCRT21/1763
	Microphone Capsule	MC230	9381	29 October 2021	TCRT21/1759
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-13022-E0	18 August 2021	TCRT21/1571
	Preamplifier	MA220	6853	18 August 2021	TCRT21/1571
	Microphone Capsule	MC230	A14127	18 August 2021	TCRT21/1571
NTi	Type 1 - Sound Level Meter	XL2-TA	A2A-14577-E0	23 June 2022	UK - 22 -051
	Preamplifier	MA220	7485	23 June 2022	UK - 22 -051
	Microphone Capsule	MC230	A15594	23 June 2022	UK - 22 -051
Larson Davis	Calibrator (94.00dB / 114.03dB @ 1kHz)	CAL200	19047	15 August 2022	44788-19047-CAL200
Leica	Laser measure	DISTO D510	1081540163	14 May 2018	1081540163

Measurement systems were calibrated before and after the surveys and no variation occurred.

Note: Copies of traceable calibration certificates for all equipment are available upon request.

5.4 Results

The following details results of sample measurements undertaken of the ship.

Table 5.3 – Source Sample Measurement Results

Pos	Description	Duration (secs)	Distance (m)	Height (m)	L_{Aeq} (dB)	$L_{Amax,F}$ (dB)
1	20m from side rear, engine running	15	20	1.5	67.2	68.4
-	30m from rear of ship, engine running	20	30	1.5	65.6	66.6
3	40m from rear of ship, engine running	32	40	1.5	65.1	67.1
4	90m from rear of ship, engine running	30	90	1.5	59.8	61.1
1	20m from ship, engine dropped in level	10	20	1.5	61.4	63.4
1	20m from ship, engine off, generators only	22	20	1.5	56.9	63.1
-	9m from side of ship, approx. 16m to pumps	31	16	1.5	67.3	69.1
3	35m from rear of ship, provides screening to pumps	33	35	1.5	61.5	62.9
4	94m from rear of ship	31	94	1.5	54.8	56.5
-	125m from rear of ship	30	125	1.5	54.4	55.7
-	24m from side of ship, 3x pumps running	33	24	1.5	62.5	63.9
-	8m from side of ship, 15m to pumps	12	15	3	68.7	69.7
7	Mountbatten Centre, pumps audible	73	~600	1.5	34.7	37.3
6	3 Boringdon Terrace, pumps clearly audible, tonal	43	~330	1.5	47.3	50

6	4 Boringdon Terrace, pumps clearly audible, tonal	18	~330	1.5	47.6	49.5
5	South West Coast Path, from rear of ship, pumps audible, tonal	38	560	1.5	42.5	44.9
5	South West Coast Path, from rear of ship, pumps audible, tonal	31	560	1.5	41.9	43.9

Octave band data is included in Table B.1 of Appendix B.

At off-site measurement locations during ship off-loading, tonality was highly perceptible at 330m, reducing to clearly perceptible at distances of 500-600m during the measurements attracting a 4dB character correction under BS 4142.

During the ship off-loading scenarios presented in this report, it is therefore proposed to include a 4dB penalty for tonality for receptors within 600m of the ship as opposed to the 3dB for the general site operations.

The noise model has been calibrated using the 47dB(A) at 330m measurement from the 3no pumps running and then adjusted to allow for up to 6no pumps running as worst-case.

The ship pass-by has been modelled and calibrated using the 60dB(A) at 90m from the rear of the ship with engine running measurement.

6. NOISE MODELLING

Our analysis has used the proprietary Predictor (v2023) computer modelling software, in conjunction with procedures of ISO 9613.

This model allows noise levels from noise sources to be predicted over large distances and varying terrain. Attenuation is included accounting for distance, air absorption, ground absorption and screening losses from site topography/local structures.

Note that existing structures immediately east of the Production Development Zone (PDZ) area have been taken out of the model as this area is to be used as a Temporary Construction Area (TCA).

LIDAR contour data has been used for terrain modelling, along with site observations and Google Earth for buildings. 8m AOD development plateau assumed across the PDZ, as per 'Earthworks and Levels'.

The intervening ground between site and receptors consists mainly of reflective hard ground and water, with some smaller green areas which are included in the model as soft ground.

The analysis predicts resultant noise levels at the SSRs.

Drawings used in our assessment are referenced in Appendix D.

6.1 Source Plant Noise Data

Source noise data used in the model for the various items of plant is detailed in Appendix C.1 taken from initial information provided by the project engineering team, Technip Energies (TE) and in-house database figures.

Following liaison with TE, the following information has been made available for assessment at planning stage, prior to detailed engineering design.

6.1.1 Enclosed Ground Flare

Following Best Available Techniques (BAT) to control noise at source, the scheme is to utilise an enclosed ground flare as opposed to an elevated flare.

We are advised that in the general day to day running of the plant, the flare should not be in use, however it is required in two main scenarios;

a) Start-up/shutdown of the plant (assumed worst case, once every 6months initially but reducing to every two years, could last for 48hrs, no combustion noise)

b) Emergency (assume worst case, once every 10years, at this level for 30mins before reducing)

TE advises that noise levels are expected at 80dB(A) at 1m from the wind fence and 52dB(A) at 150m for start-up flaring. For emergency flaring, this increases to 90dB(A) at 1m from the wind fence and 62dB(A) at 150m.

The following spectra shape has been provided for the enclosed ground flare:

Table 6.1 – Ground Flare Spectra Shape

Un-weighted Octave Band Sound Pressure Levels at 1m from Wind Fence of Ground Flare								Overall dB(A)
63	125	250	500	1000	2000	4000	8000	
75.2	71.5	72.5	75.6	70.0	68.0	69.7	77.5	79.7

The model has therefore been calibrated with the above spectra shape to equal the 150m distance figures quoted above in each scenario.

6.1.2 Cooling Towers

There are 3no banks of two-cell cooling towers proposed. Sound power level data has been provided by TE for outlet, inlet and casing radiated noise and it is understood this is based upon a 2 cell together configuration.

The noisier inlets have been modelled facing into the site (i.e. south), away from critical residential receptors. We understand this can be accommodated and represents best practice in terms of plant orientation.

A 5dB reduction in levels is indicated to be required at this stage and therefore a limit of 70dB(A) at 10m from the north of the cooling towers (all running) is set and included in the modelling.

Sound power level data have also been provided by TE for the cooling water pumps.

6.1.3 Compressors

Following BAT and good practice, large compressors are to be housed in buildings on the southern site boundary. The final design of these buildings is to be confirmed at detailed design stage however a maximum limit of 85dB(A) at 1m from the building has been confirmed achievable by TE.

The model therefore assumes a large area source 5m wide by 10m height (building height) on the north face of each compressor building (representing louvres) to achieve 85dB(A) at 1m at this stage to form a robust assessment.

Spectra shape for a compressor taken from the Predictor database has been used to generate source sound power levels to set 85dB(A) at 1m in the model. These are included in Appendix C.1.

6.1.4 Pumps

There are a significant number of pumps proposed on the scheme.

TE has provided levels of 80dB(A) at 1m and 85dB(A) at 1m for the various pumps, as guaranteed by Vendors and state these are conservative figures. Limits of 60 and 65dB(A) at 10m should therefore be met from the pumps respectively.

We are advised by TE that where multiple pumps are referenced for a particular item on drawings, that they are duty/spare configuration and it is only expected that one pump would run in normal operation.

Spectra shape for a centrifugal pump from the Predictor database have been used to generate source sound power levels to meet 80-85dB(A) at 1m in the model. These are included in Appendix C.1.

6.1.5 HP Boiler

Octave band spectra have been provided by TE for stated level of 85dB(A) at 1m. A limit of 65dB(A) at 10m should therefore be met from the HP Boiler and should be confirmed by Vendors at the detailed design stage.

It is understood the HP Boiler has a 40m stack. This has been included in the model with a limit set at 65dB(A) at 10m which it is understood is achievable. TE advised:

"Flue gas is forced draft fan driven. As such anticipated noise from stack is less than 85 dBA due to convection coils reflecting noise back to boiler firebox."

6.1.6 Utilities and Storage Vendor Packages

For remaining noise generating plant identified by TE within the Utilities and Vendor Packages, spectra shape for pumps, boilers, compressors and fans taken from the Predictor database have been used and adjusted to meet the dB(A) at 1m levels quoted by TE. These are included in Appendix C.1.

Vendors to confirm that limits of 60 and 65dB(A) at 10m are met from these packages (quoted at 80 and 85dB(A) at 1m respectively) at the detailed design stage.

6.1.7 Diesel Generators

Figures of 83dB(A) at 7m have been used for the diesel generator sets.

Spectra shape for diesel generator taken from the Predictor database has been used to generate source sound power levels to meet 83dB(A) at 7m in the model. These are included in Appendix C.1.

Vendors to confirm this limit is met at the detailed design stage.

6.1.8 Ship

Noise levels for the ship pass-by and off-loading have been based on sample measurements undertaken as discussed in Section 5.

6.1.9 Remaining Items of Plant

TE have advised remaining plant is assumed quiet and is not therefore included in the modelling.

6.2 Noise Model Scenarios

Scenarios modelled are set out in Appendix C, including flows/speeds of mobile sources and percentage on-times for fixed plant.

Note: As all plant is indicated to run 100% of the time, the daytime and night-time $L_{Aeq,1hr}$ and night-time $L_{Aeq,15min}$ predicted levels are the same from the main plant.

With regards to HGV movements, 4no movements in a worst case one-hour period equate to 1no movement in a 15minute period which is considered robust based on the estimated worst-case 26 two-way HGV movements per day (during the unlikely event of disruption in the shipping supply chain, resulting SAF being transported via trucks).

Scenario 4 is representative of daytime only as it is understood testing of diesel generators would not occur at night.

With regards to the ship movement, 1no one-way movement is considered reasonable in a one-hour period. For night-time however, as the modelling software works on a 1hr period, to estimate the 15min period, 4no one-way movements have been modelled to equate to 1no movement in a 15minute period.

Therefore, with exception of the with ship movement scenario and diesel generator testing scenario, daytime modelling is also representative of night-time modelling.

6.3 Noise Model Results

Predicted levels at critical receiver locations are shown in Table 6.2 below;

Table 6.2 – Noise Model Predictions

Sound Sensitive Receptor (SSR)	Height (m)	Scenario						
		1	1a	1b	2	3	4	5
		Normal Operation	Normal Operations with Ship Movement (Day $L_{Aeq,1hr}$)	Normal Operations with Ship Movement (Night $L_{Aeq,15mins}$)	Ship Off-loading	Start-up Flare	Emergency Flare	Generator Testing
SSR1 - 27 Mariners Point	1.5	39	44	49	40	39	43	40
SSR1 - 27 Mariners Point	4.5	39	45	50	40	39	43	41
SSR2 - 1 Darwin Road	1.5	38	39	42	40	39	42	40
SSR2 - 1 Darwin Road	4.5	38	40	43	40	39	42	40
SSR3 - 4 Isaac's Place	1.5	37	37	39	39	38	41	39
SSR3 - 4 Isaac's Place	4.5	39	39	40	42	39	42	40
SSR4 - 5 Green Park Street	1.5	37	38	39	39	38	41	39
SSR4 - 5 Green Park Street	4.5	37	38	40	40	38	41	39
SSR5 - Blanco's Hotel	1.5	36	36	38	39	36	38	37
SSR5 - Blanco's Hotel	4.5	36	37	38	39	36	38	38
SSR5 - Blanco's Hotel	7.5	37	37	38	39	37	40	38
SSR6 - 21 Station Road	1.5	36	36	37	37	36	38	38
SSR6 - 21 Station Road	4.5	37	37	38	40	37	39	39
SSR7 - 105 Talbot Road	1.5	38	39	39	42	39	41	40
SSR7 - 105 Talbot Road	4.5	41	41	41	46	41	46	42
SSR8 - 10 Lower West End	1.5	40	40	41	46	40	42	41
SSR8 - 10 Lower West End	4.5	43	43	43	46	43	46	43
SSR9 - 19 St Albans Terrace	1.5	38	38	39	42	38	39	38
SSR9 - 19 St Albans Terrace	4.5	40	40	41	45	40	41	41

SSR10 - 21 Duke Street	1.5	34	34	35	38	34	36	34
SSR10 - 21 Duke Street	4.5	35	35	36	39	35	36	35
SSR11 - Magistrates Court	1.5	42	42	43	44	42	44	43
SSR11 - Magistrates Court	4.5	42	42	43	44	42	44	43
Talbot Memorial Park	1.5	38	38	39	42	38	40	38
Vivian Park	1.5	31	32	34	33	31	33	32

Noise map contour plots are included in Appendix C.4 for each scenario set out above.

7. ASSESSMENT OF INDUSTRIAL NOISE IMPACT

7.1 Acoustic Character Correction

Noise from plant on site is not indicated to contain impulsive or intermittent characteristics as we understand the plant is all generally running continuously. Pumps, fans, compressors etc. can however contain tonal content at source.

Given the distance between the site and residential receptors (minimum approx. 500m from ship offloading to SSR8, Lower West End) and the predicted absolute sound levels in relation to the existing sound climate, it is likely that tonality may be just perceptible from the site which would warrant a 2dB character correction under BS 4142:2014+A1:2019.

For robustness at this stage however, a 3dB penalty has been included for sound characteristics that are readily distinctive against the residual acoustic environment, as specified in BS 4142:2104+A1:2019.

For the ship off-loading scenario however, as discussed in Section 5.4, a 4dB correction has been included for tonality being clearly perceptible at receptors around 600m or less from the ship (SSR 7 and SSR8), based on sample measurements discussed in Section 5.

7.2 Impact Assessments

The following tables show predicted rating levels against measured background sound levels to provide an initial outcome of the impact, depending on context.

Note: The background sound levels quoted are night-time background sound levels for a worst-case night-time assessment with exception of Scenario 1a and 5 which are daytime scenarios.

7.2.1 SSR1 – 27 Mariners Point

Table 7.1 – SSR1 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background at Pos A L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	39	3	42	45	-3
1a (Normal with Ship Day)	45	3	48	45	3
1b (Normal with Ship Night)	50	3	53	45	8
2 (Ship Off-loading)	40	3	43	45	-2
3 (Start-up Flare)	39	3	42	45	-3
4 (Emergency Flare)	43	3	46	45	1
5 (Generator Testing, Day)	41	3	44	45	-1

With rating levels indicated to be in line with the night-time background (by 1dB), BS 4142 would indicate this is a low impact, depending on context.

At +3/+8dB during ship movements (day/night), an adverse impact is indicated likely depending on context. Given this is an infrequent event (potential for 2no two-way trips per week), we would suggest this could be modified to adverse impact less likely when considering context (discussed further in Section 7.3).

7.2.2 SSR2 – 1 Darwin Road

Table 7.2 – SSR2 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	38	3	41	45	-4
1a (Normal with Ship Day)	40	3	43	45	-2
1b (Normal with Ship Night)	43	3	46	45	1
2 (Ship Off-loading)	40	3	43	45	-2
3 (Start-up Flare)	39	3	42	45	-3
4 (Emergency Flare)	42	3	45	45	0
5 (Generator Testing, Day)	40	3	43	45	-2

With rating levels indicated to be in line with (by 1dB) or below the night-time background, BS 4142 would indicate this is a low impact, depending on context.

7.2.3 SSR3 – 4 Isaac's Place

Table 7.3 – SSR3 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	39	3	42	40	2
1a (Normal with Ship Day)	39	3	42	49	-7
1b (Normal with Ship Night)	40	3	43	40	3
2 (Ship Off-loading)	42	3	45	40	5
3 (Start-up Flare)	39	3	42	40	2
4 (Emergency Flare)	42	3	45	40	5
5 (Generator Testing, Day)	40	3	43	49	-6

With rating levels indicated up to 3dB above the night-time background, BS 4142 would indicate an adverse impact is less likely, depending on context.

At +5dB during ship off-loading during the night, an adverse impact is indicated depending on context.

At +5dB during emergency flaring during the night, an adverse impact is indicated depending on context. Given this is an emergency event (potential 1 in 10 years), we would suggest an adverse impact is less likely when considering context (discussed further in Section 7.3).

During daytime, rating levels fall below background and therefore a low impact is indicated, depending on context.

7.2.4 SSR4 – 5 Green Park Street

Table 7.4 – SSR4 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	37	3	40	40	0
1a (Normal with Ship Day)	38	3	41	49	-8
1b (Normal with Ship Night)	40	3	43	40	3
2 (Ship Off-loading)	40	3	43	40	3
3 (Start-up Flare)	38	3	41	40	1
4 (Emergency Flare)	41	3	44	40	4
5 (Generator Testing, Day)	39	3	42	49	-7

With rating levels indicated up to 4dB above the night-time background, BS 4142 would indicate an adverse impact is less likely, depending on context.

During daytime, rating levels fall below background and therefore a low impact is indicated, depending on context.

7.2.5 SSR5 – Blanco's Hotel

Table 7.5 – SSR5 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	37	3	40	40	0
1a (Normal with Ship Day)	37	3	40	49	-9
1b (Normal with Ship Night)	38	3	41	40	1
2 (Ship Off-loading)	39	3	42	40	2
3 (Start-up Flare)	37	3	40	40	0
4 (Emergency Flare)	40	3	43	40	3
5 (Generator Testing, Day)	38	3	41	49	-8

With rating levels indicated up to 3dB above the night-time background, BS 4142 would indicate an adverse impact is less likely, depending on context.

During daytime, rating levels fall below background and therefore a low impact is indicated, depending on context.

7.2.6 SSR6 – 21 Station Road

Table 7.6 – SSR6 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	37	3	40	40	0
1a (Normal with Ship Day)	37	3	40	49	-9
1b (Normal with Ship Night)	38	3	41	40	1
2 (Ship Off-loading)	40	3	43	40	3
3 (Start-up Flare)	37	3	40	40	0
4 (Emergency Flare)	39	3	42	40	2
5 (Generator Testing, Day)	39	3	42	49	-7

With rating levels indicated up to 3dB above the night-time background, BS 4142 would indicate an adverse impact is less likely, depending on context.

During daytime, rating levels fall below background and therefore a low impact is indicated, depending on context.

7.2.7 SSR7 – 105 Talbot Road

Table 7.7 – SSR7 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	41	3	44	42	2
1a (Normal with Ship Day)	41	3	44	49	-5
1b (Normal with Ship Night)	41	3	44	42	2
2 (Ship Off-loading)	46	4	50	42	8
3 (Start-up Flare)	41	3	44	42	2
4 (Emergency Flare)	46	3	49	42	7
5 (Generator Testing, Day)	42	3	45	49	-4

With rating levels indicated to up to 2dB above the night-time background, BS 4142 would indicate this is a low impact, depending on context.

At +8dB during ship off-loading during the night, an adverse impact is indicated depending on context (discussed further in Section 7.3).

At +7dB during emergency flaring during the night, an adverse impact is indicated depending on context. Given this is an emergency event (potential 1 in 10 years), we would suggest an adverse impact remains less likely when considering context (discussed further in Section 7.3).

During daytime, rating levels fall below background and therefore a low impact is indicated, depending on context.

7.2.8 SSR8 – 10 Lower West End

Table 7.8 – SSR8 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	43	3	46	52	-6
1a (Normal with Ship Day)	43	3	46	54	-8
1b (Normal with Ship Night)	43	3	46	52	-6
2 (Ship Off-loading)	46	4	50	52	-2
3 (Start-up Flare)	43	3	46	52	-6
4 (Emergency Flare)	46	3	49	52	-3
5 (Generator Testing, Day)	43	3	46	54	-8

Rating levels fall at or below background for all scenarios and therefore a low impact is indicated, depending on context.

7.2.9 SSR9 – 19 St Albans Terrace

Table 7.9 – SSR9 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	40	3	43	46	-3
1a (Normal with Ship Day)	40	3	43	53	-10
1b (Normal with Ship Night)	41	3	44	46	-2
2 (Ship Off-loading)	45	3	48	46	2
3 (Start-up Flare)	40	3	43	46	-3
4 (Emergency Flare)	41	3	44	46	-2
5 (Generator Testing, Day)	41	3	44	53	-9

Rating levels fall at or below background for all scenarios and therefore a low impact is indicated, depending on context.

