



**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
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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™ 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 impact 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
14 th June 2022	Hunter Acoustics (HA) Letter	HA note on assessment methodology and receptor locations
8 th 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.
22 nd 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
25 th 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.
2 nd June 2023	HA email to Red Twin / NPT	Request for feedback on review of scoping report.
7 th 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 dB(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 L_{Aeq} 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 L_{Aeq} 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](#)~~Table C.1~~ and [Table C.2](#)~~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

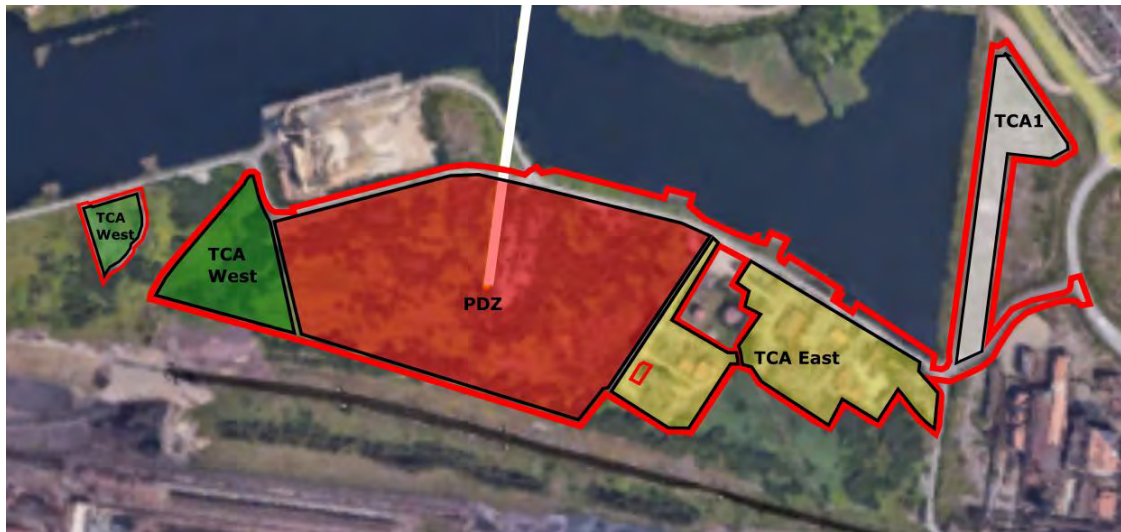
Scenarios 1-5 are provided in [Table C.3](#)~~Table C.3~~ to [Table C.8](#)~~Table C.8~~ of Appendix C respectively.

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.

- o **Scenario 1a** (Enabling works, plant at northern boundary of PDZ, including sheet piling for construction wharf)
- o **Scenario 1b** (Enabling works, plant at southern boundary of PDZ) including sheet piling for construction wharf)
- o **Scenario 2** (Months 1-6 of construction, including steel tube impact piling for operational jetty)
- o **Scenario 3** (Months 7-12 of construction)
- o **Scenario 4** (Months 13-18 of construction)
- o **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~~Figure C.1~~ and Figure C.6~~Figure C.6~~ of Appendix C with detailed scenarios set out in the associated tables, Table C.3~~Table C.3~~ to Table C.8~~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_{A,T_r}	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} (dB)
	63	125	250	500	1000	2000	4000	8000	
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} (dB)
	63	125	250	500	1000	2000	4000	8000	
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

