Havant
BOROUGH COUNCIL

Coastal
Partners



Appendix O – Construction Noise Assessment

Langstone Flood and Coastal Erosion Risk Management Scheme

Construction Noise Assessment

Project number: 60656877

29/01/24

Delivering a better world

Quality information

Prepared by	Checked by	Verified by	Approved by
Thomas Citrine, BSc MIOA Senior Acoustic Consultant	Matt Muirhead, PhD MIOA Principal Acoustician	Edward Robinson BSc (Hons) MIOA Associate Consultant	Yuyou Liu PhD MEng BSc CEng FIOA Acoustics Regional Manager

Revision History

Revision	Revision date	Details	Authorized	Name	Position
R01	25/05/22	Revised following comment	TC	Thomas Citrine	Senior Acoustic Consultant
R02	07/11/23	Revised following update to design	ER	Edward Robinson	Associate Acoustic Consultant
R03	01/12/23	Updated following comment	ER	Edward Robinson	Associate Acoustic Consultant
R04	29/01/24	Update following comment	ER	Edward Robinson	Associate Acoustic Consultant

Distribution List

# Hard Copies	PDF Required	Association / Company Name

Prepared for:

Coastal Partners
Public Service Plaza
Havant
PO9 2AX

Prepared by:

Thomas Citrine
Senior Acoustic Consultant

AECOM Limited
Sunley House
4 Bedford Park, Surrey
Croydon CRO 2AP
United Kingdom

T: +44 20 8639 3500
aecom.com

© 2024 AECOM Limited. All Rights Reserved.

This document has been prepared by AECOM Limited (“AECOM”) for sole use of our client (the “Client”) in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AECOM and the Client. Any information provided by third parties and referred to herein has not been checked or verified by AECOM, unless otherwise expressly stated in the document. No third party may rely upon this document without the prior and express written agreement of AECOM.

Table of Contents

1. Introduction 8
2. Site Description 8
3. Proposed Works 9
4. Assessment Criteria 10
4.1 BS5228-1:2009+A1:2014 10
4.2 BS5228-2:2009+A1:2014 11
4.3 Waterbird Disturbance Mitigation Tool Kit 11
5. Baseline Sound Survey 12
6. Construction Noise Criteria 13
7. Predicted Construction Noise Levels 14
8. Summary of Results 14
8.1 Residential Impact 14
8.1.1 Frontage 1A 15
8.1.2 Frontage 1B 15
8.1.3 Frontage 2 15
8.1.4 Frontage 3 16
8.1.5 Frontage 4 16
8.1.6 Frontage 5 17
8.1.7 Frontage 6 17
8.2 Qualitative Vibration Assessment 18
8.3 Water Bird Impact 18
9. Mitigation 18
9.1.1 Typical Construction Activity Mitigation 19
10. Conclusions 19
11. References 21
Appendix A Acoustic Glossary 22
Appendix B Environmental Designations 23
Appendix C Baseline Sound Survey 25
11.1 Meteorological Conditions 25
11.2 Sound Monitoring Results 26
11.3 Monitoring Location – N1 26
11.4 Monitoring Location – N2 27
11.5 Monitoring Location – N3 28
11.6 Monitoring Location – N4 29
11.7 Monitoring Location – N5 30
11.8 Monitoring Location – N6 31
Appendix D Construction Noise Activities 33
Appendix E Construction Noise Contour Maps 37
E.1 Frontage 1A Noise Contour Maps 37
E.2 Frontage 1B Noise Contour Maps 40
E.3 Frontage 2 Noise Contour Maps 44
E.4 Frontage 3 Noise Contour Maps 48
E.5 Frontage 4 Noise Contour Maps 53
E.6 Frontage 5 Noise Contour Maps 57
E.7 Frontage 6 Noise Contour Maps 62
Appendix F Water Bird Noise Disturbance Contours 64
F.1 Frontage 1A 64
F.2 Frontage 1B 67
F.3 Frontage 2 71

F.4 Frontage 3 74
F.5 Frontage 4 79
F.6 Frontage 5 83
F.7 Frontage 6 88
Appendix G Extent of Dwellings Affected by Noise During the Daytime 89

Figures

Figure 2.1 Scheme Frontage and Noise Model Assessment Locations 9
Figure 5.1 Baseline Sound Locations 13
Figure 11.1 Solent Waders and Brent Goose Strategy Mapping 2022 23
Figure 11.2 Chichester and Langstone Harbours SPA and Ramsar Site 24
Figure 11.3 N1 Monitoring Location (microphone circled in red and weather station circled in blue) 26
Figure 11.4 N2 Monitoring Location (microphone circled in red) 27
Figure 11.5 N3 Monitoring Location (microphone circled in red) 28
Figure 11.6 N4 Monitoring Location 29
Figure 11.7 N5 Monitoring Location 31
Figure 11.8 N6 Monitoring Location 32
Figure 11.9 Frontage 1A 'ABC' Method Noise Contour - Excavator 37
Figure 11.10 Frontage 1A 'ABC' Method Noise Contour - Wacker Plate 37
Figure 11.11 Frontage 1A 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting Aggregate 38
Figure 11.12 Frontage 1A 'ABC' Method Noise Contour - Bulldozer 38
Figure 11.13 Frontage 1A 'ABC' Method Noise Contour - Dump Truck 39
Figure 11.14 Frontage 1B 'ABC' Method Noise Contour - 35t Excavator 40
Figure 11.15 Frontage 1B 'ABC' Method Noise Contour - Wacker Plate 40
Figure 11.16 Frontage 1B 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting General Fill 41
Figure 11.17 Frontage 1B 'ABC' Method Noise Contour - Bulldozer 41
Figure 11.18 Frontage 1B 'ABC' Method Noise Contour - Dump Truck 42
Figure 11.19 Frontage 1B 'ABC' Method Noise Contour - Movax Vibro Piling Rig 42
Figure 11.20 Frontage 1B 'ABC' Method Noise Contour - Percussive Piling Rig 43
Figure 11.21 Frontage 2 'ABC' Method Noise Contour - 35t Excavator 44
Figure 11.22 Frontage 2 'ABC' Method Noise Contour - Wacker Plate 44
Figure 11.23 Frontage 2 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting General Fill 45
Figure 11.24 Frontage 2 'ABC' Method Noise Contour - Bulldozer 45
Figure 11.25 Frontage 2 'ABC' Method Noise Contour - Dump Truck 46
Figure 11.26 Frontage 2 'ABC' Method Noise Contour – Breaking of Asphalt 46
Figure 11.27 Frontage 2 'ABC' Method Noise Contour – Movax Piling 47
Figure 11.28 Frontage 2 'ABC' Method Noise Contour – Percussive Piling 47
Figure 11.29 Frontage 3 'ABC' Method Noise Contour - 26t Pre-mix Concrete Truck, Discharging 48
Figure 11.30 Frontage 3 'ABC' Method Noise Contour - 26t Concrete Truck Placing Concrete 48
Figure 11.31 Frontage 3 'ABC' Method Noise Contour - 40t / 50t / 70t Crawler Crane 49
Figure 11.32 Frontage 3 'ABC' Method Noise Contour - 35t Excavator 49
Figure 11.33 Frontage 3 'ABC' Method Noise Contour - 21t Excavator 50
Figure 11.34 Frontage 3 'ABC' Method Noise Contour - 13t Excavator 50
Figure 11.35 Frontage 3 'ABC' Method Noise Contour - 5t / 8t Excavator 51
Figure 11.36 Frontage 3 'ABC' Method Noise Contour - Percussive Piling 51
Figure 11.37 Frontage 3 'ABC' Method Noise Contour Movax Piling 52
Figure 11.38 Frontage 4 'ABC' Method Noise Contour - 26t Pre-mix Concrete Discharging 53
Figure 11.39 Frontage 4 'ABC' Method Noise Contour - 26t Concrete Truck Placing Concrete 53
Figure 11.40 Frontage 4 'ABC' Method Noise Contour - 35t Excavator 54
Figure 11.41 Frontage 4 'ABC' Method Noise Contour - 21t Excavator 54
Figure 11.42 Frontage 4 'ABC' Method Noise Contour - 13t Excavator 55
Figure 11.43 Frontage 4 'ABC' Method Noise Contour - 5t / 8t Excavator 55
Figure 11.44 Frontage 4 'ABC' Method Noise Contour - Movax Vibro Piling Rig 56
Figure 11.45 Frontage 4 'ABC' Method Noise Contour - Percussive Piling Rig 56
Figure 11.46 Frontage 5 'ABC' Method Noise Contour - Excavator 57
Figure 11.47 Frontage 5 'ABC' Method Noise Contour - Wacker Plate 57

Figure 11.48 Frontage 5 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting Aggregate 58
Figure 11.49 Frontage 5 'ABC' Method Noise Contour - Bulldozer 58
Figure 11.50 Frontage 5 'ABC' Method Noise Contour - Dump Truck 59
Figure 11.51 Frontage 5 'ABC' Method Noise Contour - 26t Pre-mix Concrete Truck Discharging 59
Figure 11.52 Frontage 5 'ABC' Method Noise Contour - 26t Concrete Truck Placing Concrete 60
Figure 11.53 Frontage 5 'ABC' Method Noise Contour - Movax Vibro Piling Unit 60
Figure 11.54 Frontage 5 'ABC' Method Noise Contour - Percussive Piling Rig 61
Figure 11.55 Frontage 6 'ABC' Method Noise Contour - 20t Wheeled Front End Loader Moving Rock / Loading Lorries 62
Figure 11.56 Frontage 6 'ABC' Method Noise Contour - 23t Articulated Dumper Truck Moving and Tipping Fill / Rock 62
Figure 11.57 Frontage 6 'ABC' Method Noise Contour - 40t Long Reach Excavator 63
Figure 11.58 Frontage 6 'ABC' Method Noise Contour – 20t 8-Wheeled Lorry Moving and Tipping Fill 63
Figure 11.59 Frontage 1A Water Bird Noise Disturbance Contour - Excavator 64
Figure 11.60 Frontage 1A Water Bird Noise Disturbance Contour - Wacker Plate 64
Figure 11.61 Frontage 1A Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting Aggregate 65
Figure 11.62 Frontage 1A Water Bird Noise Disturbance Contour - Bulldozer 65
Figure 11.63 Frontage 1A Water Bird Noise Disturbance Contour - Dump Truck 66
Figure 11.64 Frontage 1B Water Bird Noise Disturbance Contour - Excavator 67
Figure 11.65 Frontage 1B Water Bird Noise Disturbance Contour - Wacker Plate 67
Figure 11.66 Frontage 1B Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting General Fill 68
Figure 11.67 Frontage 1B Water Bird Noise Disturbance Contour - Bulldozer 68
Figure 11.68 Frontage 1B Water Bird Noise Disturbance Contour - Dump Truck 69
Figure 11.69 Frontage 1B Water Bird Noise Disturbance Contour - Movax Vibro Piling Rig 69
Figure 11.70 Frontage 1B Water Bird Noise Disturbance Contour - Percussive Piling Rig 70
Figure 11.71 Frontage 2 Water Bird Noise Disturbance Contour - Excavator 71
Figure 11.72 Frontage 2 Water Bird Noise Disturbance Contour - Wacker Plate 71
Figure 11.73 Frontage 2 Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting Aggregate 72
Figure 11.74 Frontage 2 Water Bird Noise Disturbance Contour - Bulldozer 72
Figure 11.75 Frontage 2 Water Bird Noise Disturbance Contour - Dump Truck 73
Figure 11.76 Frontage 3 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Discharging 74
Figure 11.77 Frontage 3 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Placing Concrete 74
Figure 11.78 Frontage 3 Water Bird Noise Disturbance Contour - 40t / 50t / 70t Crawler Crane 75
Figure 11.79 Frontage 3 Water Bird Noise Disturbance Contour - 35t Excavator 75
Figure 11.80 Frontage 3 Water Bird Noise Disturbance Contour - 21t Excavator 76
Figure 11.81 Frontage 3 Water Bird Noise Disturbance Contour - 13t Excavator 76
Figure 11.82 Frontage 3 Water Bird Noise Disturbance Contour - 5t / 8t Excavator 77
Figure 11.83 Frontage 3 Water Bird Noise Disturbance Contour - Percussive Piling 77
Figure 11.84 Frontage 3 Waterbird Noise Disturbance Contour - Movax Piling 78
Figure 11.85 Frontage 4 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Discharging 79
Figure 11.86 Frontage 4 Water Bird Noise Disturbance Contour - 26t Concrete Truck Placing Concrete 79
Figure 11.87 Frontage 4 Water Bird Noise Disturbance Contour - 35t Excavator 80
Figure 11.88 Frontage 4 Water Bird Noise Disturbance Contour - 21t Excavator 80
Figure 11.89 Frontage 4 Water Bird Noise Disturbance Contour - 13t Excavator 81
Figure 11.90 Frontage 4 Water Bird Noise Disturbance Contour - 5t / 8t Excavator 81
Figure 11.91 Frontage 4 Water Bird Noise Disturbance Contour - Movax Vibro Piling Rig 82
Figure 11.92 Frontage 4 Water Bird Noise Disturbance Contour - Percussive Piling Rig 82
Figure 11.93 Frontage 5 Water Bird Noise Disturbance Contour - Excavator 83
Figure 11.94 Frontage 5 Water Bird Noise Disturbance Contour - Wacker Plate 83
Figure 11.95 Frontage 5 Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting General Fill 84
Figure 11.96 Frontage 5 Water Bird Noise Disturbance Contour - Bulldozer 84
Figure 11.97 Frontage 5 Water Bird Noise Disturbance Contour - Dump Truck 85
Figure 11.98 Frontage 5 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Discharging 85
Figure 11.99 Frontage 5 Water Bird Noise Disturbance Contour - 26t Concrete Truck Placing Concrete 86
Figure 11.100 Frontage 5 Water Bird Noise Disturbance Contour - Movax Vibro Piling Rig 86
Figure 11.101 Frontage 5 Water Bird Noise Disturbance Contour - Percussive Piling 87

Figure 11.102 Frontage 6 Water Bird Noise Disturbance Contour - 20t Front Wheeled Loader Moving and Tipping Fill / Rock 88
Figure 11.103 Frontage 6 Water Bird Noise Disturbance Contour - 23t Articulated Dumper Truck Moving and Tipping / Rock 88

Tables

Table 4.1 BS 5228-1 ABC Method 10
Table 4.2 Guidance on effects of vibration levels 11
Table 4.3 Transient vibration guide values for cosmetic damage 11
Table 4.4 Water bird noise disturbance threshold values 12
Table 5.1 Sound Monitoring Locations 12
Table 5.2 Baseline Sound Monitoring Results 13
Table 6.1 ABC method Impact Threshold Values 13
Table 8.1 Frontage 1A - Construction Noise Impact on Nearby Sensitive Receptors 15
Table 8.2 Frontage 1B - Construction Noise Impact on Nearby Sensitive Receptors 15
Table 8.3 Frontage 2 – Construction Noise Impact on Nearby Sensitive Receptors 16
Table 8.4 Frontage 3 - Construction Noise Impact on Nearby Sensitive Receptors 16
Table 8.5 Frontage 4 - Construction Noise Impact on Nearby Sensitive Receptors 17
Table 8.6 Frontage 5 - Construction Noise Impact on Nearby Sensitive Receptors 17
Table 8.7 Frontage 6 - Construction Noise Impact on Nearby Sensitive Receptors 18
Table 8.8 Properties in close proximity to proposed sheet pile wall 18
Table 11.1 Survey Equipment Details 25
Table 11.2 Summary of Meteorological Conditions 25
Table 11.3 Sound Level Monitoring Results - N1 26
Table 11.4 Sound Level Monitoring Results – N2 28
Table 11.5 Sound Level Monitoring Results – N3 29
Table 11.6 Sound Level Monitoring Results – N4 30
Table 11.7 Sound Level Monitoring Results – N5 31
Table 11.8 Sound Level Monitoring Results – N6 32
Table 11.9 Anticipated Construction Activities and predicted Sound Power Levels 33

1. Introduction

AECOM has been commissioned by Coastal Partners (Havant Borough Council (HBC)) to carry out a baseline sound monitoring survey and noise impact assessment in relation to the construction of the proposed Langstone Flood and Coastal Erosion Risk Management Scheme (FCERM).

This report presents the results of the baseline sound survey together with an assessment of construction works for the proposed FCERM scheme. This report will be included as part of the Environmental Impact Assessment (EIA) for the proposed FCERM scheme.

Baseline monitoring was carried out at six locations identified in the '*Langstone FCERM Scheme – Sound Surveys and Impact Assessment'* brief to define baseline sound conditions at the village of Langstone, Havant. Unattended sound monitoring was carried out from 01/12/21 until 13/12/21 to establish baseline sound levels at sensitive receptors.

The impact assessment for human receptors has been undertaken following guidance from BS 5228-1:2009+A1: 2014 (Ref 1) and 3D noise modelling has been used to produce noise contour maps of construction activities across the proposed scheme.

Noise predictions have also been used to assess impacts on Special Protection Area (SPA), Ramsar and Site of Special Scientific Interest (SSSI) protected bird species, which will be undertaken by Coastal Partners. Noise contours in GIS format have been provided based upon threshold limits in the "Water bird disturbance mitigation toolkit" for informing estuarine planning and construction projects, produced by the Tidal River Development Project (TIDE) (Ref 2).

A qualitative vibration assessment has been carried out due to concern of the proximity of a proposed sheet piled wall across multiple frontages of the FCERM. Advice has been given following guidance from BS 5228-2:2009+A1: 2014 (Ref 3).

A glossary of acoustic terminology can be found in Appendix A.

2. Site Description

The 1km long Langstone FCERM Scheme frontage is located south of Havant and north of Hayling Island, in the Borough of Havant. The Langstone FCERM Scheme frontage extends from Mill Lane in the west, to the A3023, north to the Royal Oak Pub and then to the meadows of North Langstone High Street. The six frontage locations are presented in Figure 2.1. Eight locations have also been highlighted that formed the basis of the construction noise impacts assessment in Section 6 below.

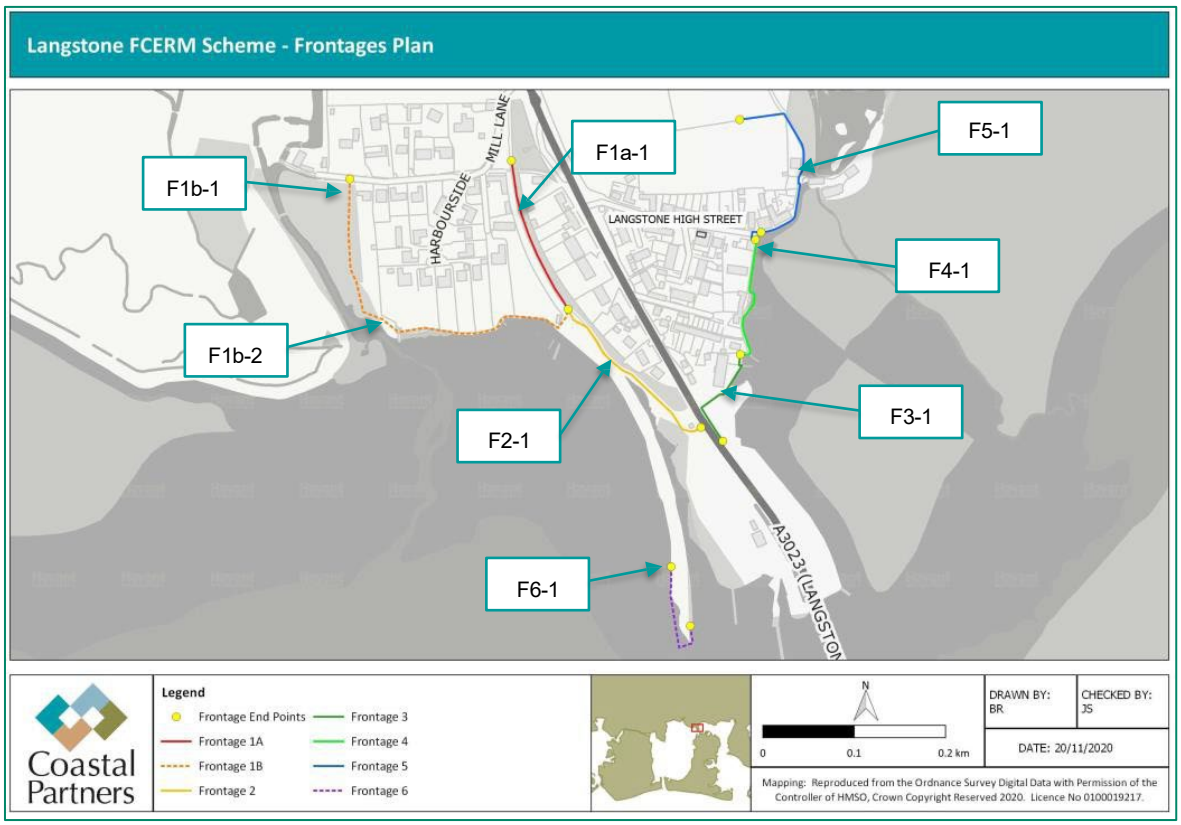


Figure 2.1 Scheme Frontage and Noise Model Assessment Locations

3. Proposed Works

The Langstone FCERM scheme is split into six frontage locations (Figure 2.1) and the design for each frontage is as follows:

Core scheme:

- Frontage 1A: Billy Line North. The flood defence comprises of a raised earth embankment and follows the line of the existing Billy Line cycleway (National Cycle Route 2 cycleway). The existing cycle path is to be upgraded to a new 3m wide cycle path which sits on top of the flood embankment.
- Frontage 2: Billy Line South. The design for Frontage 2 consists of a sheet-piled wall. Raised earth embankments are included where the defence alignment needs to cross existing utility pipes. The existing cycle path is to be upgraded to a new 3m wide cycle path which sits adjacent to the sheet-piled wall. Frontage 2 ties in with Frontages 1A and/or 1B and the existing higher levels on the A3023 road.
- Frontage 3: A3023 Road to 9 Coastguard Cottages (the Look Out). Frontage 3 consists of a continuous flood defence that largely comprises of four flood defence structures. These structures include the A3023 flood wall, Ship Inn car park raised earth bund, Ship Inn flood wall and Ship Inn Annex flood wall. A flood gate is also to be provided between the Ship Inn and Ship Inn Annex flood walls.
- Frontage 4: The Look Out to No. 24 Langstone High Street (the Winklemarket). Frontage 4 consists of new reinforced concrete walls in front of the existing garden walls that run along the frontage. The existing footpath is to be upgraded to a new 1.5m wide footpath through the construction of a new quay wall. 2 No. of gates (the Ship Inn annex, the Green Cottage) and 1 No. of demountable flood defences are provided to ensure robust continuity of the defence.
- Frontage 5: Langstone High Street to the field north of Royal Oak. Frontage 5 consists of a continuous flood defence that largely comprises of five structures. These structures include the High Street flood gates, the Royal Oak flood wall, the Allotment flood wall, the Footpath flood wall that runs west of the Mill Pond, and an earth embankment in the field north of Royal Oak. Demountable flood defences are provided between the section transitions.

Additional scheme:

- Frontage 1B: Mill Lane and Harbourside. The design for Frontage 1B consists of capital refurbishment works to the existing concrete sea walls that run along the front of the Mill Lane and Harbourside properties. The works also consist of a sheet pile wall between 9 Harbourside and 7 Mill Lane and an earth embankment in the field to the west of the frontage. Separate to the Langstone FCERM scheme of a works an Alternative Scheme of works for Frontage 1B exists where a lower cost staged approach is considered for this frontage only.
- Frontage 6: Langstone Spit. Frontage 6 consists of a rock armour revetment that provides erosion protection to Langstone spit.

At the time of submission of this report, a principal contractor has not been appointed and a final method statement for the construction works has not yet been finalised. Consequently, this assessment is based upon preliminary information obtained from the Project Management Team and may be subject to change when more detailed information becomes available. The plant associated with the above activities and the associated sound power levels are presented in Appendix D.

The construction phase will be undertaken over the course of two years in 2025 and 2026, with frontline works scheduled to avoid the sensitive bird over-wintering period in the harbours. The proposed core working hours are 07:00 – 19:00 hrs Monday to Friday. At times, there may be a requirement to work outside of these hours around the low tide period. For the basis of this assessment, daytime, evening, and night periods have been assessed under the assumption that works may be required outside the proposed core working hours.

4. Assessment Criteria

4.1 BS5228-1:2009+A1:2014

BS 5228-1 'Code of practice for noise and vibration control on construction and open sites' provides a 'best practice' guide for noise control and includes sound power level (L_w) data for individual plant as well as a calculation method for noise from construction activities.

The assessment of construction noise impacts has been undertaken based on 'example method 1 – the ABC method' as defined in BS 5228 1:2009+A1:2014. Table 4.1 provides guidance in terms of appropriate threshold values to define the onset of significant construction noise impact at residential receptors based upon existing ambient noise levels. Other project-specific factors, such as the number of receptors affected and the duration and character of the impact, will be considered to determine if there is a significant impact.

Table 4.1 BS 5228-1 ABC Method

Assessment Category and Threshold Value Period	Impact Category A (a)	Category B (b)	Category 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 potential significant impact is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

NOTE 2: If the ambient sound level exceeds the Category C threshold values given in the table (i.e. the ambient sound level is higher than the above values), then a potential significant impact is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.

NOTE 3: Applies to residential receptors only.

(a) Category A: Threshold values to use when ambient sound 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 value

(c) Category C: Threshold values to use when ambient sound 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, 07:00 – 23:00 Sundays.

4.2 BS5228-2:2009+A1:2014

BS5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open site – Part 2:Vibration' provides guidance on vibration levels that can cause disturbance to humans and have potential to damage structures.

Table 4.2 details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of construction vibration impacts on human receptors based on guidance contained in BS 5228-2.

Table 4.2 Guidance on effects of vibration levels

Peak Particle Velocity Level	Description	Approximate Distance to Receptor
< 0.3 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	>= 20 m
0.3 to < 1 mm/s	Vibration might be just perceptible in residential environments.	10 m to < 20 m
1.0 to < 10 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	5 m to < 10 m
>= 10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	< 5 m

Table 4.3 Presents the numerical limits for transient vibration, above which cosmetic damage could occur in terms of the component PPV to different types of building.

Table 4.3 Transient vibration guide values for cosmetic damage

Type of Building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures Residential or light commercial buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz
NOTE 1 Values referred to are at the base of the building. NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.		

4.3 Waterbird Disturbance Mitigation Tool Kit

The proposed scheme area sits within the boundaries of the Chichester and Langstone Harbours SPA and Ramsar site and associated bird supporting habitat (functionally linked land), which is indicated by Solent Wader and Brent Goose Strategy (SWBGS) sites as presented in Appendix B.

Water bird disturbance results from visual and aural stimuli but is also dependent upon sensitivities of individual species and seasonality. Various threshold values are contained within the "Waterbird disturbance mitigation toolkit for informing estuarine planning and construction projects", produced by TIDE (Ref 2). These values are used in this assessment and are listed in Table 4.4.

Table 4.4 Water bird noise disturbance threshold values

Sound Pressure Level dB A	Impact
< 54	Unlikely to have any effect
55 - 70	Low level behavioural response
71 - 79	Behavioural response likely (consider mitigation)
80 - 84	Mitigation necessary
>84	Flight Response (may require cessation of works during periods of high sensitivity)

5. Baseline Sound Survey

Unattended sound monitoring equipment was set up for a period of 12-days from 01/12/21 until 13/12/21. Continuous measurements were taken to establish ambient sound levels during daytime (07:00 – 19:00), evening (19:00 – 23:00) and night-time (23:00 – 07:00) periods. The unattended sound level monitoring instruments were housed within a weatherproof box with sufficient batteries to power the instrument for the full measurement duration. Appropriate outdoor all-weather kits were used on all microphones.

Monitoring locations were chosen to identify baseline sound levels at sensitive receptors such as residential and commercial properties, and sensitive ecological sites. Sound level monitoring locations are presented in Table 5.1 and Figure 5.1.

Table 5.1 Sound Monitoring Locations

Monitoring Location	Description	GPS Coordinates (N, W)
N1	Harbourside properties (foreshore)	50.838251, -0.985155
N2	Billy Line footpath	50.838028, -0.982206
N3	Langstone Sailing Club	50.836736, -0.981185
N4	Ship Inn car park	50.837531, -0.980554
N5	Footpath in front of Green Cottage	50.838416, -0.980054
N6	Royal Oak	50.839545, -0.979334



Figure 5.1 Baseline Sound Locations

Table 5.2 shows a summary of the arithmetic average of measured sound levels at the six locations, during day, evening, and night-time periods. It is noted that the sound level meter at N5 was damaged during flooding and, as such, attended measurements were carried out in lieu of unattended measurements. Full details of the baseline sound survey can be found in Appendix C.

Table 5.2 Baseline Sound Monitoring Results

Monitoring Location	Daytime $L_{Aeq,12h}$ dB	Evening $L_{Aeq,4h}$ dB	Night $L_{Aeq,8h}$ dB
N1	52	49	47
N2	54	50	46
N3	54	51	50
N4	66	62	59
N5	59*	-	-
N6	55	51	49

*Attended short-term results

6. Construction Noise Criteria

Criteria for assessing construction noise impact have been defined with reference to 'example method 1 – the ABC method' as defined in BS 5228-1:2009+A1:2014. The results of the baseline sound survey have been used to define the threshold values presented in Table 6.1 for the assessment of significant impacts due to construction noise. Assessment locations are illustrated in Figure 2.1.

Table 6.1 ABC method Impact Threshold Values

Assessment Location	Daytime $L_{Aeq,\ 12hr}$ (07:00 – 19:00)	Evening $L_{Aeq,4hr}$ (19:00 – 23:00)	Night $L_{Aeq,8hr}$ (23:00 – 07:00)
F1a-1	65	55	45
F1b-1 / F1b-2	65	55	45
F2-1	65	55	45
F3-1	65	55	55

Assessment Location	Daytime $L_{Aeq,\ 12hr}$ (07:00 – 19:00)	Evening $L_{Aeq,4hr}$ (19:00 – 23:00)	Night $L_{Aeq,8hr}$ (23:00 – 07:00)
F4-1	65	60	50
F5-1	65	55	50
F6-1	65	55	50

7. Predicted Construction Noise Levels

CadnaA (version 2021 MR 2 (32bit) (build: 187.5163) software has been used to produce noise contour maps relating to the noise generated by the anticipated activities for the construction of each of the frontages identified in Section 3. This version of Cadna was used for the initial draft and first revision (R01) of this report. CadnaA (version 2022 MR 2 (32bit) (build: 193.5260) has been used for the second revision of this report (R02).