At +2dB during ship off-loading during the night, an adverse impact is indicated less likely depending on context.

7.2.10 SSR10 – 21 Duke Street

Table 7.10 – SSR10 Impact Assessment

Scenario	Predicted L_{Aeq} (dB)	Rating Penalty	Rating Level L_{Ar} (dB)	Background L_{A90} (dB)	Excess over Background (dB)
1 (Normal Operation)	35	3	38	46	-8
1a (Normal with Ship Day)	35	3	38	53	-15
1b (Normal with Ship Night)	36	3	39	46	-7
2 (Ship Off-loading)	39	3	42	46	-4
3 (Start-up Flare)	35	3	38	46	-8
4 (Emergency Flare)	36	3	39	46	-7
5 (Generator Testing, Day)	35	3	38	53	-15

Rating levels fall below background for all scenarios and therefore a low impact is indicated, depending on context.

7.2.11 SSR11 – Magistrates Court

Absolute levels of 42-44dB $L_{Aeq,1hr}$ daytime are predicted outside the Magistrates Court. Existing daytime background sound levels measured at this location were 51dB $L_{A90,15mins}$ with existing daytime ambient levels at 53-54dB $L_{Aeq,15mins}$.

Although not a residential receptor, BS 4142 would assess this as a low impact depending on context.

With absolute levels well below existing ambient levels, a low impact is indicated at this receptor location.

7.2.12 Designated Quiet Areas

As highlighted in Section 2.3.2 of this report, Talbot Memorial Park and Vivian Park are designated quiet areas in NPT CBC local policy.

Predicted levels to Talbot Memorial Park are in the range 38-42dB $L_{Aeq.1hr}$ Existing daytime background sound levels at Position 9 adjacent to the rear of Talbot Memorial Park were around 53-54dB $L_{A90,15mins.}$ Predicted levels to Vivian Park are in the range 31-34dB $L_{Aeq,1hr.}$ Existing daytime background sound levels at Position 8 adjacent to Vivian Park entrance were around 41-42dB $L_{A90,15mins}$.

Therefore with predicted levels falling well below existing background sound levels, the development proposal is not indicated to have unacceptable impacts on the designated quiet areas.

7.3 Context

Referring to Section 11 of BS 4142 (quoted in 2.5 of this report), the following section outlines the context:

7.3.1 Absolute Sound Levels

Absolute sound levels from the operations are indicated to fall at or below 45dB L_{Aeq} externally for the majority of scenarios at all receptors, with exception of scenarios/receptors outlined below.

Through a partially open window, this would equate to 30dB (assuming a 15dB loss) which is in line with desirable level inside bedrooms at night quoted in BS 8233:2014, quoted in Section 2.6 of this report.

During the emergency flaring and ship off-loading scenarios, levels of up to 46dB L_{Aeq} are indicated at SSR7 and SSR8. At these levels, through a partially open window, this marginally exceeds the 30dB level however falls in the range between desirable and reasonable inside bedrooms (30-35dB L_{Aeq}) in line with BS 8233:2014.

For the ship pass-by at night, an $L_{Aeq,15min}$ of up to 50dB is predicted at SSR1 (Mariners Point) however these are infrequent (up to 2no two-way trips per week).

Outcome: No modification of impact due to absolute noise sound levels.

7.3.2 Character of Specific Sound Level

BS4142 advises: "*Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound.*"

At this stage, it is envisaged that a tonal component to the sound could be just perceptible at the receptors in the existing sound climate (+2dB, however +3dB used in assessments).

Based on sample measurements of the ship off-loading, tonality could be clearly perceptible at receptors around $\leq$ 600m away (+4dB).

This has been accounted for in the character correction in the initial numerical assessment.

Outcome: No modification of impact due to character.

7.3.3 Character of a Particular Neighbourhood

The proposed site is located on the Port Talbot Docks adjacent to Tata Steel and Hanson Cement, both of which operate 24/7.

Receptors are therefore located near to a well-established industrial area and have an industrial noise component in their existing sound climate.

Outcome: No modification of impact due to character of neighbourhood.

7.3.4 Emergency Flaring

It is not uncommon for higher limits to be permissible during emergency scenarios. The emergency flaring is not a typical part of the operations. It is estimated this event could potentially happen 1 in 10 years.

It is also understood that during this state of emergency, the flare noise levels would likely fall to those in line with the start-up flaring after around 30mins.

Outcome: Modification of impact due to likely occurrence to adverse impact less likely at SSR3.

7.3.5 Ship Movement

We understand that only 2no two-way ship movements are indicated to occur per week.

Outcome: Modification of impact at SSR1 due to likely occurrence to adverse impact less likely.

7.3.6 Ship Off-loading

It is understood the ship off-load process can take up to 18hrs.

Ship pumps off-loading during the night have the potential to cause an adverse impact at SSR3 and SSR7. It is understood this would occur once every 7-14 days.

It should be noted that the ship pumps are not in control of the applicant and an element of ship activity around a well-established port is to be expected.

Outcome: No modification of impact due – remains an adverse impact at SSR3 and SSR7.

7.4 Uncertainty

7.4.1 Background Sound Levels

All reasonable measures were employed to minimise the uncertainty in measuring and assessing the background sound levels at the nearest Sound Sensitive Receivers:

- Long-term monitoring was carried out at 3 positions representative of SSRs to the west, north and east of the site. Long-term monitoring was carried out over a week-long period in order to capture a range of background sound levels.
- Long-term monitoring was supplemented by daytime and night-time sample measurements at intermediate positions.
- Type 1 / Class 1 sound level meters were used in the noise monitoring. Measurement systems were calibrated before and after the surveys and no variation occurred.
- Meteorological conditions were recorded during the monitoring. Data used in the analysis of background sound levels omitted any adverse weather conditions that occurred during the latter part of the survey.
- Measured background sound levels were statistically analysed in accordance with BS 4142. For a robust assessment the lowest consistent L_{A90} values were selected.

Uncertainty in background sound levels is therefore assessed as low.

7.4.2 Noise Prediction and Impact Assessment

There is a degree of uncertainty in the source noise data used in the modelling as the scheme is not yet fully designed, and the full plant noise data is not currently available. All plant modelled is discussed in Section 6.1 and fully listed in Appendix C.

The following steps have therefore been taken to minimise the uncertainty insofar as is possible:

- Significant sources – Flare, Cooling Towers – noise levels have been confirmed by the project engineering team, Technip Energies (TE)
- Noise measurement of similar ship unloading activities undertaken at representative site and used to calibrate noise model
- Noise limits for other plant are based on single-figure limits provided by TE, with spectra shapes taken from the Predictor database

- Noise model follows the procedures of ISO 9613
- Noise sources have been calibrated to near-field positions in the model to validate the far-field receivers

The source data input in the model effectively becomes limits for plant for suppliers to quote against at the detailed engineering design stage of the scheme.

8. CONCLUSION

A planning stage noise impact assessment has been carried out for Project DRAGON at Land at Crown Wharf in Port Talbot.

A baseline noise survey was undertaken by Hunter Acoustics Ltd and is detailed in full in report 6387/ENS1_Rev1 dated 15/05/2023.

Nearest sound sensitive receptors have been identified in each direction from the site.

Three-dimensional modelling has been carried out using Predictor v2023 which in turn uses methodology of ISO 9613.

Input data for the model has been provided by the project engineering team (Technip Energies) however at planning stage, it has been necessary to set limits for some items of plant based on information provided. Sample measurements of representative ship activities have also been measured to reduce uncertainty in the modelling.

Overall, noise impact at surrounding receptors identified is considered low to adverse impact less likely when assessed in accordance with BS 4142 with exception of ship off-loading activities where an adverse impact is indicated at SSR3 and SSR7.

APPENDIX A - ACOUSTIC TERMINOLOGY

Human response to noise depends on a number of factors including loudness, frequency content and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'.

The following units have been used in this report:

dB(A)	The sound pressure level A-weighted to correspond with the frequency response of the human ear and therefore a persons' subjective response to frequency content.
L_{eq}	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L_{max}	The highest instantaneous sound level recorded during the measurement period.
L_{10}	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1 hour measurement - used as a measure of background noise.
L_{90}	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1 hour measurement - used as a measure of background noise.
$L_{Ar,Tr}$	The 'rating' level, as described in BS 4142:2014 – the specific noise plus any adjustment for the characteristic features of the noise.
SSR	Sound sensitive receiver

APPENDIX B - DIAGRAMS, GRAPHS AND TABLES

Figure B.1 – Site Plan Showing Monitoring Locations and Sound Sensitive Receptors

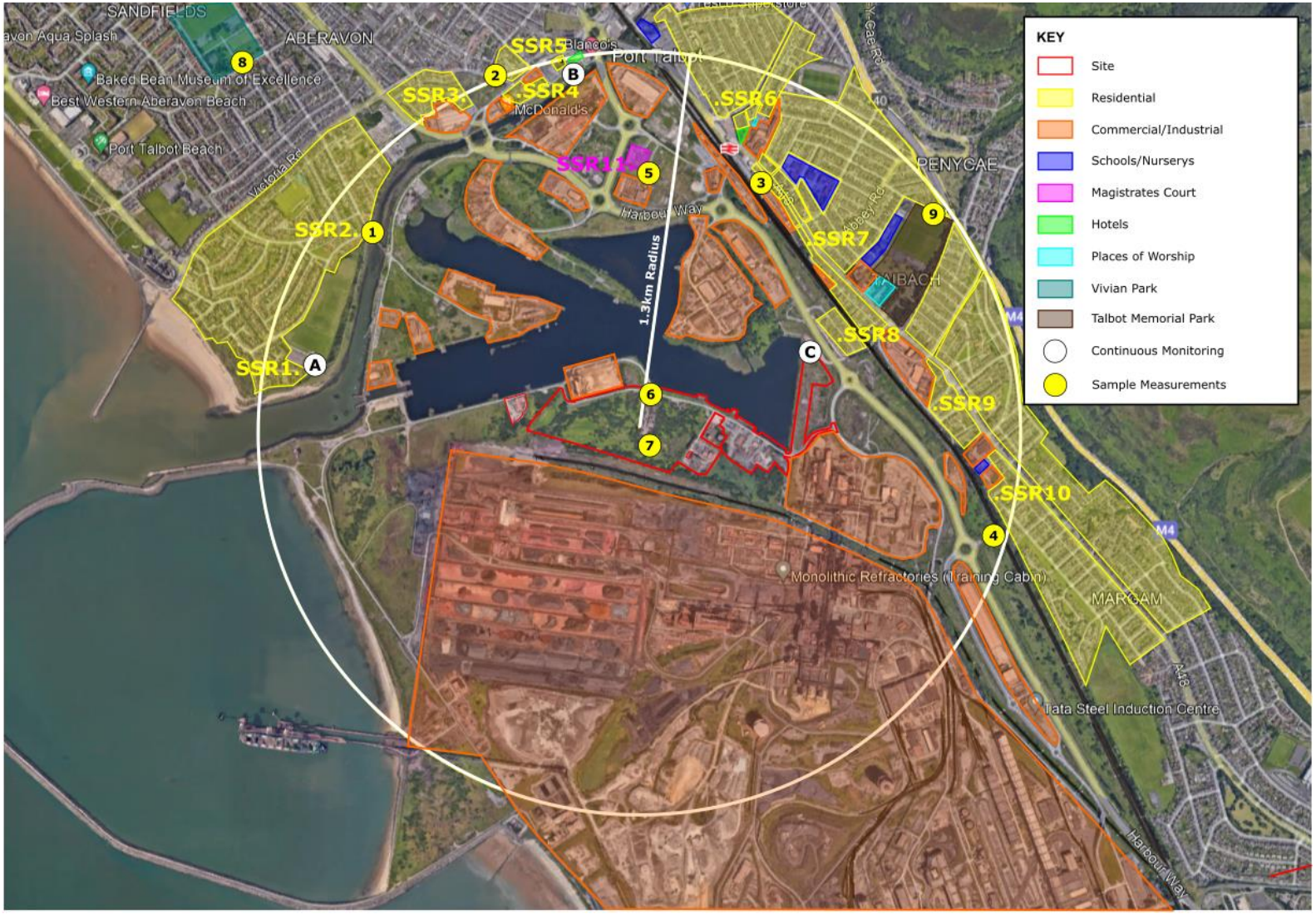


Table B.1 – Source Sample Measurement Results including Octave Band Spectra

Pos	Description	Duration (secs)	Distance (m)	Height (m)	L_{Aeq} (dB)	$L_{AMax,F}$ (dB)	L_{eq} at Octave Band Centre Frequencies (dB)							
							63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
1	20m from side rear, engine running	15	20	1.5	67.2	68.4	87.1	73.3	69.7	65.3	59.5	53.5	46.9	37.7
-	30m from rear of ship, engine running	20	30	1.5	65.6	66.6	81.0	70.4	66.4	64.6	59.4	54.8	47.7	38.5
3	40m from rear of ship, engine running	32	40	1.5	65.1	67.1	79.7	72.0	65.9	63.7	59.5	54.1	47.1	37.0
4	90m from rear of ship, engine running	30	90	1.5	59.8	61.1	75.6	67.3	60.8	58.6	53.7	46.9	38.5	28.4
1	20m from ship, engine dropped	10	20	1.5	61.4	63.4	80.0	71.2	65.3	58.4	53.3	49.2	42.8	32.4
1	20m from ship, engine off, generators only	22	20	1.5	56.9	63.1	66.7	66.8	61.0	54.0	49.3	45.4	40.4	28.6
-	9m from side of ship, approx. 16m to pumps	31	16	1.5	67.3	69.1	73.4	71.2	69.7	63.2	59.6	60.9	53.0	47.5
3	35m from rear of ship, provides screening to pumps	33	35	1.5	61.5	62.9	66.2	65.7	62.8	61.1	56.1	49.9	40.9	31.4
4	94m from rear of ship	31	94	1.5	54.8	56.5	59.3	60.6	55.6	52.6	50.1	44.5	34.6	26.6

-	125m from rear of ship	30	125	1.5	54.4	55.7	63.2	65.5	55.3	53.3	48.1	43.2	32.5	24.5
-	24m from side of ship, 3x pumps running	33	24	1.5	62.5	63.9	72.5	74.0	62.4	61.3	54.7	52.5	44.7	36.3
-	8m from side of ship, 15m to pumps	12	15	3	68.7	69.7	75.4	75.4	68.6	66.2	63.5	60.7	51.9	46.6
7	Mountbatten Centre, pumps audible	73	~600	1.5	34.7	37.3	51.6	44.8	34.9	32.1	26.9	23.2	16.6	16.4
6	3 Boringdon Terrace, pumps clearly audible, tonal	43	~330	1.5	47.3	50	53.4	53.4	43.8	47.6	40.7	38.3	27.0	17.4
6	4 Boringdon Terrace, pumps clearly audible, tonal	18	~330	1.5	47.6	49.5	53.2	51.4	44.5	47.9	41.2	39.4	26.4	16.5
5	South West Coast Path, from rear of ship, pumps audible, tonal	38	560	1.5	42.5	44.9	52.5	50.4	42.3	43.8	35.0	28.8	20.2	16.4
5	South West Coast Path, from rear of ship, pumps audible, tonal	31	560	1.5	41.9	43.9	53.5	52.1	40.0	43.2	34.1	27.8	18.4	16.2

APPENDIX C - NOISE MODELLING

C.1 Noise Model Input Data

Table C.1 – Mobile Plant Sound Power Noise Data Used in Model

Plant Item / Activity	Height	L_{wA} at Octave Band Centre Frequencies, Hz (dB)								L_{wA}
	(m)	63	125	250	500	1000	2000	4000	8000	(dB)
HGV on site (<20km/h)	1	79	88	92	97	100	98	91	94	104
Ship	5	97	98	99	103	101	95	87	74	107
LGV/cars on site (<20km/h)	0.75	69	76	78	81	84	84	78	71	89

Table C.2 – Fixed Plant Sound Power Noise Data Used in Model

Plant Item / Activity	Max Height	L_{wA} at Octave Band Centre Frequencies, Hz (dB)								L_{wA}
	(m)	63	125	250	500	1000	2000	4000	8000	(dB)
Heat Exchanger HE-1351*	10.5	92	98	92	91	80	77	73	69	91
Heat Exchanger HE-1451*	6.5	92	98	92	91	80	77	73	69	91
Heat Exchanger HE-1511*	10.5	92	98	92	91	80	77	73	69	91
Heat Exchanger HE-2401*	7.5	92	98	92	91	80	77	73	69	91
Heat Exchanger HE-2605*	6.5	92	98	92	91	80	77	73	69	91
Heat Exchanger HE-2200	18.5	72	80	90	93	87	85	77	62	96
Heat Exchanger HE-2403	18.5	72	80	90	93	87	85	77	62	96
Heat Exchanger HE-2650	18.5	72	80	90	93	87	85	77	62	96
Heat Exchanger HE-2750	6.5	67	75	85	88	82	80	72	57	91
Heat Exchanger HE-2760	6.5	67	75	85	88	82	80	72	57	91
Heat Exchanger HE-4011	8	67	75	85	88	82	80	72	57	91
Heat Exchangers HE-5451, HE-5452	8	67	75	85	88	82	80	72	57	91
Heat Exchangers HE-7301, HE-7310, HE-7311	8	67	75	85	88	82	80	72	57	91

Pump P-1112A/B	27.5	64	79	85	88	89	86	82	78	94
Pump P-1120A/B	2.5	59	74	80	83	84	81	77	73	89
Pump P-1132A/B	2.5	64	79	85	88	89	86	82	78	94
Pump P-1362A/B	16	59	74	80	83	84	81	77	73	89
Pump P-1453A/B	3	64	79	85	88	89	86	82	78	94
Pump P-1462A/B	12	59	74	80	83	84	81	77	73	89
Pump P-1522/A/B	25	59	74	80	83	84	81	77	73	89
Pump P-1532A/B	12	64	79	85	88	89	86	82	78	94
Pump P-1540A/B	4	59	74	80	83	84	81	77	73	89
Pump P-1612/A/B	25	59	74	80	83	84	81	77	73	89
Pump P-1652/A/B	0.5	59	74	80	83	84	81	77	73	89
Pump P-1811A/B	2.5	59	74	80	83	84	81	77	73	89
Pump P-1821A/B	2.5	64	79	85	88	89	86	82	78	94
Pump P-2120A/B	1	64	79	85	88	89	86	82	78	94
Pumps P-2211A/B	1	64	79	85	88	89	86	82	78	94
Pumps P-2302A/B	1	64	79	85	88	89	86	82	78	94
Pumps P-2340A/B	1	64	79	85	88	89	86	82	78	94
Pump P-2402A/B	1	64	79	85	88	89	86	82	78	94
Pump P-2421A/B	4	59	74	80	83	84	81	77	73	89
Pump P-2453A/B	1	64	79	85	88	89	86	82	78	94
Pump P-2481A/B	1	64	79	85	88	89	86	82	78	94
Pump P-2490A/B	1	59	74	80	83	84	81	77	73	89
Pump P-2602A/B	1	64	79	85	88	89	86	82	78	94
Pump P-2603	1	59	74	80	83	84	81	77	73	89
Pump P-2662A/B	4	59	74	80	83	84	81	77	73	89
Pump P-2672A/B	1	64	79	85	88	89	86	82	78	94
Pump P-2711A/B	8	59	74	80	83	84	81	77	73	89
Pump P-4251A/B	3	59	74	80	83	84	81	77	73	89
Pump P-4530A/B	3	64	79	85	88	89	86	82	78	94
Pump P-4540A/B/C	3	64	79	85	88	89	86	82	78	94
Pump P-4601A/B/C	3	64	79	85	88	89	86	82	78	94