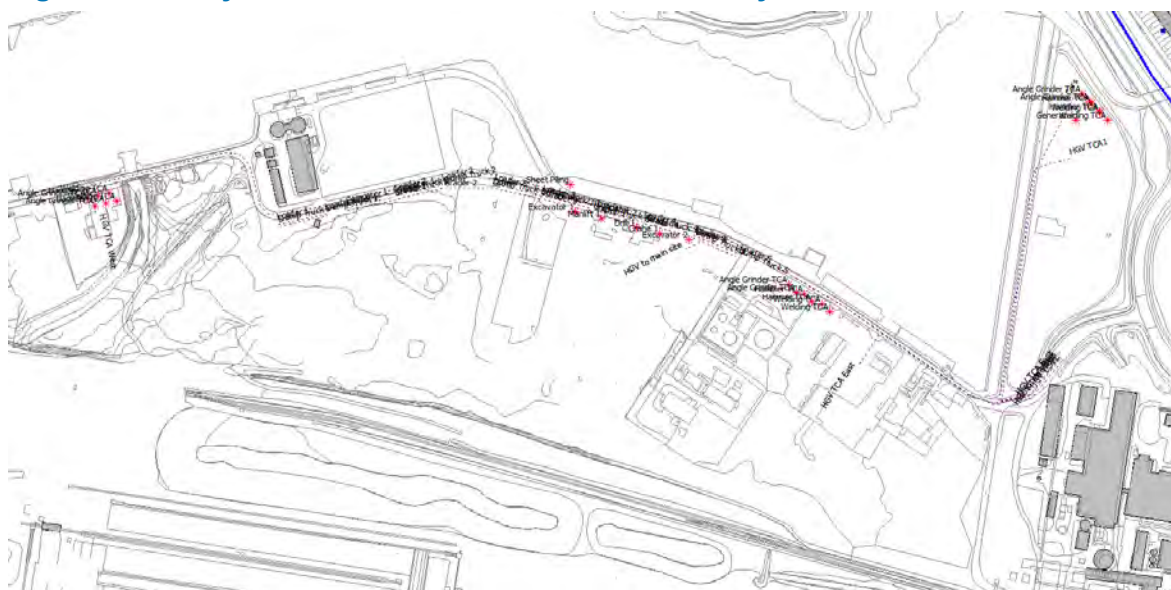
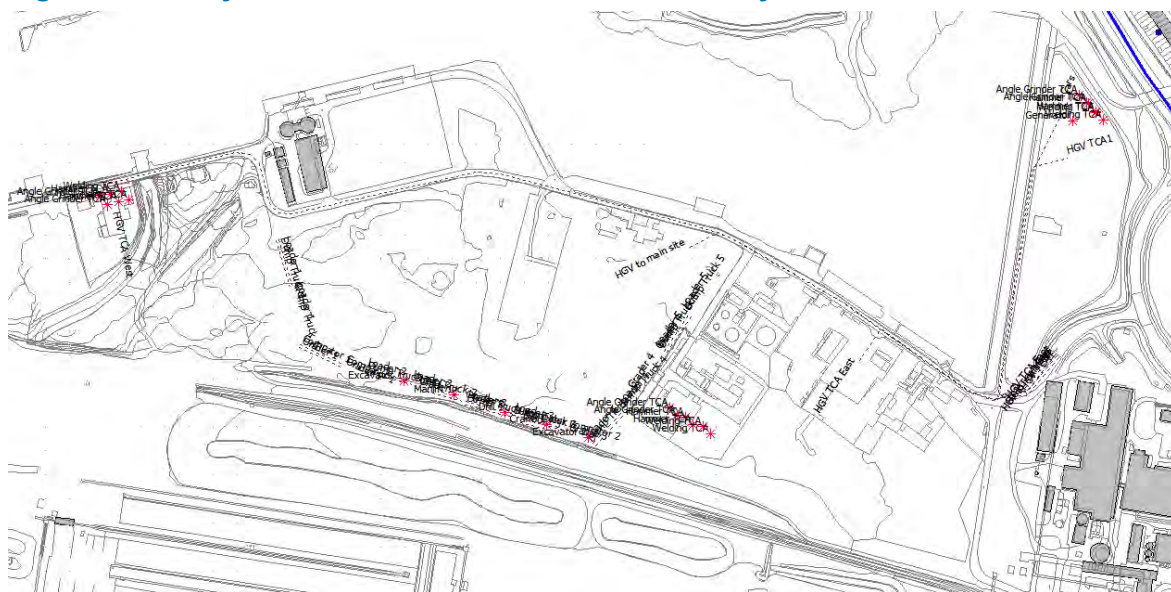


Table C.4 – Daytime Modelled Scenario 1b (Worst Case 1hr Period)

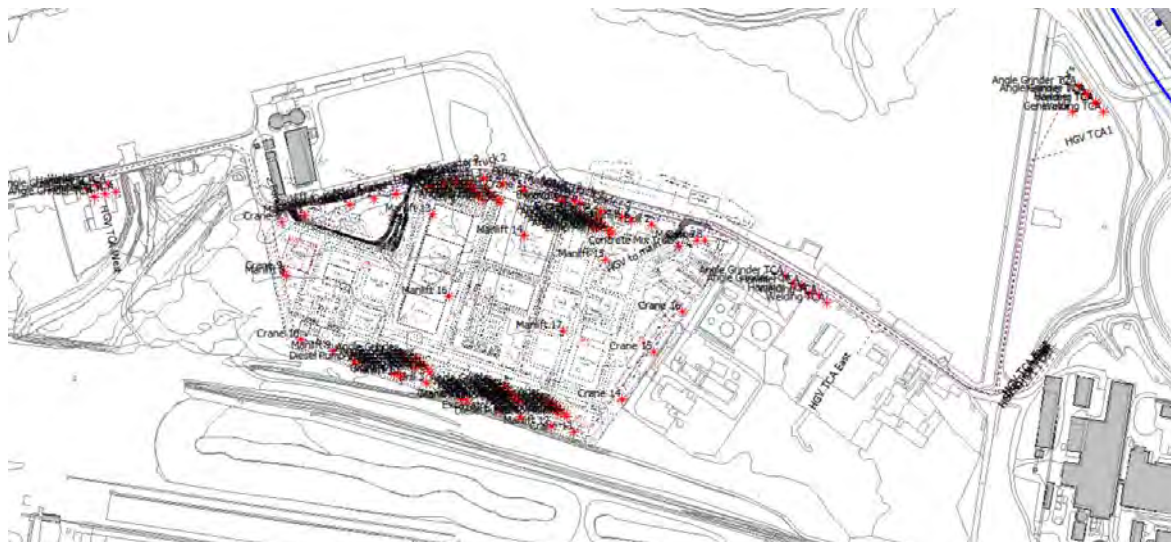
Activity	% On-time	Flow	Speed (km/h)	Source Height (m)
2no Excavators	100	-	-	3
5no Loaders on 50m paths	-	360	25	3
4no Dump trucks on 50m paths	-	360	25	3
4no Graders on 50m paths	-	180	13	3
2no Compactors on 50m paths	-	180	13	1
HGVs to main PDZ (46no two-way)	-	92	50	1
Bauer Drill rig	50	-	-	3
Crane 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