Due to the progressive nature of the works, a single sample area has been modelled for each activity at the most sensitive locations along their respective frontage as a means of determining a worst-case scenario. It is understood that piling activities are only planned along coastal areas and, as such, have been modelled at a frontage coastal line nearest to a noise sensitive receptor location. These locations are illustrated in Figure 2.1.

It is assumed that each individual activity will not be operating constantly throughout an entire shift. Assumptions for the percentage of the time of each activity have been made based on previous experience of similar projects. A list of construction activities and their related sound power levels adjusted for their assumed running time can be seen in Appendix D. Resulting sound power levels from adjusted operating times have been used in the model.

Noise contour maps have been produced to identify all properties falling within the appropriate threshold values as defined in Section 6. Contour maps for each frontage location can be seen in Appendix E. For the purposes of the construction noise assessment, the noise contour lines have been split up into three bands:

- Red – properties within the red contour may experience a significant impact during daytime period (07:00 – 19:00).
- Orange – Properties within the orange contour lines may experience significant impact during the evening period (19:00 – 23:00).
- Yellow – Properties within the yellow contour lines may experience a significant impact during the night (23:00 – 7:00).

At frontage location F3, the evening and night-time threshold values were the same at 55dB $L_{Aeq,T}$. Consequently, noise contours have only been split into two bands for this frontage: red for the daytime period, and orange for evening and night period.

For the assessment of impact upon water birds, contours have been produced to identify the four criteria levels for behavioural responses outlined in Table 4.4. Noise contours relating to each individual item of plant at each frontage location are presented in Appendix F.

8. Summary of Results

8.1 Residential Impact

Residential impacts have been assessed following the BS 5228-1 'ABC' method. The ABC method states '*if the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect*.' Noise contour maps presented in Appendix E have been analysed to assess the impact on nearby dwellings across daytime, evening, and night-time periods.

8.1.1 Frontage 1A

Analysis of the noise contour maps in Appendix E indicate that all construction activities planned at Frontage 1A would have a temporary significant impact upon surrounding sensitive receptors during all time periods due to the close proximity to the proposed works.

During the daytime, construction works would impact properties directly adjacent to the Billy Line. If work is carried out in the evening or night-time, this would have a significant impact on properties adjacent to the Billy Line and further inland.

Table 8.1 provides a summary of the items associated with construction that are likely to cause a temporary significant impact during different time periods of the day.

Table 8.1 Frontage 1A - Construction Noise Impact on Nearby Sensitive Receptors

Frontage	Activity	Plant	Impact on nearby dwellings		
			Daytime	Evening	Night
		35t Excavator	Yes	Yes	Yes
		Wacker Plate for compacting aggregate	Yes	Yes	Yes
1a	Placing of granular material	18t single drum roller compacting general fill	Yes	Yes	Yes
		Bulldozer	Yes	Yes	Yes
		Dump truck	Yes	Yes	Yes

8.1.2 Frontage 1B

Analysis of the noise contour maps in Appendix E indicate that all construction activities planned at Frontage 1B would have a temporary significant impact upon surrounding sensitive receptors during all time periods.

Properties on Harbourside and Mill Lane would be significantly impacted by works that will take place from Mill Lane southwards towards the coast.

Table 8.2 provides a summary of the items associated with construction that are likely to cause a temporary significant impact during different time periods.

Table 8.2 Frontage 1B - Construction Noise Impact on Nearby Sensitive Receptors

Frontage	Activity	Plant	Impact on nearby dwellings		
			Daytime	Evening	Night
1b	Placing of granular material	35t Excavator	Yes	Yes	Yes
		Wacker Plate for compacting aggregate	Yes	Yes	Yes
		18t single drum roller compacting general fill	Yes	Yes	Yes
		Bulldozer	Yes	Yes	Yes
		Dump truck	Yes	Yes	Yes
	Vibration Piling	Movax vibro piling rig	Yes	Yes	Yes
	Percussive Piling	Percussive piling rig	Yes	Yes	Yes

8.1.3 Frontage 2

Analysis of the noise contour maps in Appendix E indicate that all construction activities planned at Frontage 2 would have a temporary significant impact upon surrounding sensitive receptors during all time periods due to the close proximity to the works.

During the daytime, construction works would significantly impact properties directly east of the Billy Line along Langstone Road. If works were to continue to the evening and night period, properties further inland would also experience a significant impact.

Table 8.3 provides a summary of the items associated with construction that are likely to cause a temporary significant impact during different time periods.

Table 8.3 Frontage 2 – Construction Noise Impact on Nearby Sensitive Receptors

Frontage	Activity	Plant	Impact on nearby dwellings		
			Daytime	Evening	Night
Frontage 2	Placing of granular material	Excavators	Yes	Yes	Yes
		Wacker Plate for compacting aggregate	Yes	Yes	Yes
		18t single drum roller compacting general fill	Yes	Yes	Yes
		Bulldozer	Yes	Yes	Yes
		Dump truck	Yes	Yes	Yes
	Breaking	Breaking of asphalt	Yes	Yes	Yes
	Vibration Piling	Movax vibro piling rig	Yes	Yes	Yes
	Percussive Piling	Percussive piling rig	Yes	Yes	Yes

8.1.4 Frontage 3

Analysis of the noise contour maps in Appendix E indicate that the majority of construction activities planned at Frontage 3 would have a temporary significant impact at nearby sensitive receptors. The majority of activities during the daytime would have a significant impact at the Ship Inn, activities during the evening and night would have a significant impact at the Ship Inn and residential properties north of the Ship Inn.

Table 8.4 provides a summary of the items associated with construction that are likely to cause a temporary significant impact during different time periods.

Potential use of vibratory and percussive piling would result in a significant impact on properties located approximately 250m north into Langstone Village during all periods of operation.

Table 8.4 Frontage 3 - Construction Noise Impact on Nearby Sensitive Receptors

Frontage	Activity	Plant	Impact on nearby dwellings		
			Daytime	Evening	Night
Frontage 3	Placing of concrete in situ	26t Pre-mix concrete truck, discharging	Yes	Yes	Yes
		26t Concrete truck, placing concrete	Yes	Yes	Yes
	Cranes for lifting glass panel	40t Crawler crane	No	Yes	Yes
		50t Crawler crane	No	Yes	Yes
		70t Crawler crane	No	Yes	Yes
	Excavations for works	35t Excavator	Yes	Yes	Yes
		21t Excavator	Yes	Yes	Yes
		13t Excavator	Yes	Yes	Yes
		8t Excavator	Yes	Yes	Yes
		5t Excavator	Yes	Yes	Yes
	Vibration Piling	Movax vibro piling rig	Yes	Yes	Yes
	Percussive Piling	Percussive piling rig	Yes	Yes	Yes

8.1.5 Frontage 4

Analysis of the noise contour maps in Appendix E indicate that all construction activities planned at Frontage 4 would have a significant temporary impact upon surrounding sensitive receptors during all time periods due to the close proximity of the works along the coastal wall.

During the daytime the majority of works would only have a significant impact on properties directly on the eastern coast of Langstone Village. If works were to continue to the evening and night period, properties further inland would also experience a significant impact.

Table 8.4 provides a summary of the items associated with construction that are likely to cause a temporary significant impact during different time periods.

Table 8.5 Frontage 4 - Construction Noise Impact on Nearby Sensitive Receptors

Frontage	Activity	Plant	Impact on nearby dwellings		
			Daytime	Evening	Night
Frontage 4	Placing of concrete in situ	26t Pre-mix concrete truck, discharging	Yes	Yes	Yes
		26t Concrete truck, placing concrete	Yes	Yes	Yes
	Excavations for works	35t Excavator	Yes	Yes	Yes
		21t Excavator	Yes	Yes	Yes
		13t Excavator	Yes	Yes	Yes
		8t Excavator	Yes	Yes	Yes
		5t Excavator	Yes	Yes	Yes
	Vibration Piling	Movax vibro piling rig	Yes	Yes	Yes
	Percussive Piling	Percussive piling rig	Yes	Yes	Yes

8.1.6 Frontage 5

Analysis of the noise contour maps in Appendix E indicate that all construction activities planned at Frontage 5 would have a temporary significant impact upon surrounding sensitive receptors during all time periods due to the proximity to the works along the coastal wall.

During the daytime, the majority of works would only have an impact on properties directly on the coast of Langstone Village. If works were to continue to the evening and night period, properties further inland would also experience a significant impact.

The use of vibratory and/or percussive piling would mean the significant impact effect will be apparent further inland. The most impactful of activities in this area would be from percussive piling (if required).

Table 8.6 provides a summary of the items associated with construction that are likely to cause a temporary significant impact during different time periods.

Table 8.6 Frontage 5 - Construction Noise Impact on Nearby Sensitive Receptors

Frontage	Activity	Plant	Impact on nearby dwellings		
			Daytime	Evening	Night
Frontage 5	Placing of granular material	35t Excavator	Yes	Yes	Yes
		Wacker Plate for compacting aggregate	Yes	Yes	Yes
		18t single drum roller compacting general fill	Yes	Yes	Yes
		Bulldozer	Yes	Yes	Yes
		Dump truck	Yes	Yes	Yes
	Placing of concrete in situ	26t Pre-mix concrete truck, discharging	Yes	Yes	Yes
		26t Concrete truck, placing concrete	Yes	Yes	Yes
	Vibration Piling	Movax vibro piling rig	Yes	Yes	Yes
	Percussive Piling	Percussive piling rig	Yes	Yes	Yes

8.1.7 Frontage 6

Analysis of the noise contour maps in Appendix E indicate that all construction activities planned at Frontage 6 would not have any temporary significant impacts upon surrounding sensitive receptors during daytime and evening periods.

The use of a 23t articulated dumper truck to move / tip fill and the use of a 40t long reach excavator would have an impact during the night period.

Table 8.7 provides a summary of the items associated with construction that are likely to cause a temporary significant impact during different time periods.

Table 8.7 Frontage 6 - Construction Noise Impact on Nearby Sensitive Receptors

Frontage	Activity	Plant	Impact on nearby dwellings		
			Daytime	Evening	Night
Frontage 6	Placing of rock	20t wheeled front end loader moving rock / loading lorries	No	No	No
		23t articulated dumper truck moving and tipping fill / rock	No	No	Yes
		40t long reach excavator with grab attachment	No	No	Yes
	Delivery of rock	23t articulated dumper truck	No	No	Yes
		20t 8 wheeled lorry moving and tipping fill / rock	No	No	No

8.2 Qualitative Vibration Assessment

A sheet piled wall will be included as part of the design for the proposed scheme at frontages F1B, F2, F3, F4, and F5. Sheet piling can be done either through impact (percussive), vibratory, or hydraulic press and can have a potential negative impact on nearby local residents and properties. Table 8.8 shows the properties the closest to the sheet pile wall and their respective distance. With the exception of Frontage F1B, the nearest properties across frontages with a sheet piled wall range between 3 – 7 m.

Table 8.8 Properties in close proximity to proposed sheet pile wall

Frontage	Closest address to sheet piled wall	Distance (m)
F1B	9 Harbourside	90
F2	50a The Boat House	7
F3	The Ship Inn	4
F4	24 The Winkle Market	3
F5	Royal Oak Havant	4

At these distances the construction vibration limit of 10 mm/s may not be achievable by impact or vibratory piling methods. Consequently, wherever practicable, it is recommended that a hydraulic press piling method is adopted to limit the impact of vibration at sensitive receptors. If vibratory or impact piling is required a vibration risk assessment will need to be carried out. As there is a distance of 90 m between properties and the sheet pile wall at Frontage F1B, impact or vibratory piling can be adopted along Frontage F1B.

8.3 Water Bird Impact

Noise prediction contours have been provided in Appendix F for waterbird disturbance thresholds. These will feed into an assessment of impacts on sensitive bird receptors which will be undertaken by Coastal Partners.

9. Mitigation

It is predicted that noise impacts on nearby receptors will occur during the construction phases, although these would be of a temporary nature and have no lasting residual impact. BS 5228 provides practical information on construction noise reduction measures and promotes a Best Practicable Means (BPM) (as defined in Section 72 of the Control of Pollution Act) approach to noise control.

While BS 5228 does not state criteria for acceptable levels of construction noise, the preferred approach is to reduce noise levels (where possible), but with due regard to practicality. Sometimes, a greater noise level may be acceptable if the overall construction time and therefore length of disruption is reduced.

9.1.1 Typical Construction Activity Mitigation

BS 5228 is a useful reference document and provides additional advice for mitigation measures. The following example mitigation measures have been recommended in order to provide a methodology for controlling noise emissions during works such that noise limits may be adhered to during the construction works programme.

- Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use;
- Internal haul routes will be kept well maintained;
- Rubber linings in, for example, chutes and dumpers will be used to reduce impact noise;
- Drop heights of materials will be minimised;
- Plant and vehicles will be sequentially started up rather than all together;
- Use of effective exhaust silence systems or acoustic engine covers as appropriate;
- As far as reasonably practicable, sources of significant noise will be enclosed;
- Plant will always be used in accordance with manufacturers' instructions. Care will be taken to use Site equipment away from noise-sensitive areas. Where possible, loading and unloading will also be carried out away from such areas;
- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturers specifications; and
- Screening e.g. noise barriers and blinds will be used as appropriate.

The impact of noise on nearby sensitive residential and commercial receptors can be minimised through a good communication strategy. Paragraph 6.3 of BS 5228-1 states that

"*Local residents might be willing to accept higher levels of noise if they know that such levels will only last for a short time".*

Prior to construction works being undertaken, liaison will be undertaken with occupiers of sensitive receptors that may be adversely affected by construction noise. Details on the timings and duration of high noise generating works will be provided. All communications will contain contact details to direct any questions or complaints to.

The measures above would be secured through a Construction Environment Management Plan (CEMP) and controls should be properly managed to ensure the reduction of noise impact of the proposed scheme on the natural and human environment.

Prior to commencement of noisy work or work that is proposed outside of core working hours, the project team will be required to submit an application to the Local Authority for prior consent to carry out noisy work under Section 61 of the Control of Pollution Act regarding the methods that will be adopted to minimise noise and vibration as far as reasonably practicable. The Section 61 application will set out the specific method of working, the actual working hours required, noise (and if necessary, vibration) monitoring locations, details of communication measures and the BPM mitigation measures implemented to minimise noise and vibration impacts.

No percussive piling shall commence until a piling method statement has been submitted and approved as part of the Section 61 process. Any piling must be undertaken in accordance with the terms of the approved piling method statement.

10. Conclusions

AECOM has been appointed to carry out a construction noise assessment for the Langstone FCERM Scheme. Noise prediction contours are provided in Appendix E and Appendix F with regards to BS 5228 and Waterbird disturbance criteria.

Noise prediction contours provided in relation to residential impact show that during the daytime, evening, and night, construction works would have a significant impact on Frontages 1-5. It is unlikely that any construction works at Frontage 6 would cause any impact during daytime and evening works, but night-time works may result in an impact to local dwellings. Noise mitigation measures have been provided.

A qualitative vibration assessment has been provided concerning the use of vibratory piling at Frontages F1B, F2, F3, F4, and F5. Due to the proximity of the sheet piling wall at Frontages F2, F3, F4, and F5 a method statement must be submitted and approved as part of the Section 61 process for vibratory or impact piling.

The project team will apply for prior consent to carry out works through the Section 61 process, as secured in the CEMP.

Noise prediction contours provided in relation to waterbird disturbance will feed into an assessment of impacts on the protected bird species, which will be undertaken by Coastal Partners.

11. References

Ref 1. British Standards Institute, (2009); BS 5228-1:2009+A1–2014 - Code of practice for noise and vibration control on construction and open sites: Noise, BSi, London

Ref 2. TIDE Tidal River Development; www.tide-toolbox.eu; [online], Waterbird Disturbance Mitigation Tool Kit, 2022, accessed 16/03/22

Ref 3. British Standards Institute, (2009); BS 5228-2:2009+A1–2014 - Code of practice for noise and vibration control on construction and open sites: Vibration, BSi, London

Ref 4. British Standards Institute, (2003); BS 7445 - Description and Measurement of Environmental Noise. Part 1 – Guide to Quantities and Procedures, BSi, London

Appendix A Acoustic Glossary

Term	Definition
Decibel (dB)	The range of audible sound pressures is approximately 2 x 10^{-5} Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0dB to 140dB. Mathematically Sound Pressure level = 20 log {p(t)/p_0} Where P_0 = 2 x 10^{-5} Pa.
A" Weighting (dB(A))	The human ear does not respond uniformly to different frequencies. "A" weighting is commonly used to simulate the frequency response of the ear. It is used in the assessment of risk of damage of hearing due to noise.
Ambient Sound	Totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far (*The ambient sound comprises the residual sound and the specific sound when present)*.
Ambient Sound Level $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound Pressure Level $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, T = $t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation: $$L_{Aeq,T} = 10lg_{10}\{(\frac{1}{T})\int_{t1}^{t2}[p_A\frac{(t)^2}{p_0^2}]\,dt\}$$ Where p_0 is the reference sound pressure (20μPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t
Measurement Time Interval T_m	Total time over which measurements are taken (*This may consist of the sum of a number of non-contiguous, short-term measurement time intervals)*
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (*This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h*)
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T.
Specific sound level $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T.
Specific Sound Source	Sound source being assessed
Peak Particle Velocity (PPV)	Instantaneous maximum velocity reached by a vibrating element as it oscillates about it's rest position

Appendix B Environmental Designations

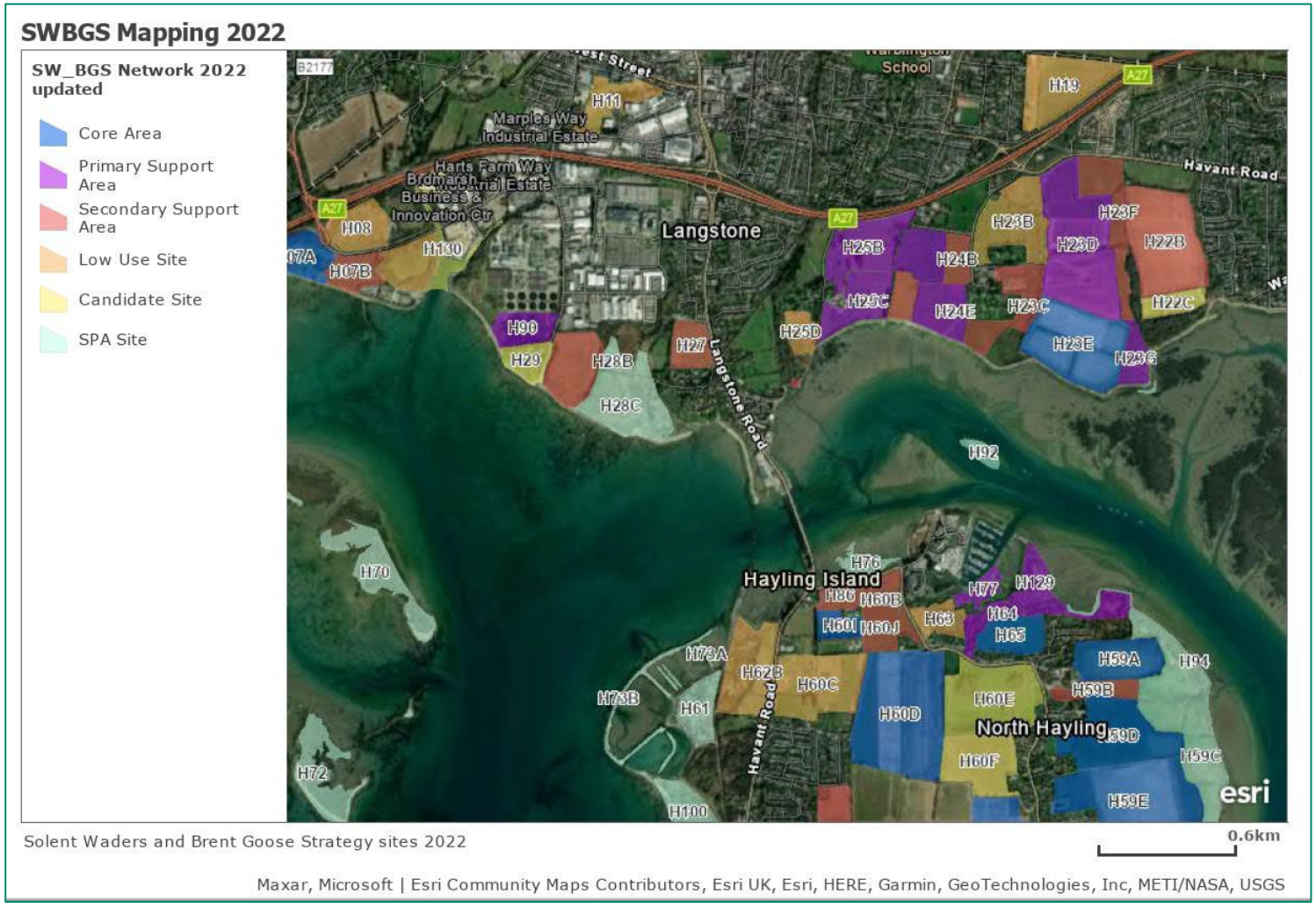


Figure 11.1 Solent Waders and Brent Goose Strategy Mapping 2022



Figure 11.2 Chichester and Langstone Harbours SPA and Ramsar Site

Appendix C Baseline Sound Survey

The sound monitoring procedures for this survey were completed using guidance from *BS 7445-1:2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures* (BS 7445). The calibrator and sound level meters used for the sound monitoring are listed in Table 11.1. The sound level meters were issued with a valid laboratory calibration certificate within the last two years and the calibrator within the last year, which is in line with *BS 7445 (Ref 4).*

All measurements included a range of sound level indicators including $L_{Aeq,T}$, $L_{A90,T}$, and L_{AFmax} continuously sampled over 15-minute as well as 1-second time intervals. Field calibrators were carried out for each instrument at the start and end of each measurement survey.

Table 11.1 Survey Equipment Details

Type	Monitoring Location	Model	Serial Number	Laboratory Calibration Date
Sound Level Meter	N1	DUO	12029	24/03/2021
Sound Level Meter	N2	Rion NL-52	420763	25/01/2021
Sound Level Meter	N3	Rion NL-52	909493	26/02/2021
Sound Level Meter	N4	Rion NL-52	242750	17/02/2021
Sound Level Meter	N5	Rion NL-52	420763	25/01/2021
Sound Level Meter	N6	DUO	12049	18/01/2021
Sound Level Meter Calibrator	All	Rion NC-74	34304647	27/01/2021

11.1 Meteorological Conditions

A weather station was installed in conjunction with monitoring location N1 to measure meteorological conditions. The weather station set up can be seen highlighted in blue in Figure 11.3.

The data was analysed to determine if any periods would need to be excluded from the analysis due to adverse weather conditions. BS7445-2 states that intervals of data should only be selected during a period within which the sound level may be considered approximately steady with windspeeds below 5m/s and no heavy precipitation.

The following dates have been excluded from the measurement analysis due to unsuitable meteorological conditions:

- Saturday 04/12/21.
- Monday 06/12/21.
- Tuesday 07/12/21.
- Wednesday 08/12/21.

A summary of meteorological conditions during measurement period is presented in Table 11.2.

Table 11.2 Summary of Meteorological Conditions

Day	Date	Average Wind Speed (m/s)	Typical Wind Direction	Total Rain (mm)
Wed	01/12/21	2	N	0
Thu	02/12/21	1	NW	0
Fri	03/12/21	2	SW	0.1
Sat	04/12/21	2	NW	6.1
Sun	05/12/21	2	NW	1.1
Mon	06/12/21	2	NW	5.3

Day	Date	Average Wind Speed (m/s)	Typical Wind Direction	Total Rain (mm)
Tue	07/12/21	4	S	21.2
Wed	08/12/21	5	W	0
Thu	09/12/21	2	W	3.6
Fri	10/12/21	2	NW	0
Sat	11/12/21	1	N	0
Sun	12/12/21	3	W	0

11.2 Sound Monitoring Results

A description of the monitoring set ups and locations for each monitor is listed below.

11.3 Monitoring Location – N1

Unattended sound measurements were taken at the southern frontage of the Harbourside properties. The sound measurements started at 13:00 on 01/12/21 and finished at 14:45 on 13/12/21. The microphone was located approximately 2m above ground level, as shown highlighted red in Figure 11.3 below. The weather station was set up approximately 1.5m above ground, as shown highlighted in blue in Figure 11.3 below.



Figure 11.3 N1 Monitoring Location (microphone circled in red and weather station circled in blue)

During the installation and collection of the sound monitoring equipment, the sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 200m).
- Birdsong.
- The tide going out.

The sound level monitoring results are presented in Table 11.3 below.

Table 11.3 Sound Level Monitoring Results - N1

Date	Daytime		Evening		Night-time		
	$L_{Aeq,12h}$ dB	$L_{A90,15minr}$ dB	$L_{Aeq,4h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,8h}$ dB	$L_{A90,15min}$dB	L_{Amax} dB
Wed 01/12/2021	50	48	48	46	46	42	59
Thu 02/12/2021	52	50	48	43	51	43	67
Fri 03/12/2021	52	50	50	41	45	43	66
Sat 04/12/2021	-	-	-	-	-	-	-

Date	Daytime		Evening		Night-time		
	$L_{Aeq,12h}$ dB	$L_{A90,15minr}$ dB	$L_{Aeq,4h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,8h}$ dB	$L_{A90,15min}$dB	L_{Amax} dB
Sun 05/12/2021	53	51	48	48	45	43	56
Mon 06/12/2021	-	-	-	-	-	-	-
Tue 07/12/2021	-	-	-	-	-	-	-
Wed 08/12/2021	-	-	-	-	-	-	-
Thu 09/12/2021	57	54	51	49	49	43	70
Fri 10/12/2021	52	50	48	47	45	40	60
Sat 11/12/2021	53	52	47	45	45	42	65
Sun 12/12/2021	50	47	49	47	46	40	60
Mon 13/12/2021	52	50	-	-	-	-	-
Weekday Average	**52**	**50**	**49**	**45**	**47**	**42**	**64**
Weekend Average	**52**	**50**	**48**	**47**	**45**	**42**	**60**

11.4 Monitoring Location – N2

Unattended sound measurements were taken on the west bounds of the property located at 48 Langstone Road. The sound measurements started at 13:00 on 01/12/21 and finished at 14:45 on 13/12/21. The microphone was located approximately 2.5m above ground level, as shown highlighted red in Figure 11.4 below.



Figure 11.4 N2 Monitoring Location (microphone circled in red)

During the installation and collection of the sound level monitoring equipment, the sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 40m).
- Aircraft passing by overhead.
- Activity from the residents along Billy Line (dogs barking, distant conversation etc).
- Distant clanging of metal from Langstone Sailing Club to the south.

The sound monitoring results are presented in Table 11.4 below.

Table 11.4 Sound Level Monitoring Results – N2

Date	Daytime		Evening		Night-time		
	$L_{Aeq,12h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,4h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,8h}$ dB	$L_{A90,15min}$ dB	L_{Amax} dB
Wed 01/12/2021	53	51	50	45	46	37	59
Thu 02/12/2021	54	52	50	42	48	37	61
Fri 03/12/2021	54	53	50	45	47	37	60
Sat 04/12/2021	-	-	-	-	-	-	-
Sun 05/12/2021	55	52	49	47	45	37	61
Mon 06/12/2021	-	-	-	-	-	-	-
Tue 07/12/2021	-	-	-	-	-	-	-
Wed 08/12/2021	-	-	-	-	-	-	-
Thu 09/12/2021	54	47	53	48	48	42	62
Fri 10/12/2021	54	52	50	47	46	39	58
Sat 11/12/2021	55	53	50	45	45	43	56
Sun 12/12/2021	52	50	50	45	47	40	59
Mon 13/12/2021	55	52	-	-	-	-	-
Weekday Average	**54**	**51**	**51**	**45**	**47**	**38**	**60**
Weekend Average	**54**	**52**	**50**	**46**	**46**	**40**	**59**

11.5 Monitoring Location – N3

Unattended sound measurements were taken at the west bounds of Langstone Sailing Club. The sound measurement started at 13:00 on 01/12/21 and finished at 14:45 on 13/12/21. The microphone was located approximately 1.2m above ground level, shown highlighted red in Figure 11.5 below.



Figure 11.5 N3 Monitoring Location (microphone circled in red)

During the installation and collection of the sound level monitoring equipment, the sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 40m).
- Clanging of masts in the wind from sail boats moored / on land at Langstone Sailing Club.
- Birdsong.

The sound monitoring results are presented in Table 11.5 below.

Table 11.5 Sound Level Monitoring Results – N3

Date	Daytime		Evening			Night-time	
	$L_{Aeq,12h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,4h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,8h}$ dB	$L_{A90,15min}$ dB	L_{Amax} dB
Wed 01/12/2021	55	53	53	47	50	37	63
Thu 02/12/2021	55	54	51	44	49	44	65
Fri 03/12/2021	54	52	51	43	49	43	59
Sat 04/12/2021	-	-	-	-	-	-	-
Sun 05/12/2021	57	54	51	49	49	49	62
Mon 06/12/2021	-	-	-	-	-	-	-
Tue 07/12/2021	-	-	-	-	-	-	-
Wed 08/12/2021	-	-	-	-	-	-	-
Thu 09/12/2021	53	49	53	49	53	49	67
Fri 10/12/2021	57	55	51	48	50	48	62
Sat 11/12/2021	54	53	50	47	52	47	65
Sun 12/12/2021	52	51	50	44	49	44	62
Mon 13/12/2021	53	53	-	-	-	-	-
Weekday Average	**55**	**52**	**52**	**46**	**50**	**44**	**63**
Weekend Average	**54**	**53**	**51**	**47**	**50**	**47**	**63**

11.6 Monitoring Location – N4

Unattended sound measurements were taken in The Ship Inn's courtyard. The sound measurement started at 13:00 on 01/12/21 and finished at 14:45 on 13/12/21. The microphone was located approximately 3m above ground level, shown highlighted red in Figure 11.6 below.