Pump P-4610A/B	3	64	79	85	88	89	86	82	78	94
Pump P-4710A/B*	3	111	110	99	88	81	79	77	74	97
Pump P-4740A/B	3	64	79	85	88	89	86	82	78	94
Pump P-5011A/B	3	64	79	85	88	89	86	82	78	94
Pump P-5030A/B	3	64	79	85	88	89	86	82	78	94
Pump P-5030A/B	3	64	79	85	88	89	86	82	78	94
Pump P-5401	3	64	79	85	88	89	86	82	78	94
Pump P-5460A/B	3	64	79	85	88	89	86	82	78	94
Pump P-5500	3	59	74	80	83	84	81	77	73	89
Pump P-5510A/B	3	64	79	85	88	89	86	82	78	94
Pump P-5671A/B	3	64	79	85	88	89	86	82	78	94
Pump P-5800	3	59	74	80	83	84	81	77	73	89
Pump P-5810A/B	3	59	74	80	83	84	81	77	73	89
Pump P-6020A/B	3	64	79	85	88	89	86	82	78	94
Pump P-6110A/B	3	64	79	85	88	89	86	82	78	94
Pump P-6170A/B	3	59	74	80	83	84	81	77	73	89
Pump P-6420A/B	3	64	79	85	88	89	86	82	78	94
Pump P-6480A/B	3	64	79	85	88	89	86	82	78	94
Pump P-6450A/B	3	64	79	85	88	89	86	82	78	94
Pump P-6601A/B	3	64	79	85	88	89	86	82	78	94
Pump P-6911A/B	3	64	79	85	88	89	86	82	78	94
Pump P-6912A/B	3	64	79	85	88	89	86	82	78	94
Pump P-7001A/B	3	64	79	85	88	89	86	82	78	94
Pump P-7151A/B	3	64	79	85	88	89	86	82	78	94
Pump P-7951A/B	3	64	79	85	88	89	86	82	78	94
Pump P-7961A/B	3	64	79	85	88	89	86	82	78	94
Vacuum Pump Package Z-2680	12	64	79	85	88	89	86	82	78	94
Air Compressor Package Z-3500 / Z-3520	4	79	84	86	88	88	85	79	72	94
Liquid Nitrogen Package Z-3750	12	79	84	86	88	88	85	79	72	94

Hydrogen Generation Package Z-4300	20	74	79	81	83	83	80	74	67	89
Treatment Package Z-4510	4	64	79	85	88	89	86	82	78	94
Cooling Tower Z-4700 - Outlet	6.9	81	89	91	91	93	92	90	87	99
Cooling Tower Z-4700 – Casing	6.9	85	88	84	80	76	70	74	55	91
Cooling Tower Z-4700 – Inlet	2	76	85	88	95	99	101	102	100	107
Package Z-4760	3	85.8	84.7	76	76.5	77.6	74.1	67.5	59.3	81.3
Package Z-5000, Z-5020	8	59	74	80	83	84	81	77	73	89
Dosing System Z-5050	6	59	74	80	83	84	81	77	73	89
Boiler Package Z-5100	4.4	79	84	83	81	84	89	84	79	93
Boiler Package Z-5100 Stack	40	79	84	83	81	84	89	84	79	93
Boiler Package Z-5200	4.4	90	96	90	89	78	75	71	67	89
Package Z-7450	4	79	84	86	88	88	85	79	72	94
Ground Package Z-7460 Flare Burners 238m^2 area (emergency)	2	89	96	104	113	110	110	111	117	120
Ground Package Z-7460 Flare Top 238m^2 area (emergency)	20	84	90	99	107	105	104	106	111	115
Package Z-7910	6	79	84	86	88	88	85	79	72	94
Emergency Diesel Gen1 (A15)	4	83	90	102	101	103	100	91	80	108
Emergency Diesel Gen2 (A17)	4	83	90	102	101	103	100	91	80	108
Emergency Diesel Gen3 (A18)	4	83	90	102	101	103	100	91	80	108
Compressor House 1 Louvre Area (5m x 10m)	10	84	89	91	93	93	90	84	77	99
Compressor House 2 Louvre Area (5m x 10m)	10	84	89	91	93	93	90	84	77	99
Ship pumps (x6, levels per pump)	5	74	89	95	98	99	96	92	88	104

** Denotes z-weighted spectra.*

C.2 Noise Model Scenarios

Table C.3 – Daytime Modelled Scenarios (Worst Case 1hr period)

No	Details	All General Plant	Ground Flare	Diesel Generators	Ship Movement	HGVs	LGVs / Cars
1	Normal Operation (no ship movement)	On 100%	Off	Off	No	4no, 20km/h on site	52no, 20km/h on site
1a	Normal Operation (with ship movement)	On 100%	Off	Off	1no, 7km/h	4no, 20km/h on site	52no, 20km/h on site
2	Normal Operation (ship off-loading to site)	On 100%	Off	Off	No, but 6no pumps on ship running at jetty	4no, 20km/h on site	52no, 20km/h on site
3	Start-up Flaring	On 100%	Start-up Duty	Off	No	4no, 20km/h on site	52no, 20km/h on site
4	Emergency	On 100%	Emergency Duty	Off	No	4no, 20km/h on site	52no, 20km/h on site
5	Back-up Generator Testing	On 100%	Off	On 50% (30min test)	No	4no, 20km/h on site	52no, 20km/h on site

Table C.4 – Night-time Modelled Scenario (Worst Case 15min Period)

No	Details	All General Plant	Ground Flare	Diesel Generators	Ship Movement	HGVs	LGVs / Cars
1	Normal Operation (no ship movement)	On 100%	Off	Off	No	1no, 20km/h on site	13no, 20km/h on site
1b	Normal Operation (with ship movement)	On 100%	Off	Off	1no, 7km/h	1no, 20km/h on site	13no, 20km/h on site
2	Normal Operation (ship off-loading to site)	On 100%	Off	Off	No, but 6no pumps on ship running at jetty	1no, 20km/h on site	13no, 20km/h on site
3	Start-up Flaring	On 100%	Start-up Duty	Off	No	1no, 20km/h on site	13no, 20km/h on site
4	Emergency	On 100%	Emergency Duty	Off	No	1no, 20km/h on site	13no, 20km/h on site

Note: Scenarios 1, 2, 3 & 4 are effectively the same for daytime and night-time as plant runs continuously and the expected vehicle movements over the daytime one-hour assessment period are divided by 4 for the night-time 15minute assessment period which is considered reasonable.

As the modelling software references a one-hour assessment period, the model input includes for 4no ship movements over an hour to equate to the 1no potential ship movement in a 15minute period shown in the scenario table above. For reference, only 2no two-way ship movements are anticipated per week.

C.3 Noise Model 3D Views

Figure C.1 – 3D Model of Proposed Site and Surrounding Area

Figure C.2 – 3D Model of Proposed Site

C.4 Noise Model Contour Plots

Figure C.3 – Scenario 1 Daytime/Night-time Noise Model $L_{Aeq,1hr}$ / $L_{Aeq,15mins}$ Contours at 4.5m Height (Typical Operation)

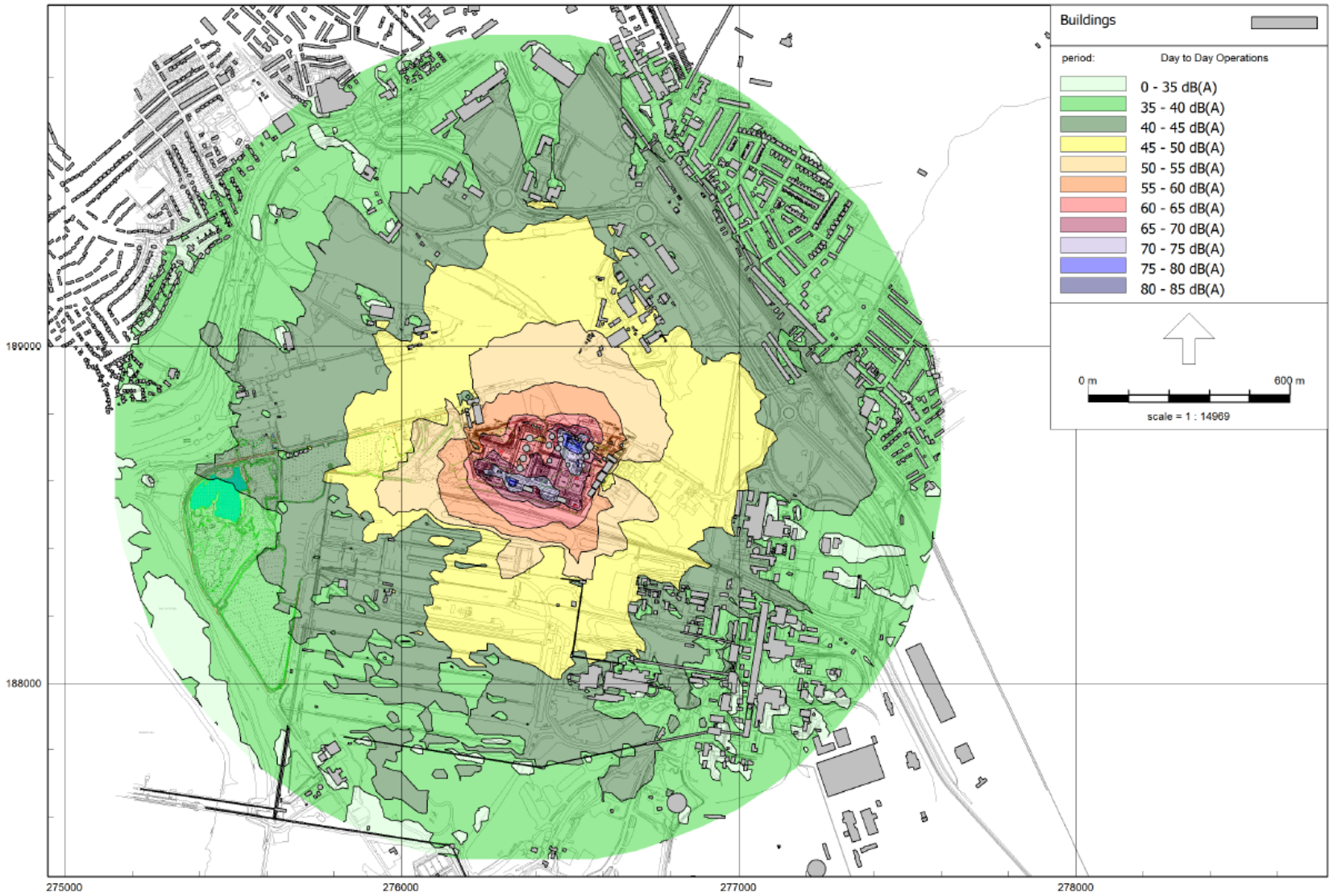


Figure C.4 – Scenario 1a Daytime Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height (with Ship Movement)

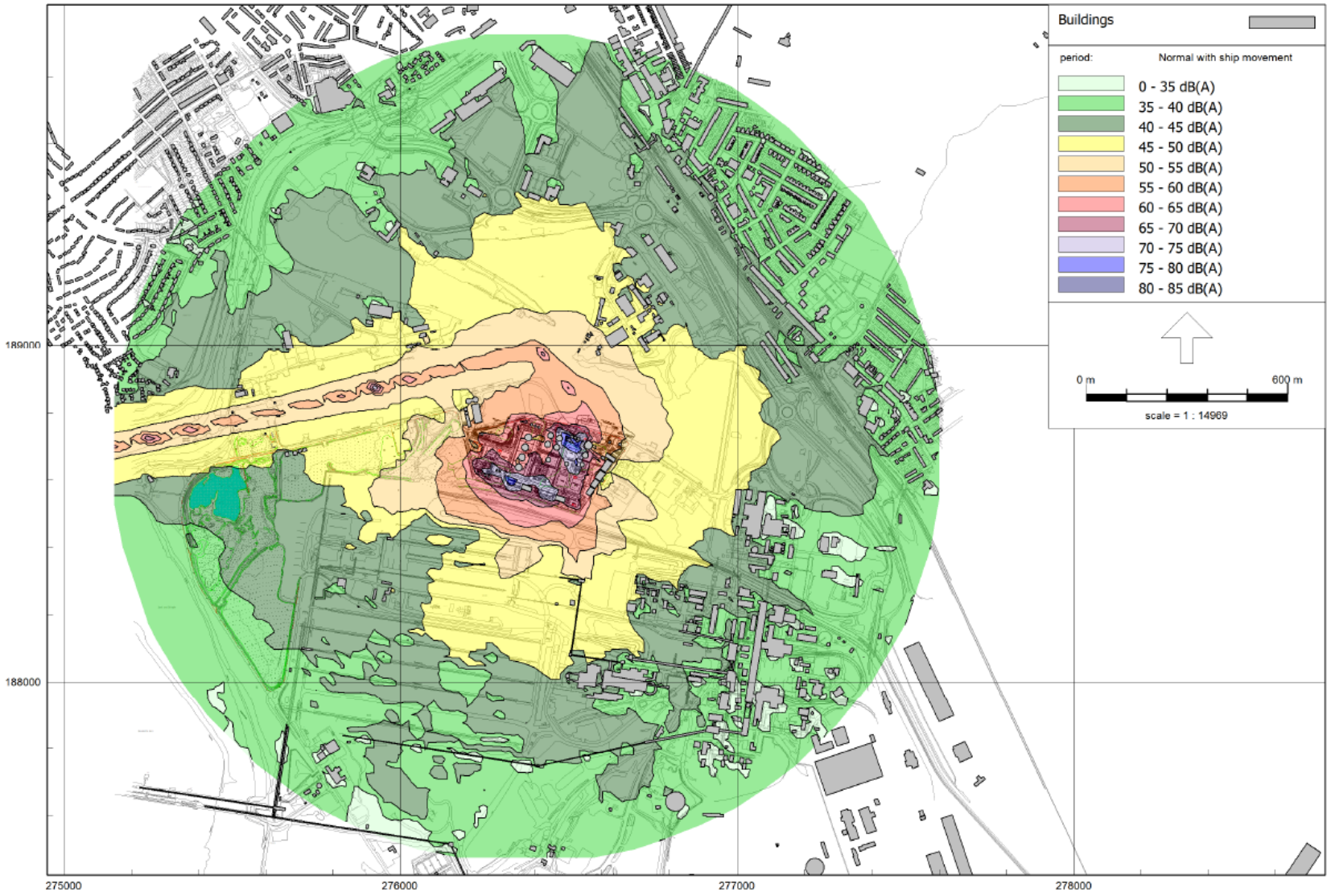


Figure C.5 – Scenario 2 Daytime/Night-time Noise Model $L_{Aeq,1hr}$ / $L_{Aeq,15mins}$ Contours at 4.5m Height (Ship Off-loading to Site)

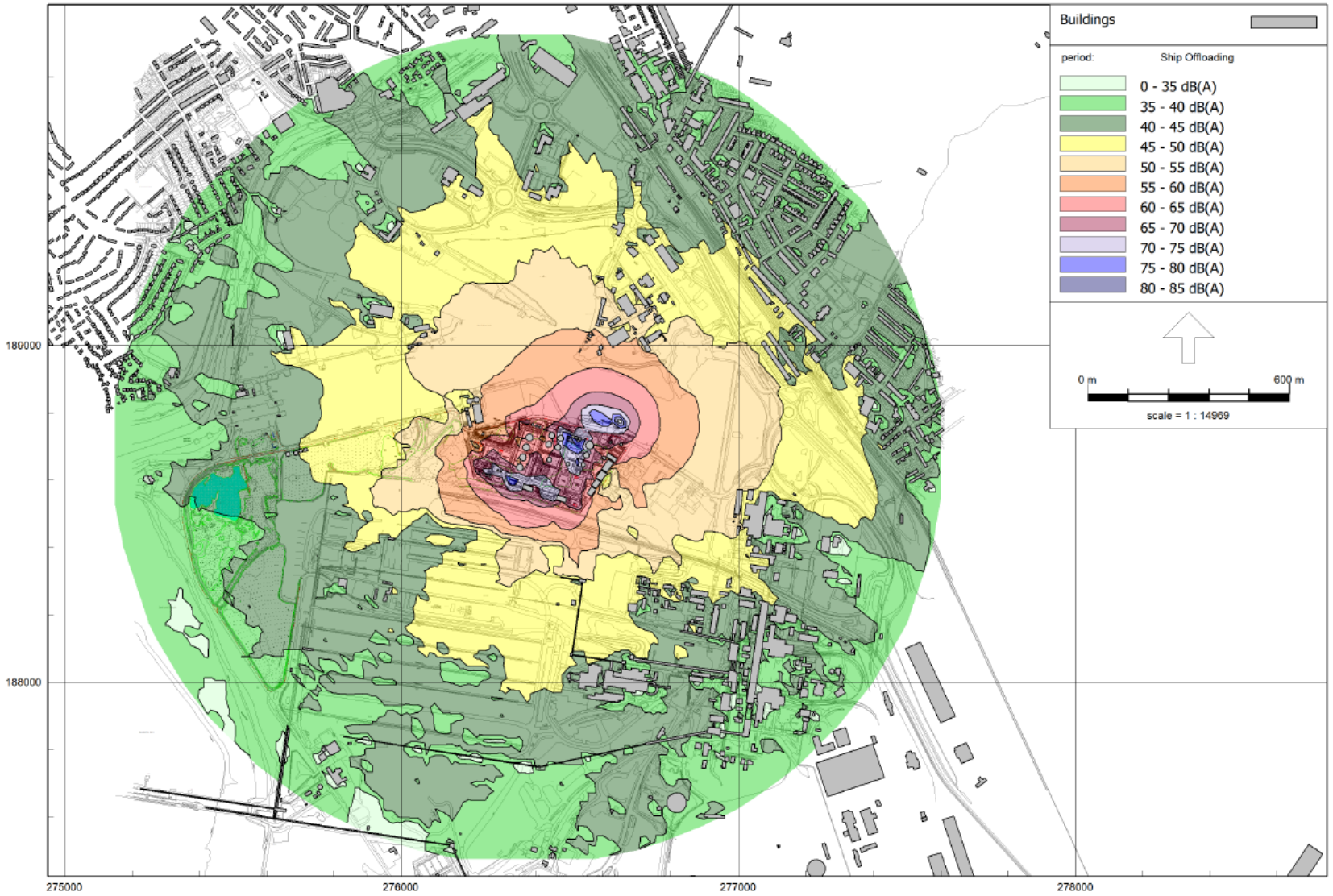


Figure C.6 – Scenario 3 Daytime/Night-time Noise Model $L_{Aeq,1hr}$ / $L_{Aeq,15mins}$ Contours at 4.5m Height (Start-up Flaring)