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

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

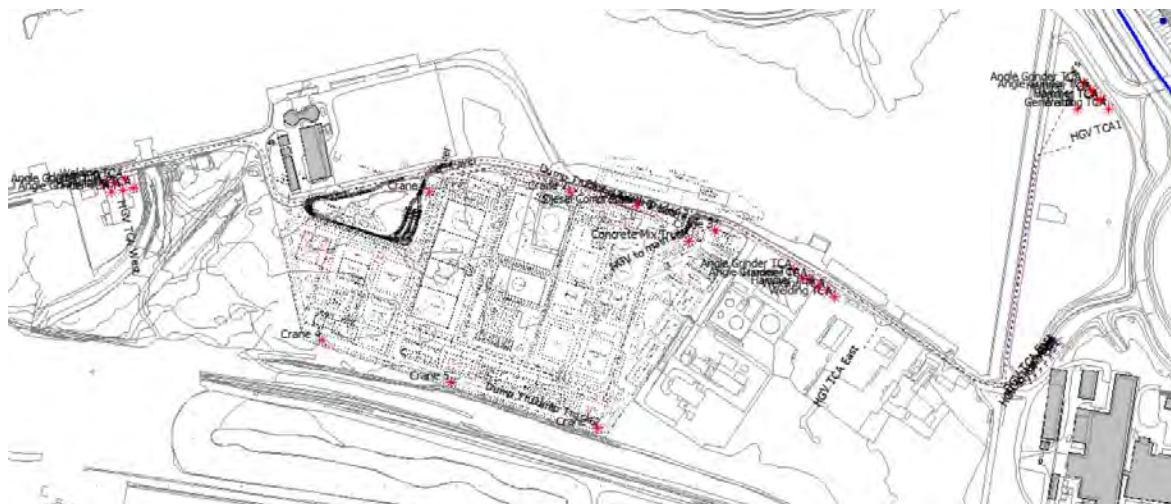
Figure C.4 – Daytime Modelled Scenario 3 Source Layout