Figure 11.6 N4 Monitoring Location

During the installation and collection of the sound level monitoring equipment, the sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 30m).
- Movement from vehicles in the carpark.
- Customers entering/exiting the pub during operational hours.
- Music coming from inside the pub during operational hours.

The sound level monitoring results are presented in Table 11.6 below.

Table 11.6 Sound Level Monitoring Results – N4

Date	Daytime		Evening		Night-time		
	$L_{Aeq,12h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,4h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,8h}$ dB	$L_{A90,15min}$ dB	L_{Amax} dB
Wed 01/12/2021	65	62	61	54	58	38	76
Thu 02/12/2021	65	61	62	54	60	38	75
Fri 03/12/2021	66	61	62	56	58	36	75
Sat 04/12/2021	-	-	-	-	-	-	-
Sun 05/12/2021	64	59	61	53	57	37	78
Mon 06/12/2021	-	-	-	-	-	-	-
Tue 07/12/2021	-	-	-	-	-	-	-
Wed 08/12/2021	-	-	-	-	-	-	-
Thu 09/12/2021	66	61	64	56	60	46	76
Fri 10/12/2021	66	61	62	56	58	40	75
Sat 11/12/2021	65	62	63	55	58	43	75
Sun 12/12/2021	66	64	63	52	59	37	75
Mon 13/12/2021	68	64	-	-	-	-	-
Weekday Average	**66**	**62**	**62**	**55**	**59**	**39**	**75**
Weekend Average	**65**	**62**	**62**	**53**	**58**	**39**	**76**

11.7 Monitoring Location – N5

Unattended sound measurements were taken at the east frontage edge of Green Cottage's boundary fence. During the measurement period there was a storm (Barra) on the 07/12/21 causing flooding of the entire area surrounding Green Cottage, as such the sound level meter took on water damage and the data from the measurement was lost. In lieu of an unattended measurement, a 2-hour attended measurement was taken during the collection of the sound level monitors on the 13/12/21. The shortened measurement is considered to provide representative sound data for a typical daytime period. The measurement started at 14:35 and finished at 16:35. The microphone was located approximately 1.2m above ground level, shown highlighted red in Figure 11.7 below.



Figure 11.7 N5 Monitoring Location

During the attended measurement, the sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 100m).
- Birdsong.
- Leaves rustling in the wind.
- Distant sound of a wind chime from a nearby residential property.

The sound level monitoring results are presented in Table 11.7 below.

Table 11.7 Sound Level Monitoring Results – N5

Date	Daytime	
	$L_{Aeq,\ 2h30min}$ dB	$L_{A90,15min}$ dB
Mon 13/12/2021	59	60

11.8 Monitoring Location – N6

Unattended sound measurements were taken at the eastern boundary of the Royal Oak's beer garden. The sound level measurement started at 13:00 on 01/12/21 and finished at 14:45 on 13/12/21. The microphone was located approximately 2m above ground level, shown highlighted red in Figure 11.8 below.



Figure 11.8 N6 Monitoring Location

During the installation and collection of the sound level monitoring equipment, the sound environment at this location was characterised by (from most dominant to least dominant sound):

- Pedestrians using the nearby coastal line footpath.
- Distant road traffic on A3023, Langstone Road (approximately 200m).
- Birdsong.
- Tide going out.

The sound level monitoring results are presented in Table 11.8.

Table 11.8 Sound Level Monitoring Results – N6

Date	Daytime		Evening		Night-time		
	$L_{Aeq,12h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,4h}$ dB	$L_{A90,15min}$ dB	$L_{Aeq,8h}$ dB	$L_{A90,15min}$ dB	L_{Amax} dB
Wed 01/12/2021	52	51	50	47	48	47	66
Thu 02/12/2021	55	52	50	45	48	45	63
Fri 03/12/2021	55	52	51	44	49	39	70
Sat 04/12/2021	-	-	-	-	-	-	-
Sun 05/12/2021	54	52	49	49	47	39	63
Mon 06/12/2021	-	-	-	-	-	-	-
Tue 07/12/2021	-	-	-	-	-	-	-
Wed 08/12/2021	-	-	-	-	-	-	-
Thu 09/12/2021	56	50	54	50	51	42	64
Fri 10/12/2021	54	52	50	48	49	48	64
Sat 11/12/2021	56	56	54	48	52	48	64
Sun 12/12/2021	56	56	53	46	51	39	64
Mon 13/12/2021	58	57	-	-	-	-	-
Weekday Average	**55**	**52**	**51**	**47**	**49**	**44**	**66**
Weekend Average	**55**	**54**	**52**	**47**	**50**	**42**	**64**

Appendix D Construction Noise Activities

Table 11.9 below presents the anticipated activities and plant associated with construction works at each frontage location.

Table 11.9 Anticipated Construction Activities and predicted Sound Power Levels

Frontage	Activity	Plant	A-weighted sound pressure level dB LAeq 10 m	Sound Power Level LWA	Assumed on time (% of 12hr shift)	Correction dB	Resulting Power
Frontage 1a	Placing of granular material	Excavators	78	106	75	-1	105
		Wacker Plate for compacting aggregate	96	124	30	-5	119
		18t single drum roller compacting general fill	79	107	30	-5	102
		Bulldozer	85	113	50	-3	110
		Dump truck	84	112	75	-1	111
Frontage 1b	Placing of granular material	Excavators	78	106	75	-1	105
		Wacker Plate for compacting aggregate	96	124	30	-5	119
		18t single drum roller compacting general fill	79	107	30	-5	102
		Bulldozer	85	113	50	-3	110
		Dump truck	84	112	75	-1	111
	Vibration Piling	Movax vibro piling rig	90	118	40	-4	114
	Percussive Piling	Percussive piling rig	105	133	40	-4	129
Frontage 2	Placing of granular material	Excavators	78	106	75	-1	105
		Wacker Plate for compacting aggregate	96	124	30	-5	119
		18t single drum roller compacting general fill	79	107	30	-5	102
		Bulldozer	85	113	50	-3	110
		Dump truck	84	112	75	-1	111
	Breaking of asphalt	Breaking of asphalt	95	123	40	-4	119
	Vibration Piling	Movax vibro piling	90	118	40	-4	114

Frontage	Activity	Plant	A-weighted sound pressure level dB LAeq 10 m	Sound Power Level LWA	Assumed on time (% of 12hr shift)	Correction dB	Resulting Power
	Percussive piling	Percussive piling rig	105	133	40	-4	129
Frontage 3	Placing of concrete in situ	26t Pre-mix concrete truck, discharging	75	103	40	-4	99
		26t Concrete truck, placing concrete	80	108	40	-4	104
	Cranes for lifting glass panel	40t Crawler crane	70	98	20	-7	91
		50t Crawler crane	70	98	20	-7	91
		70t Crawler crane	70	98	20	-7	91
	Excavations for works	35t Excavator	78	106	75	-1	105
		21t Excavator	71	99	75	-1	98
		13t Excavator	70	98	75	-1	97
		8t Excavator	74	102	75	-1	101
		5t Excavator	74	102	75	-1	101
	Vibration Piling	Movax vibro piling rig	90	118	40	-4	114
	Percussive Piling	Percussive piling rig	105	133	40	-4	129
Frontage 4	Placing of concrete in situ	26t Pre-mix concrete truck, discharging	75	103	40	-4	99
		26t Concrete truck, placing concrete	80	108	40	-4	104
	Excavations for works	35t Excavator	78	106	75	-1	105
		21t Excavator	71	99	75	-1	98
		13t Excavator	70	98	75	-1	97
		8t Excavator	74	102	75	-1	101
		5t Excavator	74	102	75	-1	101
	Vibration Piling	Movax vibro piling rig	90	118	40	-4	114
	Percussive Piling	Percussive piling rig	105	133	40	-4	129
Frontage 5	Placing of granular material	Excavators	78	106	75	-1	105
		Wacker Plate for compacting aggregate	96	124	30	-5	119

Frontage	Activity	Plant	A-weighted sound pressure level dB LAeq 10 m	Sound Power Level LWA	Assumed on time (% of 12hr shift)	Correction dB	Resulting Power
		18t single drum roller compacting general fill	79	107	30	-5	102
		Bulldozer	85	113	50	-3	110
		Dump truck	84	112	75	-1	111
	Placing of concrete in situ	26t Pre-mix concrete truck, discharging	75	103	40	-4	99
		26t Concrete truck, placing concrete	80	108	40	-4	104
	Vibration Piling	Movax vibro piling rig	90	118	40	-4	114
	Percussive Piling	Percussive piling rig	105	133	40	-4	129
Frontage 6	Placing of rock	20t wheeled front end loader moving rock / loading lorries	82	110	75	-1	109
		23t articulated dumper truck moving and tipping fill / rock	87	115	75	-1	114
		40t long reach excavator with grab attachment	85	113	75	-1	112
	Delivery of rock	23t articulated dumper truck	87	115	75	-1	114
		20t 8 wheeled lorry moving and tipping fill / rock	80	108	75	-1	107
All	small tools for general activities	4KVA Generator	95	123	90	0	123
		Prime diesel pump (over pumping water)	88	116	80	-1	115
		compare compressor DLT 0406 (full revs)	91	119	80	-1	118
		Lighting set, lister diesel 2 cylinder engine /9 full working revs)	98	126	80	-1	125
		2" vibrating poker agitating concrete	97	125	30	-5	120
		2" Vibrating poker placing 30 newton concrete	94	122	30	-5	117
		Breaking out reinforced concrete	96	124	30	-5	119
		RK12 Medium Breaking c/w	108	136	30	-5	131
		Rock drill (drilling concrete)	102	130	30	-5	125
		Benchsaw cutting timber	94	122	20	-7	115
		Sawbench cutting plywood	94	122	20	-7	115
		Blade cutter 1/2"	98	126	20	-7	119

Frontage	Activity	Plant	A-weighted sound pressure level dB LAeq 10 m	Sound Power Level LWA	Assumed on time (% of 12hr shift)	Correction dB	Resulting Power
		Reinforcement bars	104	132	20	-7	125

Appendix E Construction Noise Contour Maps

E.1 Frontage 1A Noise Contour Maps

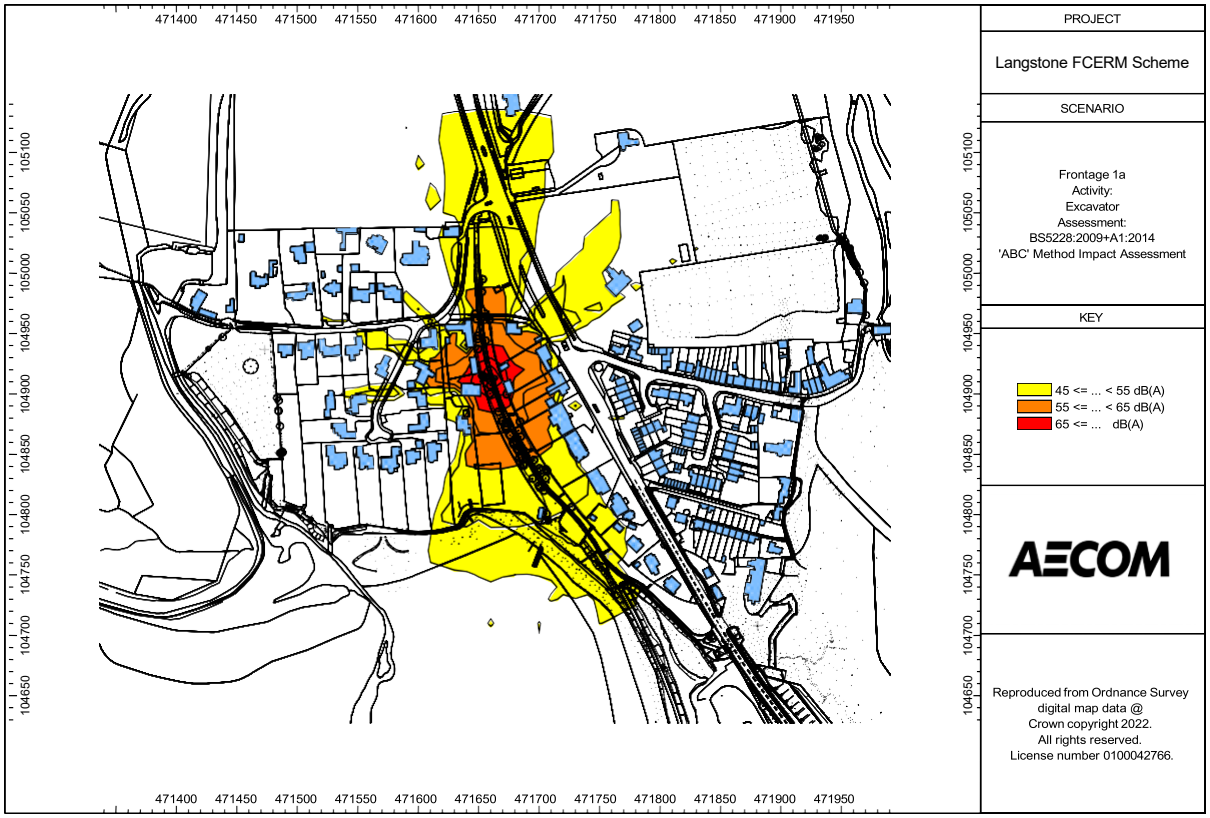


Figure 11.9 Frontage 1A 'ABC' Method Noise Contour - Excavator

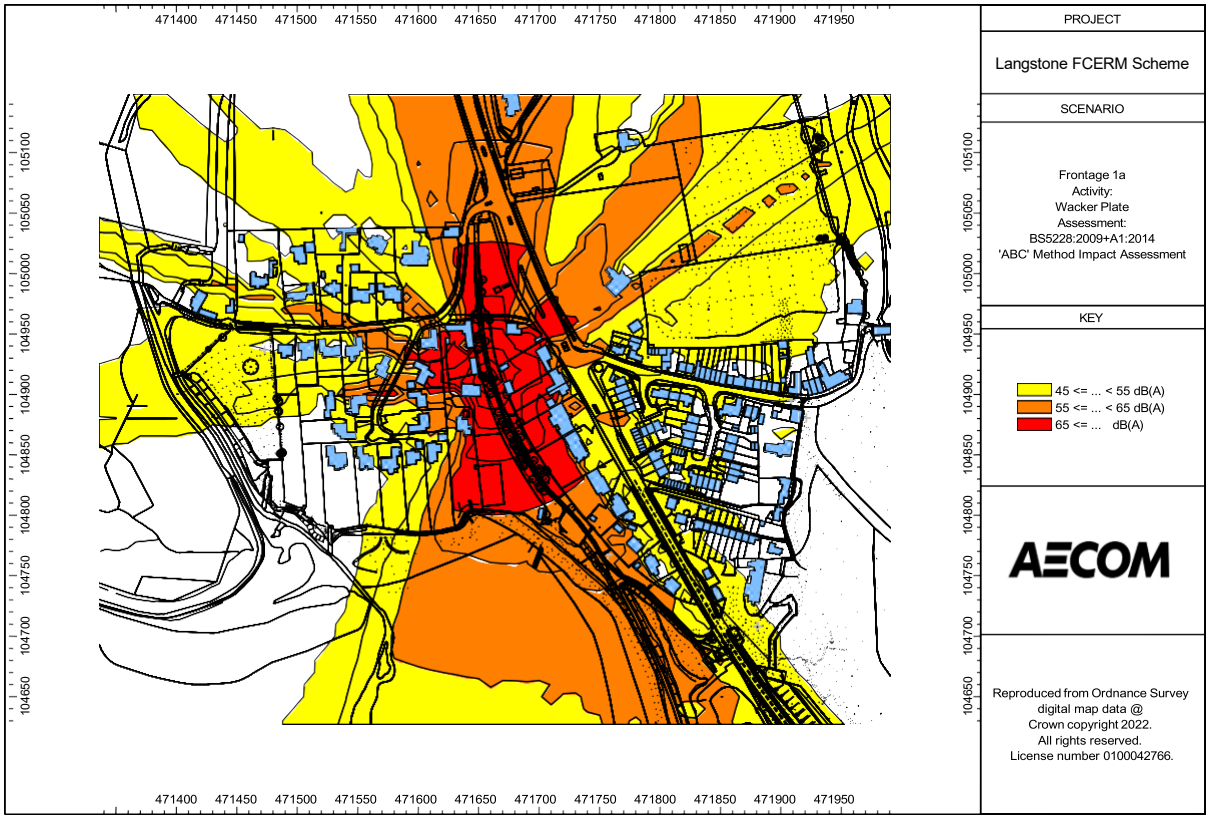


Figure 11.10 Frontage 1A 'ABC' Method Noise Contour - Wacker Plate

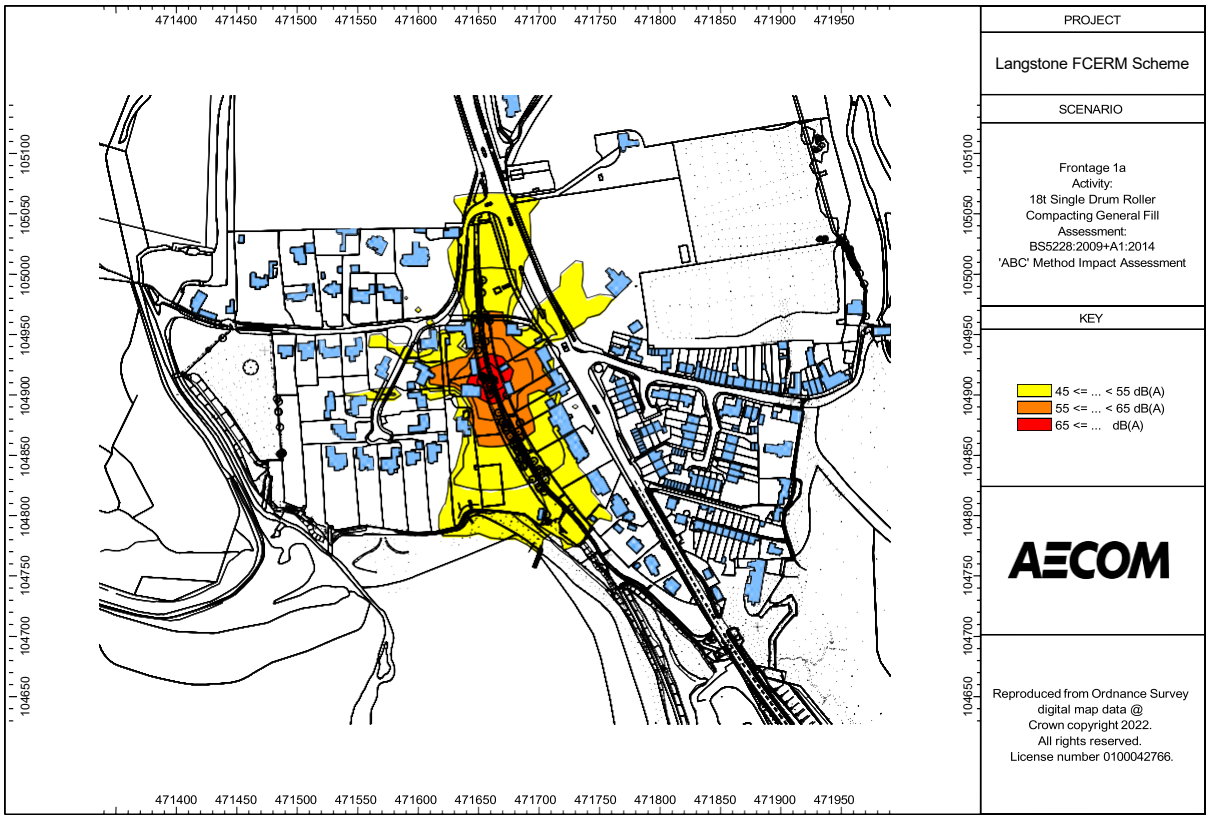


Figure 11.11 Frontage 1A 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting Aggregate