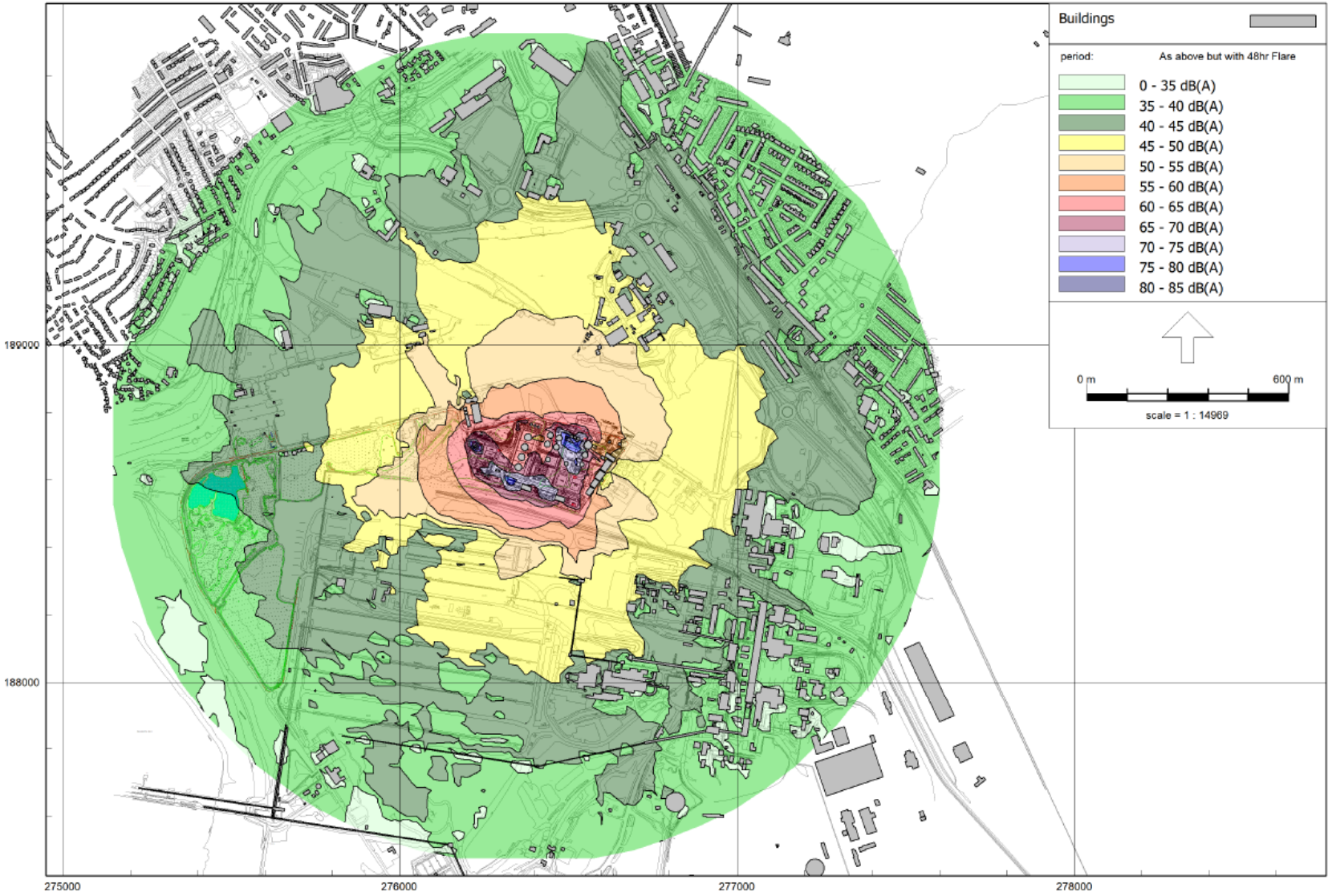


Figure C.7 – Scenario 4 Daytime/Night-time Noise Model $L_{Aeq,1hr}$ / $L_{Aeq,15mins}$ Contours at 4.5m Height (Emergency Flaring)

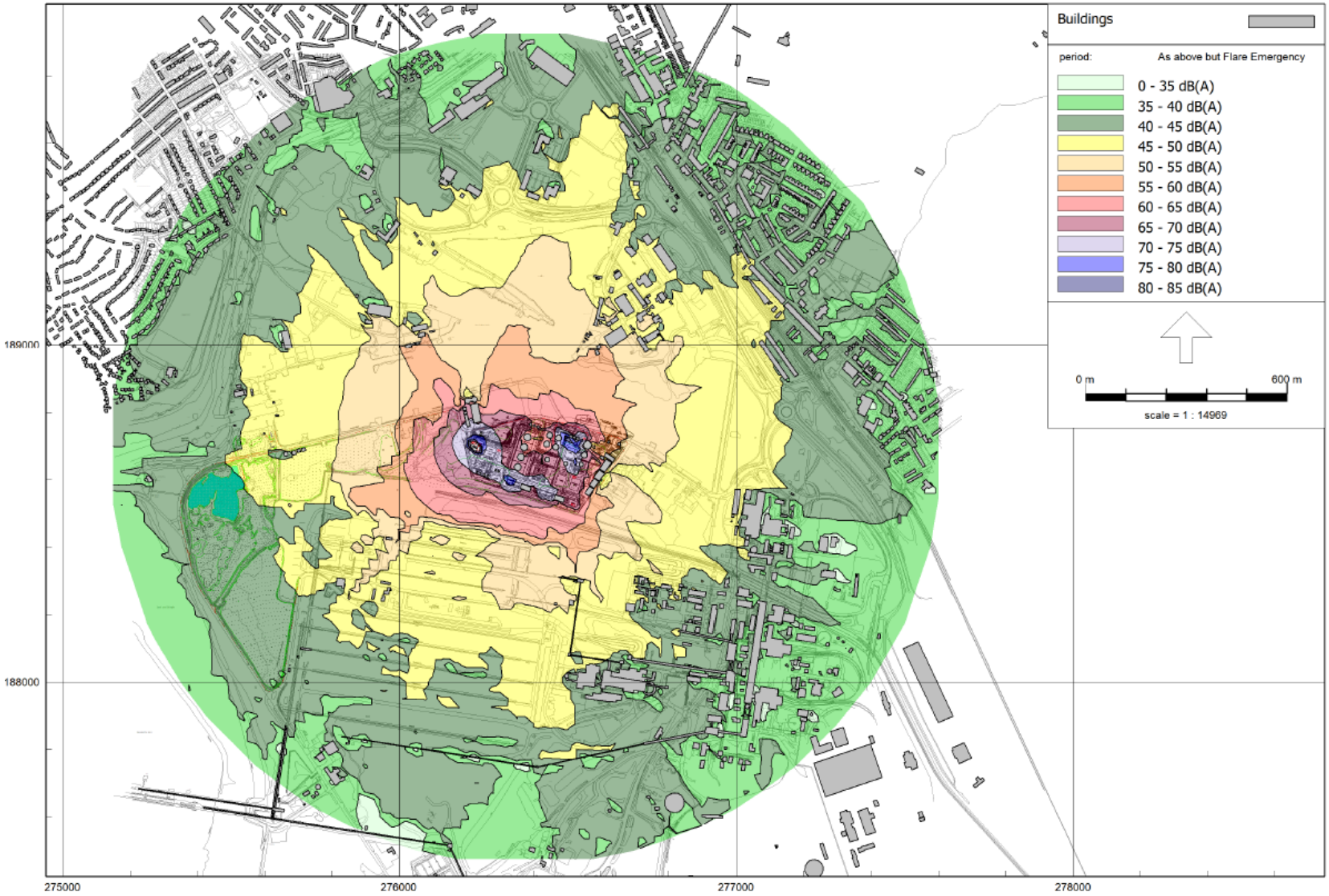


Figure C.8 – Scenario 5 Daytime Noise Model $L_{Aeq,1hr}$ / $L_{Aeq,15mins}$ Contours at 4.5m Height (Back-up Generator Testing)

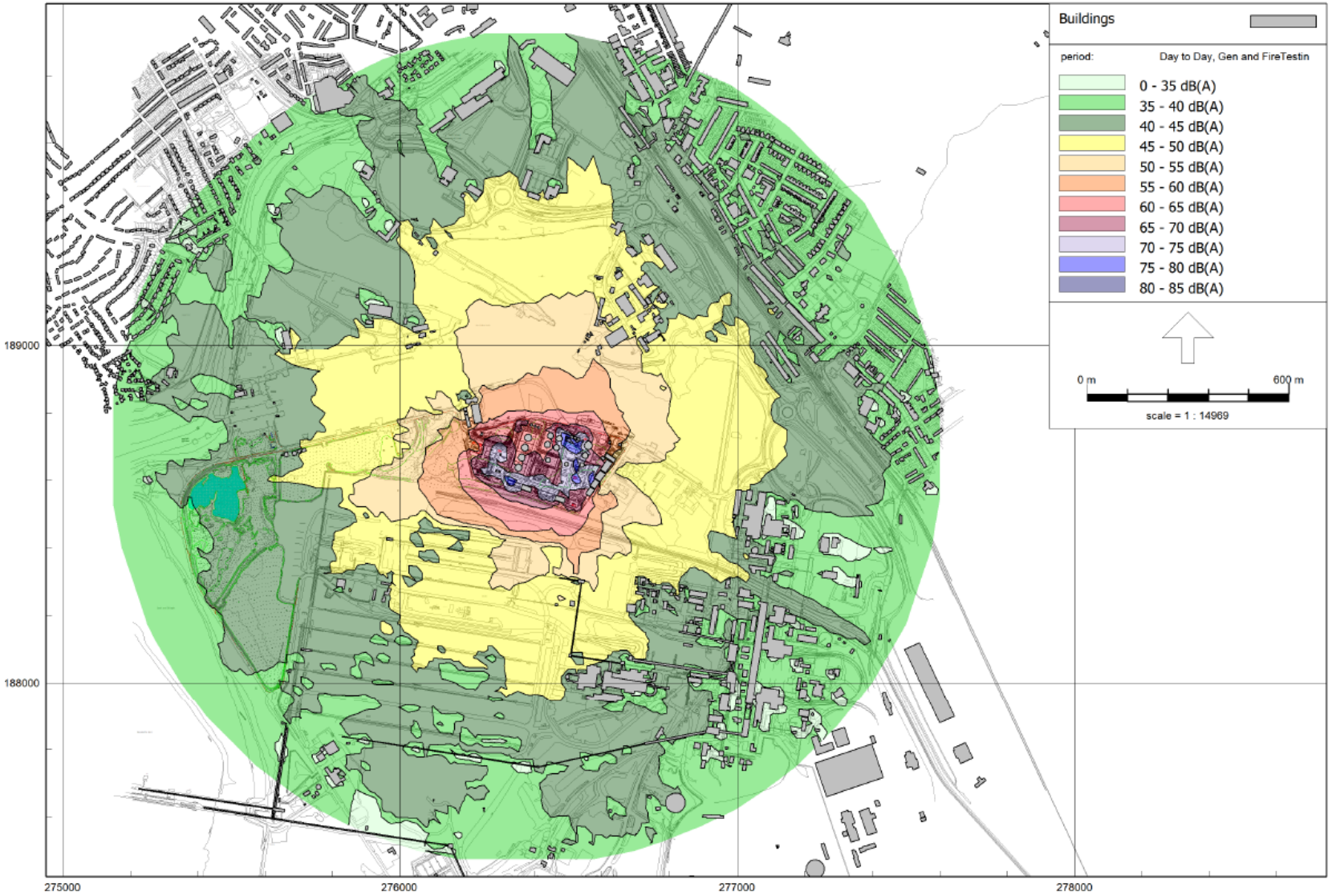
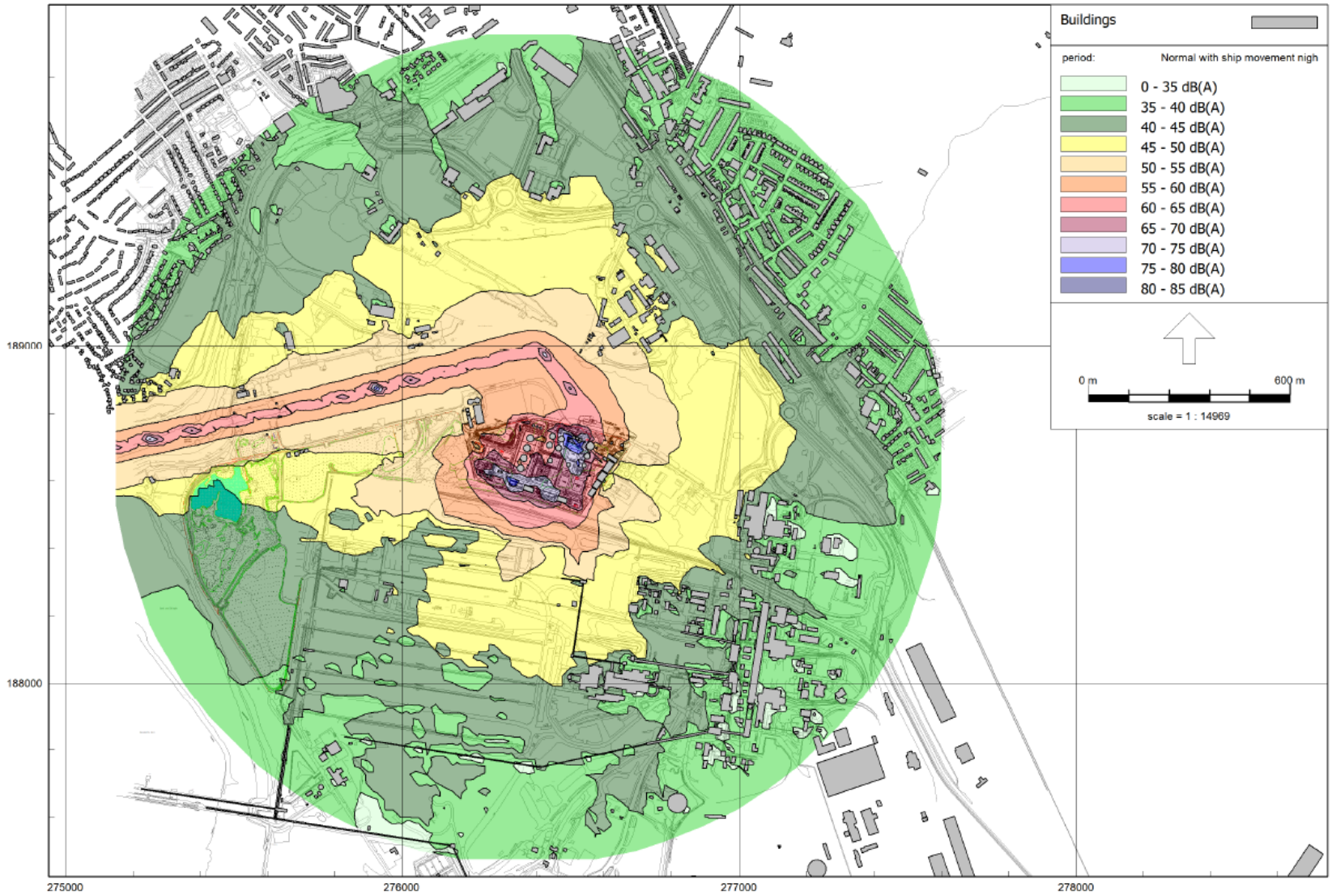


Figure C.9 – Scenario 1b Night-time Noise Model $L_{Aeq,15min}$ Contours at 4.5m Height (with Ship Movement)



APPENDIX D - DRAWING LISTS

The following Technip Energies drawings and documents have been used in our assessment;

Table D.1 – Drawing & Documents List

Drawing Title	Drawing Number	Rev	Date
Noise Source Schedule & Report	202947C-050-NM-6000-00001	2	20/05/2023
Overall Plot Plan	202947C-050-DW-0051-00001	3	11/05/2023
ATJ Unit Plot Plan (Process Area)	202947C-050-DW-0051-00001	2	11/05/2023

Hunter ACOUSTICS

Independent Acoustic Consultancy Practice

Construction Noise Assessment

Project DRAGON
Port Talbot

6387/CNA1_DRAFT4

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Construction Noise Assessment

Project:	**Project DRAGON**
Site Address:	Land at Crown Wharf Port Talbot
HA Reference:	6387/CNA1_DRAFT4
Date:	11/08/2023
Client:	LanzaTech c/o Turley 18 Windsor Place Cardiff CF10 3BY
Contact:	jadine.berry@turley.co.uk

ISSUE / REVISION

Rev	Date			
-	11 August 2023	**Filename**	23.6929_CNA1_Draft4	
		Description	Draft for comment	
			Prepared by:	**Checked by:**
		Name	Meirion Townsend BSc(Hons) MIOA	Paul McGrath BSc(Hons) MIOA
		Signature		

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TABLE OF CONTENTS

1. INTRODUCTION

A new industrial development known as Project DRAGON is proposed on Land at Crown Wharf, Port Talbot Docks.

The Proposed Scheme is to comprise a new facility for the production of sustainable aviation fuel (SAF) using "LanzaJet^{TM} ATJ technology" [ATJ] and processes developed and licenced by the Applicant.

A construction noise impact assessment has been carried out as part of an Environmental Statement (ES) to be submitted in support of a forthcoming planning application. Furthermore, this construction noise impact assessment is intended to be submitted as a technical appendices to the ES and therefore should be read in conjunction with the ES.

It should be noted that a further operational noise impart assessment has been completed and submitted separately.

A baseline noise survey has been carried out and is included in Hunter Acoustics report 6387/ENS1_Rev1 dated 15/05/2023, also provided as a technical appendix to the submitted ES.

This report has therefore been commissioned to estimate likely noise levels from proposed construction activities and plant, allowing an assessment of the impact to be made.

1.1 Pre-application Discussions

Pre-application consultation was undertaken with the Local Planning Authority's acoustician (Red Twin Limited) and Natural Resources Wales (NRW) as set out below:

Date	Consultation	Summary
14th June 2022	Hunter Acoustics (HA) Letter	HA note on assessment methodology and receptor locations
8th July 2022	Red Twin (RT) Limited Technical Note	Response to methodology. Broadly agreed however additional receptor locations including 'quiet areas' identified in the LDP highlighted as well as request for assessment to Mumbles to be scoped, as well baseline survey to be conducted at different times of the year.
22nd July 2022	HA Letter	Rebuttal of request for assessment to Mumbles due to distance (13km) and critical receptors much closer and also of repeating baseline surveys at different times of the year
25th May 2023	Teams Meeting (HA, NPT, RT, NRW, Turley, LanzaTech)	Methodology of assessment and scenarios to be modelled discussed. HA and LanzaTech explained change to enclosed ground flare, demonstrating good acoustic design. Red Twin confirmed they had not received Scoping Report at this stage.
2nd June 2023	HA email to Red Twin / NPT	Request for feedback on review of scoping report.
7th June 2023	Email from NRW to Turley	Confirm NRW have no further comments on noise chapter other than what was discussed at the meeting

2. CRITERIA

2.1 Noise (British Standard 5228-1:2009+A1:2014)

BS 5228-1:2009 Code of Practice for noise and vibration control on construction and open sites – Part 1: Noise gives guidance on neighbourhood noise nuisance (Section 6) and significance of noise effects from construction projects (Annex E).

BS 5228 states that a construction noise assessment for this kind of development would normally be undertaken for an application under the Control of Pollution Act (CoPA) 1974, Section 61, "Applications for prior consent for work on construction sites". Applications under this section of the CoPA are often found to be desirable and useful by both the Local Authority and the contractor. The applications would usually include (as identified in the CoPA):

1) details of the works and the method by which they are to be carried out; and

2) the steps proposed to be taken to minimize noise resulting from the works.

However, it is good practice to carry out construction noise predictions to provide additional information and to determine, for projects of significant size, any eligibility for noise insulation or temporary re-housing.

By gaining consent under Section 61, the contractor gains protection from action under Section 60 of the CoPA, whereby a stop or enforcement notice cannot be served on the contractor, as long as the works are carried out in accordance with the details in the application.

BS 5228 outlines methods of determining significance of construction noise based on the change in ambient noise levels.

BS 5228 paragraph E.2 advises;

"E.2 Significance based on fixed noise limits and eligibility for noise insulation and temporary rehousing

For projects of significant size such as the construction of a new railway or trunk road, historically, there have been two approaches to determining whether construction noise levels are significant or not.

The older and more simplistic is based upon exceedance of fixed noise limits which were originally promoted by the Wilson Committee in their report on noise 1601 as presented to Parliament in 1963. These noise limits were then included in Advisory Leaflet 72 [611, first published in 1968; the accompanying wording was subsequently revised and the 1976 version is quoted below:

"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter, as we hear it, in A-weighted decibels (dB(A))- see note below. Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- *70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;*
- *75 decibels (dBA) in urban areas near main roads in heavy industrial areas.*

These limits are for daytime working outside living rooms and offices. In noise-sensitive situations, for example, near hospitals and educational establishments - and when working outside the normal hours say between 19.00 and 22.00 hours - the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer (a reduction of 10 d8(A) may often be appropriate). Noisy work likely to cause annoyance locally should not be permitted between 22.00 hours and 07.00 hours."

The above principle has been expanded over time to include a suite of noise levels covering the whole day/week period taking into account the varying sensitivities through these periods An example is provided in E.3 and these levels are also often used as limits above which noise insulation would be provided if the temporal criteria are also exceeded."

The following 'ABC' method sets threshold values of significant effects based on the existing ambient noise climate.

Table 2.1 – Table E.1 of BS 5228-1:2019

Table E.1 Example threshold of significant effect at dwellings

Assessment category and threshold value period (L_{Aeq})	Threshold value, in decibels (dB)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night-time (23.00−07.00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total LAeq noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total LAeq noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

3. SOUND SENSITIVE RECEIVERS

The site plan in Figure B.1 of Appendix B shows the proposed site and surrounding area.