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

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

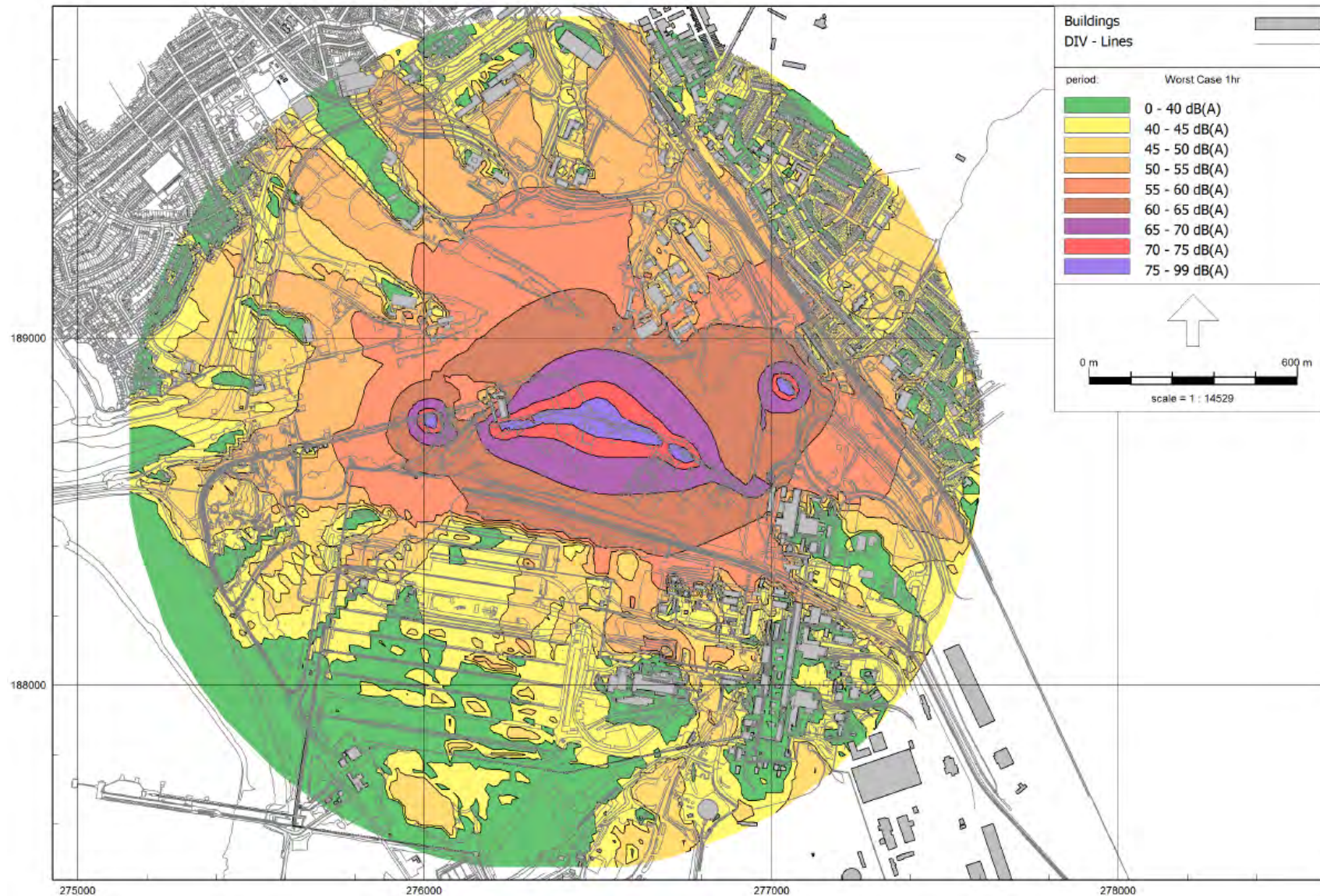


Figure C.8 – Daytime Scenario 1b (Enabling, South Boundary) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

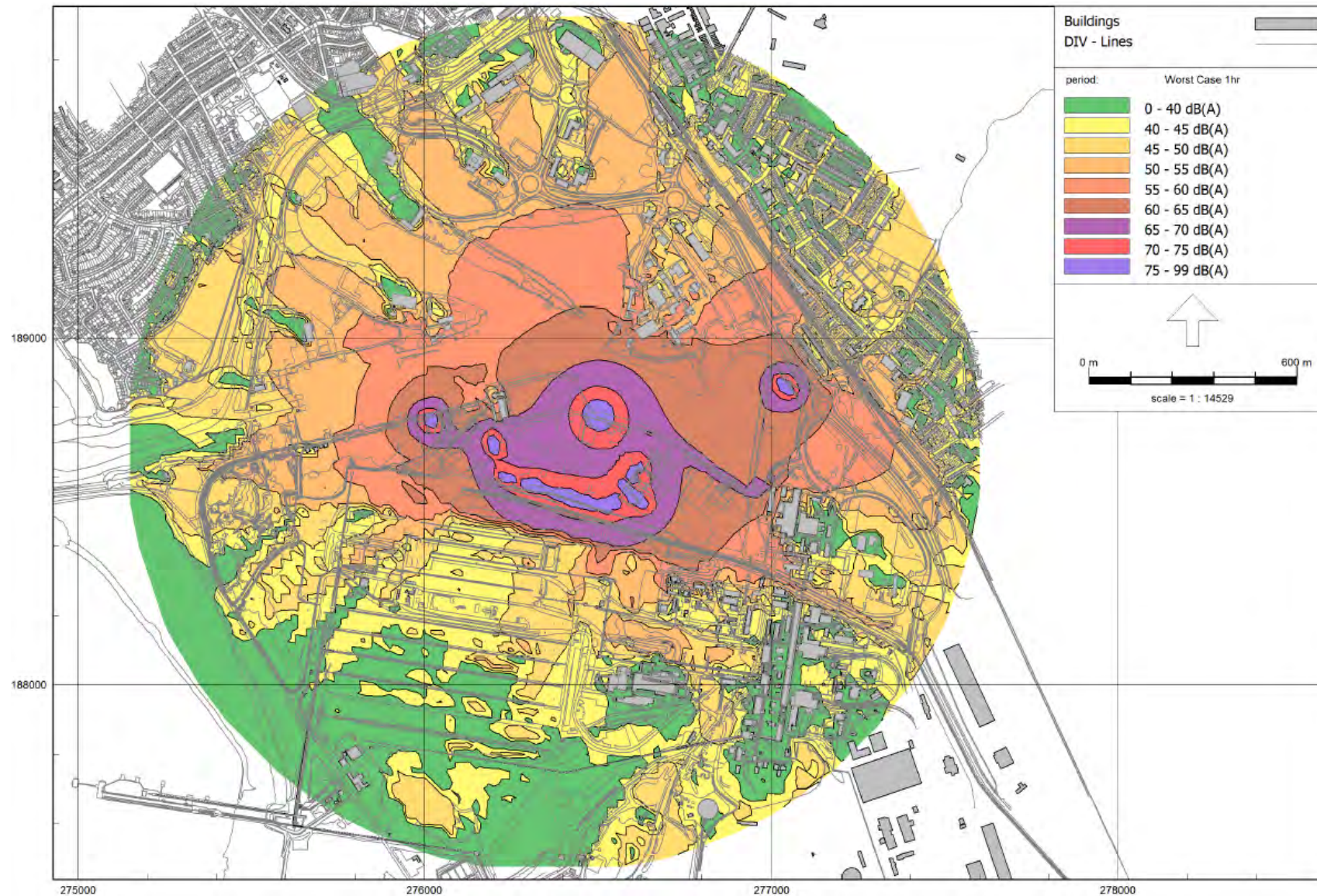


Figure C.9 – Daytime Scenario 2 (M1-6) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