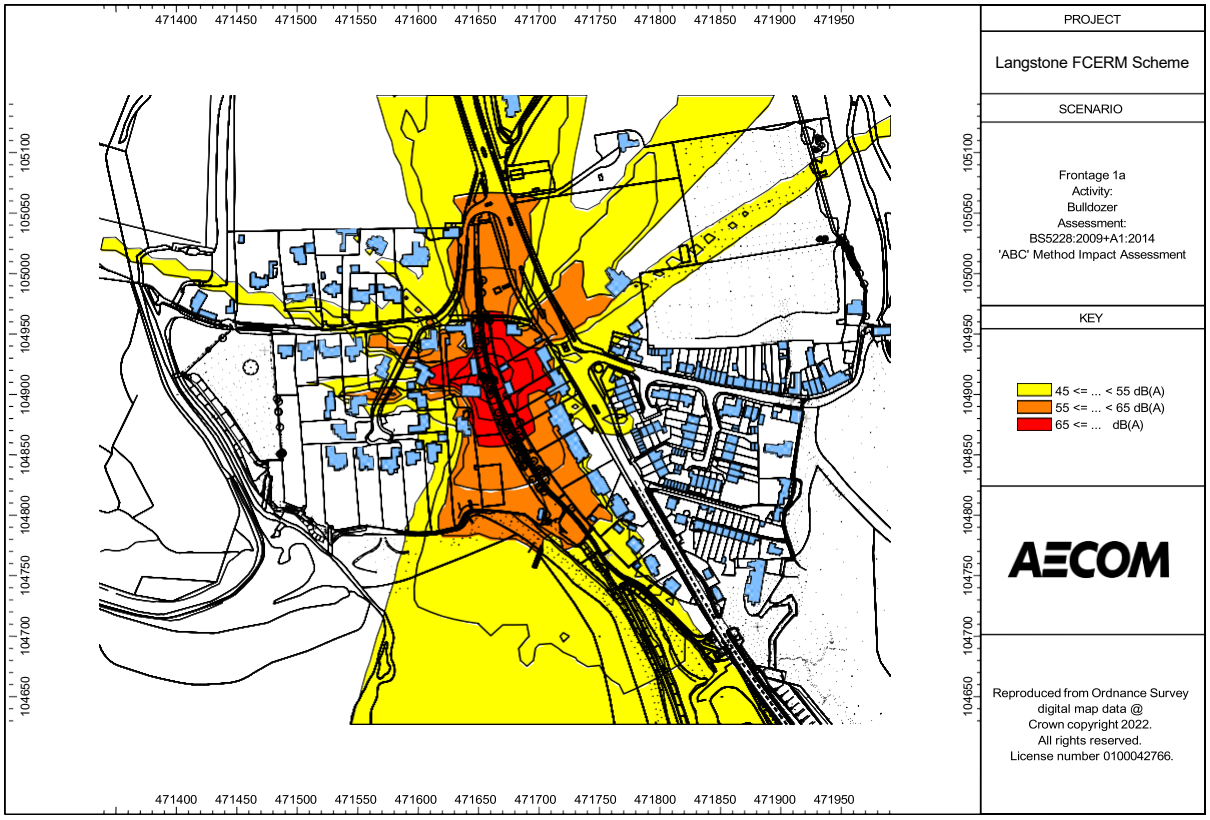


Figure 11.12 Frontage 1A 'ABC' Method Noise Contour - Bulldozer

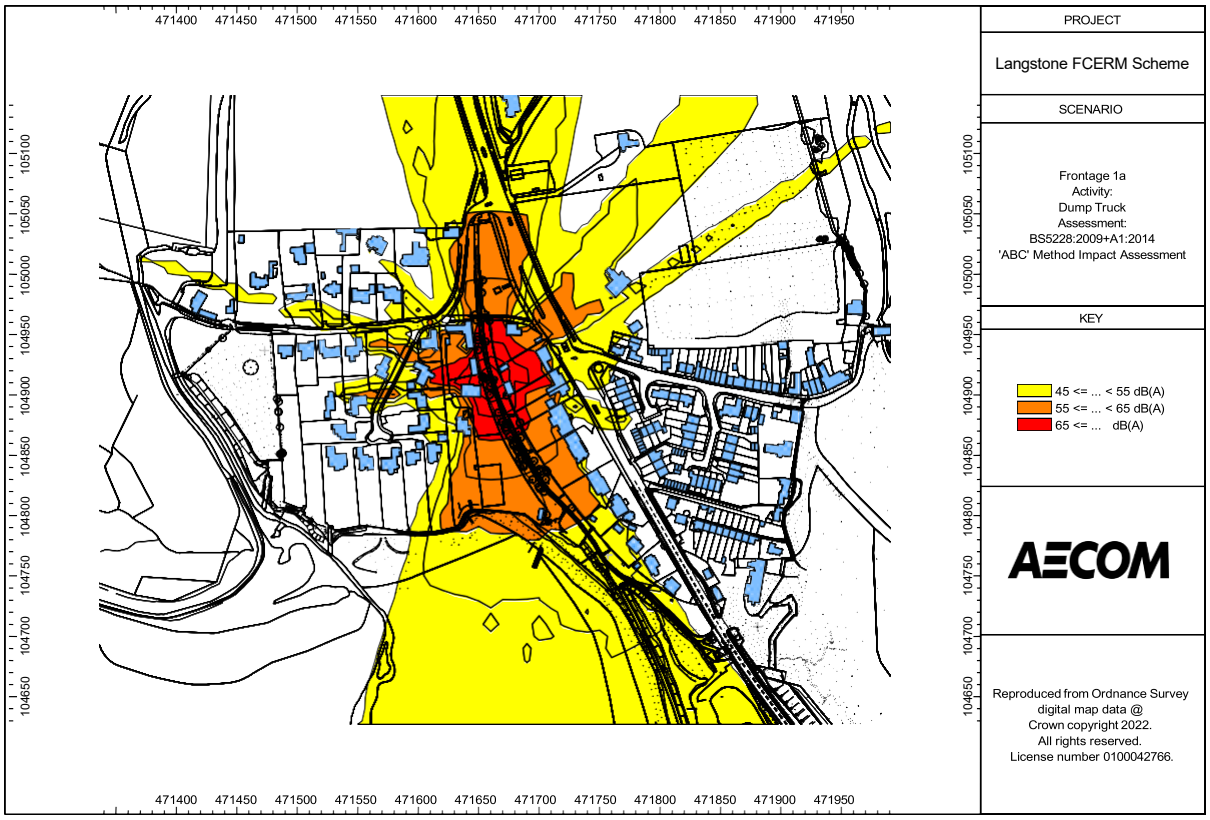


Figure 11.13 Frontage 1A 'ABC' Method Noise Contour - Dump Truck

E.2 Frontage 1B Noise Contour Maps

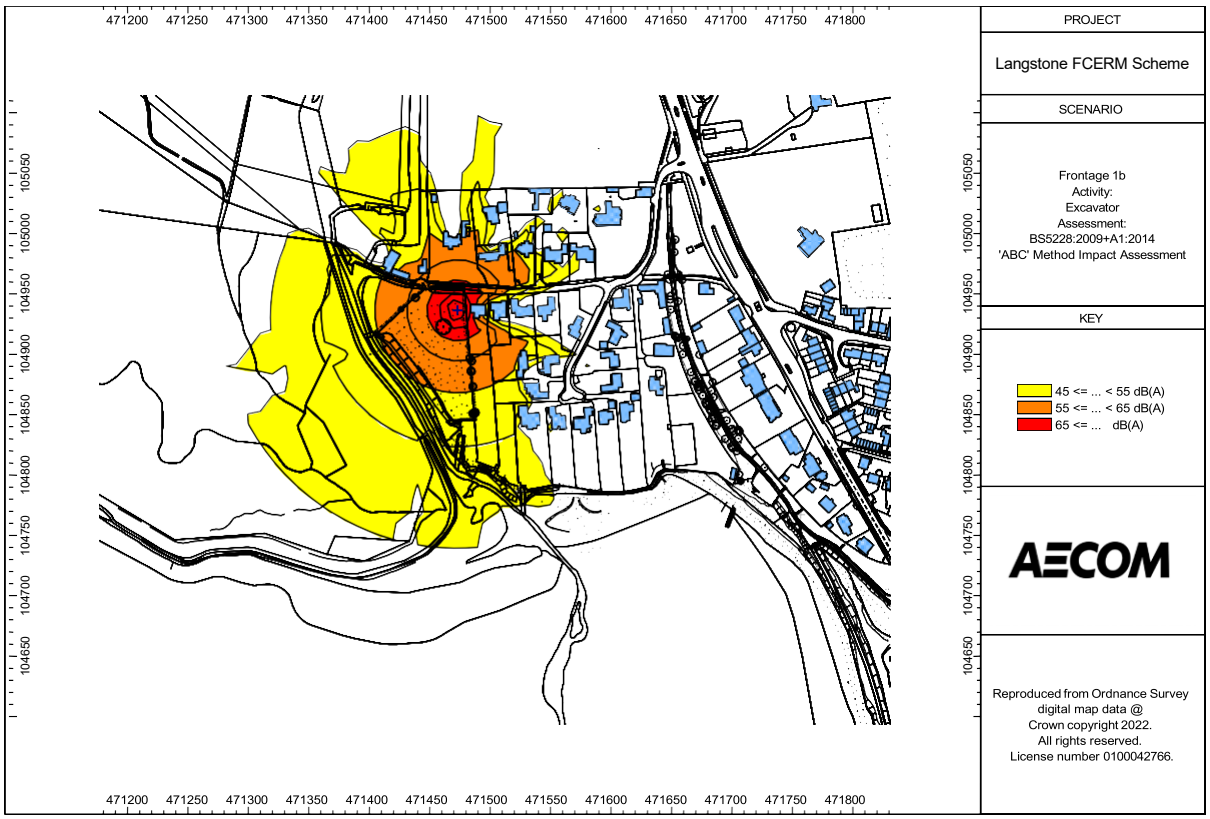


Figure 11.14 Frontage 1B 'ABC' Method Noise Contour - 35t Excavator

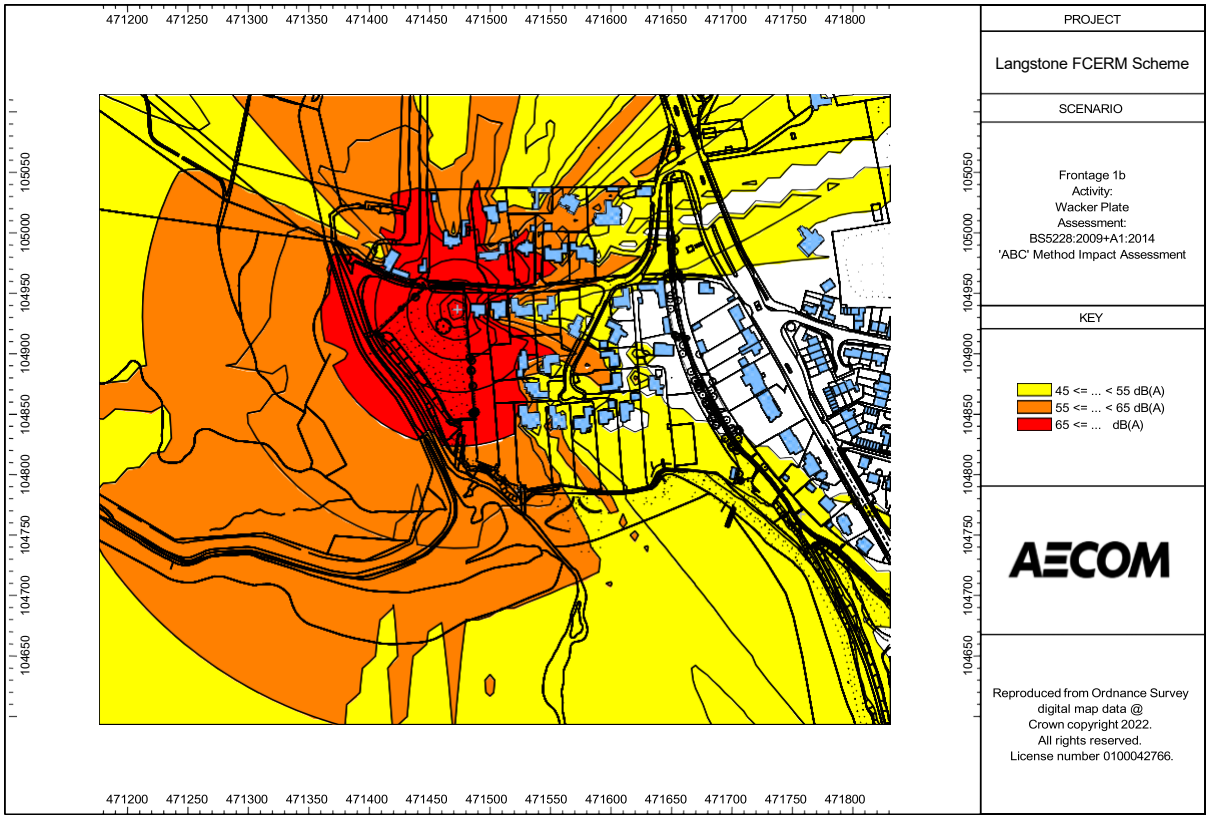


Figure 11.15 Frontage 1B 'ABC' Method Noise Contour - Wacker Plate

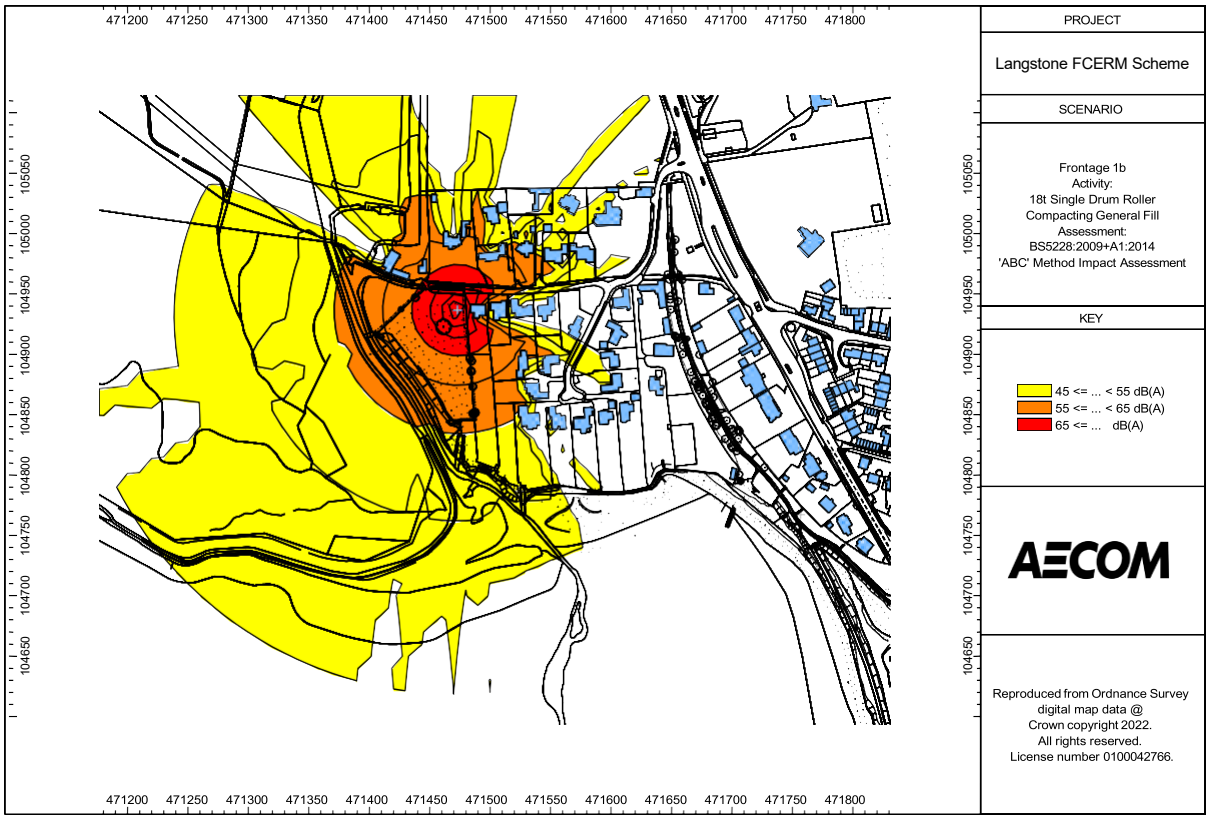


Figure 11.16 Frontage 1B 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting General Fill

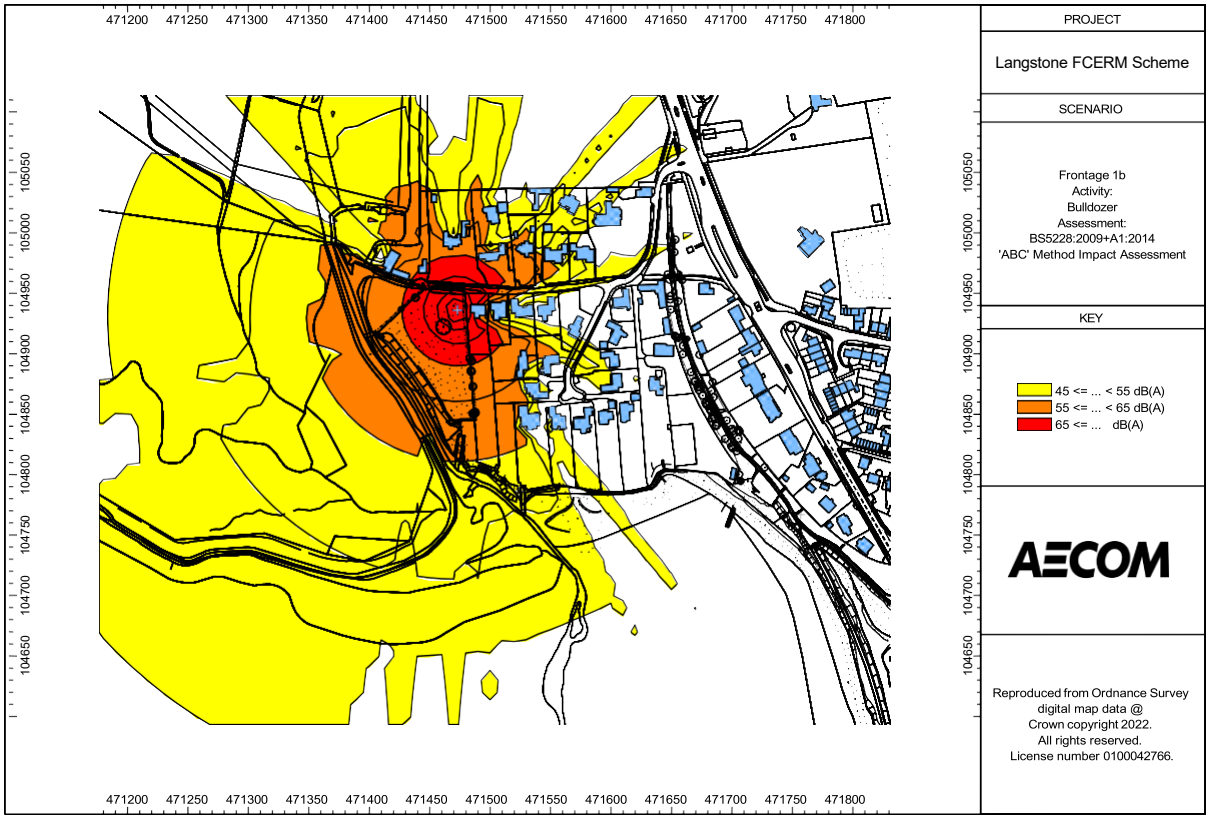


Figure 11.17 Frontage 1B 'ABC' Method Noise Contour - Bulldozer

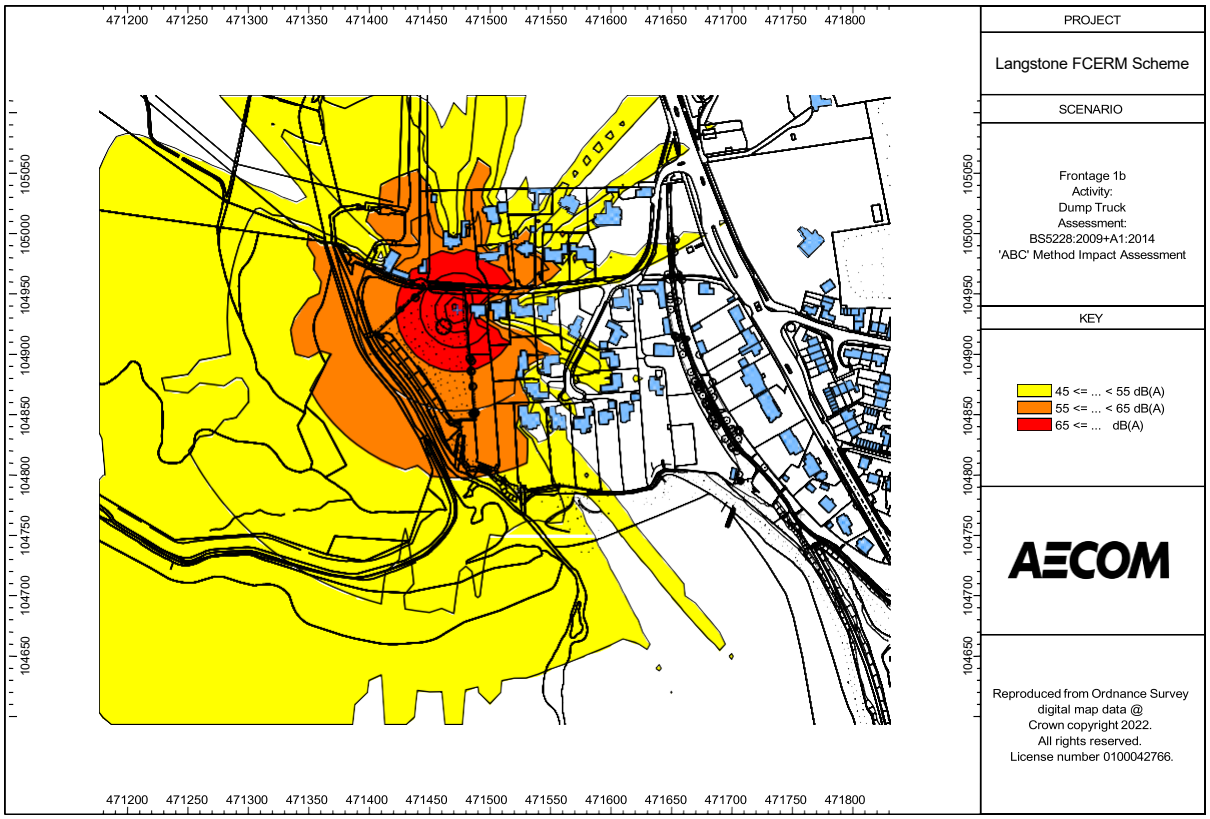


Figure 11.18 Frontage 1B 'ABC' Method Noise Contour - Dump Truck

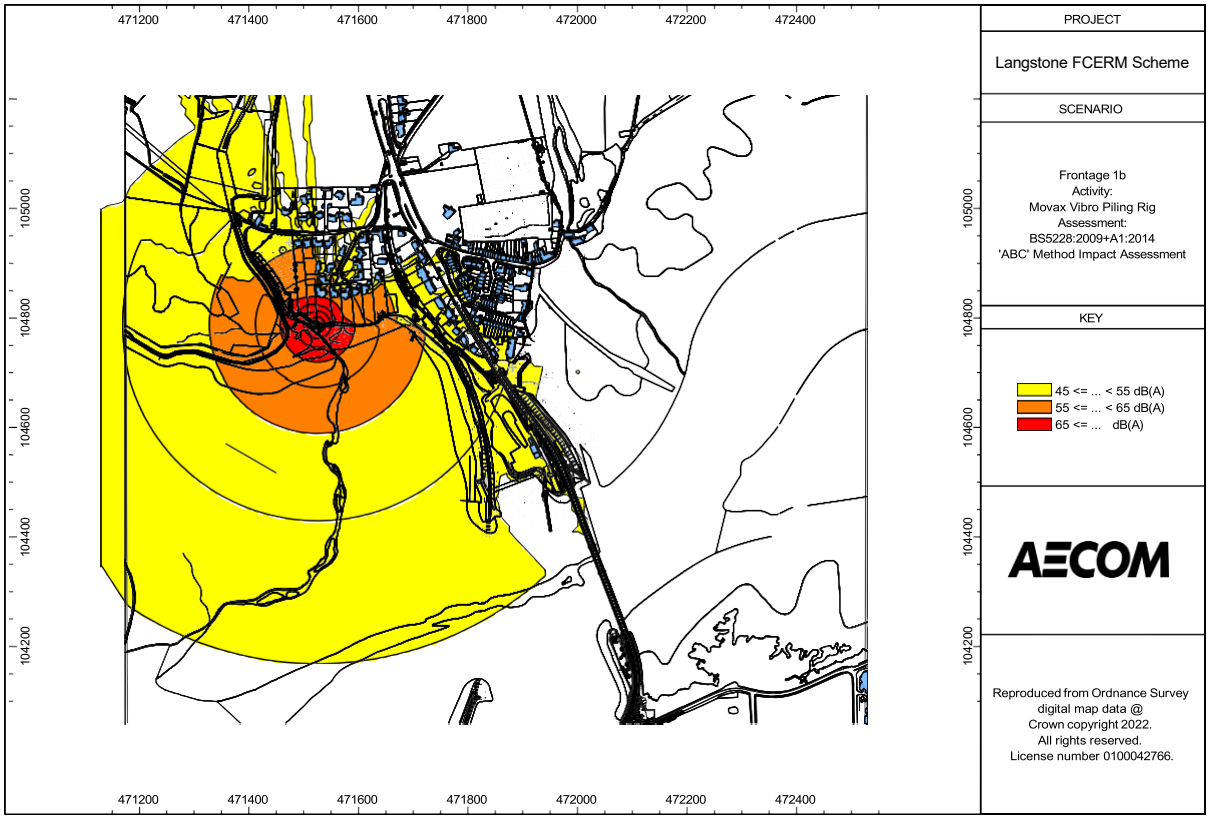


Figure 11.19 Frontage 1B 'ABC' Method Noise Contour - Movax Vibro Piling Rig

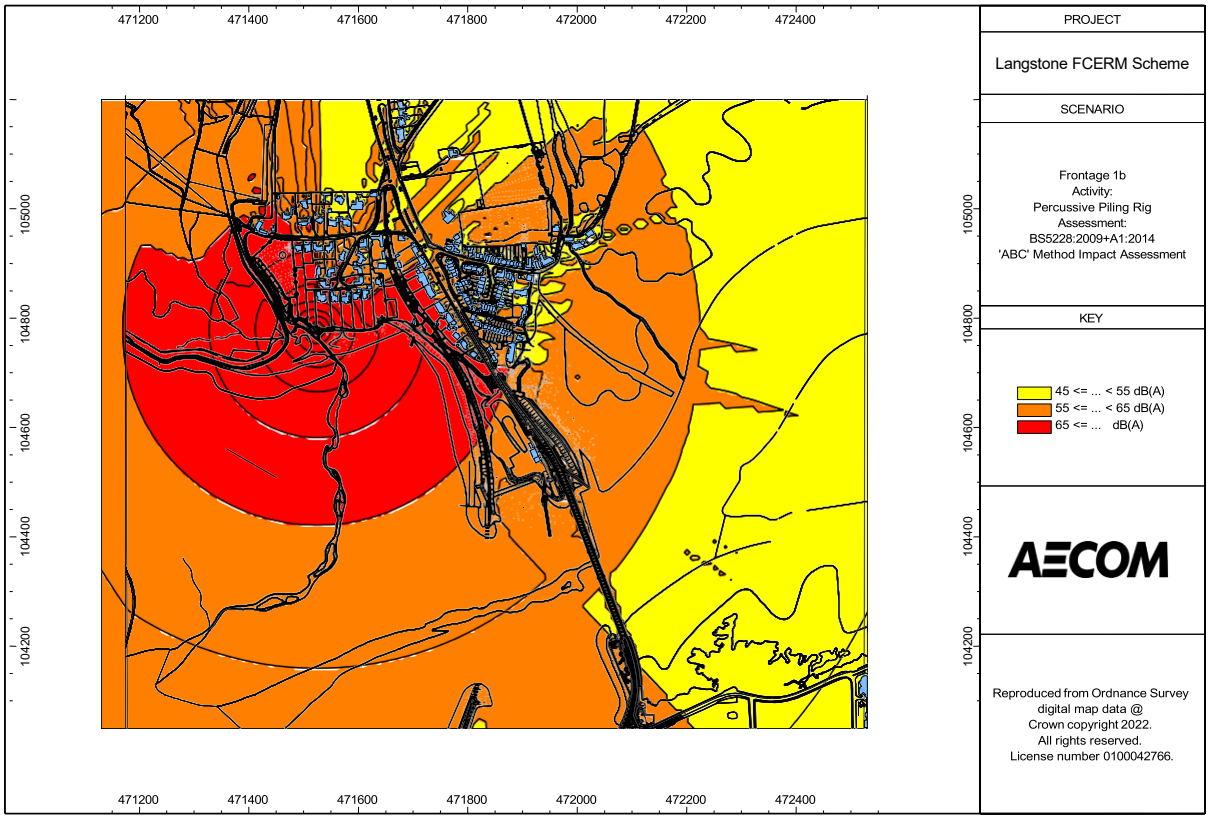


Figure 11.20 Frontage 1B 'ABC' Method Noise Contour - Percussive Piling Rig

E.3 Frontage 2 Noise Contour Maps

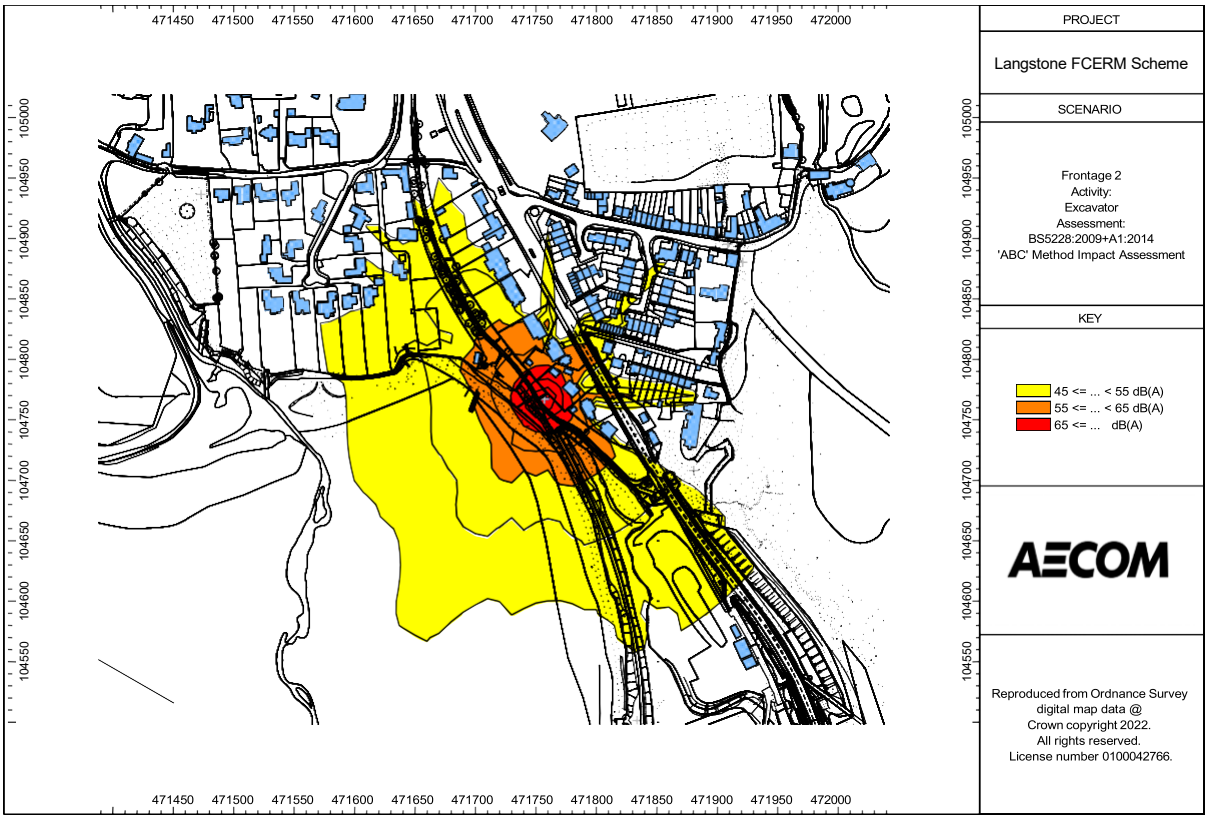


Figure 11.21 Frontage 2 'ABC' Method Noise Contour - 35t Excavator

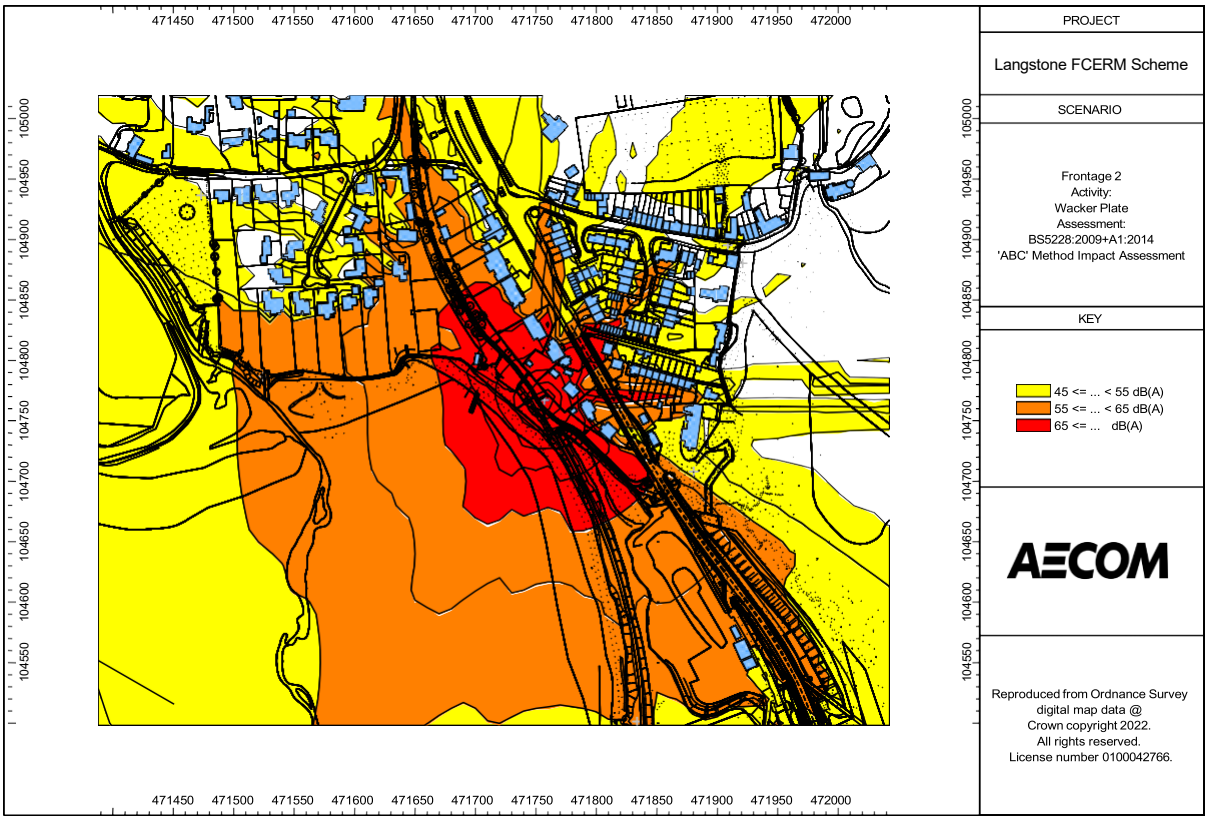


Figure 11.22 Frontage 2 'ABC' Method Noise Contour - Wacker Plate

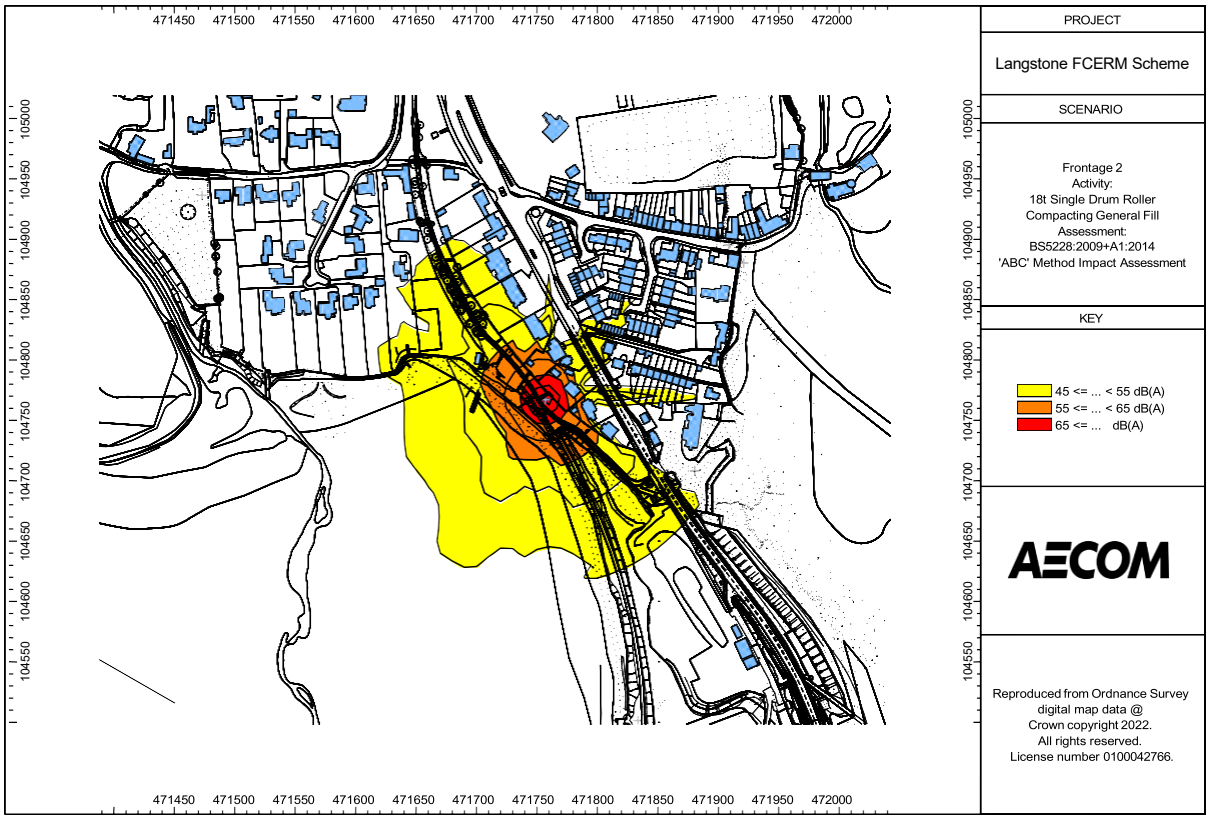


Figure 11.23 Frontage 2 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting General Fill