The following sound sensitive receptors (SSRs) have been identified at this stage within a 1.3km radius from the site (which picks up the closest residential receptors in each direction) and agreed with NPT during pre-application discussions:

Table 3.1 – Sound Sensitive Receptor Locations

ID No.	Description	Approx. Distance to Nearest Operational Site Boundary (m)
SSR1	Dwellings at Mariners Point	890
SSR2	Dwellings at Darwin Rd / Newbridge Rd	900
SSR3	Dwellings on Isaac's Place / Borough St	1090
SSR4	Dwellings on Green Park St	1050
SSR5	Dwellings on Water St / Blanco's Hotel	1150
SSR6	Flats above shops on Station Rd	990
SSR7	Dwellings on Talbot Rd	745
SSR8	Dwellings on Lower West End	575
SSR9	Dwellings on St Alban's Terrace	810
SSR10	Dwellings on Duke St	1000
SSR11	Port Talbot Magistrates' Court	790

In addition to the above, consultation with NPT CBC / Red Twin Limited also highlighted the following quiet areas defined in the Neath Port Talbot LDP Policy EN10 as Vivian Park (north-west of the site) and Talbot Memorial Park (north-east of the site).

4. BASELINE NOISE SURVEY

Detailed methodology and results of the baseline noise survey carried out are included in Hunter Acoustics report 6387/ENS1_Rev1 dated 15/05/2023 which consisted of combination of short-term day/night sample measurements and long-term continuous monitoring.

The site plan in Figure B.1 of Appendix B shows the measurement positions used, namely:

Table 4.1 – Continuous Monitoring Location Details

Position	Description
A	On fence outside 27 Mariners Point, 2.5m above ground level. Representative of sound climate at residential receptors on Mariners Point.
B	On top of wall section in council car park adjacent to Blanco's Hotel, approx. 4.5m above ground level. Representative of sound climate at Blanco's Hotel and residential receptors on Water Street / Green Park Street.
C	Along Tata Steel's north-eastern boundary, approx. 36m away from Harbour Way, 1.5m above ground level. Representative of residential receptors on Lower West End.

Table 4.2 – Sample Measurement Location Details

Position	Description
1	Adjacent to residential dwellings along Newbridge Road
2	In front of residential dwellings along Water Street
3	At the rear of Port Talbot Parkway station car park, approx. 14m from dwellings along Talbot Road
4	At eastern exit of Harbour Way roundabout, approx. 120m from residential dwellings along Prince Street
5	On Harbourside Road, adjacent to HMCTS Port Talbot Justice Centre
6	At northern boundary of proposed site & access road for Tata Steel
7	At southern area of proposed site
8	On Moorland Road, adjacent to entrance to Vivian Park
9	Along Park View, adjacent to rear of Talbot Memorial Park

Note: All sample measurement microphone positions approximately 1.5m above local ground level.

Baseline ambient noise levels measured at the continuous monitoring locations are summarised below:

Table 4.3 – Summary of Baseline Ambient Noise Levels

Period	Range of Baseline Ambient Noise $L_{Aeq,T}$ (dB)		
	Position A	Position B	Position C
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	50-52	54-55	58-61
Evenings (19.00-23.00) and weekends	49-52	51-56	56-60
Night-time (23.00−07.00)	47-51	47-52	56-60

Full hourly data logs are set out in report 6387/ENS1_Rev1 dated 15/05/2023.

Daytime noise levels at Talbot Memorial Park and Vivian Park were measured at 56-59dB $L_{Aeq,15min}$ and 55-56dB $L_{Aeq,15min}$ respectively.

5. CONSTRUCTION NOISE LIMITS

Based on results of the baseline survey and guidance in BS 5228-1 in Section 2.1, the following construction noise limits are indicated at the three main monitoring locations:

Table 5.1 - Proposed Construction Noise Limits based on Survey Results

Position	Daytime (0700-1900hrs)	Sat (0700-1300hrs)	Evenings and weekends	Night-time (2300-0700hrs)
Pos A (east, dwellings at Mariners Point)	65	65	55	50
Pos B (north, dwellings at Water St/Green Park St)	65	65	55	50
Pos C (west, dwellings at Lower West End)	65	65	60	55

With exception of SSR8 (dwellings on Lower West End, for which it is proposed to use limits set at Position C), it is proposed to use the construction noise limits at Position A/B for all remaining SSRs.

6. NOISE PREDICTION

Construction noise prediction has been undertaken using Softnoise *Predictor* environmental noise mapping software package, which in turn uses calculation methods of British Standard 5228-1:2009.

Predicted construction noise levels are assessed against category thresholds.

6.1 Source Plant Noise Data

The project engineering team, Technip Energies (TE), have provided information relating to plant type/number.

Source noise data used in the model for the various items of plant and activities is detailed in Table C.1 and Table C.2 of Appendix C, taken from the Predictor software database, which is largely based on data from Appendices of BS 5228-1.

6.2 Scenarios

Scenarios 1-*5* are provided in Table C.3 to Table C.8 of Appendix C respectively.

The areas used for construction are set out below, including temporary construction areas that are to be used for lay-down, deliveries, parking and pre-fabrication:

- Production Development Zone (PDZ)
- Temporary Construction Area 1 (TCA1)
- Temporary Construction Area East (TCA East)
- Temporary Construction Area West (TCA West)

These areas are shown on the site plan below:

Figure 6.1 – Plan Showing Locations of TCAs and PDZ

The construction scheme has been subdivided into the following scenarios for modelling.

Note: Scenario 1 has been broken down into two scenarios (1a and 1b) for enabling works where there is less plant on site to form a robust assessment.

- **Scenario 1a** (Enabling works, plant at northern boundary of PDZ, including sheet piling for construction wharf)
- **Scenario 1b** (Enabling works, plant at southern boundary of PDZ) including sheet piling for construction wharf)
- **Scenario 2** (Months 1-6 of construction, including steel tube impact piling for operational jetty)
- **Scenario 3** (Months 7-12 of construction)
- **Scenario 4** (Months 13-18 of construction)
- **Scenario 5** (Months 19-24 of construction)

Construction activities/plant has generally been distributed around the perimeter of the Production Development Zone in the modelling for worst-case assessment (reducing distance from source to receiver).

To form a robust assessment for a worst-case one-hour period, for pre-fabrication activities on the TCAs, 2no angle grinders, 2no hammers and 2no welders have been included at the north of each TCA in all scenarios. 2no two-way HGVs to each of the three TCAs and 153no construction staff vehicles to the north of TCA 1 are also included.

46no two-way HGV movements have been modelled to the main PDZ area. This aligns with the total worst-case peak AM construction HGV flow of 52no AM arrivals and 52no AM departures set out in the Transport Assessment.

Distribution of plant in models is shown in Figure C.1 and Figure C.6 of Appendix C with detailed scenarios set out in the associated tables, Table C.3 to Table C.8 of Appendix C.

6.3 Results

The following noise levels have been predicted at the closest receivers:

Table 6.1 – Predicted L_{Aeq} Noise Levels for Worst Case Hour

Sound Sensitive Receptor (SSR)	Height (m)	$L_{Aeq, 1hr}$ (dB) for Scenarios					
		1a	1b	2	3	4	5
		Enabling Works North Boundary	Enabling Works South Boundary	M1-6	M7-12	M13-18	M19-24
SSR1 - 27 Mariners Point	1.5	48	50	51	50	49	48
SSR1 - 27 Mariners Point	4.5	49	51	52	51	51	49
SSR2 - 1 Darwin Road	1.5	48	50	52	51	50	48
SSR2 - 1 Darwin Road	4.5	49	51	53	52	52	48
SSR3 - 4 Isaac's Place	1.5	48	47	49	48	48	43
SSR3 - 4 Isaac's Place	4.5	53	52	54	53	53	48
SSR4 - 5 Green Park Street	1.5	42	45	47	44	44	39
SSR4 - 5 Green Park Street	4.5	46	47	49	48	47	42
SSR5 - Blanco's Hotel	1.5	39	39	42	41	40	36
SSR5 - Blanco's Hotel	4.5	45	44	47	46	45	41
SSR5 - Blanco's Hotel	7.5	49	49	51	51	50	45
SSR6 - 21 Station Road	1.5	36	35	39	38	38	33
SSR6 - 21 Station Road	4.5	43	42	46	45	44	40
SSR7 - 105 Talbot Road	1.5	46	46	48	46	45	44
SSR7 - 105 Talbot Road	4.5	58	57	60	59	58	54
SSR8 - 10 Lower West End	1.5	53	52	54	53	53	52
SSR8 - 10 Lower West End	4.5	60	60	61	60	60	59
SSR9 - 19 St Albans Terrace	1.5	45	45	48	45	44	42
SSR9 - 19 St Albans Terrace	4.5	57	56	59	58	58	54
SSR10 - 21 Duke Street	1.5	33	31	36	33	33	30
SSR10 - 21 Duke Street	4.5	37	35	39	37	36	34

SSR11 - Magistrates Court	1.5	47	46	50	51	51	46
SSR11 - Magistrates Court	4.5	50	49	52	53	52	47
Talbot Memorial Park	1.5	39	40	41	40	40	38
Vivian Park	1.5	37	37	40	37	37	34

Note: The above levels are worst-case 1hr predictions with plant in open-air locations (i.e. no buildings/tanks erected on the site which could provide local screening to construction activities).

Coloured noise contour plots are included in Figure C.7 to Figure C.12 of Appendix C.

Noise levels are therefore indicated to meet proposed limits set in accordance with BS 5228-1 at all SSRs for daytime (0700-1900hrs) and Saturday 0700-1300hrs.

Limits for evenings and weekends are also met at SSRs1-6, SSR8 (marginal 1dB) and SSRs10-11. At SSR7 and SSR9, up to a 5dB excess is indicated based on the worst-case 1hour assessments. It is likely that evening/weekend works would be at a reduced rate to the main daytime and Saturday periods and therefore lower levels may be expected. Any proposed evening and weekend construction works (outside of 0700-1300hrs Sat) would therefore need to be confirmed against limits set out in this report.

Night-time works have the potential to exceed limits depending on activities and plant. It is proposed that any out of hours working that may be required would be agreed in advance with the Local Planning Authority.

7. BEST PRACTICAL MEANS

It is the duty of the contractor to use 'best practical means' to minimise noise levels. BS5228:2009 Part 1 – 'Code of Practice for Noise & Vibration Control on Construction and Open sites' gives guidance on 'best practical means' on basic procedures and methods of controlling noise.

These measures are assumed to be adopted when determining results in the modelling work set out in this report.

The relevant points for this site are listed below;

1) Quietest plant available should be selected, or where possible existing plant modified to reduce noise. Manufacturers often have attenuation kits for their equipment.

2) All equipment shall be properly maintained so no unnecessary noise is caused.

3) All access roads should be kept clean and maintained in a good state of repair to avoid unwanted rattle and "body slap" from vehicles.

4) Minimise drop heights of materials

5) Any reversing beepers fitted to vehicles should be minimised as far as is reasonably practicable and subject to maintaining site safety.

   Alternatively, mute / switch off reversing beepers and using a banksman; low beeper volume settings (if possible set to site ambient noise levels); and / or manoeuvring vehicles in a circular manner to avoid the use of reversing alarms.

6) Site layout should locate the noisiest stationary plant as far as is practicable from residential receivers.

7) The operatives of the site should be made aware of noise control requirements.

8) Switch plant off when not required

8. CONCLUSION

A construction noise assessment has been carried out for Project DRAGON on Land at Crown Wharf, Port Talbot.

Noise surveys were carried out at nearby SSRs to measure the ambient noise climate during weekday and weekend periods, including night-time. Full methodology and results are detailed in Hunter Acoustics report 6387/ENS1_Rev1 dated 15/05/2023.

A construction noise impact assessment has been carried out in accordance with BS 5528-1 based on the proposed activities, plant/equipment and working hours to predict noise levels at receptors.

Overall, noise levels are indicated to meet proposed limits set in accordance with BS 5228-1 at all SSRs for daytime (0700-1900hrs) and Saturday 0700-1300hrs.

Limits for evenings and weekends are also generally met (with exception of up to 5dB excess SSR7 and SSR9 based on worst-case 1hr assessments.

It is likely that evening/weekend works would be at a reduced rate to the main daytime and Saturday periods and therefore lower levels may be expected. Any proposed evening and weekend construction works (outside of 0700-1300hrs Sat) would therefore need to be confirmed against limits set out in this report.

Night-time works have the potential to exceed limits depending on activities and plant. It is proposed that any out of hours working that may be required would be agreed in advance with the Local Planning Authority.

Best practicable means methods of working are set out in this report and are to be adhered to at all times.

APPENDIX A - ACOUSTIC TERMINOLOGY

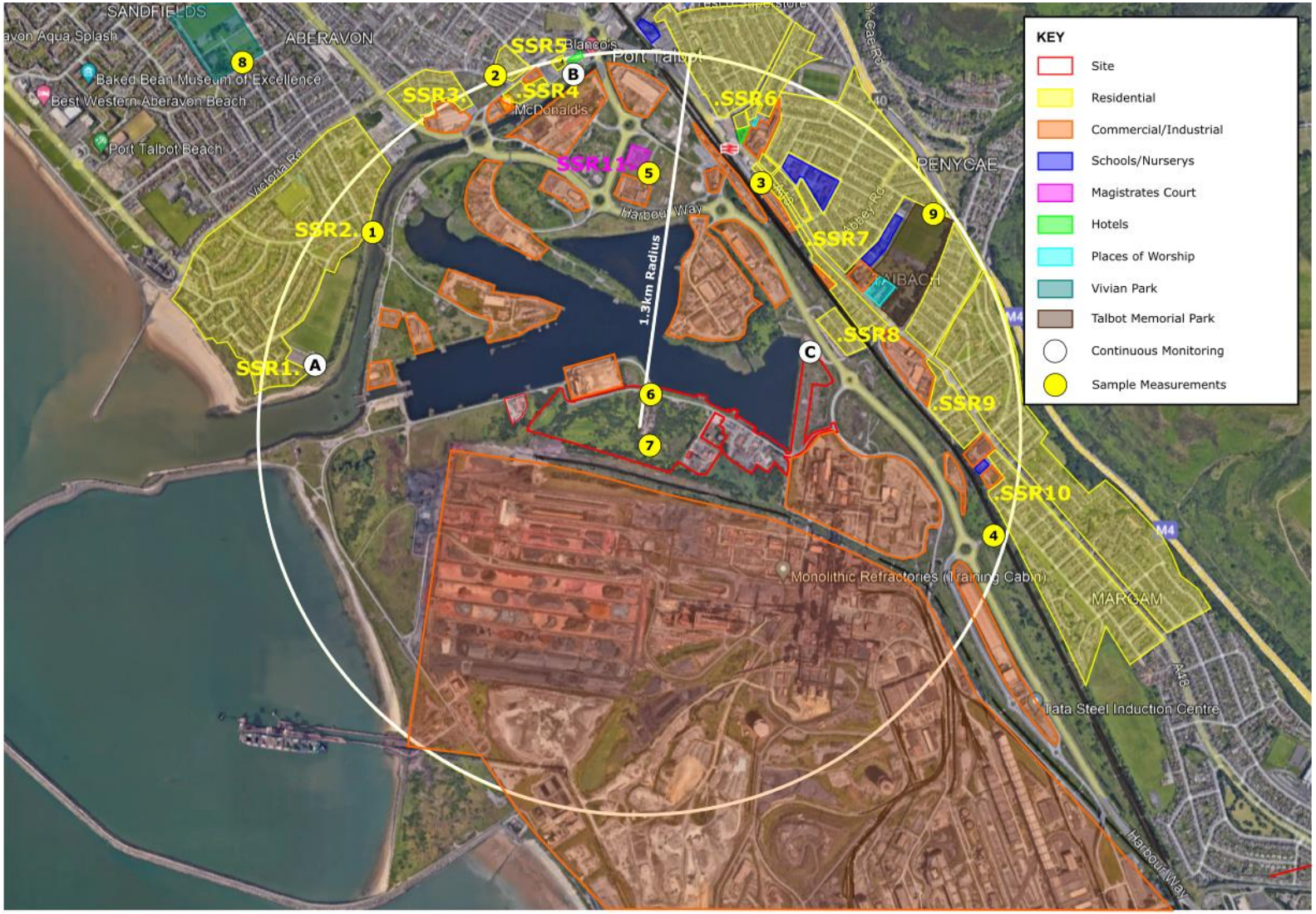
Human response to noise depends on a number of factors including loudness, frequency content and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'.

The following units have been used in this report:

dB(A)	The sound pressure level A-weighted to correspond with the frequency response of the human ear and therefore a persons' subjective response to frequency content.
L_{eq}	The equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.
L_{max}	The highest instantaneous sound level recorded during the measurement period.
L_{10}	The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1 hour measurement - used as a measure of background noise.
L_{90}	The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1 hour measurement - used as a measure of background noise.
$L_{Ar,Tr}$	The 'rating' level, as described in BS 4142:2014 – the specific noise plus any adjustment for the characteristic features of the noise.
SSR	Sound sensitive receiver

APPENDIX B - DIAGRAMS, GRAPHS AND TABLES

Figure B.1 – Site Plan Showing Monitoring Locations and Sound Sensitive Receptors



APPENDIX C - NOISE MAP MODELS

C.1 Noise Model Input Data

Table C.1 – Mobile Plant Noise Data Used in Model

Plant Item / Activity	L_{wA} at Octave Band Centre Frequencies, Hz (dB)								L_{wA}
	63	125	250	500	1000	2000	4000	8000	(dB)
Loader 6t capacity	76	78	83	89	91	89	88	77	96
Dump truck 25t capacity	92	99	96	104	103	102	96	90	109
Grader (Cat 140 GC or similar)	82	91	94	96	104	99	95	84	107
Compactor 7t	92	94	92	97	98	94	88	81	103
Road paver	74	89	93	97	99	99	96	87	105
Self-propelled modular transporter (SPMT)	85	86	85	94	98	107	89	82	108
Forklift 5T	72	79	89	93	96	94	89	80	100
HGV	78	84	92	98	101	97	91	84	104
LGV/cars	71	83	87	86	85	80	75	71	92

Table C.2 – Fixed Plant Noise Data Used in Model

Plant Item / Activity	L_{wA} at Octave Band Centre Frequencies, Hz (dB)								L_{wA}
	63	125	250	500	1000	2000	4000	8000	(dB)
Excavator Cat 313 or similar	80	82	91	93	95	95	102	92	104
Bauer Drill Rig LB16 or similar	81	91	97	103	103	100	95	83	108
Crane 80t capacity average	89	94	97	99	99	96	89	88	105
Manlift 25m capacity average	80	88	81	88	88	88	87	76	95
Concrete mixer 9m^3	85	86	85	94	98	107	89	82	108
Diesel pump	85	88	89	98	10	101	94	85	106
Diesel compressor	89	94	96	98	98	95	89	82	104
Diesel generator	71	83	87	86	85	80	75	71	92
Angle grinder	59	63	71	85	98	106	102	100	109
Hammering	80	90	96	101	105	93	100	94	109
Welding	69	80	88	93	97	95	90	83	101
Sheet Piling (Construction Wharf)	85	94	98	107	112	111	106	94	116
Steel Tube Piles Impact Driven (Operational Jetty)	89	105	104	112	111	109	104	99	117

C.2 Noise Model Scenarios

Table C.3 – Daytime Modelled Scenario 1a (Worst Case 1hr Period)

Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
2no Excavators	100	-	-	3
5no Loaders on 50m paths	-	360	25	3
4no Dump trucks on 50m paths	-	360	25	3
4no Graders on 50m paths	-	180	13	3
2no Compactors on 50m paths	-	180	13	1
HGVs to main PDZ (46no two-way)	-	92	50	1
Bauer Drill rig	50	-	-	3
Crane 80t	50	-	-	3
Manlift 25m	50	-	-	1
HGV to TCA East (2no two-way)	-	4	50	1
2no angle grinder on TCA East	25	-	-	2
2no hammer on TCA East	25	-	-	2
2no welding on TCA East	50	-	-	1
HGV to TCA West (2no two-way)	-	4	50	1
2no angle grinder on TCA West	25	-	-	2
2no hammer on TCA West	25	-	-	2
2no welding on TCA West	50	-	-	1
HGV to TCA 1 (2no two-way)	-	4	50	1
Cars to TCA 1	-	153	50	0.75
Generator TCA 1	100	-	-	1
2no angle grinder on TCA 1	25	-	-	2
2no hammer on TCA 1	25	-	-	2
2no welding on TCA 1	50	-	-	1
Sheet piling	100	-	-	6