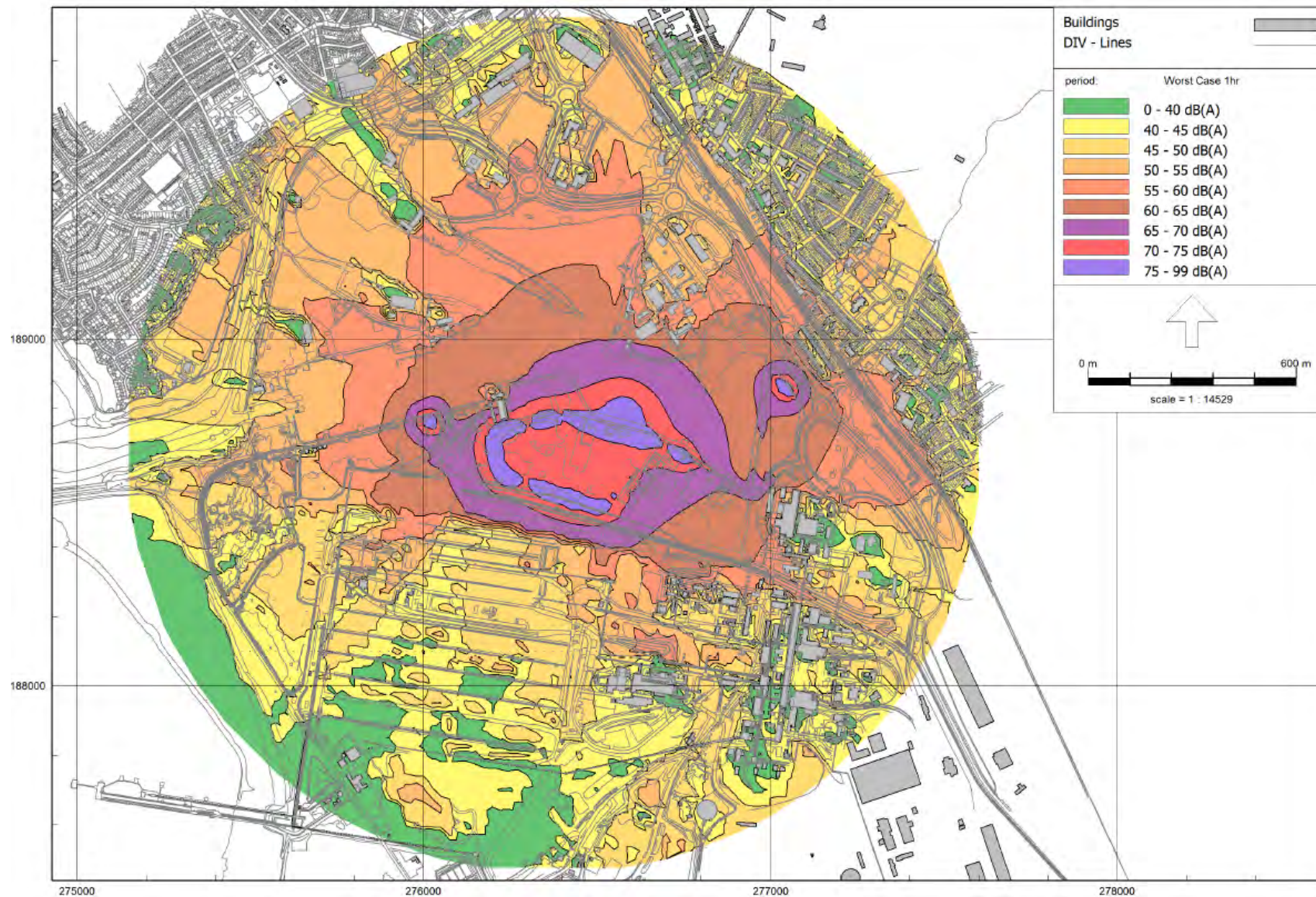


Figure C.10 – Daytime Scenario 3 (M7-12) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