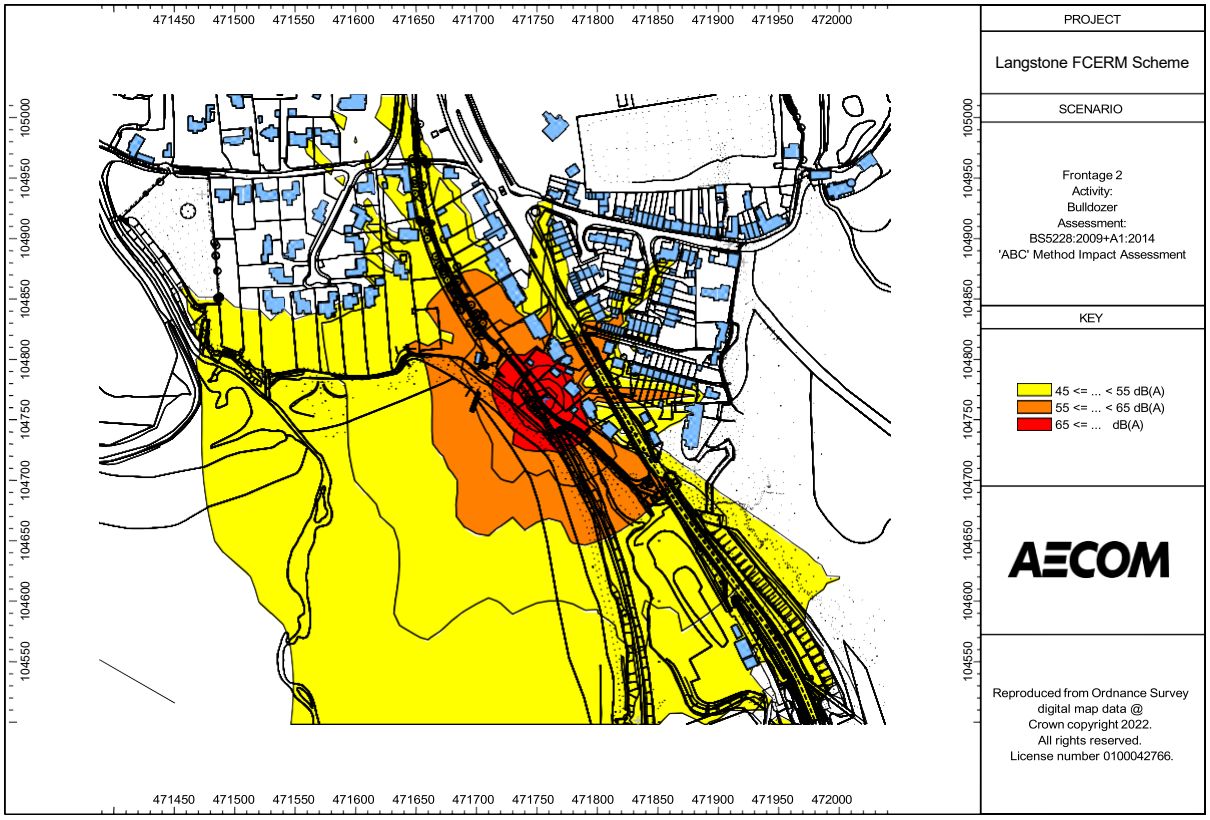


Figure 11.24 Frontage 2 'ABC' Method Noise Contour - Bulldozer

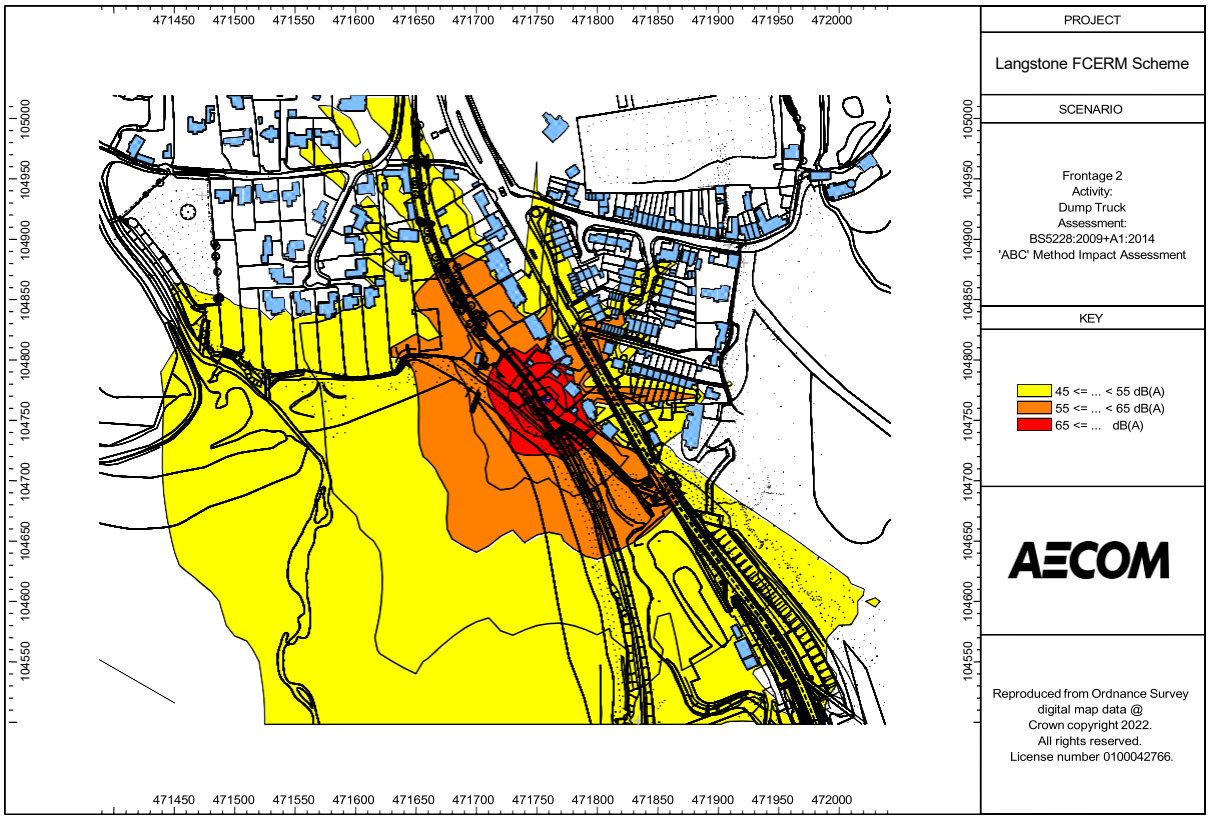


Figure 11.25 Frontage 2 'ABC' Method Noise Contour - Dump Truck

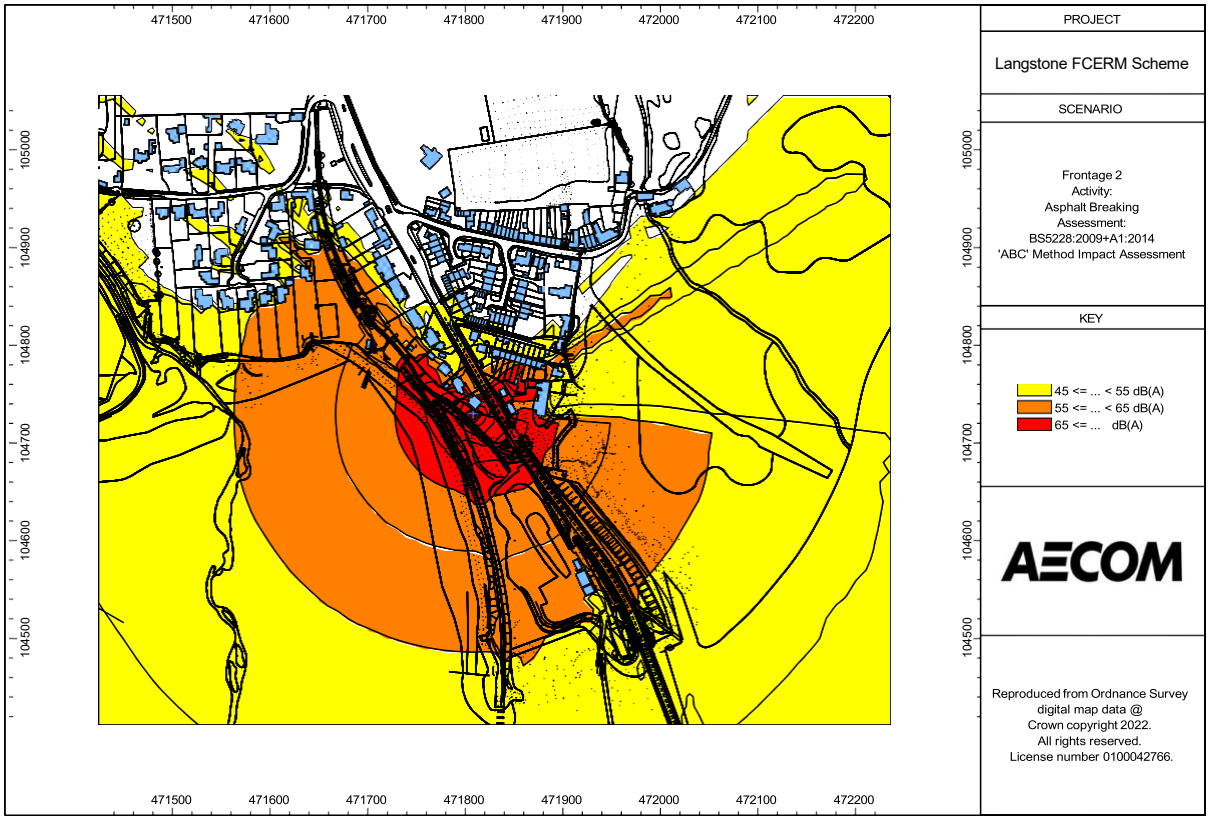


Figure 11.26 Frontage 2 'ABC' Method Noise Contour – Breaking of Asphalt

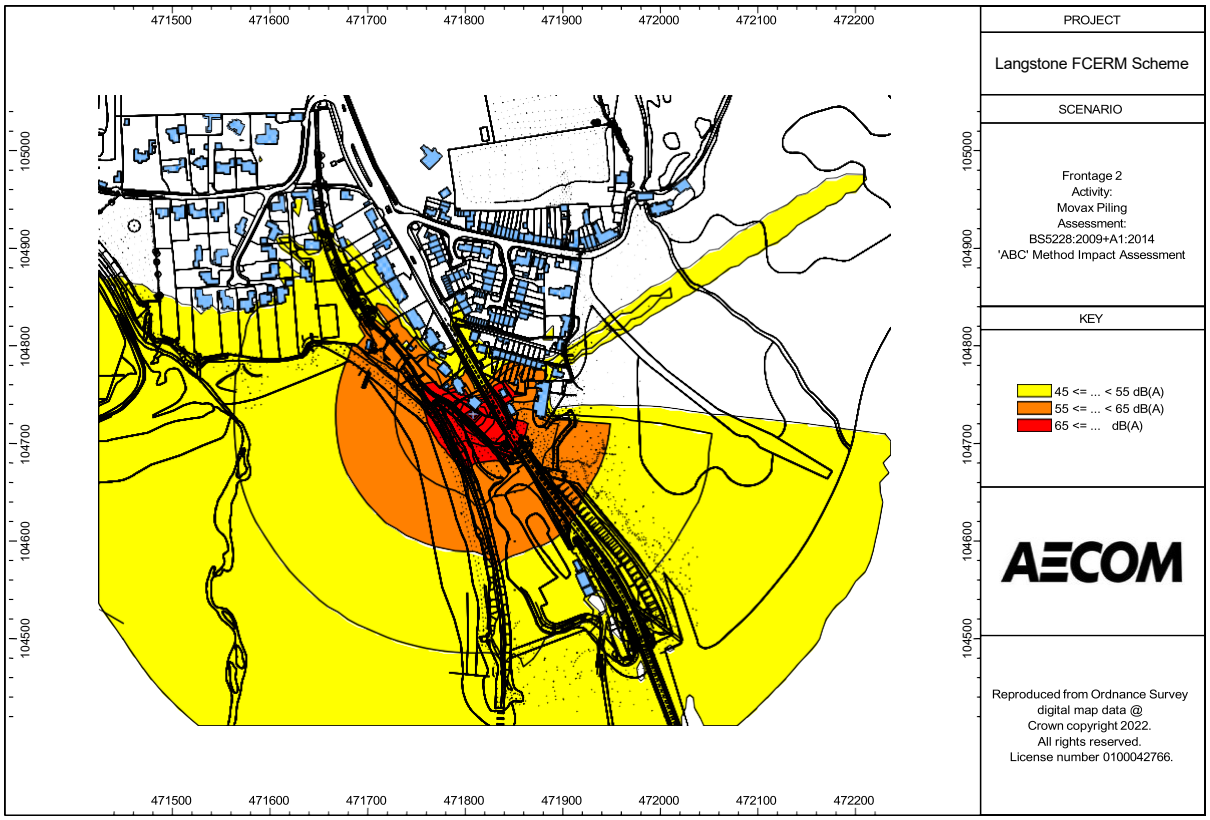


Figure 11.27 Frontage 2 'ABC' Method Noise Contour – Movax Piling

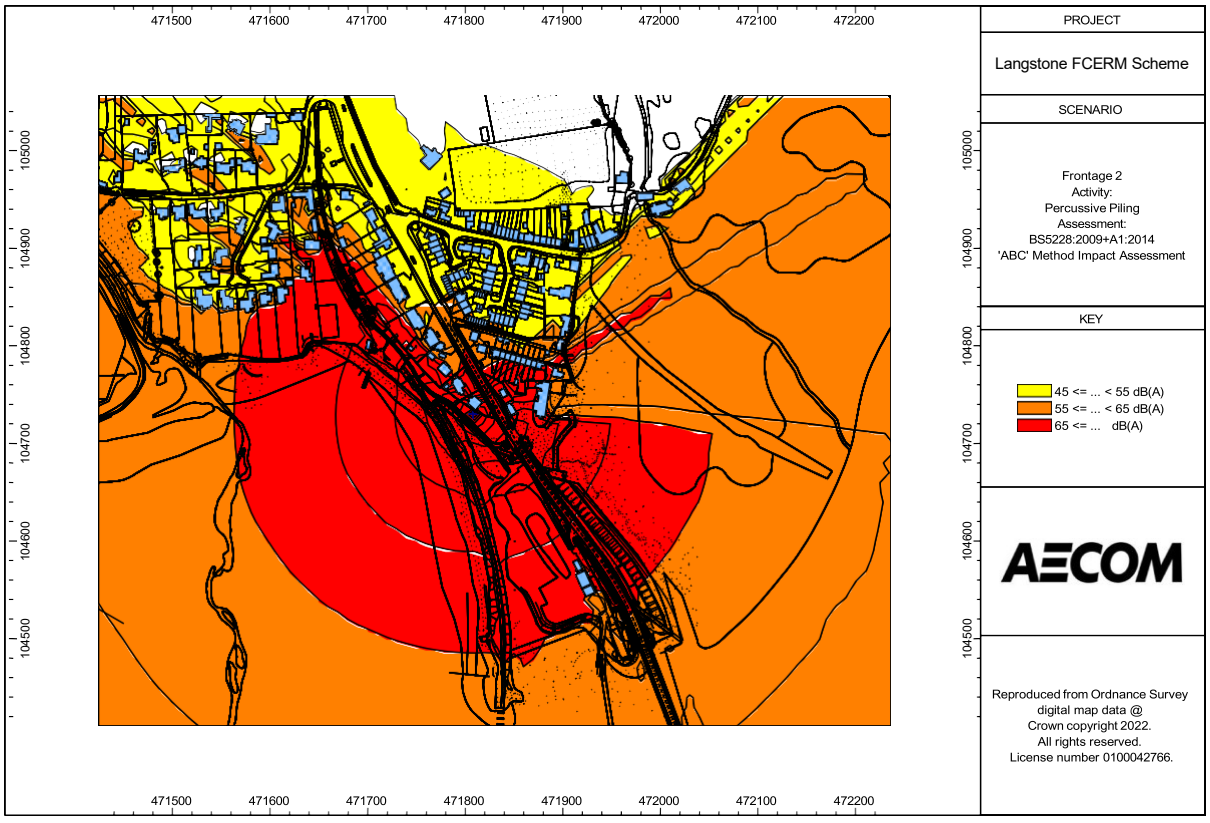


Figure 11.28 Frontage 2 'ABC' Method Noise Contour – Percussive Piling

E.4 Frontage 3 Noise Contour Maps

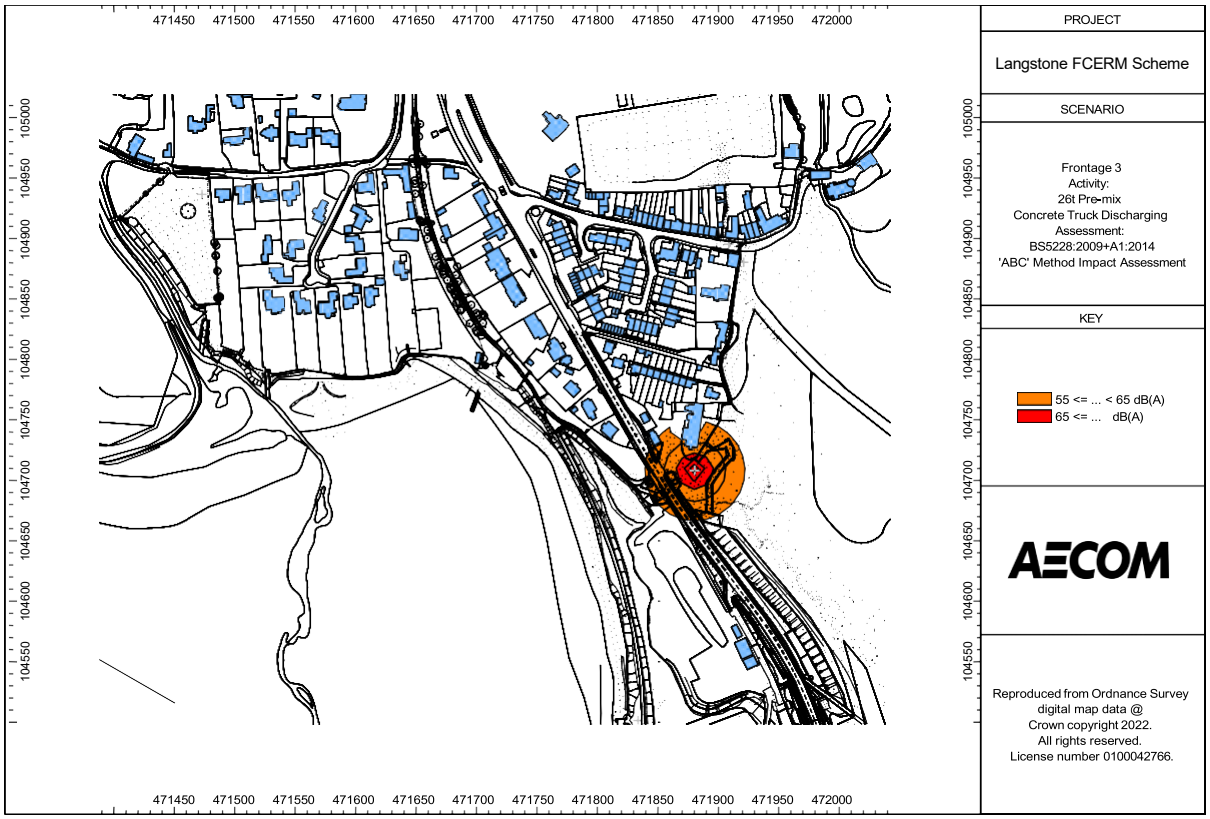


Figure 11.29 Frontage 3 'ABC' Method Noise Contour - 26t Pre-mix Concrete Truck, Discharging

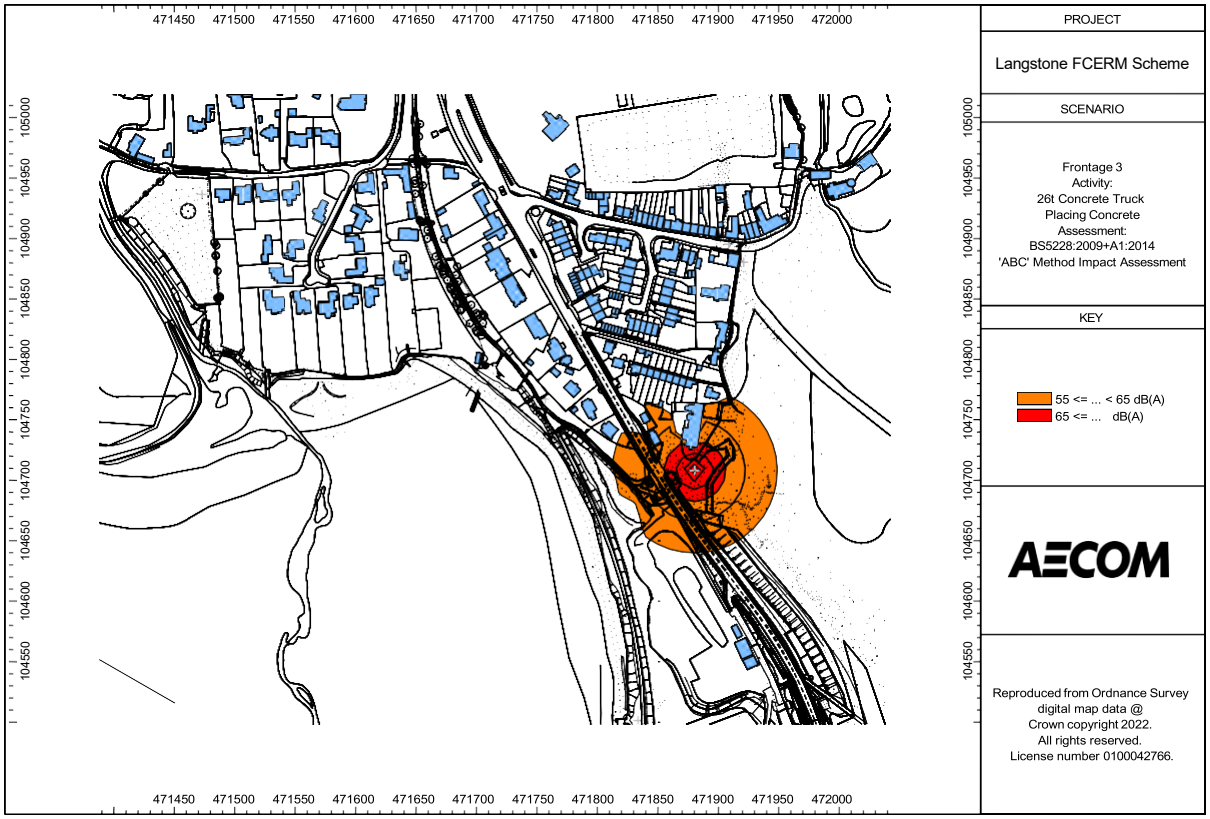


Figure 11.30 Frontage 3 'ABC' Method Noise Contour - 26t Concrete Truck Placing Concrete

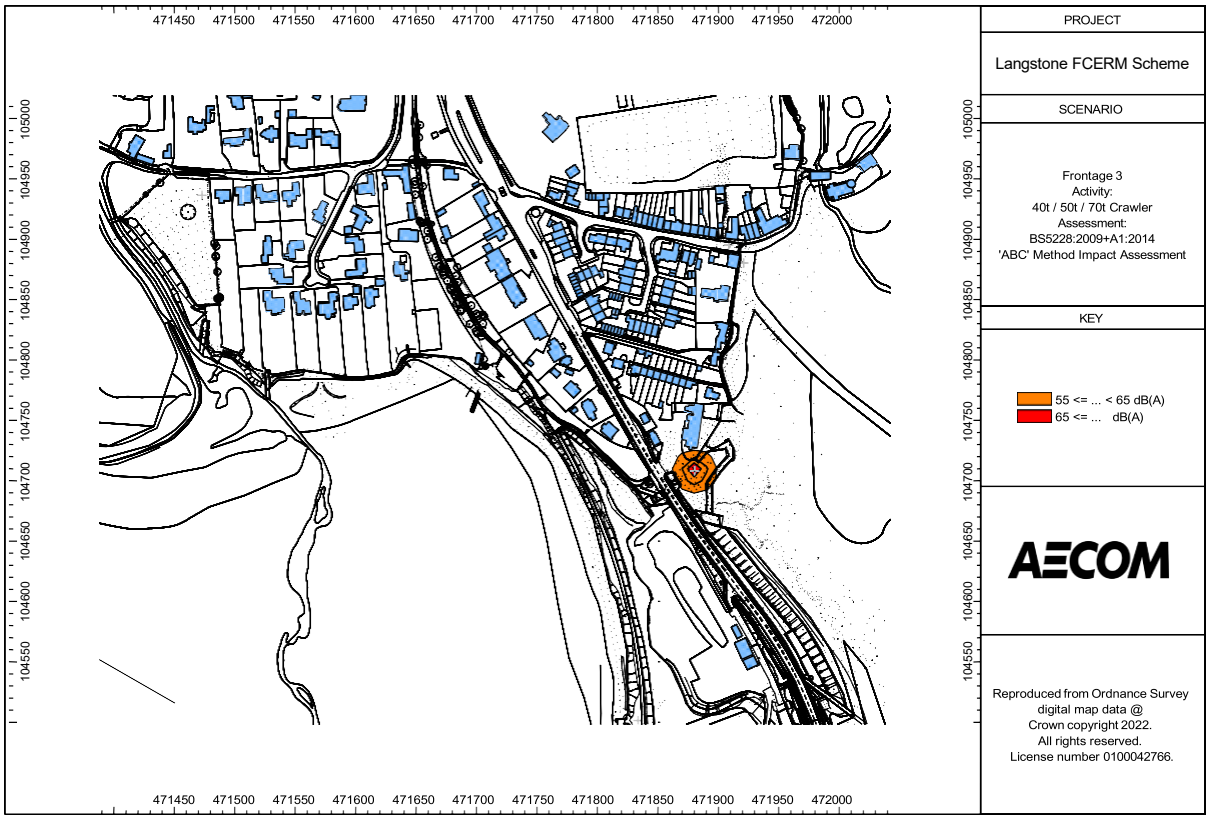


Figure 11.31 Frontage 3 'ABC' Method Noise Contour - 40t / 50t / 70t Crawler Crane