Figure C.1 – Daytime Modelled Scenario 1a Source Layout

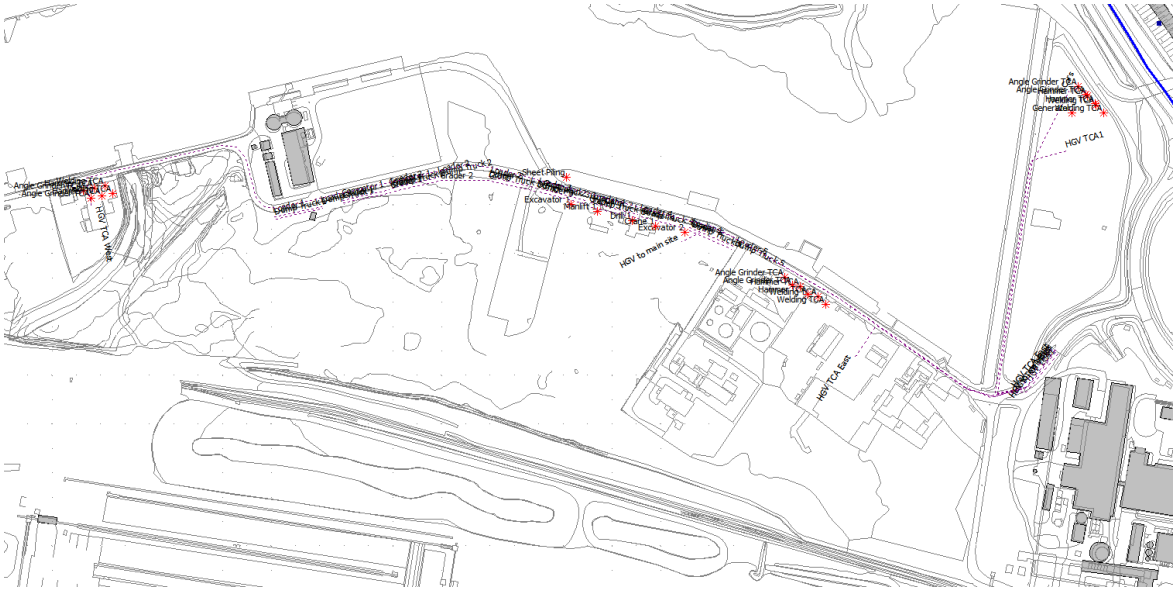


Table C.4 – Daytime Modelled Scenario 1b (Worst Case 1hr Period)

Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
2no Excavators	100	-	-	3
5no Loaders on 50m paths	-	360	25	3
4no Dump trucks on 50m paths	-	360	25	3
4no Graders on 50m paths	-	180	13	3
2no Compactors on 50m paths	-	180	13	1
HGVs to main PDZ (46no two-way)	-	92	50	1
Bauer Drill rig	50	-	-	3
Crane 80t	50	-	-	3
Manlift 25m	50	-	-	1
HGV to TCA East (2no two-way)	-	4	50	1
2no angle grinder on TCA East	25	-	-	2
2no hammer on TCA East	25	-	-	2
2no welding on TCA East	50	-	-	1
HGV to TCA West (2no two-way)	-	4	50	1
2no angle grinder on TCA West	25	-	-	2
2no hammer on TCA West	25	-	-	2
2no welding on TCA West	50	-	-	1
HGV to TCA 1 (2no two-way)	-	4	50	1
Cars to TCA 1	-	153	50	0.75
Generator TCA 1	100	-	-	1
2no angle grinder on TCA 1	25	-	-	2
2no hammer on TCA 1	25	-	-	2
2no welding on TCA 1	50	-	-	1
Sheet piling	100	-	-	6

Figure C.2 – Daytime Modelled Scenario 1b Source Layout

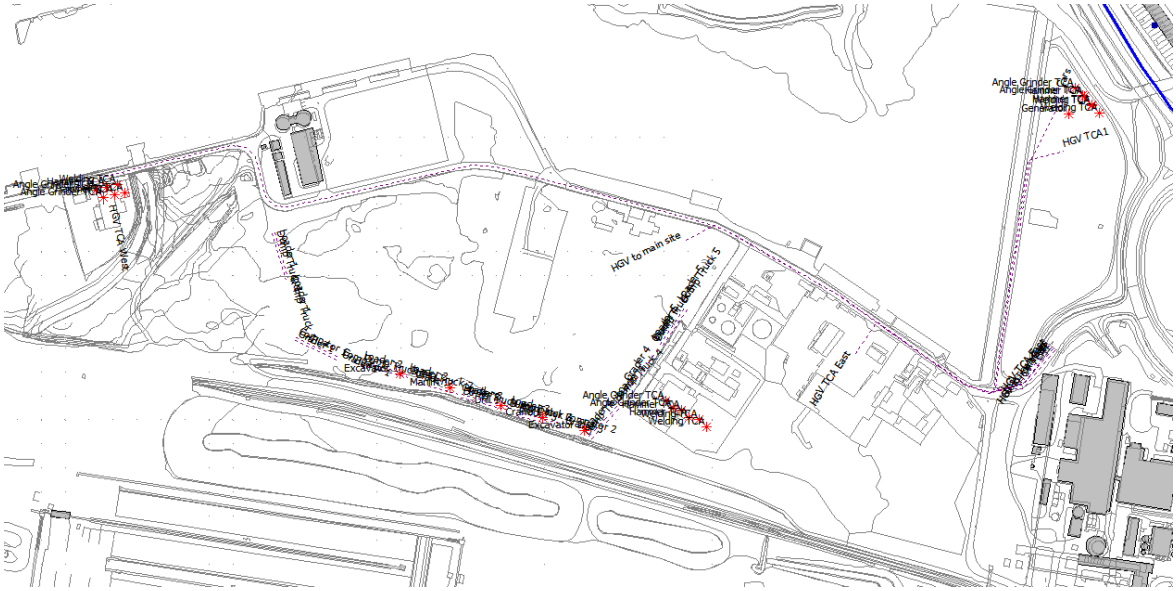


Table C.5 – Daytime Modelled Scenario 2 (Worst Case 1hr Period)

Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
2no Excavators	100	-	-	3
10no Loaders on 50m paths	-	360	25	3
10no Dump trucks on 50m paths	-	360	25	3
2no Graders on 50m paths	-	180	13	3
HGVs to main PDZ (46no two-way)	-	92	50	1
8no Bauer Drill rig	50	-	-	3
15no Crane 80t	50	-	-	3
12no Manlift 25m	50	-	-	1
2no Diesel pump	100	-	-	1
Concrete mix truck	50	-	-	1
HGV to TCA East (2no two-way)	-	4	50	1
2no angle grinder on TCA East	25	-	-	2
2no hammer on TCA East	25	-	-	2
2no welding on TCA East	50	-	-	1
HGV to TCA West (2no two-way)	-	4	50	1
2no angle grinder on TCA West	25	-	-	2
2no hammer on TCA West	25	-	-	2
2no welding on TCA West	50	-	-	1
HGV to TCA 1 (2no two-way)	-	4	50	1
Cars to TCA 1	-	153	50	0.75
Generator TCA 1	100	-	-	1
2no angle grinder on TCA 1	25	-	-	2
2no hammer on TCA 1	25	-	-	2
2no welding on TCA 1	50	-	-	1
Steel tube piling (impact driven)	100	-	-	6

Figure C.3 – Daytime Modelled Scenario 2 Source Layout

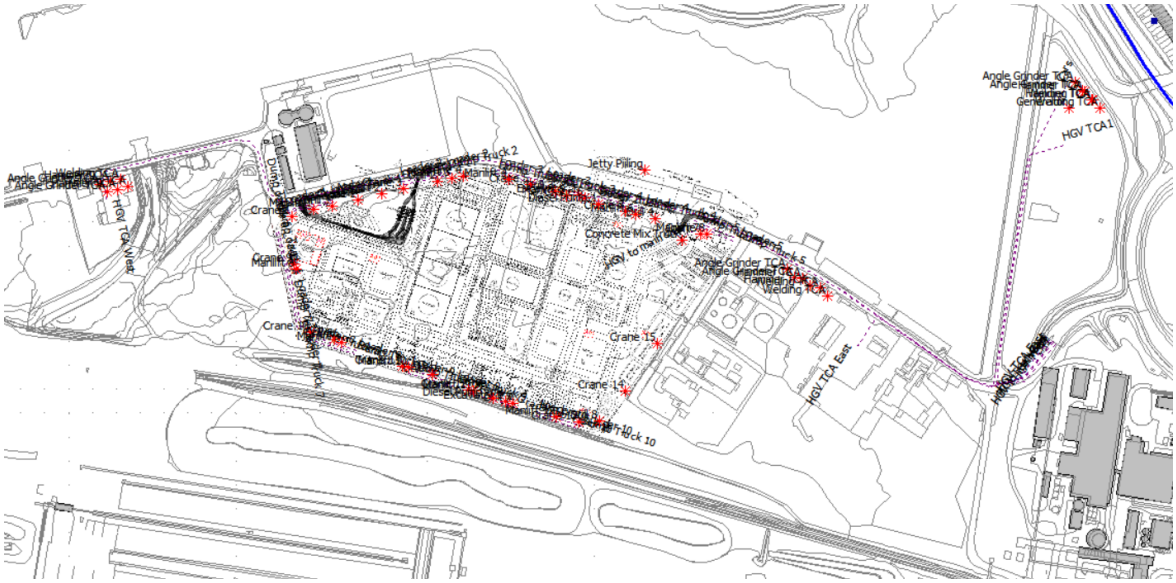


Table C.6 – Daytime Modelled Scenario 3 (Worst Case 1hr Period)

Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
2no Excavators	100	-	-	3
3no Loaders on 50m paths	-	360	25	3
3no Dump trucks on 50m paths	-	360	25	3
1no Grader on 50m paths	-	180	13	3
HGVs to main PDZ (46no two-way)	-	92	50	1
SPMT	-	1	2	1
3no Bauer Drill rig	50	-	-	3
15no Crane 80t	50	-	-	3
17no Manlift 25m	50	-	-	1
4no Diesel pump	100	-	-	1
Concrete mix truck	50	-	-	1
25no angle grinder on PDZ	25	-	-	1
25no hammer on PDZ	25	-	-	2
HGV to TCA East (2no two-way)	-	4	50	1
2no angle grinder on TCA East	25	-	-	2
2no hammer on TCA East	25	-	-	2
2no welding on TCA East	50	-	-	1
HGV to TCA West (2no two-way)	-	4	50	1
2no angle grinder on TCA West	25	-	-	2
2no hammer on TCA West	25	-	-	2
2no welding on TCA West	50	-	-	1
HGV to TCA 1 (2no two-way)	-	4	50	1
Cars to TCA 1	-	153	50	0.75
Generator TCA 1	100	-	-	1
2no angle grinder on TCA 1	25	-	-	2
2no hammer on TCA 1	25	-	-	2
2no welding on TCA 1	50	-	-	1

Figure C.4 – Daytime Modelled Scenario 3 Source Layout

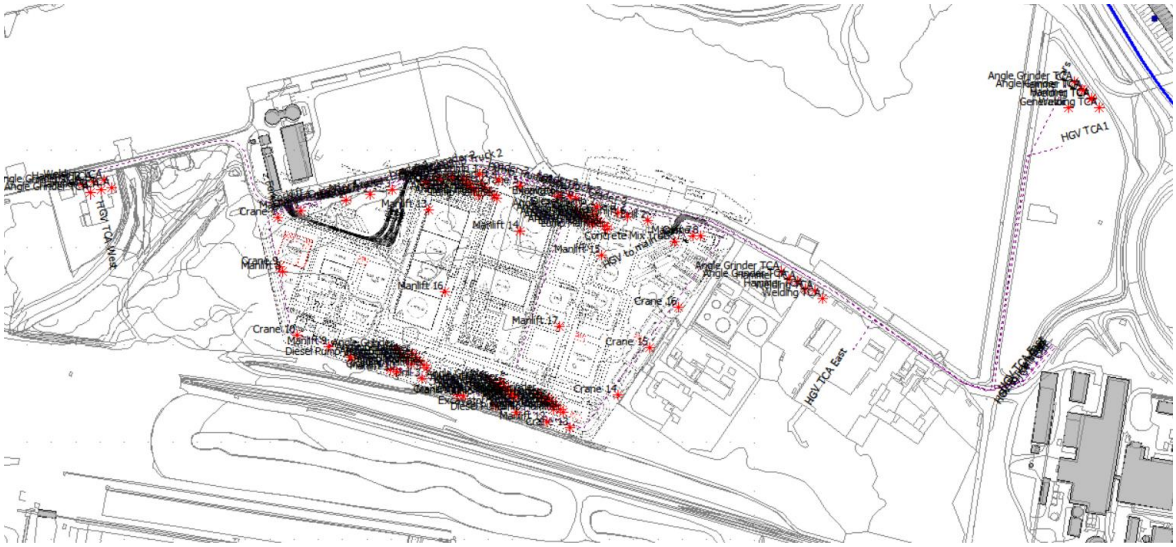


Table C.7 – Daytime Modelled Scenario 4 (Worst Case 1hr Period)

Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
3no Loaders on 50m paths	-	360	25	3
3no Dump trucks on 50m paths	-	360	25	3
1no Grader on 50m paths	-	180	13	3
Paver on 800m path	-	1	1	1
HGVs to main PDZ (46no two-way)	-	92	50	1
1no Bauer Drill rig	50	-	-	3
16no Crane 80t	50	-	-	3
11no Manlift 25m	50	-	-	1
Concrete mix truck	50	-	-	1
25no angle grinder on PDZ	25	-	-	1
25no hammer on PDZ	25	-	-	2
HGV to TCA East (2no two-way)	-	4	50	1
2no angle grinder on TCA East	25	-	-	2
2no hammer on TCA East	25	-	-	2
2no welding on TCA East	50	-	-	1
HGV to TCA West (2no two-way)	-	4	50	1
2no angle grinder on TCA West	25	-	-	2
2no hammer on TCA West	25	-	-	2
2no welding on TCA West	50	-	-	1
HGV to TCA 1 (2no two-way)	-	4	50	1
Cars to TCA 1	-	153	50	0.75
Generator TCA 1	100	-	-	1
2no angle grinder on TCA 1	25	-	-	2
2no hammer on TCA 1	25	-	-	2
2no welding on TCA 1	50	-	-	1

Figure C.5 – Daytime Modelled Scenario 4 Source Layout

Table C.8 – Daytime Modelled Scenario 5 (Worst Case 1hr Period)

Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
1no Loader on 50m paths	-	360	25	3
2no Dump trucks on 50m paths	-	360	25	3
Paver on 800m path	-	1	1	1
HGVs to main PDZ (46no two-way)	-	92	50	1
6no Crane 80t	50	-	-	3
Concrete mix truck	50	-	-	1
Diesel compressor	100	-	-	1
HGV to TCA East (2no two-way)	-	4	50	1
2no angle grinder on TCA East	25	-	-	2
2no hammer on TCA East	25	-	-	2
2no welding on TCA East	50	-	-	1
HGV to TCA West (2no two-way)	-	4	50	1
2no angle grinder on TCA West	25	-	-	2
2no hammer on TCA West	25	-	-	2
2no welding on TCA West	50	-	-	1
HGV to TCA 1 (2no two-way)	-	4	50	1
Cars to TCA 1	-	153	50	0.75
Generator TCA 1	100	-	-	1
2no angle grinder on TCA 1	25	-	-	2
2no hammer on TCA 1	25	-	-	2
2no welding on TCA 1	50	-	-	1

Figure C.6 – Daytime Modelled Scenario 5 Source Layout

C.3 Noise Model Contour Plots

Figure C.7 – Daytime Scenario 1a (Enabling, North Boundary) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

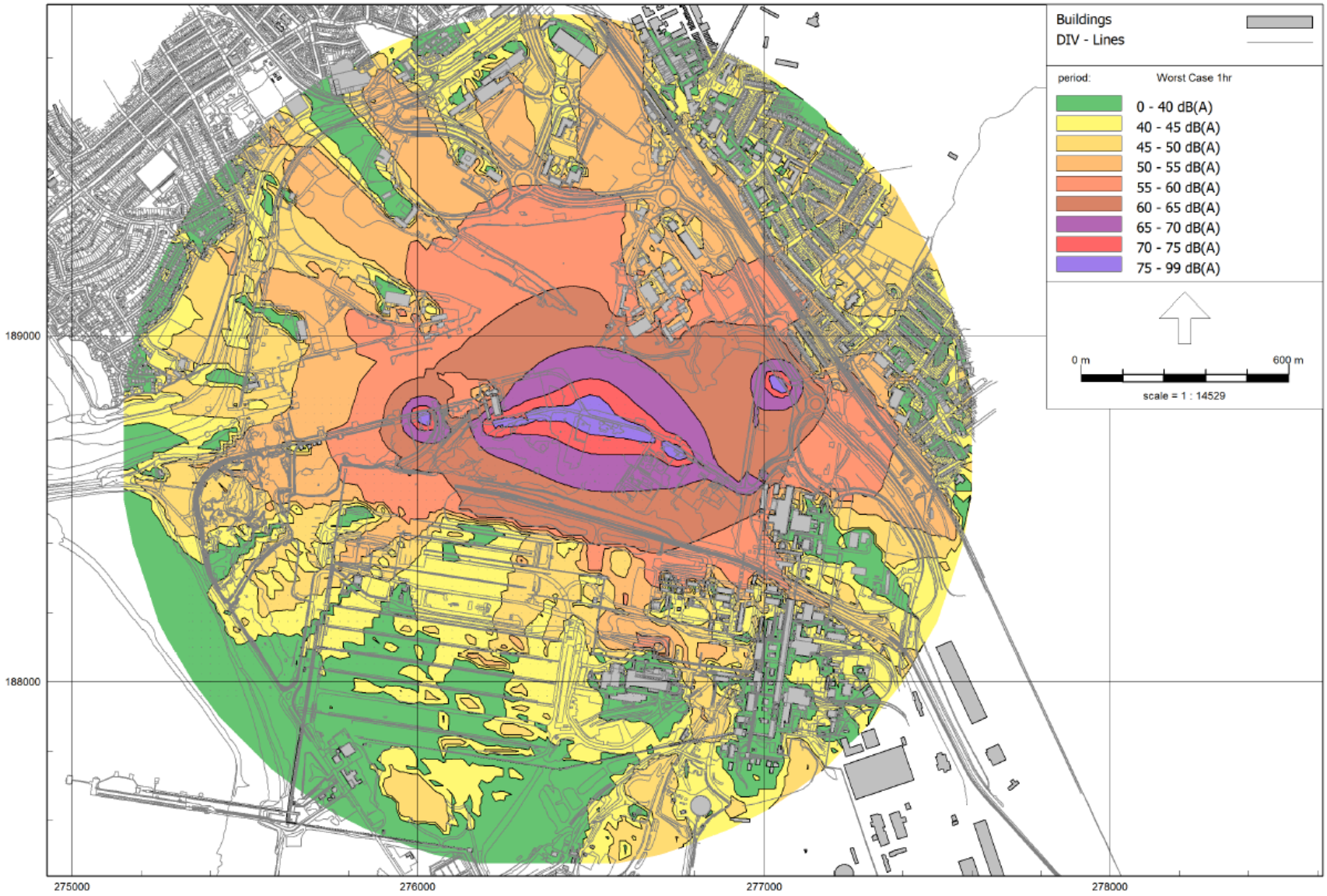


Figure C.8 – Daytime Scenario 1b (Enabling, South Boundary) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