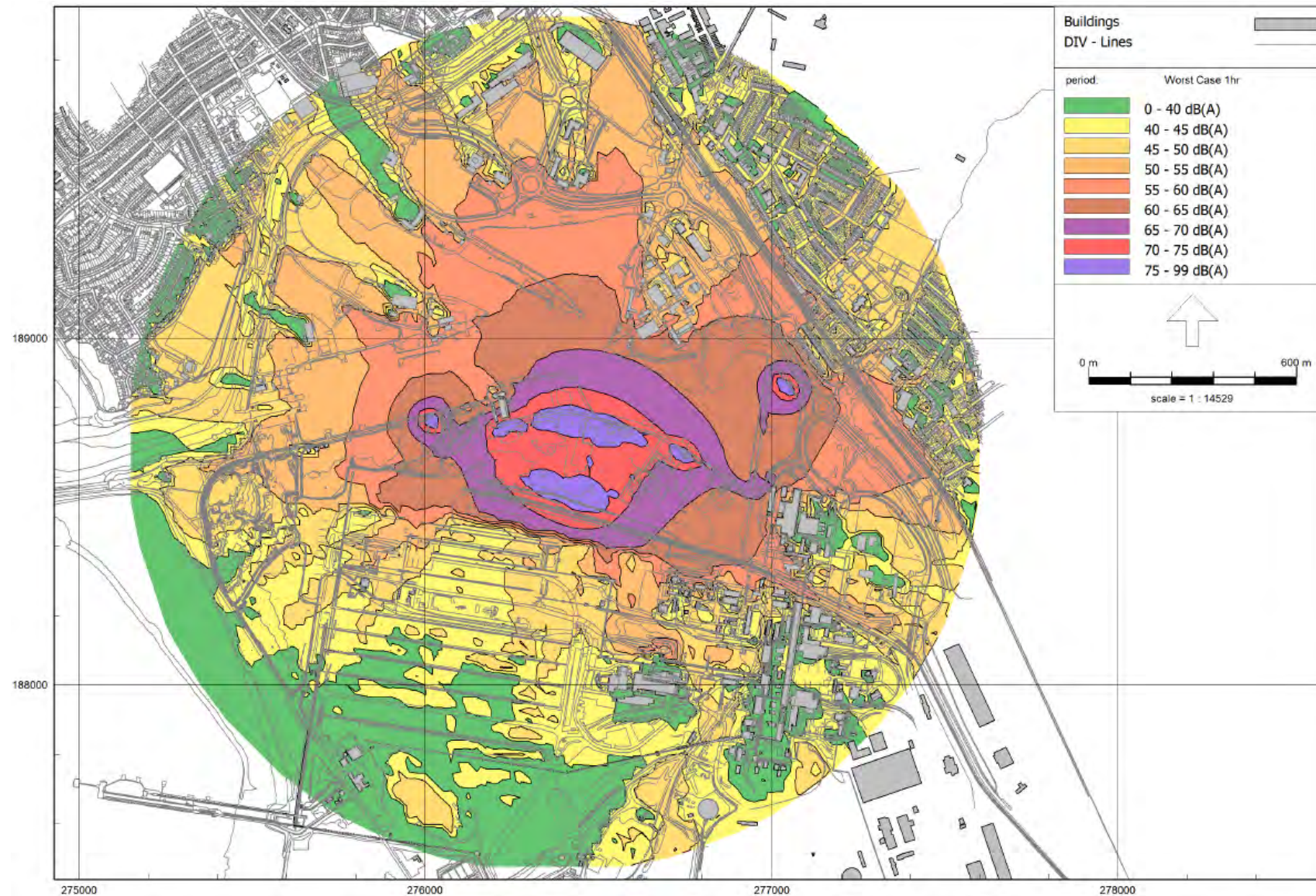


Figure C.11 – Daytime Scenario 4 (M13-18) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height