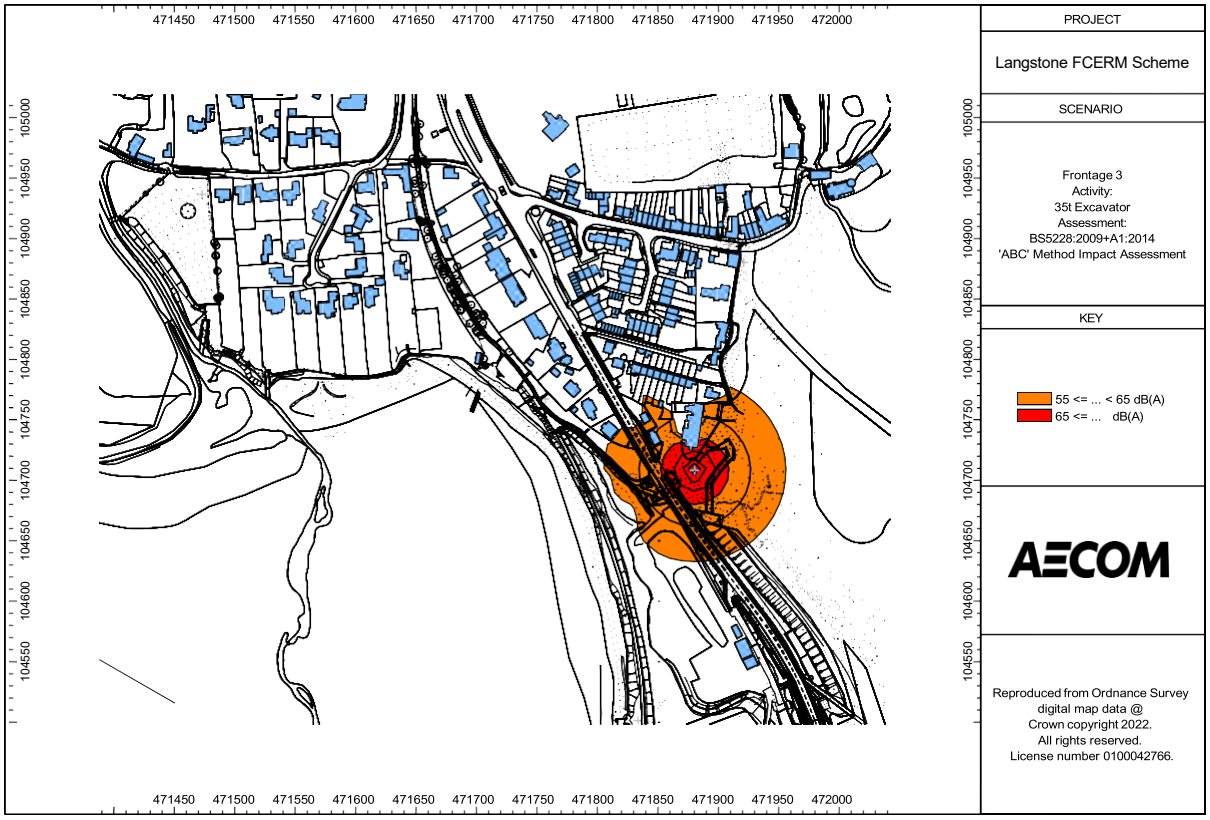


Figure 11.32 Frontage 3 'ABC' Method Noise Contour - 35t Excavator

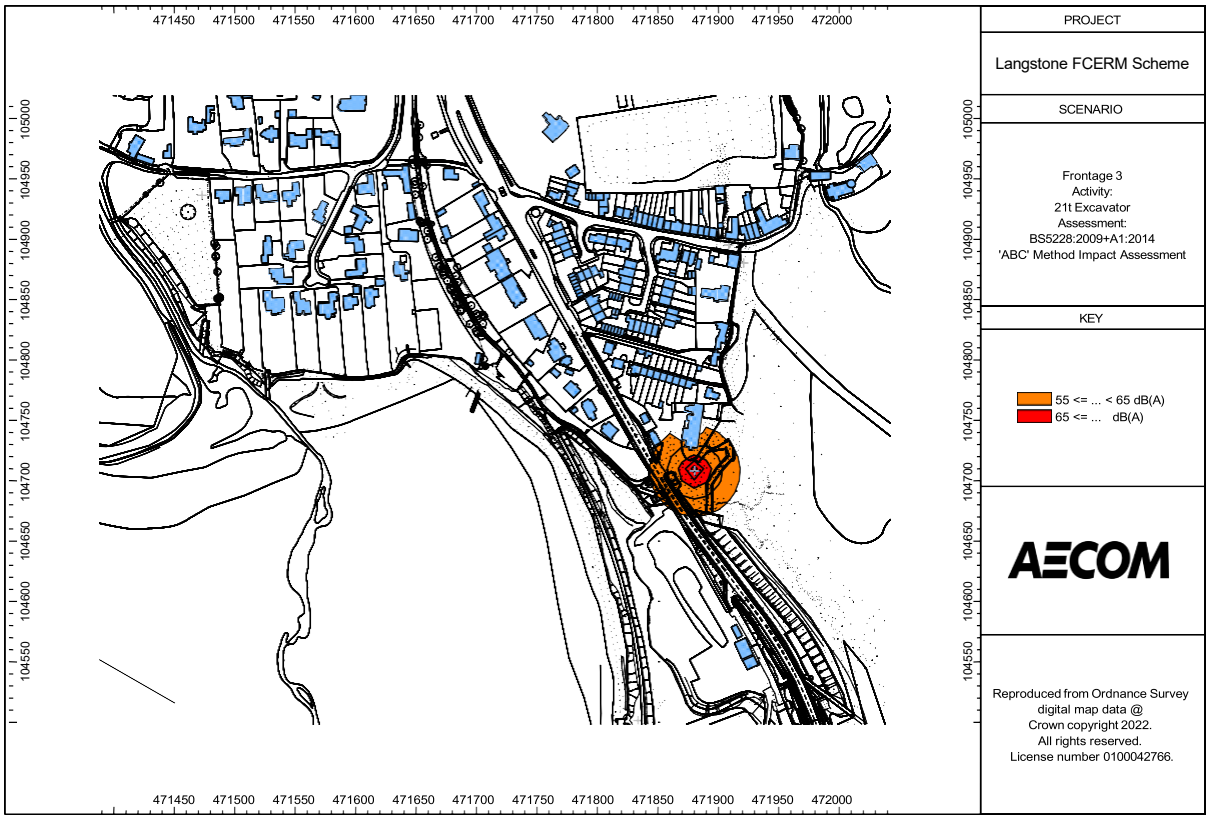


Figure 11.33 Frontage 3 'ABC' Method Noise Contour - 21t Excavator

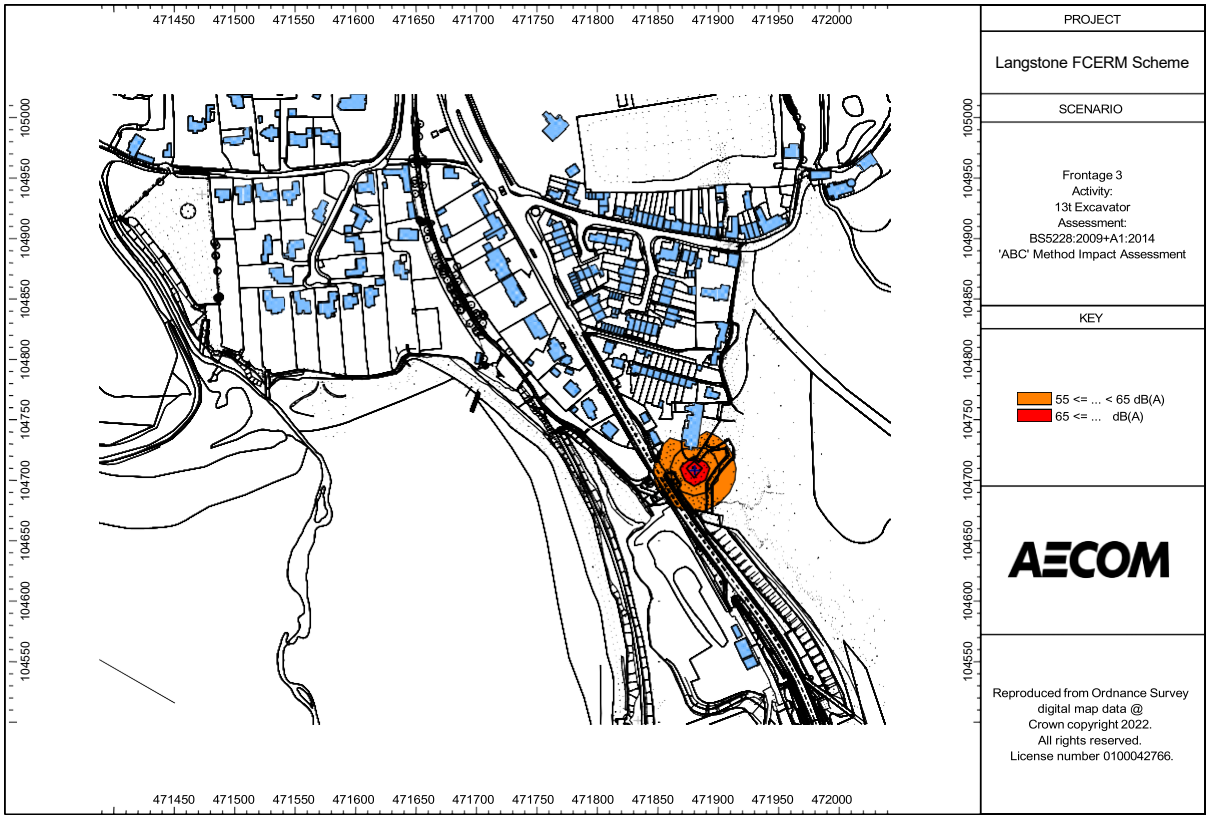


Figure 11.34 Frontage 3 'ABC' Method Noise Contour - 13t Excavator

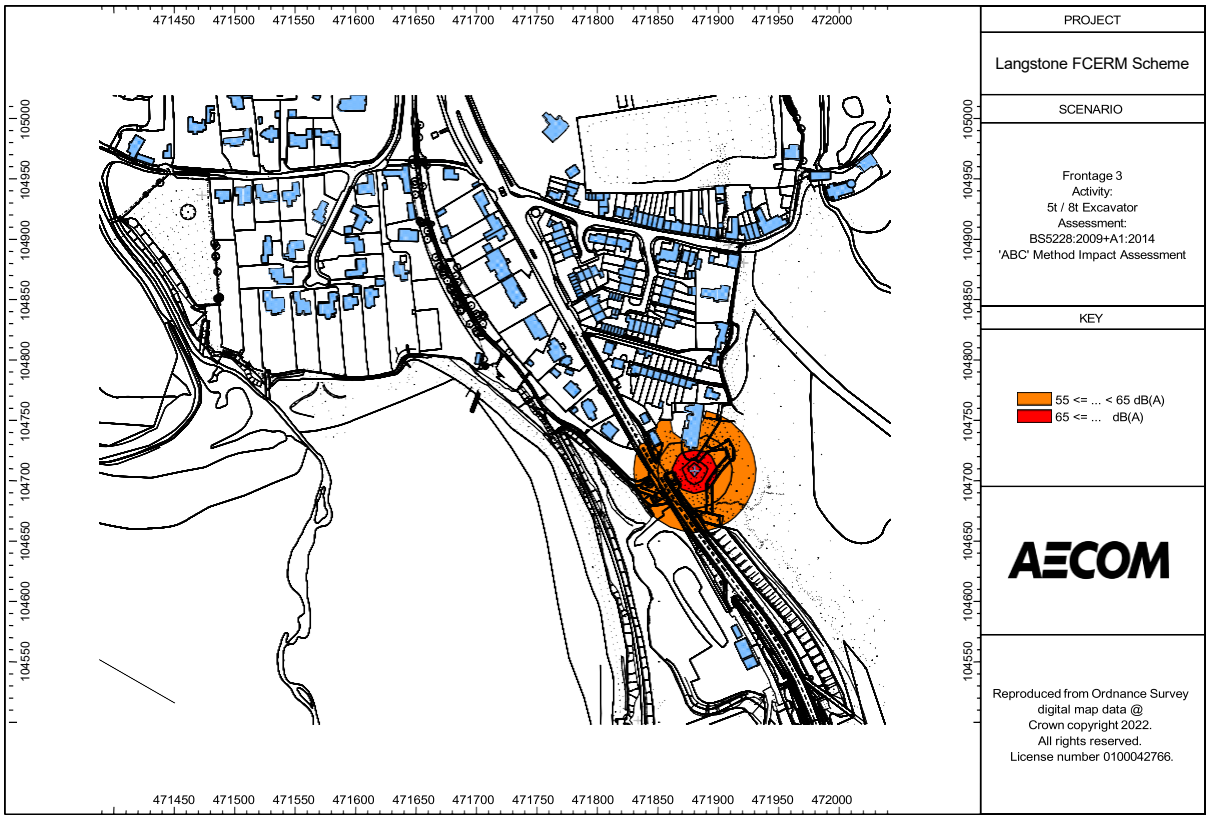


Figure 11.35 Frontage 3 'ABC' Method Noise Contour - 5t / 8t Excavator

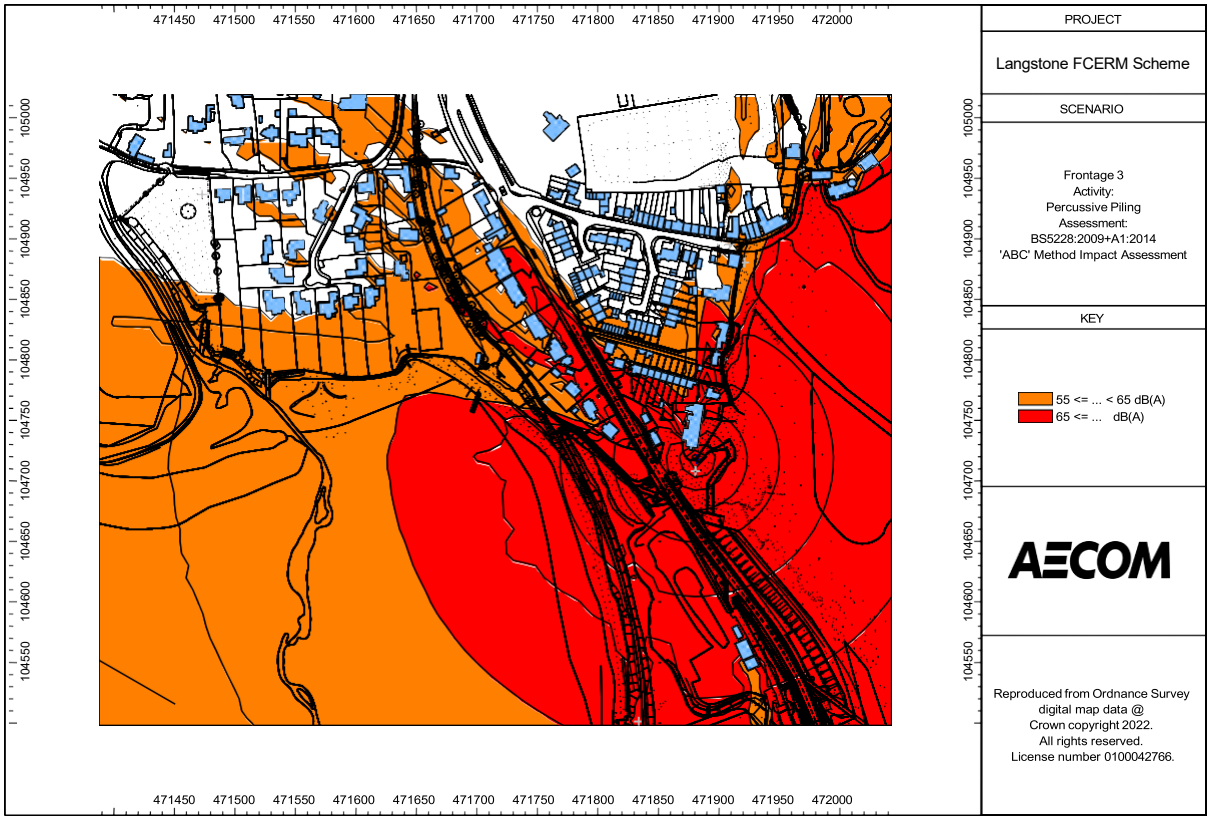


Figure 11.36 Frontage 3 'ABC' Method Noise Contour - Percussive Piling

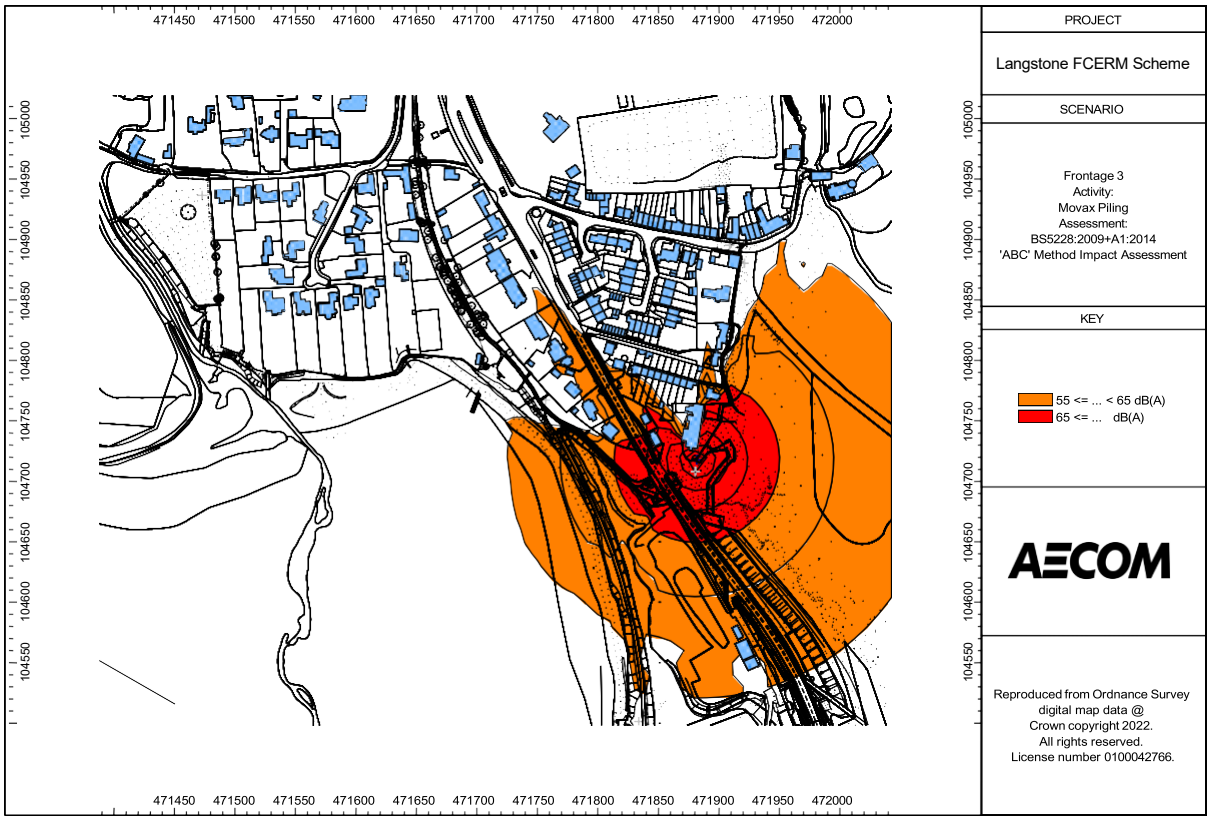


Figure 11.37 Frontage 3 'ABC' Method Noise Contour Movax Piling

E.5 Frontage 4 Noise Contour Maps

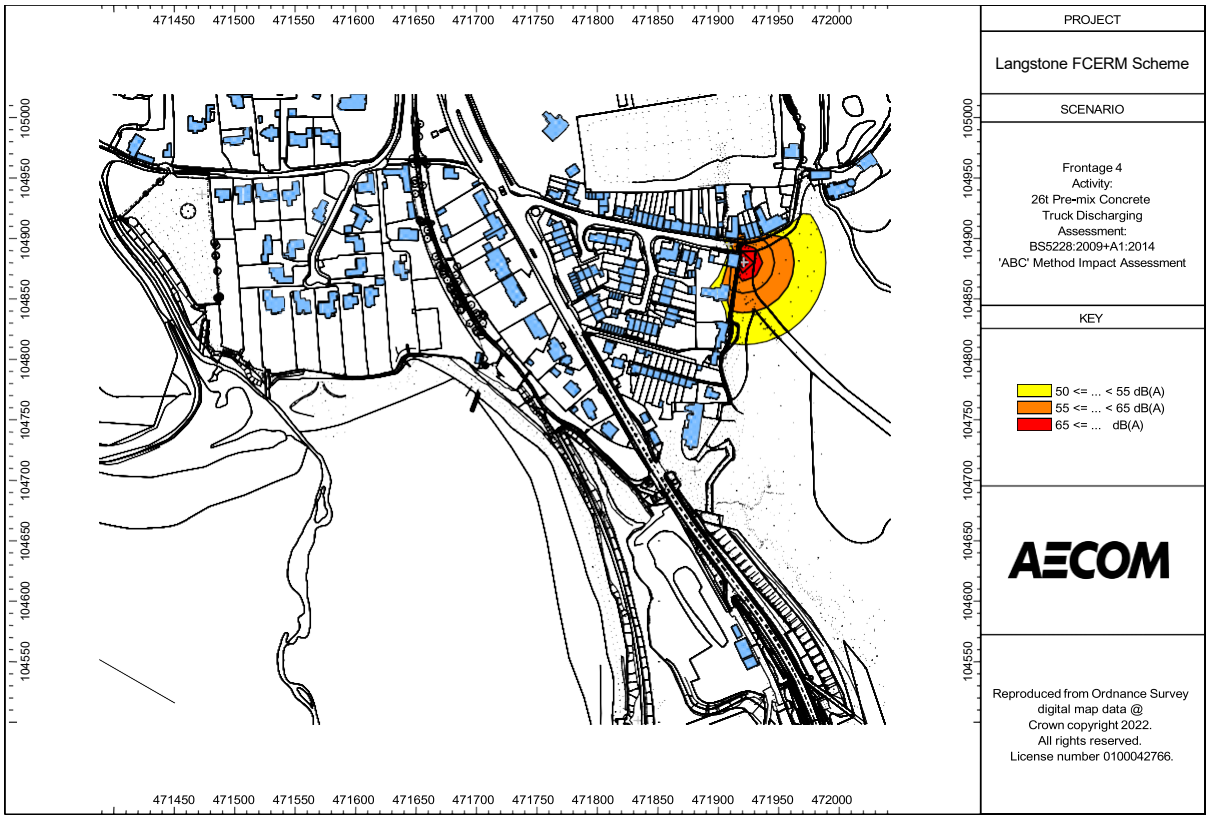


Figure 11.38 Frontage 4 'ABC' Method Noise Contour - 26t Pre-mix Concrete Discharging

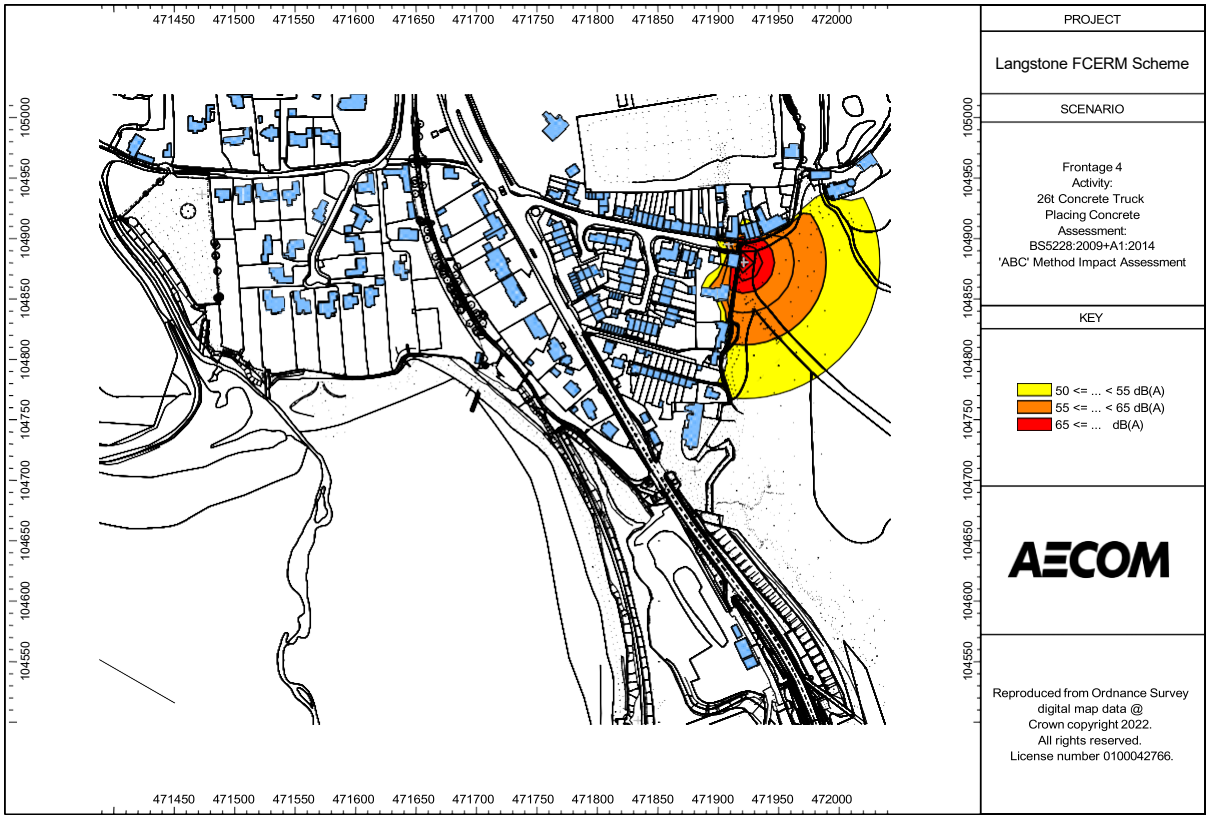


Figure 11.39 Frontage 4 'ABC' Method Noise Contour - 26t Concrete Truck Placing Concrete