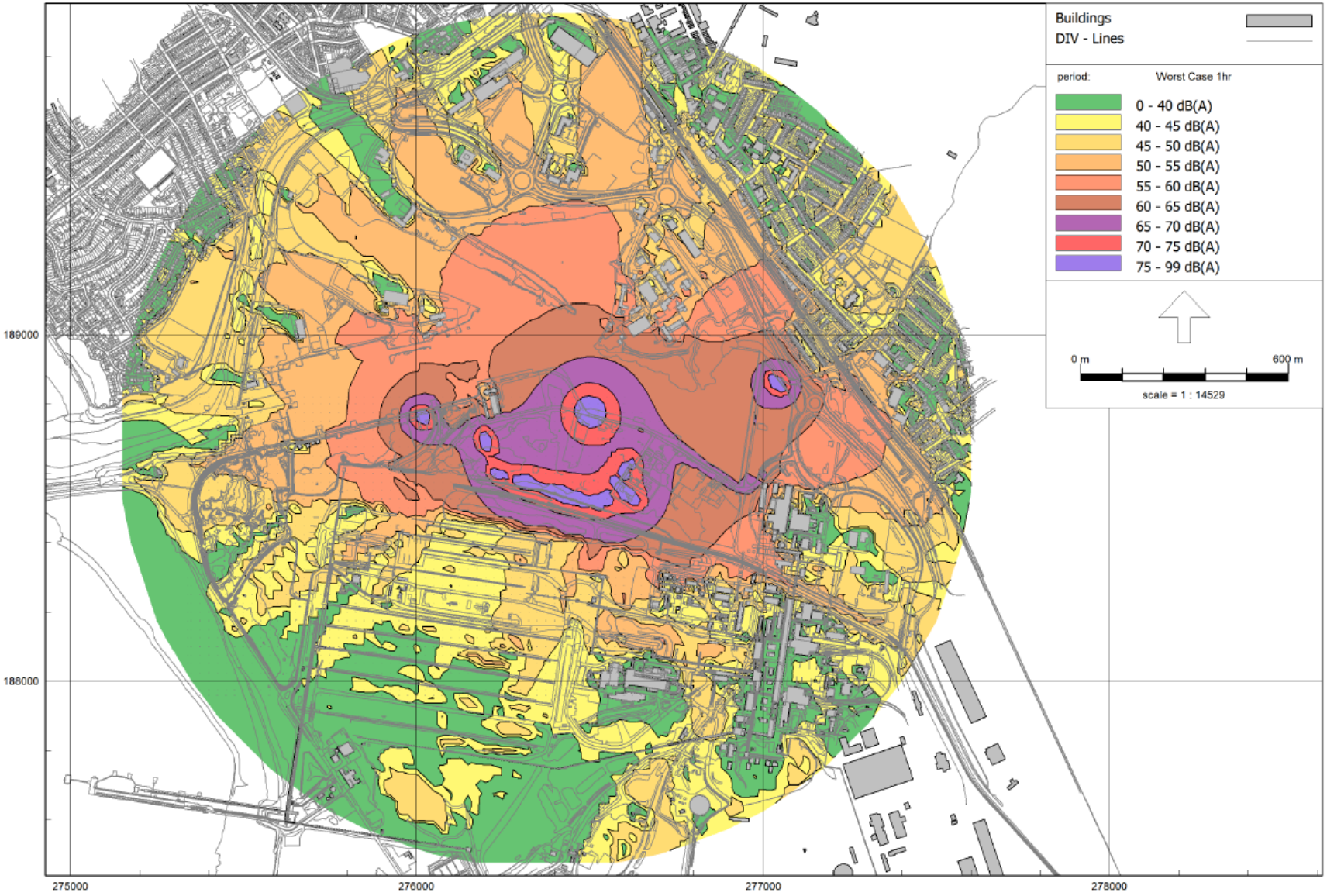


Figure C.9 – Daytime Scenario 2 (M1-6) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

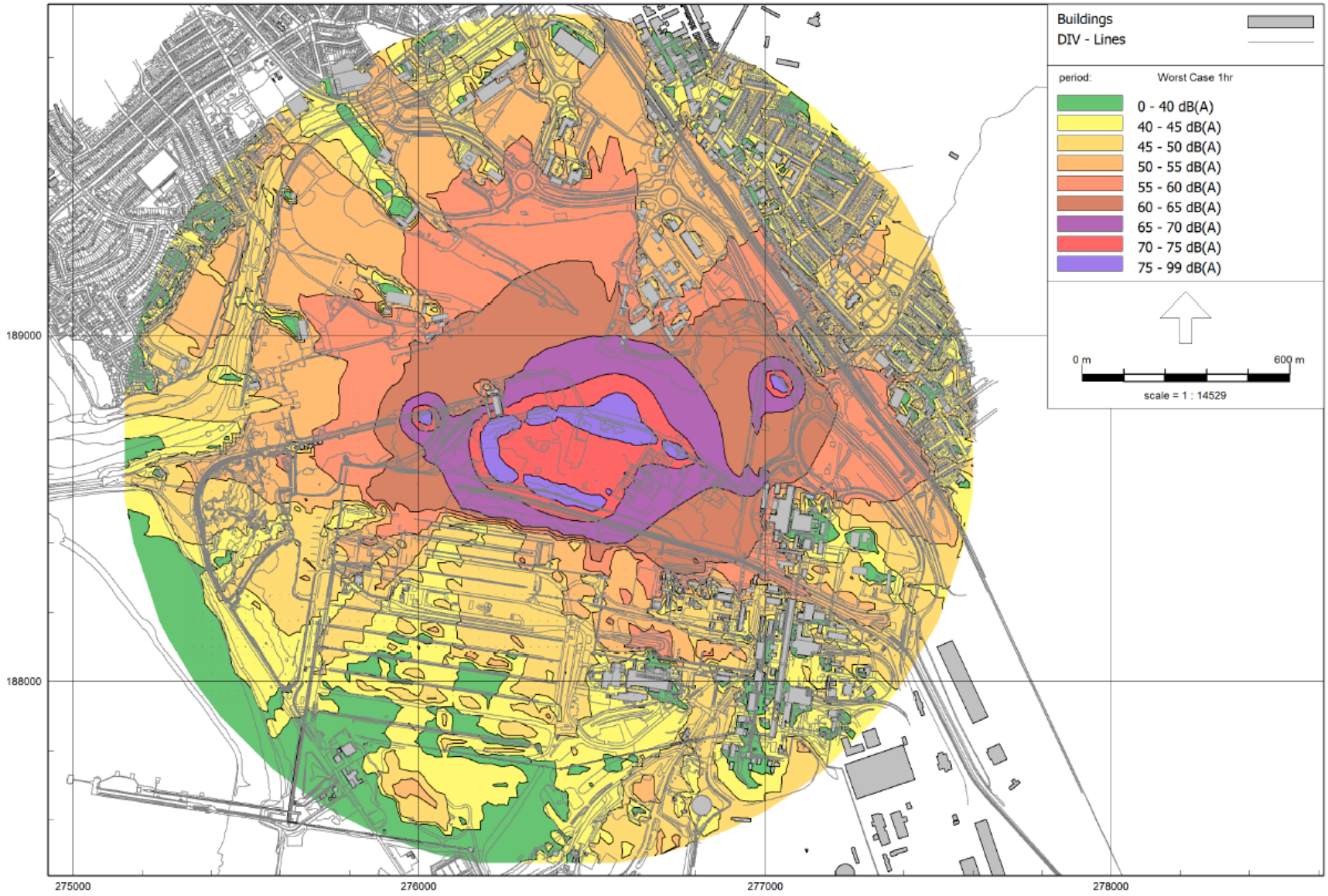


Figure C.10 – Daytime Scenario 3 (M7-12) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

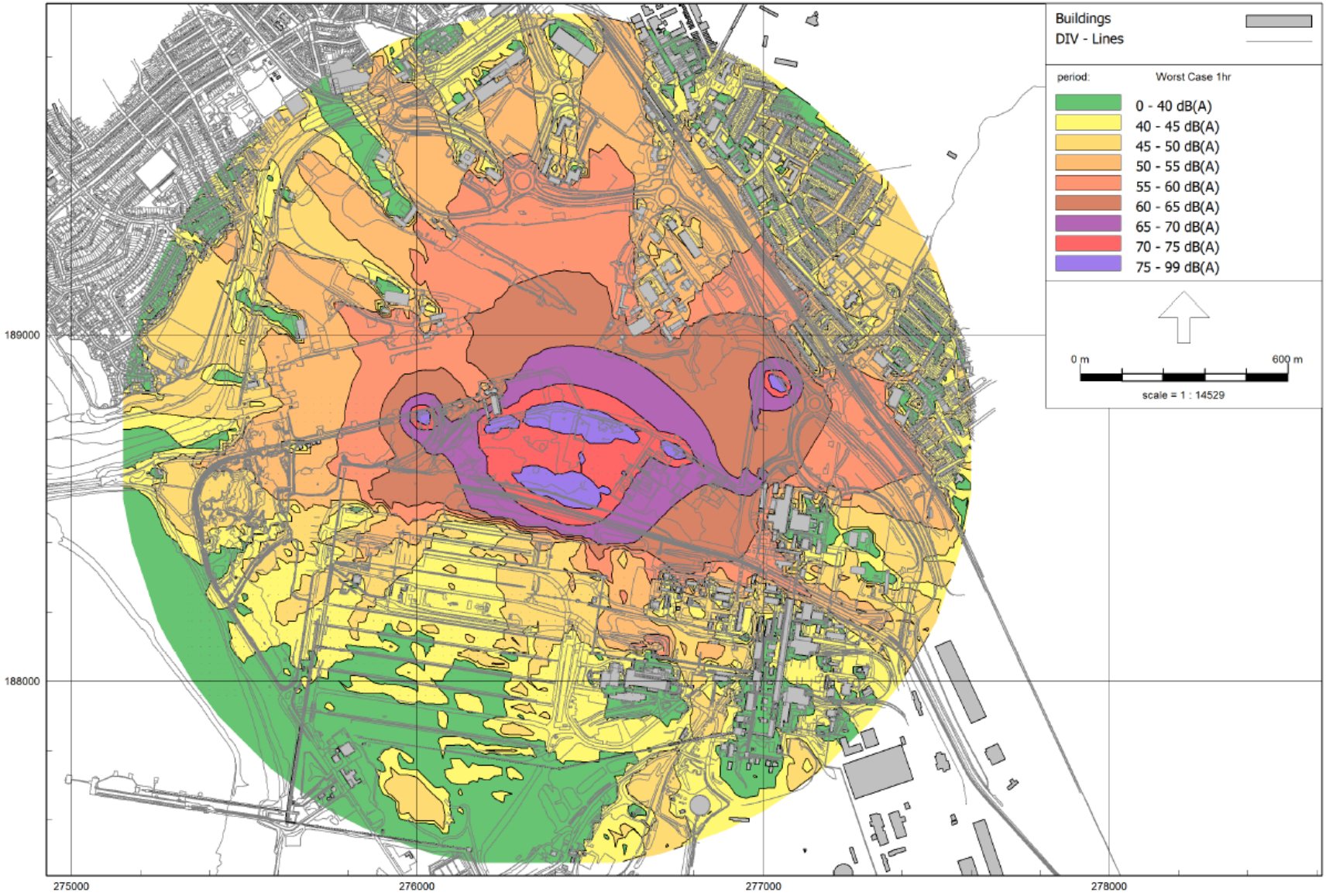


Figure C.11 – Daytime Scenario 4 (M13-18) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

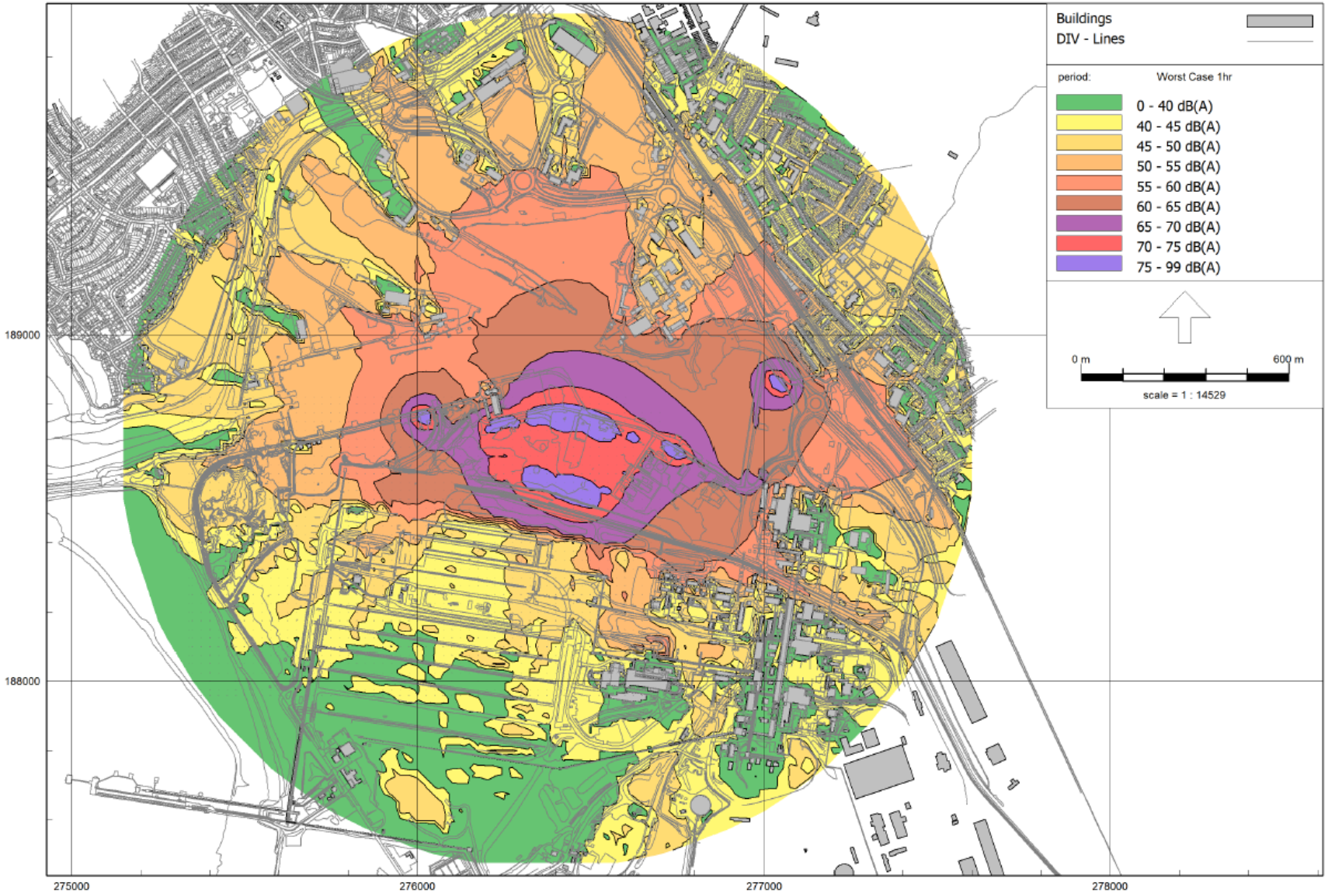
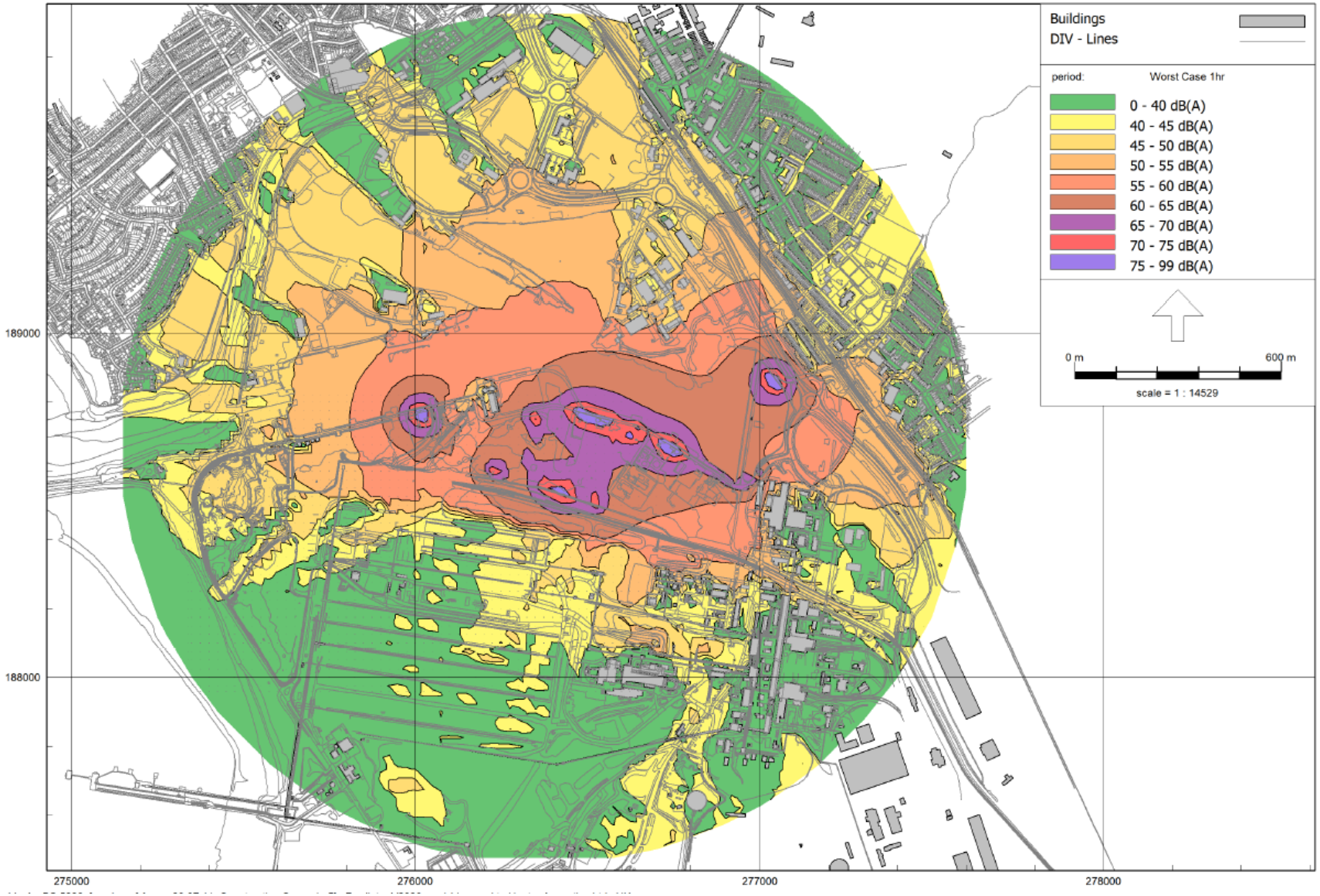


Figure C.12 – Daytime Scenario 5 (M19-24) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height