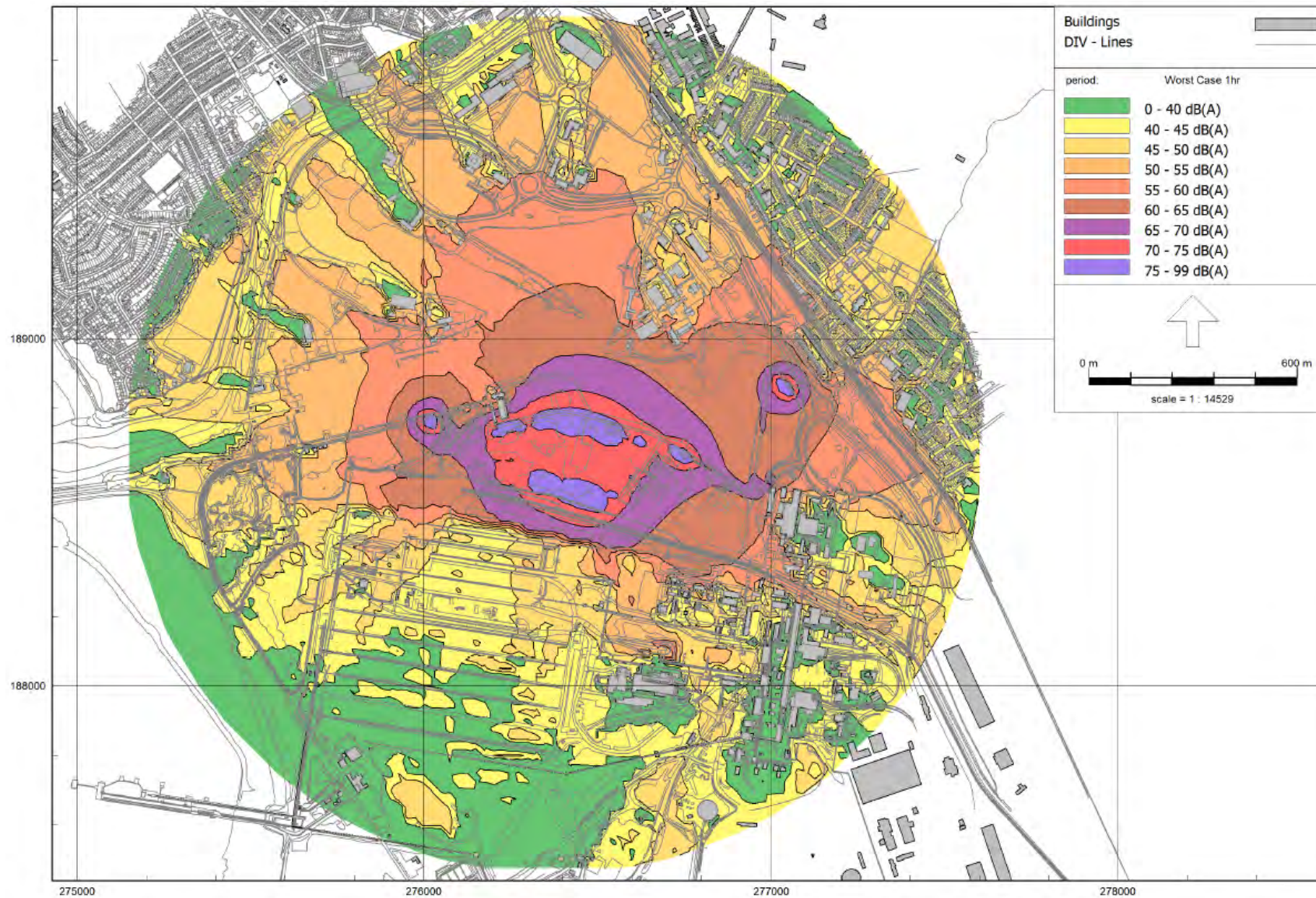
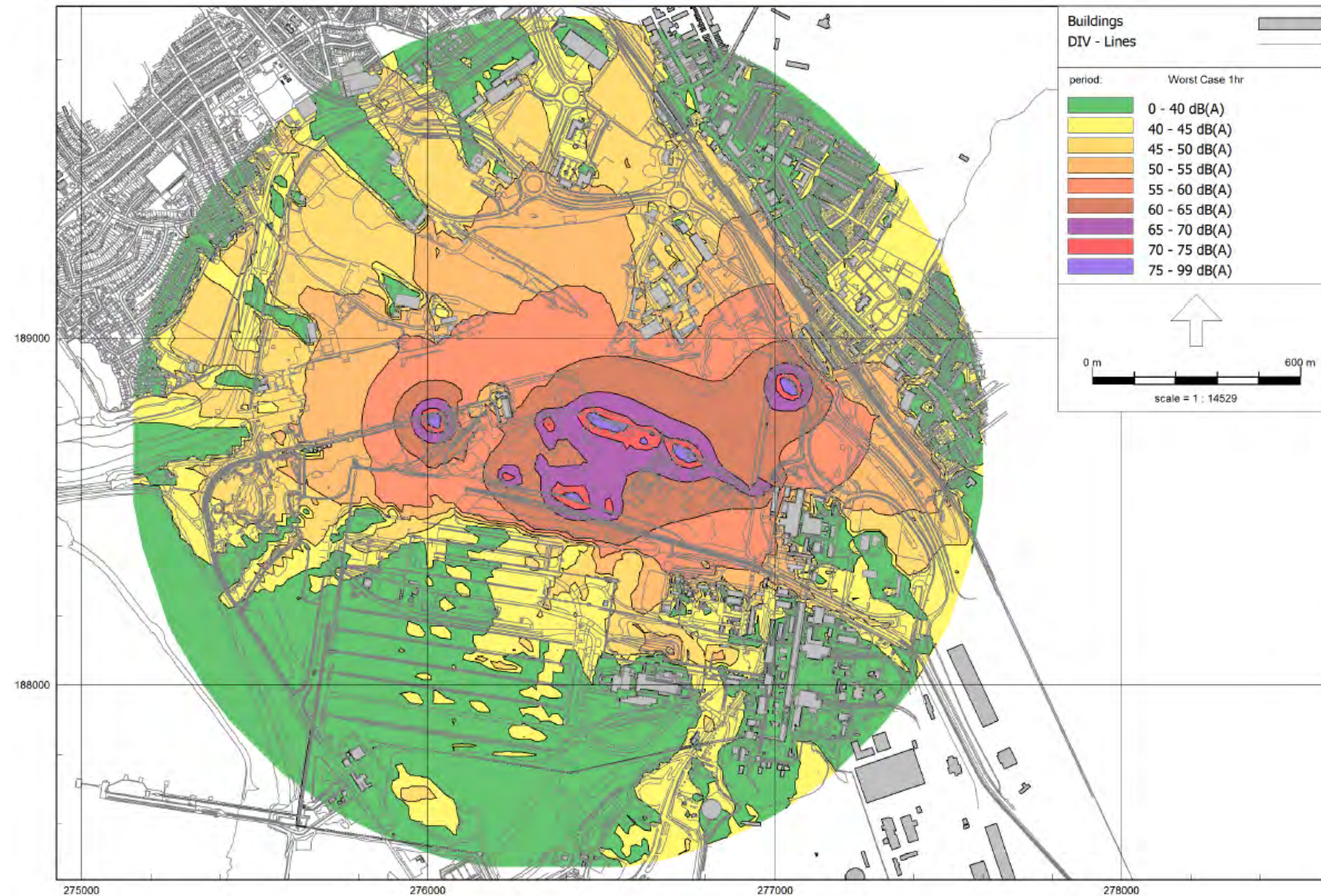


Figure C.12 – Daytime Scenario 5 (M19-24) Noise Model $L_{Aeq,1hr}$ Contours at 4.5m Height