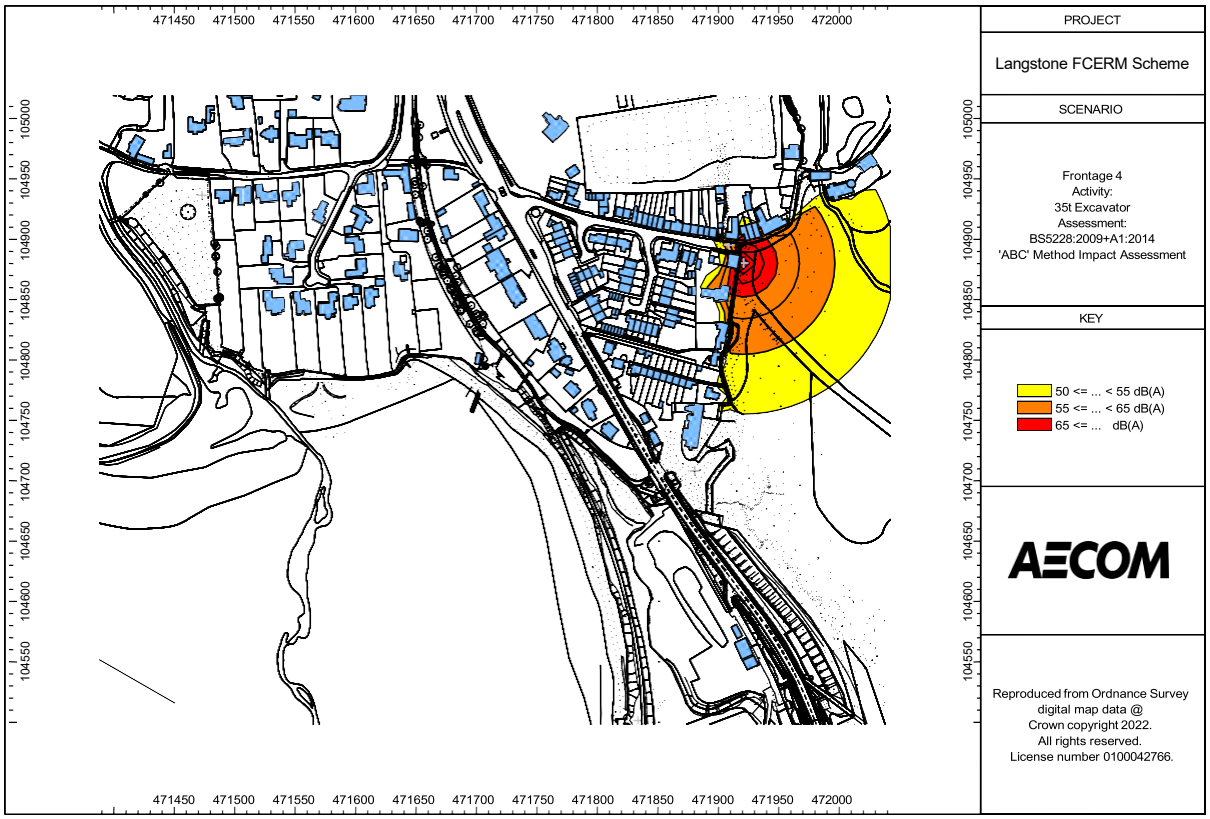


Figure 11.40 Frontage 4 'ABC' Method Noise Contour - 35t Excavator

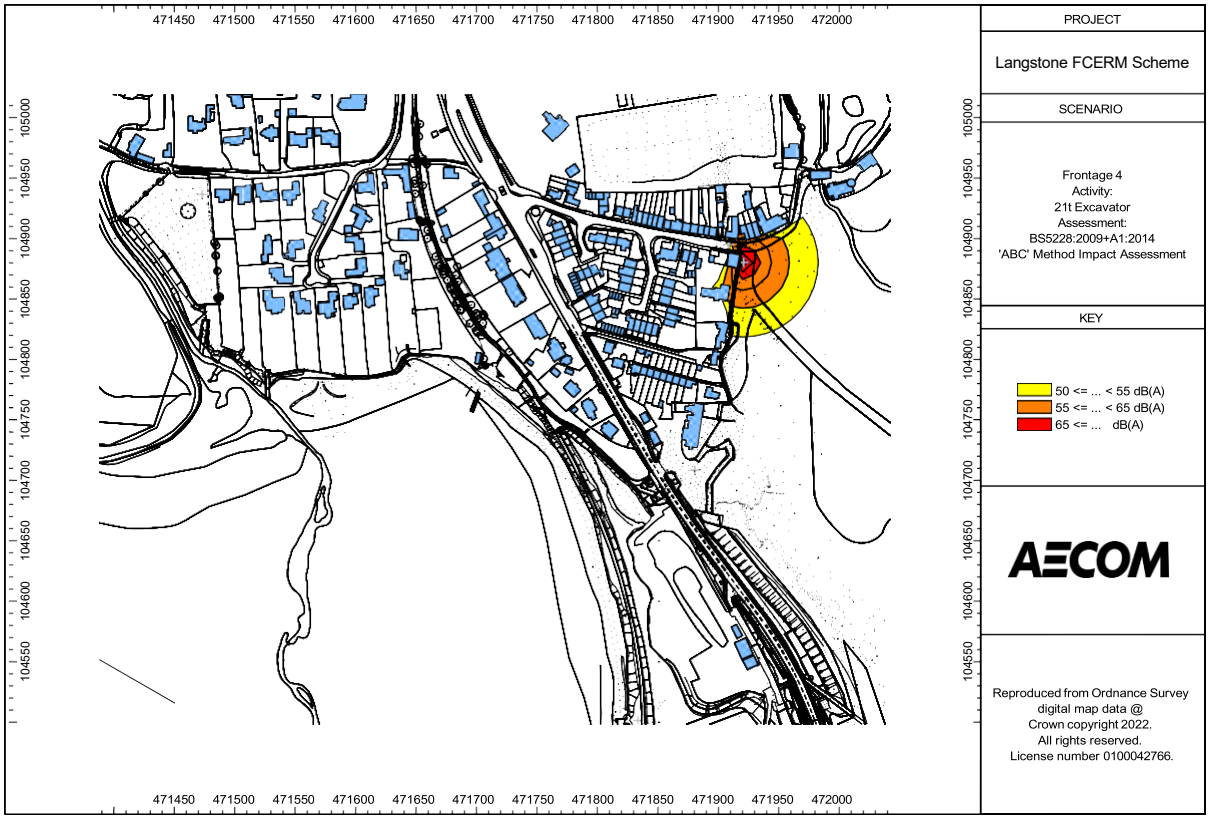


Figure 11.41 Frontage 4 'ABC' Method Noise Contour - 21t Excavator

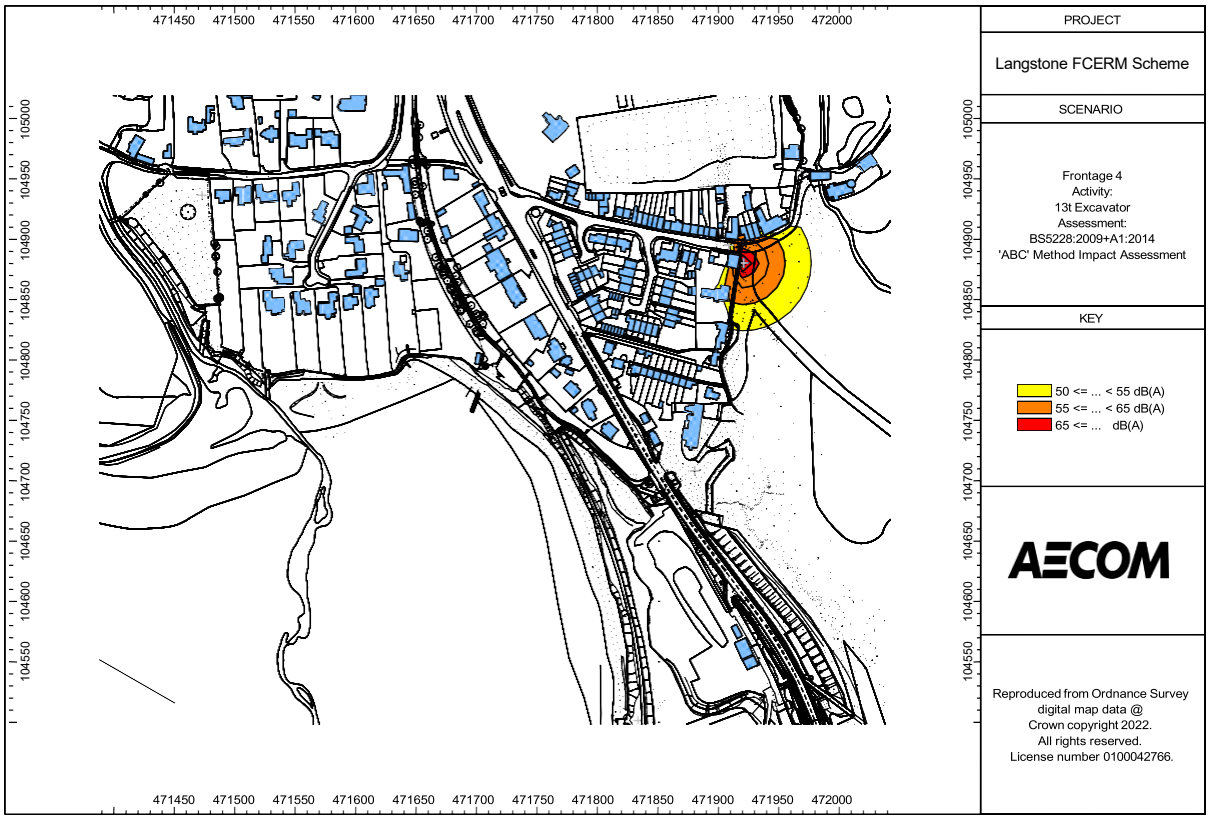


Figure 11.42 Frontage 4 'ABC' Method Noise Contour - 13t Excavator

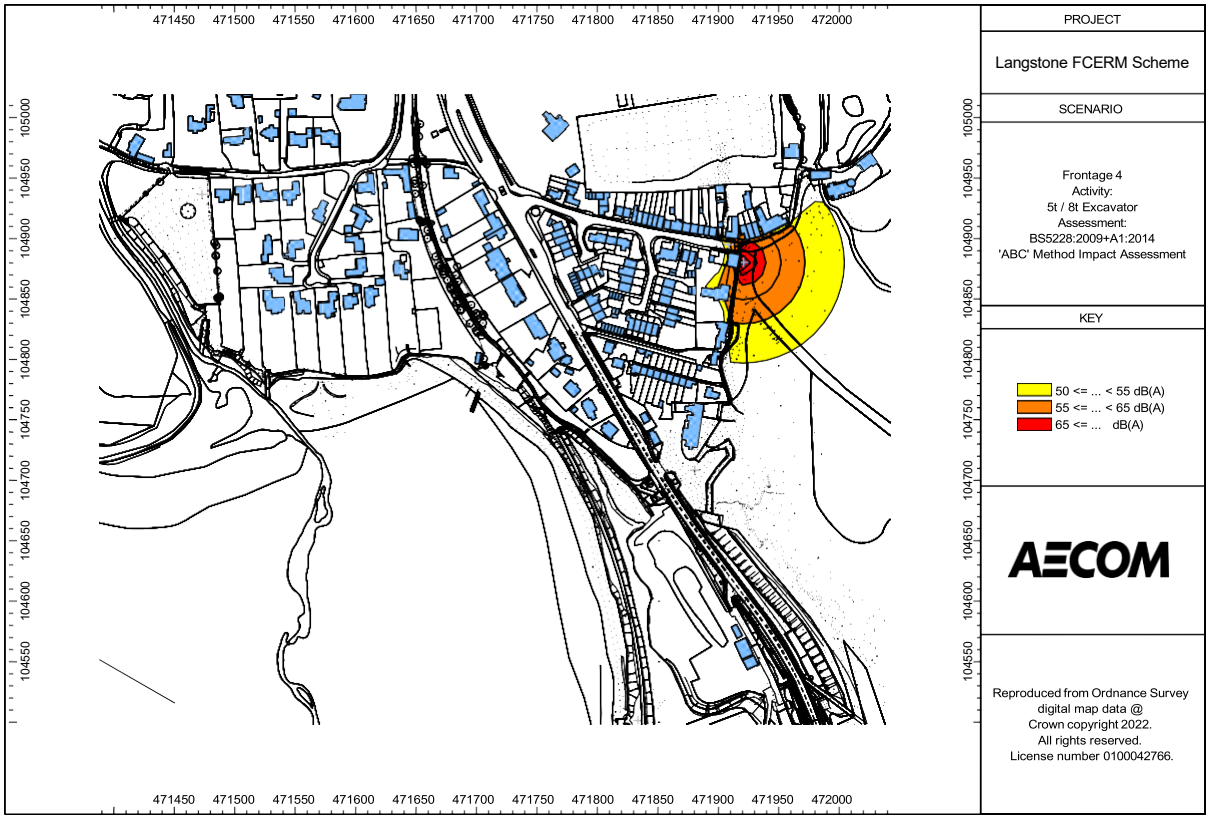


Figure 11.43 Frontage 4 'ABC' Method Noise Contour - 5t / 8t Excavator

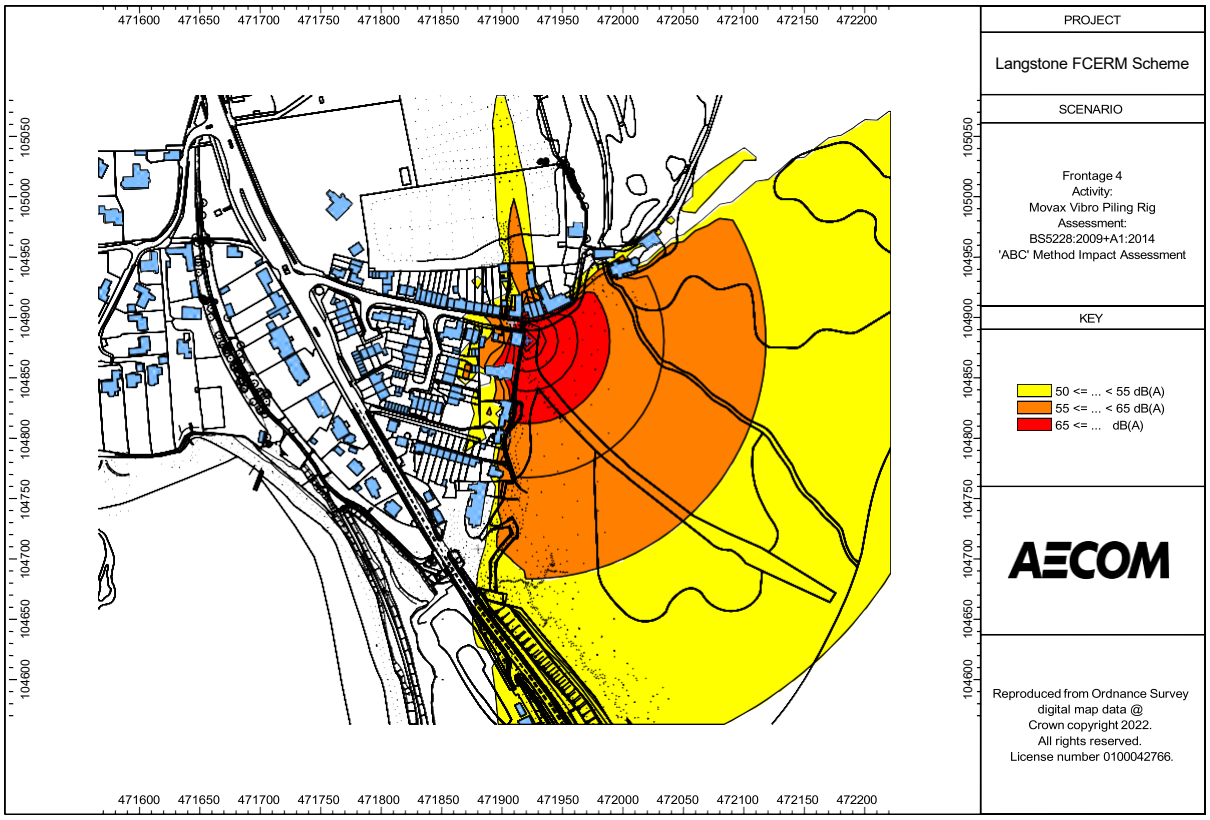


Figure 11.44 Frontage 4 'ABC' Method Noise Contour - Movax Vibro Piling Rig

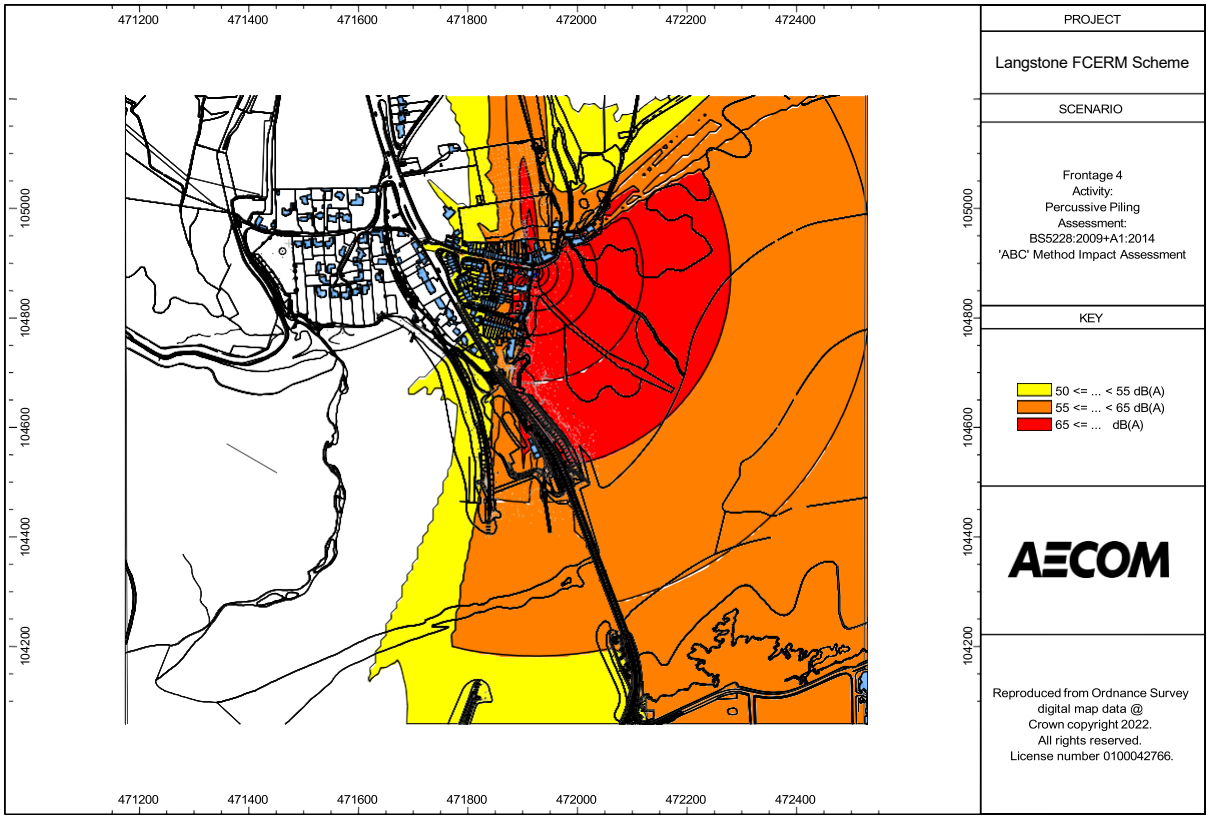


Figure 11.45 Frontage 4 'ABC' Method Noise Contour - Percussive Piling Rig

E.6 Frontage 5 Noise Contour Maps

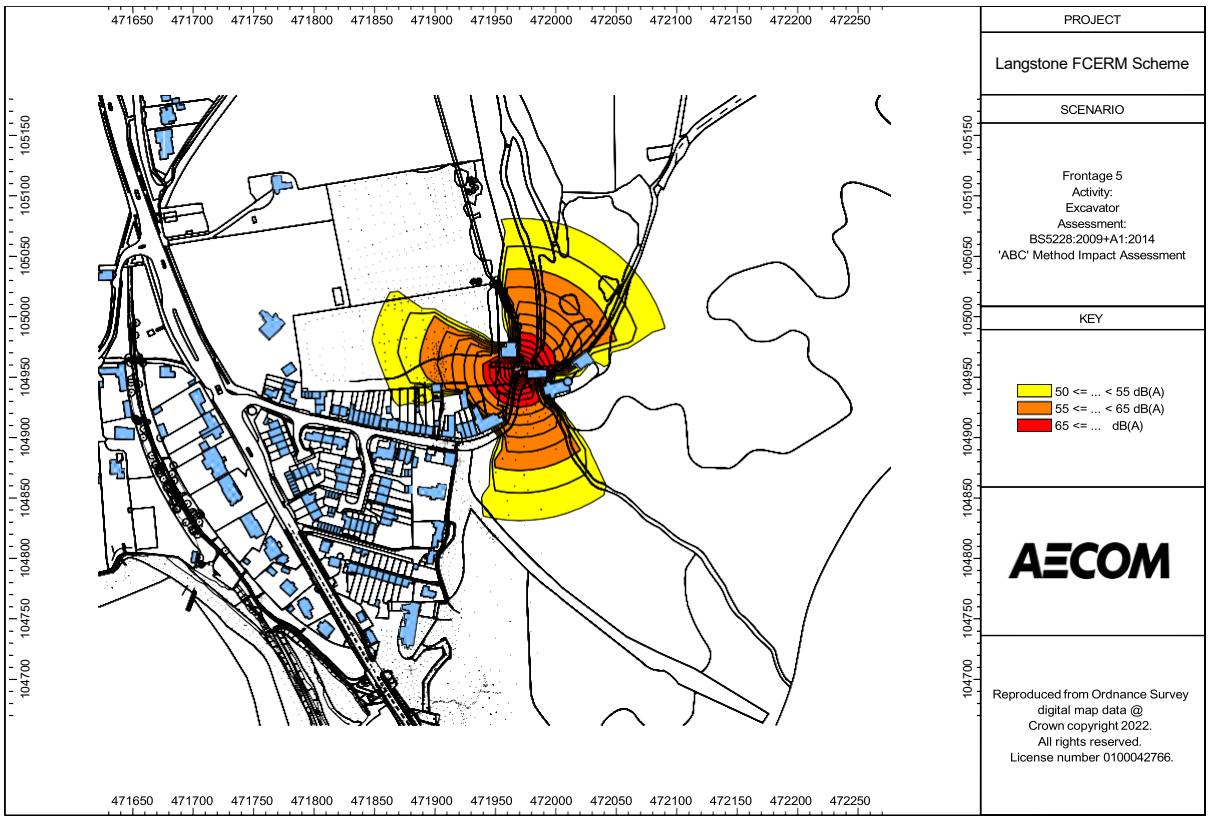


Figure 11.46 Frontage 5 'ABC' Method Noise Contour - Excavator

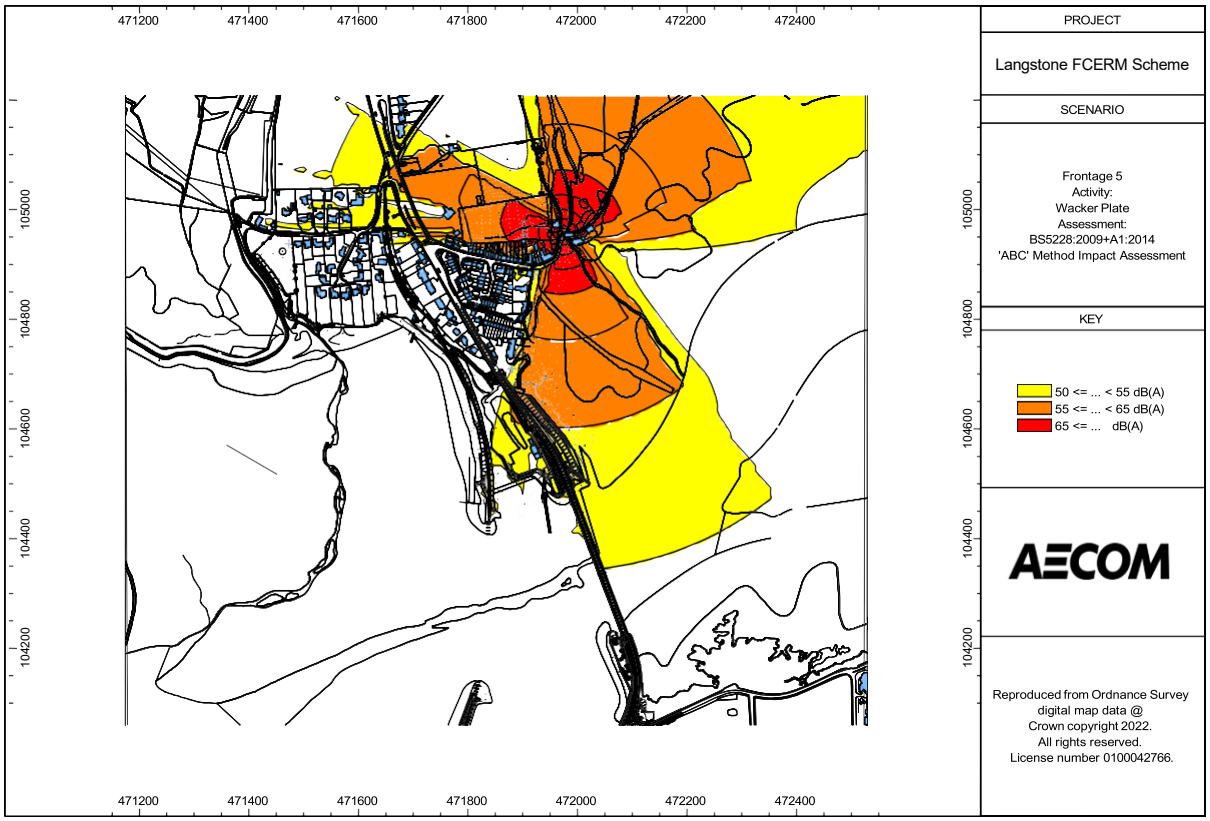


Figure 11.47 Frontage 5 'ABC' Method Noise Contour - Wacker Plate

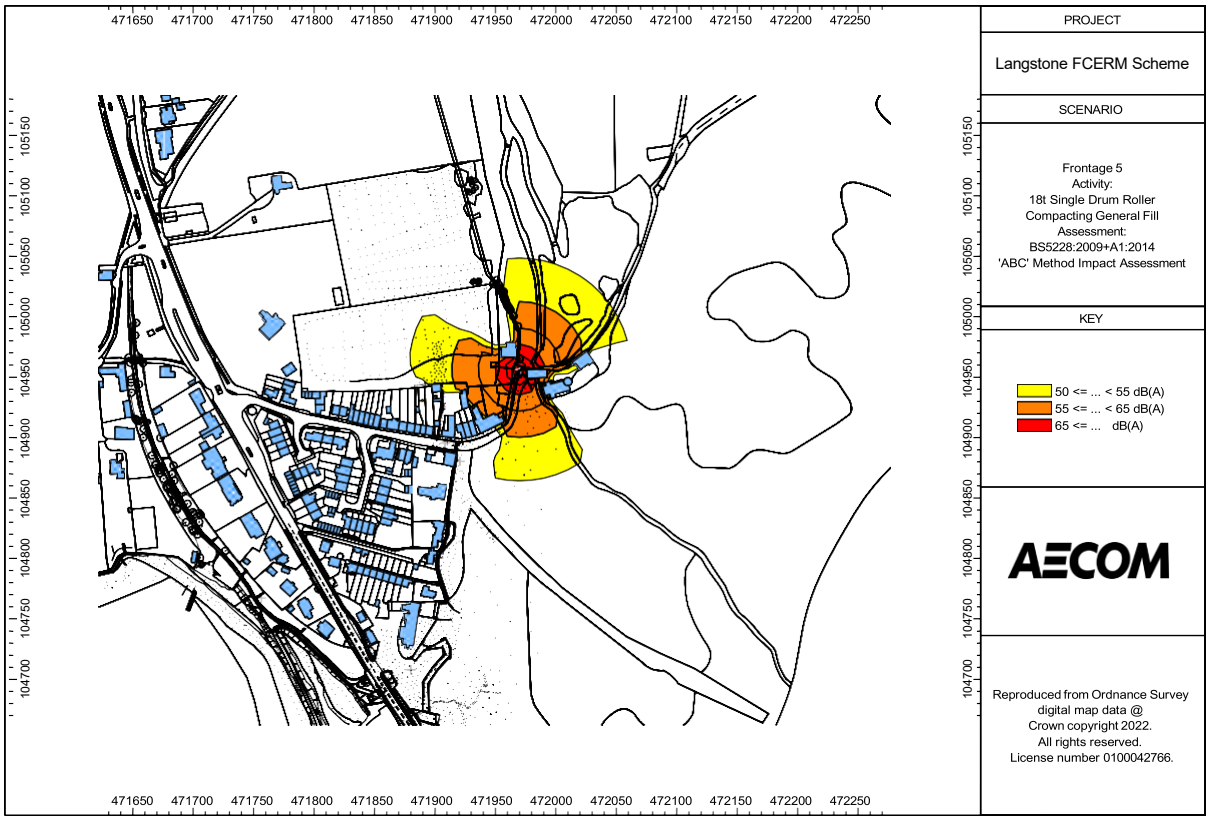


Figure 11.48 Frontage 5 'ABC' Method Noise Contour - 18t Single Drum Roller Compacting Aggregate

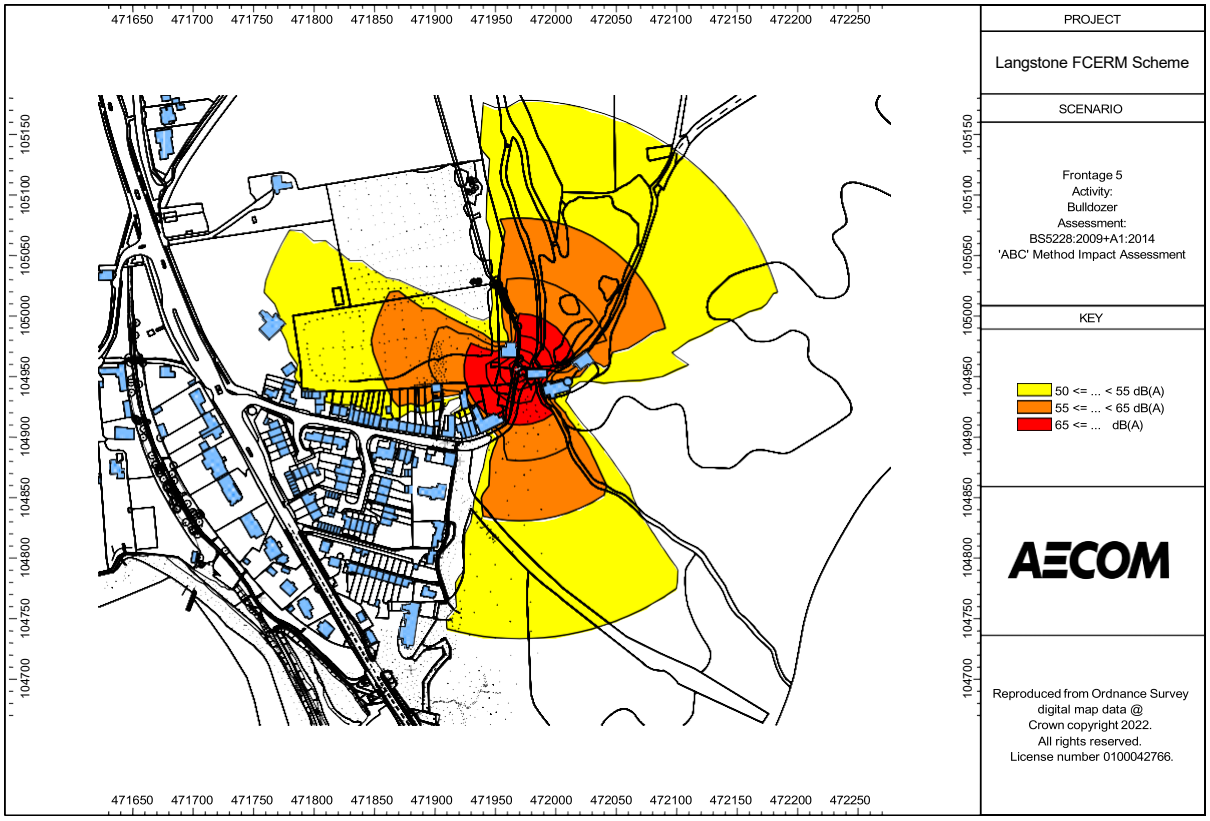


Figure 11.49 Frontage 5 'ABC' Method Noise Contour - Bulldozer

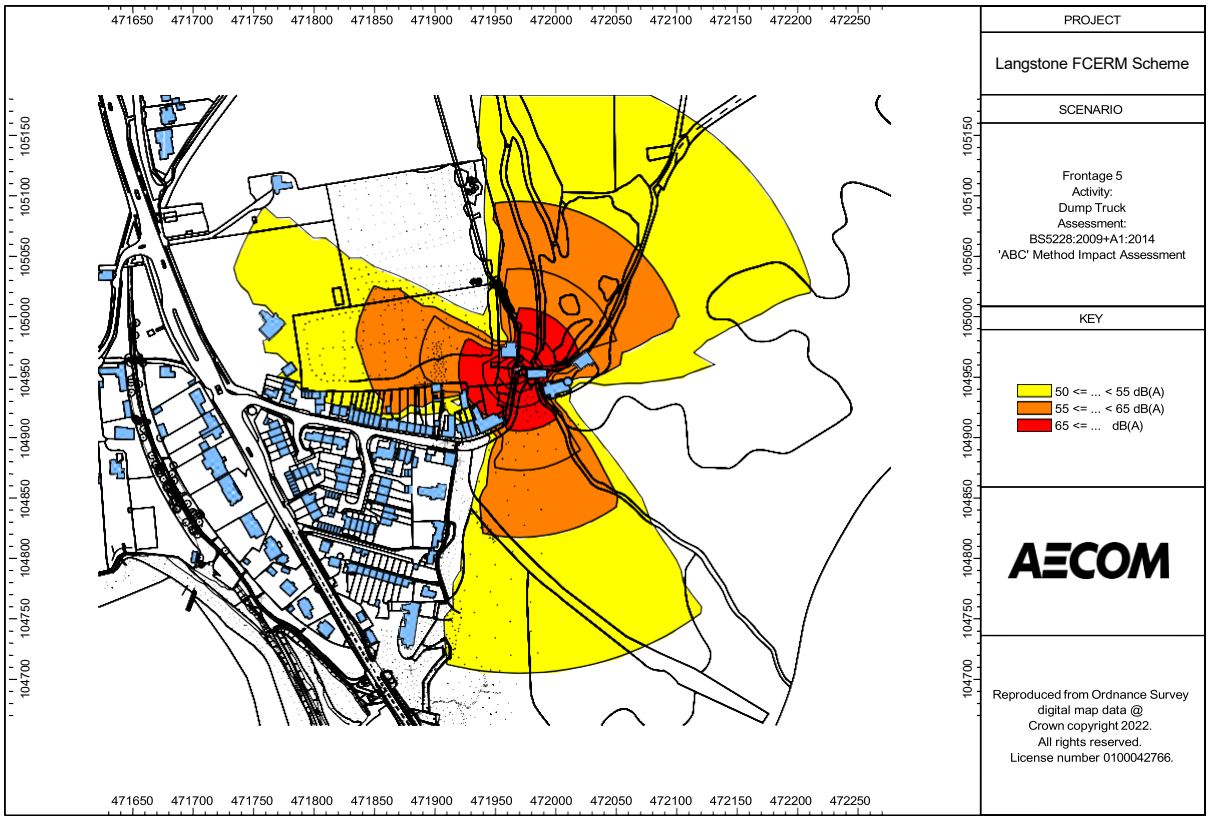


Figure 11.50 Frontage 5 'ABC' Method Noise Contour - Dump Truck

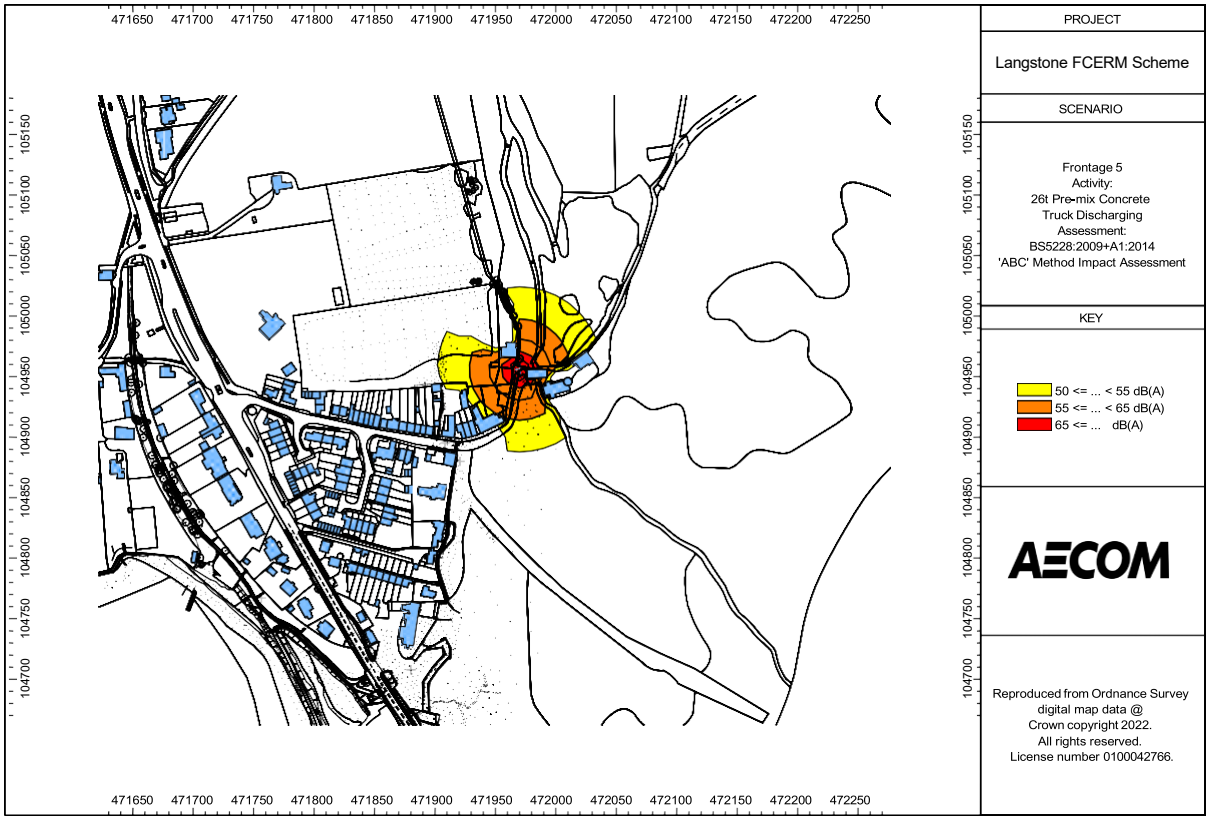


Figure 11.51 Frontage 5 'ABC' Method Noise Contour - 26t Pre-mix Concrete Truck Discharging