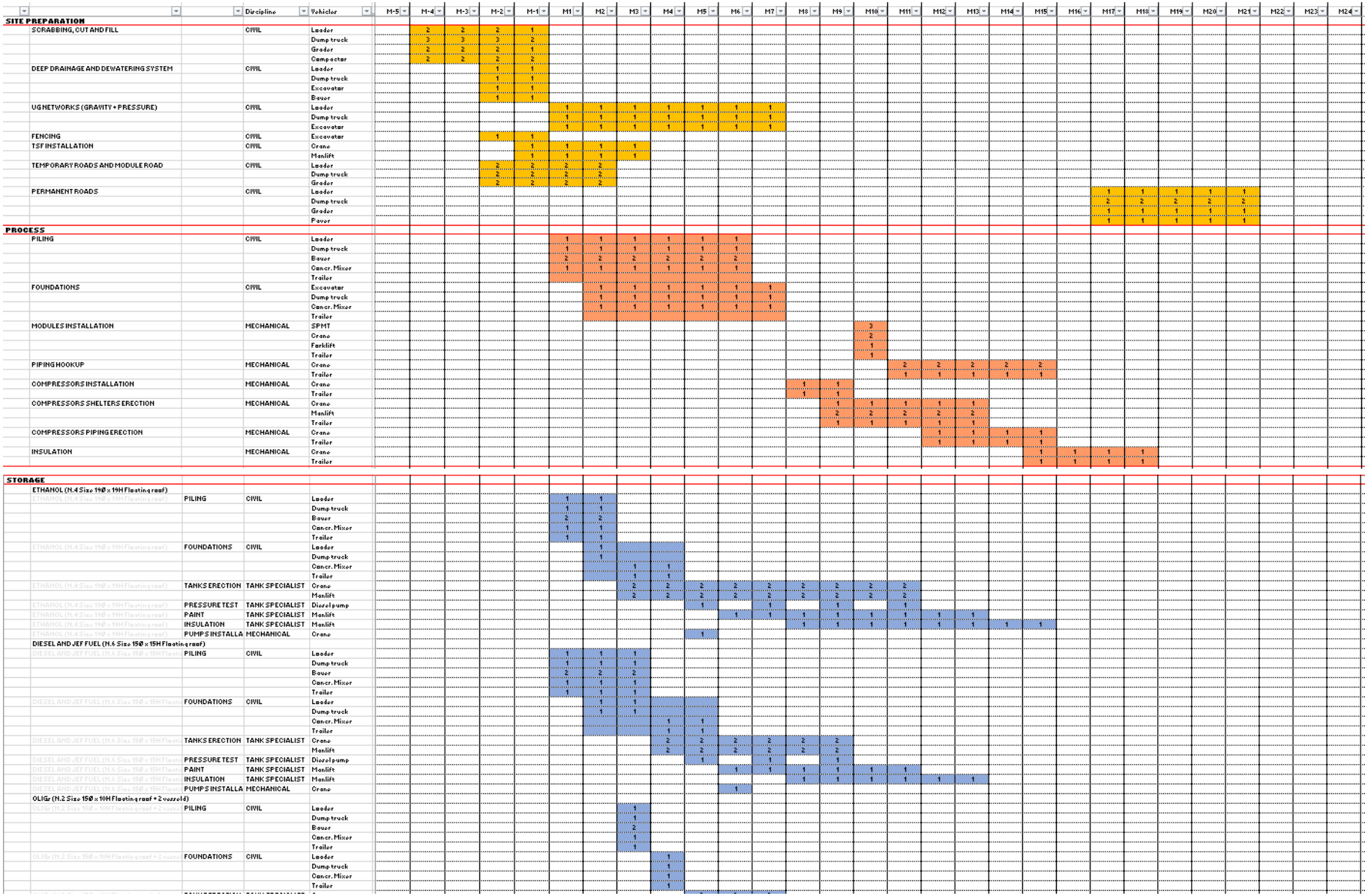
APPENDIX D - DRAWING & DOCUMENTS LISTS

The following Technip Energies documents and drawings have been used in our assessment;

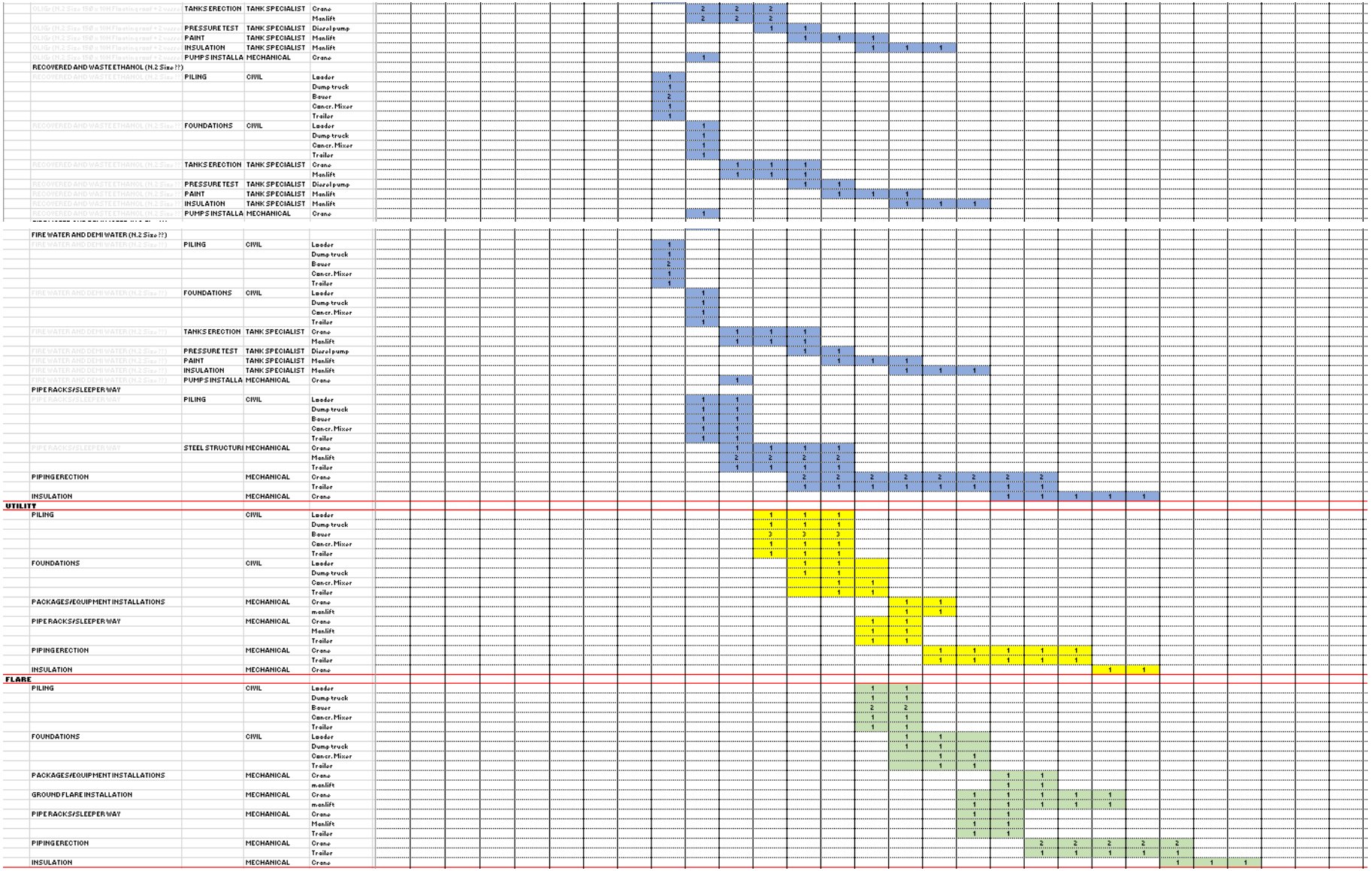
Table D.1 – Drawing & Documents List

Title	Number	Rev	Date
Dragon Project – Construction Data for Noise	(copied below)	2	05.05.2023
Construction Sequencing Plan	202947C 050 PP 00815	0	14.04.2023

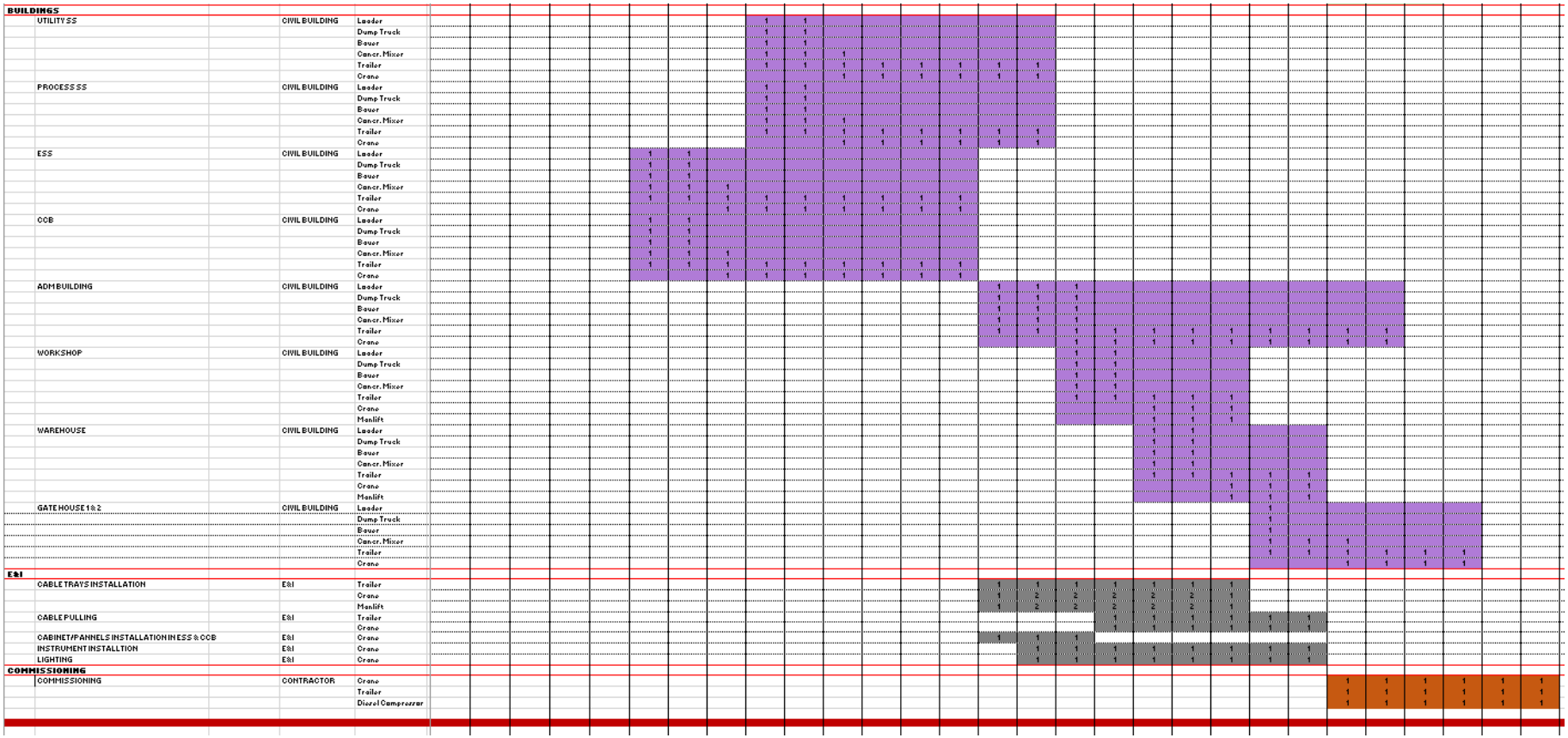
Table D.2 – Construction Data for Noise Provided by Technip Energies



		Discipline	Vehicles	M-5	M-4	M-3	M-2	M-1	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15	M16	M17	M18	M19	M20	M21	M22	M23	M24
SITE PREPARATION																																
	SCRABBING, CUT AND FILL	CIVIL	Loader		2	2	2	1																								
			Dump truck		3	3	3	2																								
			Grader		2	2	2	1																								
			Compactor		2	2	2	1																								
	DEEP DRAINAGE AND DEWATERING SYSTEM	CIVIL	Loader				1	1																								
			Dump truck				1	1																								
			Excavator				1	1																								
			Bauer				1	1																								
	UG NETWORKS (GRAVITY + PRESSURE)	CIVIL	Loader						1	1	1	1	1	1	1																	
			Dump truck						1	1	1	1	1	1	1																	
			Excavator						1	1	1	1	1	1	1																	
	FENCING	CIVIL	Excavator				1	1																								
	TSF INSTALLATION	CIVIL	Crane					1	1	1	1																					
			Manlift					1	1	1	1																					
	TEMPORARY ROADS AND MODULE ROAD	CIVIL	Loader				2	2	2	2																						
			Dump truck				2	2	2	2																						
			Grader				2	2	2	2																						
	PERMANENT ROADS	CIVIL	Loader																						1	1	1	1	1			
			Dump truck																						2	2	2	2	2			
			Grader																						1	1	1	1	1			
			Paver																						1	1	1	1	1			
PROCESS																																
	PILING	CIVIL	Loader						1	1	1	1	1	1																		
			Dump truck						1	1	1	1	1	1																		
			Bauer						2	2	2	2	2	2																		
			Concr. Mixer						1	1	1	1	1	1																		
			Trailer																													
	FOUNDATIONS	CIVIL	Excavator							1		1		1	1																	
			Dump truck							1	1	1	1	1	1																	
			Concr. Mixer							1	1	1	1	1	1																	
			Trailer																													
	MODULES INSTALLATION	MECHANICAL	SPMT															3														
			Crane															2														
			Forklift															1														
			Trailer																													
	PIPING HOOKUP	MECHANICAL	Crane																2	2	2	2	2									
			Trailer																1	1	1	1	1									
	COMPRESSORS INSTALLATION	MECHANICAL	Crane													1	1															
			Trailer													1	1															
	COMPRESSORS SHELTERS ERECTION	MECHANICAL	Crane														1	1	1	1	1											
			Manlift														2	2	2	2	2											
			Trailer														1	1	1	1	1											
	COMPRESSORS PIPING ERECTION	MECHANICAL	Crane																	1	1	1	1									
			Trailer																	1	1	1	1									
	INSULATION	MECHANICAL	Crane																				1	1	1	1	1					
			Trailer																				1	1	1	1	1					
STORAGE																																
	ETHANOL (N.4 Size 190 x 19H Floating roof)																															
		PILING	CIVIL	Loader						1	1																					
				Dump truck						1	1																					
				Bauer						2	2																					
				Concr. Mixer						1	1																					
				Trailer						1																						
		FOUNDATIONS	CIVIL	Loader							1	1																				
				Dump truck							1	1																				
				Concr. Mixer							1	1																				
				Trailer							1																					
		TANKS ERECTION	TANK SPECIALIST	Crane							2	2	2	2	2	2	2	2	2													
				Manlift							2	2	2	2	2	2	2	2	2													
		PRESSURE TEST	TANK SPECIALIST	Diesel pump									1	1	1	1	1	1	1													
		PAINT	TANK SPECIALIST	Manlift										1	1	1	1	1	1	1	1	1										
		INSULATION	TANK SPECIALIST	Manlift													1	1	1	1	1	1	1	1								
		PUMPS INSTALLA	MECHANICAL	Crane										1																		
	DIESEL AND JEF FUEL (N.6 Size 150 x 15H Floating roof)																															
		PILING	CIVIL	Loader						1	1	1																				
				Dump truck						1	1	1																				
				Bauer						2	2	2																				
				Concr. Mixer						1	1	1																				
				Trailer							1																					
		FOUNDATIONS	CIVIL	Loader							1	1																				
				Dump truck							1	1																				
				Concr. Mixer							1	1																				
				Trailer							1																					
		TANKS ERECTION	TANK SPECIALIST	Crane								2	2	2	2	2	2	2														
				Manlift								2	2	2	2	2	2	2														
		PRESSURE TEST	TANK SPECIALIST	Diesel pump											1	1	1	1														
		PAINT	TANK SPECIALIST	Manlift												1	1	1	1	1	1											
		INSULATION	TANK SPECIALIST	Manlift													1	1	1	1	1	1										
		PUMPS INSTALLA	MECHANICAL	Crane												1																
	OLIGr (N.2 Size 150 x 19H Floating roof + 2 vessels)																															
		PILING	CIVIL	Loader								1																				
				Dump truck								1																				
				Bauer								2																				
				Concr. Mixer								1																				
				Trailer								1																				
		FOUNDATIONS	CIVIL	Loader									1																			
				Dump truck									1																			
				Concr. Mixer									1																			
				Trailer									1																			



	OLIGr (N.2 Size 150 x 10H Floating roof + 2 vaults)	TANKS ERECTION	TANK SPECIALIST	Crane
				Manlift
	OLIGr (N.2 Size 150 x 10H Floating roof + 2 vaults)	PRESSURE TEST	TANK SPECIALIST	Diesel pump
	OLIGr (N.2 Size 150 x 10H Floating roof + 2 vaults)	PAINT	TANK SPECIALIST	Manlift
	OLIGr (N.2 Size 150 x 10H Floating roof + 2 vaults)	INSULATION	TANK SPECIALIST	Manlift
	OLIGr (N.2 Size 150 x 10H Floating roof + 2 vaults)	PUMPS INSTALLA	MECHANICAL	Crane
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)			
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)	PILING	CIVIL	Loader
				Dump truck
				Bauer
				Concr. Mixer
				Trailer
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)	FOUNDATIONS	CIVIL	Loader
				Dump truck
				Concr. Mixer
				Trailer
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)	TANKS ERECTION	TANK SPECIALIST	Crane
				Manlift
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)	PRESSURE TEST	TANK SPECIALIST	Diesel pump
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)	PAINT	TANK SPECIALIST	Manlift
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)	INSULATION	TANK SPECIALIST	Manlift
	RECOVERED AND WASTE ETHANOL (N.2 Size ??)	PUMPS INSTALLA	MECHANICAL	Crane
	FIRE WATER AND DEMI WATER (N.2 Size ??)			
	FIRE WATER AND DEMI WATER (N.2 Size ??)	PILING	CIVIL	Loader
				Dump truck
				Bauer
				Concr. Mixer
				Trailer
	FIRE WATER AND DEMI WATER (N.2 Size ??)	FOUNDATIONS	CIVIL	Loader
				Dump truck
				Concr. Mixer
				Trailer
	FIRE WATER AND DEMI WATER (N.2 Size ??)	TANKS ERECTION	TANK SPECIALIST	Crane
				Manlift
	FIRE WATER AND DEMI WATER (N.2 Size ??)	PRESSURE TEST	TANK SPECIALIST	Diesel pump
	FIRE WATER AND DEMI WATER (N.2 Size ??)	PAINT	TANK SPECIALIST	Manlift
	FIRE WATER AND DEMI WATER (N.2 Size ??)	INSULATION	TANK SPECIALIST	Manlift
	FIRE WATER AND DEMI WATER (N.2 Size ??)	PUMPS INSTALLA	MECHANICAL	Crane
	PIPE RACKS/SLEEPER WAY			
	PIPE RACKS/SLEEPER WAY	PILING	CIVIL	Loader
				Dump truck
				Bauer
				Concr. Mixer
				Trailer
	PIPE RACKS/SLEEPER WAY	STEEL STRUCTURI	MECHANICAL	Crane
				Manlift
				Trailer
	PIPING ERECTION		MECHANICAL	Crane
				Trailer
	INSULATION		MECHANICAL	Crane
UTILITY				
	PILING		CIVIL	Loader
				Dump truck
				Bauer
				Concr. Mixer
				Trailer
	FOUNDATIONS		CIVIL	Loader
				Dump truck
				Concr. Mixer
				Trailer
	PACKAGES/EQUIPMENT INSTALLATIONS		MECHANICAL	Crane
				manlift
	PIPE RACKS/SLEEPER WAY		MECHANICAL	Crane
				Manlift
				Trailer
	PIPING ERECTION		MECHANICAL	Crane
				Trailer
	INSULATION		MECHANICAL	Crane
FLARE				
	PILING		CIVIL	Loader
				Dump truck
				Bauer
				Concr. Mixer
				Trailer
	FOUNDATIONS		CIVIL	Loader
				Dump truck
				Concr. Mixer
				Trailer
	PACKAGES/EQUIPMENT INSTALLATIONS		MECHANICAL	Crane
				manlift
	GROUND FLARE INSTALLATION		MECHANICAL	Crane
				manlift
	PIPE RACKS/SLEEPER WAY		MECHANICAL	Crane
				Manlift
				Trailer
	PIPING ERECTION		MECHANICAL	Crane
				Trailer
	INSULATION		MECHANICAL	Crane



Loader	6T capacity
Dump truck	25T capacity
Grader	Cat 140 GC or similar
Compactor	7 T
Excavator	Cat 313 or similar
Bauer	Drill Rig LB16 or similar
Crane	80 T capacity as average
Manlift	25 m capacity as average

Paver	
Concrete mixer	9m^3
Trailer	25T capacity
SPMT	190 axels with 6 power units
Forklift	5T
Diesel pump	67HP motor
Diesel compressor	15m^3/min – 120kW