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

SITE PREPARATION				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
SORABRING, CUT AND FILL				CIVIL	Leader	2	2	2	1																							
					Dump truck	2	2	2	2																							
					Grader	2	2	2	1																							
DEEP DRAINAGE AND DEWATERING SYSTEM				CIVIL	Leader	2	2	2	2																							
					Dump truck	1	1	1	1																							
					Excavator	1	1	1	1																							
					Bouer	1	1	1	1																							
UG NETWORKS (GRAVITY + PRESSURE)				CIVIL	Leader					1	1	1	1	1	1	1	1															
					Dump truck					1	1	1	1	1	1	1	1															
					Excavator					1	1	1	1	1	1	1	1															
					Excavator			1	1																							
FENCING				CIVIL	Oreno				1	1	1	1	1	1																		
TSF INSTALLATION				CIVIL	Manlift				1	1	1	1	1																			
TEMPORARY ROADS AND MODULE ROAD				CIVIL	Leader	2	2	2	2	2																						
					Dump truck	2	2	2	2	2																						
					Grader	2	2	2	2	2																						
PERMANENT ROADS				CIVIL	Leader																						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	Leader					1	1	1	1	1	1																	
					Dump truck					1	1	1	1	1	1																	
					Bouer					2	2	2	2	2																		
					Cancer, Mixer					1	1	1	1	1																		
					Trailer																											
FOUNDATIONS				CIVIL	Excavator					1	1	1	1	1	1	1																
					Dump truck					1	1	1	1	1	1	1																
					Cancer, Mixer					1	1	1	1	1	1	1																
					Trailer																											
MODULES INSTALLATION				MECHANICAL	SPMT																											
					Oreno																											
					Forklift																											
					Trailer																											
PIPING HOOKUP				MECHANICAL	Oreno																											
					Trailer																											
COMPRESSORS INSTALLATION				MECHANICAL	Oreno																											
					Trailer																											
COMPRESSORS SHELTERS ERECTION				MECHANICAL	Oreno																											
					Manlift																											
COMPRESSORS PIPING ERECTION				MECHANICAL	Oreno																											
					Trailer																											
INSULATION				MECHANICAL	Oreno																											
					Trailer																											
STORAGE																																
ETHANOL (N.4 Size 190 x 19H Floating roof)				PILING	CIVIL	Leader				1	1																					
					Dump truck					1	1																					
					Bouer					2	2																					
					Cancer, Mixer					1	1																					
					Trailer																											
ETHANOL (N.4 Size 190 x 19H Floating roof)				FOUNDATIONS	CIVIL	Leader				1																						
					Dump truck					1																						
					Cancer, Mixer																											
					Trailer																											
ETHANOL (N.4 Size 190 x 19H Floating roof)				TANKS ERECTION	TANK SPECIALIST	Oreno																										
					Manlift																											
					Diurnal pump					2	2	2	2	2	2	2	2	2	2													
ETHANOL (N.4 Size 190 x 19H Floating roof)				PRESSURE TEST	TANK SPECIALIST	Manlift																										
ETHANOL (N.4 Size 190 x 19H Floating roof)				PAINT	TANK SPECIALIST	Manlift																										
ETHANOL (N.4 Size 190 x 19H Floating roof)				INSULATION	TANK SPECIALIST	Manlift																										
ETHANOL (N.4 Size 190 x 19H Floating roof)				PUMPS INSTALLA	MECHANICAL	Oreno																										
DIESEL AND JET FUEL (N.4 Size 190 x 19H Floating roof)				PILING	CIVIL	Leader				1	1	1																				
					Dump truck					1	1	1																				
					Bouer					2	2	2																				
					Cancer, Mixer					1	1	1																				
					Trailer					1	1	1																				
DIESEL AND JET FUEL (N.4 Size 190 x 19H Floating roof)				FOUNDATIONS	CIVIL	Leader				1																						
					Dump truck					1																						
					Cancer, Mixer																											
					Trailer																											
DIESEL AND JET FUEL (N.4 Size 190 x 19H Floating roof)				TANKS ERECTION	TANK SPECIALIST	Oreno																										
					Manlift																											
					Diurnal pump					2	2	2	2	2	2	2	2	2														
DIESEL AND JET FUEL (N.4 Size 190 x 19H Floating roof)				PRESSURE TEST	TANK SPECIALIST	Manlift																										
DIESEL AND JET FUEL (N.4 Size 190 x 19H Floating roof)				PAINT	TANK SPECIALIST	Manlift																										
DIESEL AND JET FUEL (N.4 Size 190 x 19H Floating roof)				INSULATION	TANK SPECIALIST	Manlift																										
DIESEL AND JET FUEL (N.4 Size 190 x 19H Floating roof)				PUMPS INSTALLA	MECHANICAL	Oreno																										
OLIG (N.2 Size 190 x 19H Floating roof + 2 vessel)				PILING	CIVIL	Leader																										
					Dump truck																											
					Bouer																											
					Cancer, Mixer																											
					Trailer																											
OLIG (N.2 Size 190 x 19H Floating roof + 2 vessel)				FOUNDATIONS	CIVIL	Leader																										
					Dump truck																											
					Cancer, Mixer																											
					Trailer																											

[illegible]

[illegible]

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