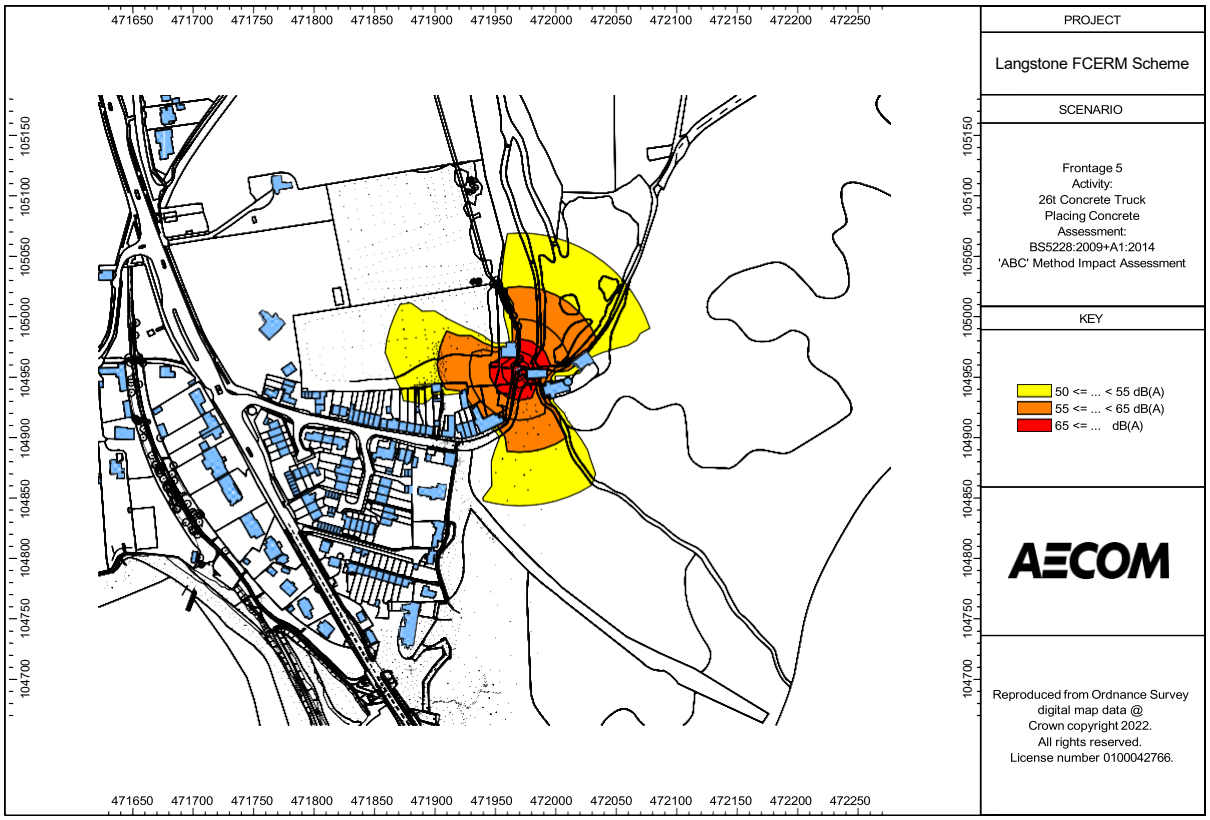


Figure 11.52 Frontage 5 'ABC' Method Noise Contour - 26t Concrete Truck Placing Concrete

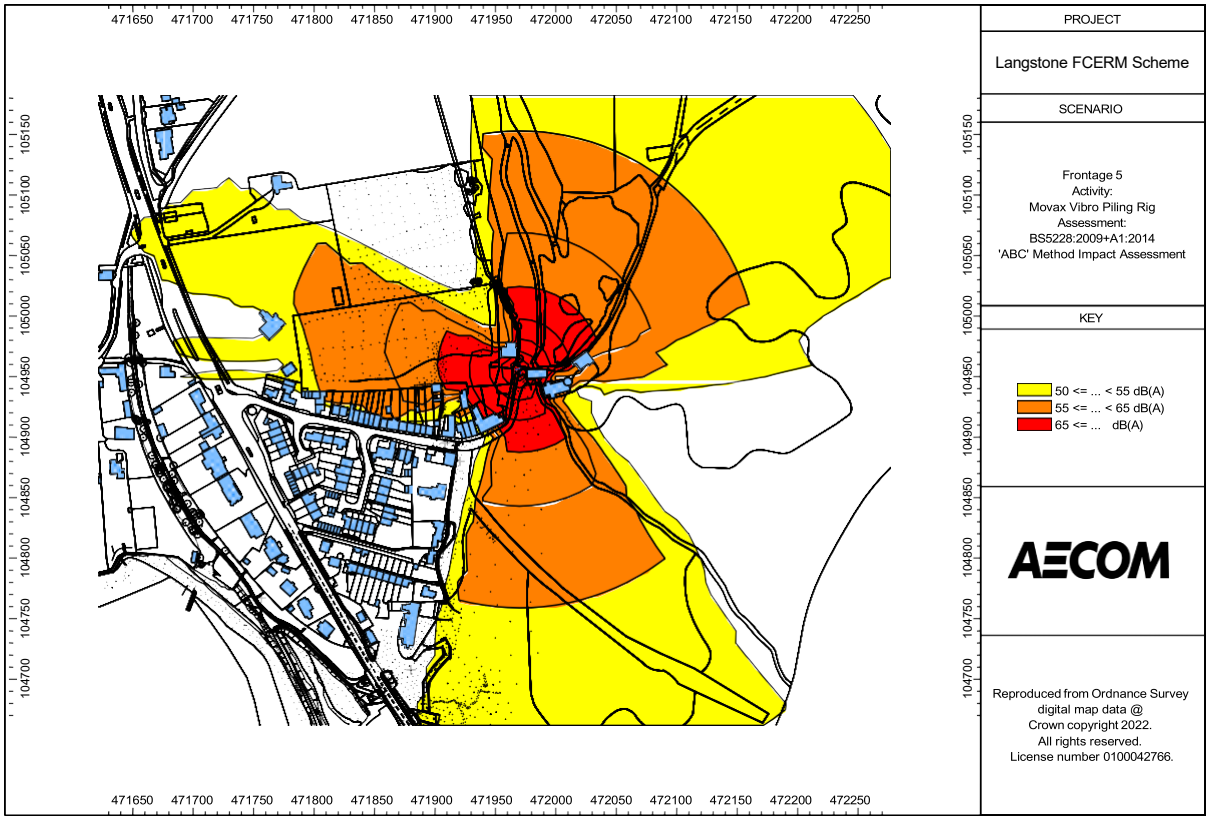


Figure 11.53 Frontage 5 'ABC' Method Noise Contour - Movax Vibro Piling Unit

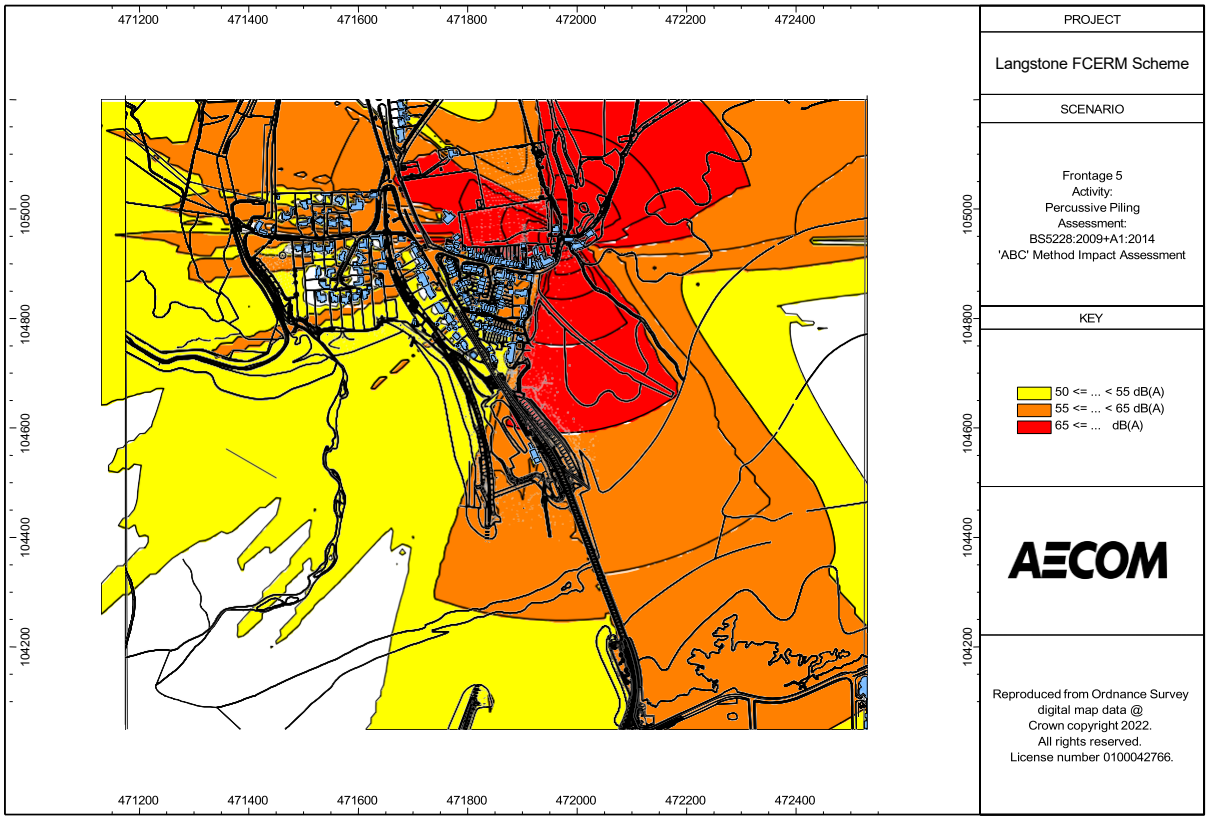


Figure 11.54 Frontage 5 'ABC' Method Noise Contour - Percussive Piling Rig

E.7 Frontage 6 Noise Contour Maps

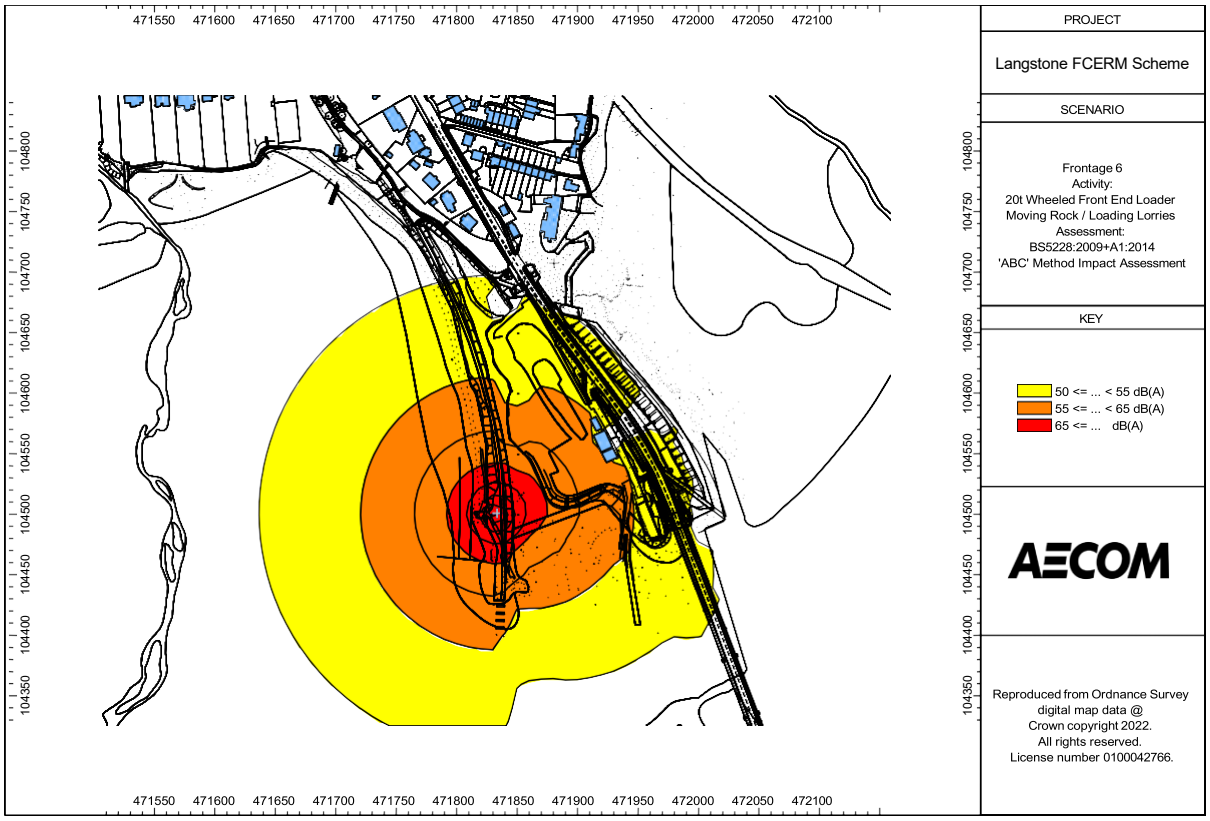


Figure 11.55 Frontage 6 'ABC' Method Noise Contour - 20t Wheeled Front End Loader Moving Rock / Loading Lorries

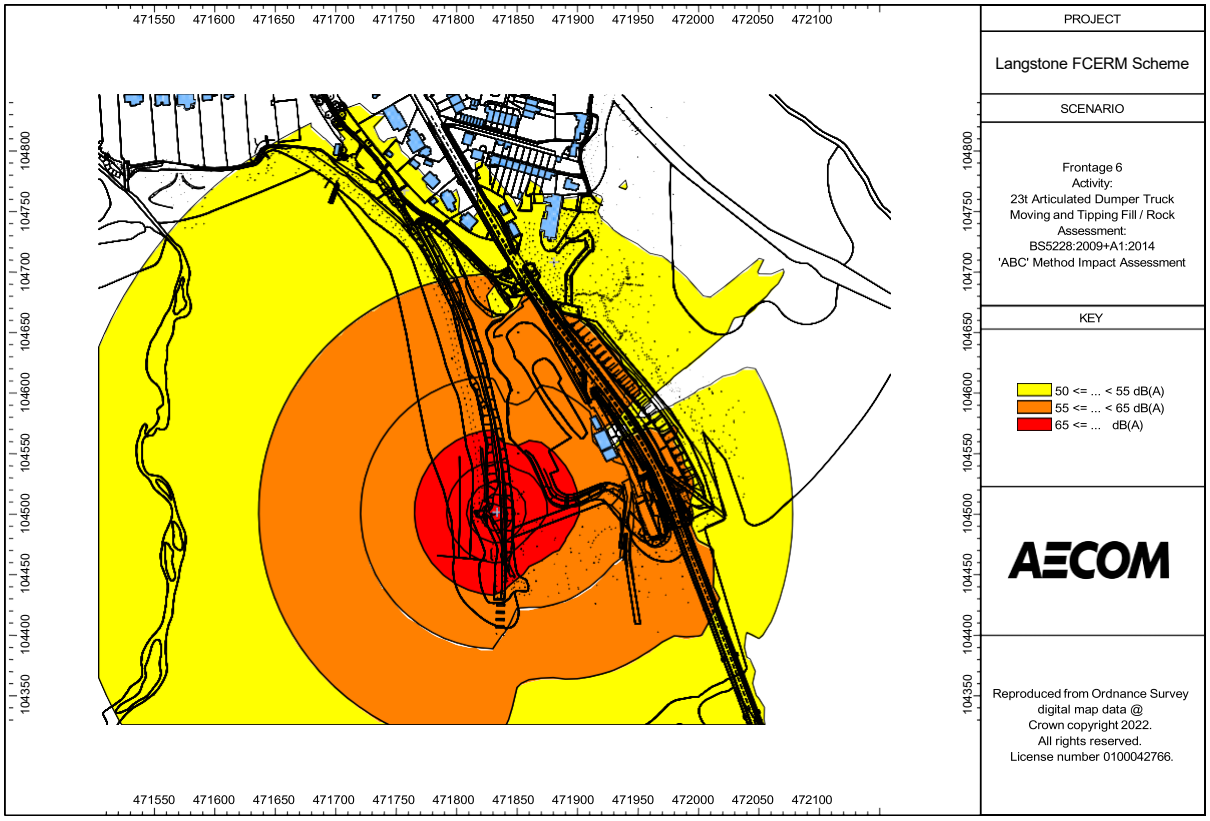


Figure 11.56 Frontage 6 'ABC' Method Noise Contour - 23t Articulated Dumper Truck Moving and Tipping Fill / Rock

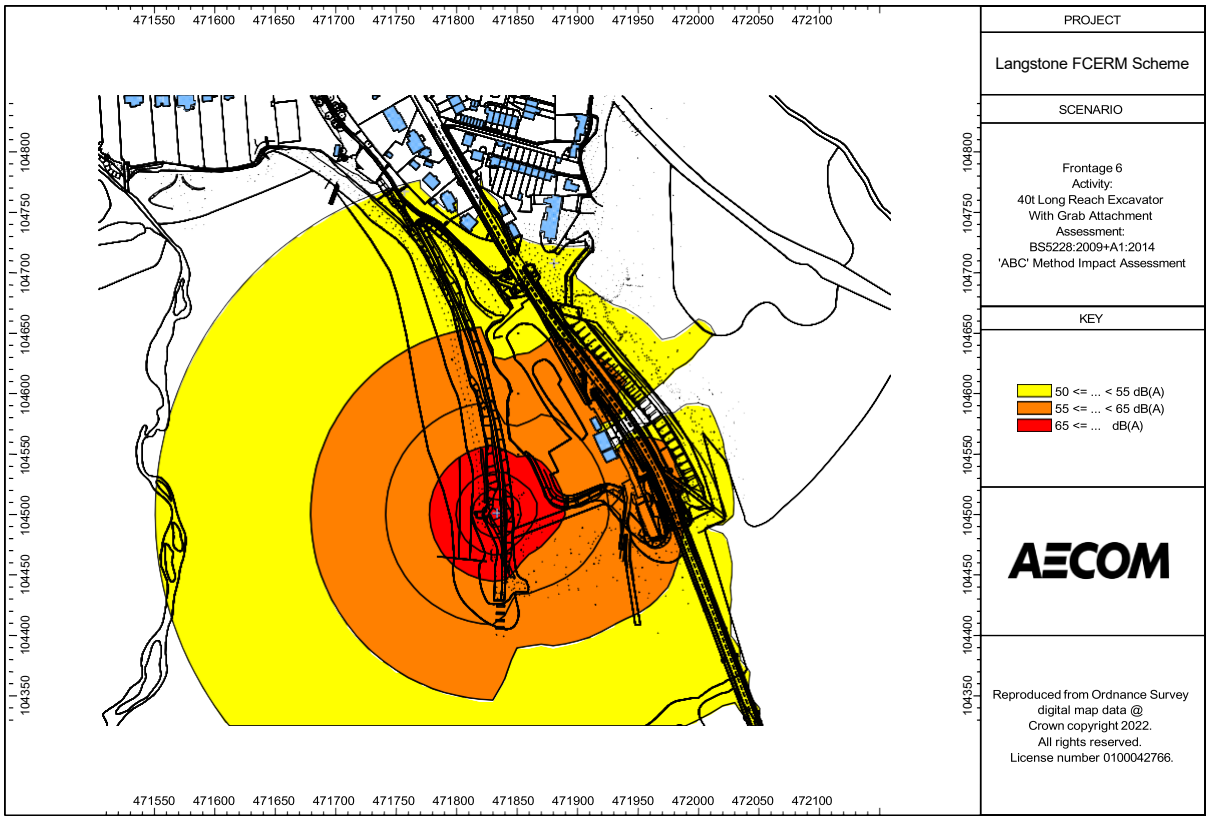


Figure 11.57 Frontage 6 'ABC' Method Noise Contour - 40t Long Reach Excavator

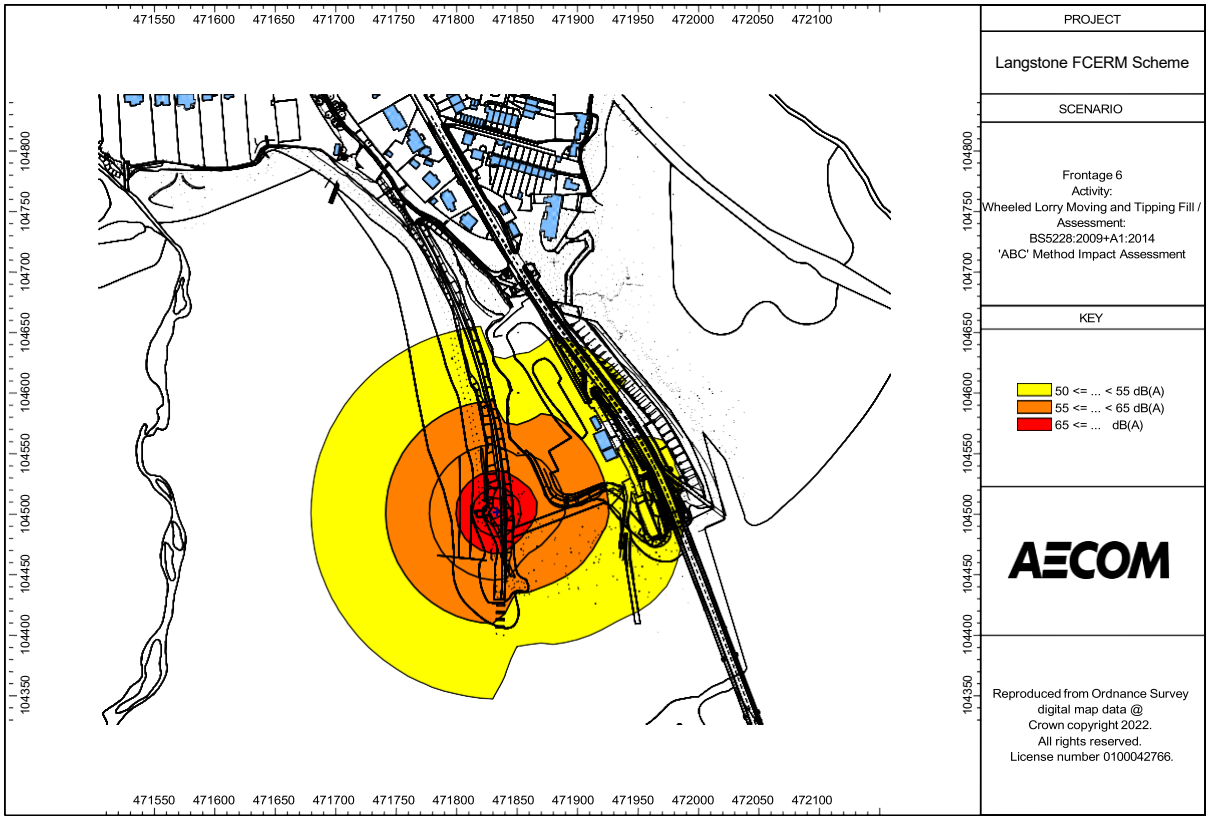


Figure 11.58 Frontage 6 'ABC' Method Noise Contour – 20t 8-Wheeled Lorry Moving and Tipping Fill

Appendix F Water Bird Noise Disturbance Contours

F.1 Frontage 1A

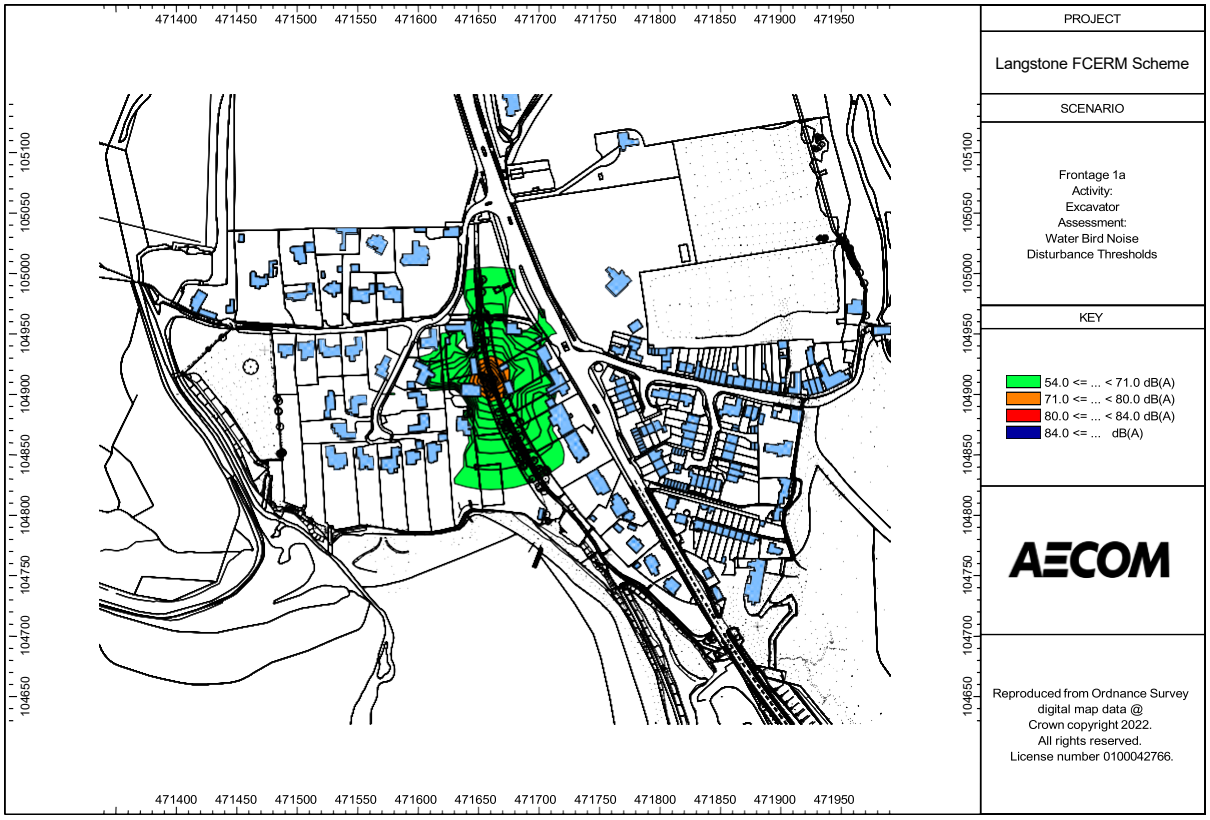


Figure 11.59 Frontage 1A Water Bird Noise Disturbance Contour - Excavator

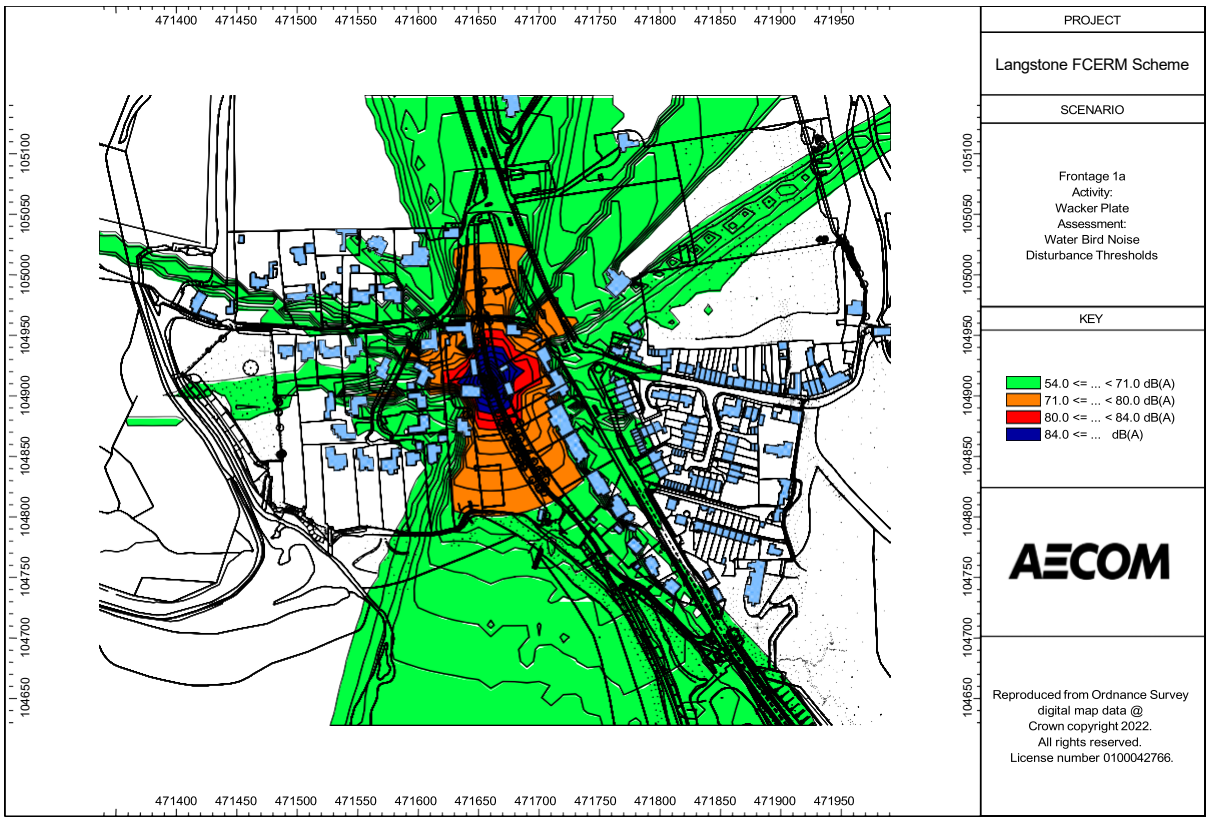


Figure 11.60 Frontage 1A Water Bird Noise Disturbance Contour - Wacker Plate

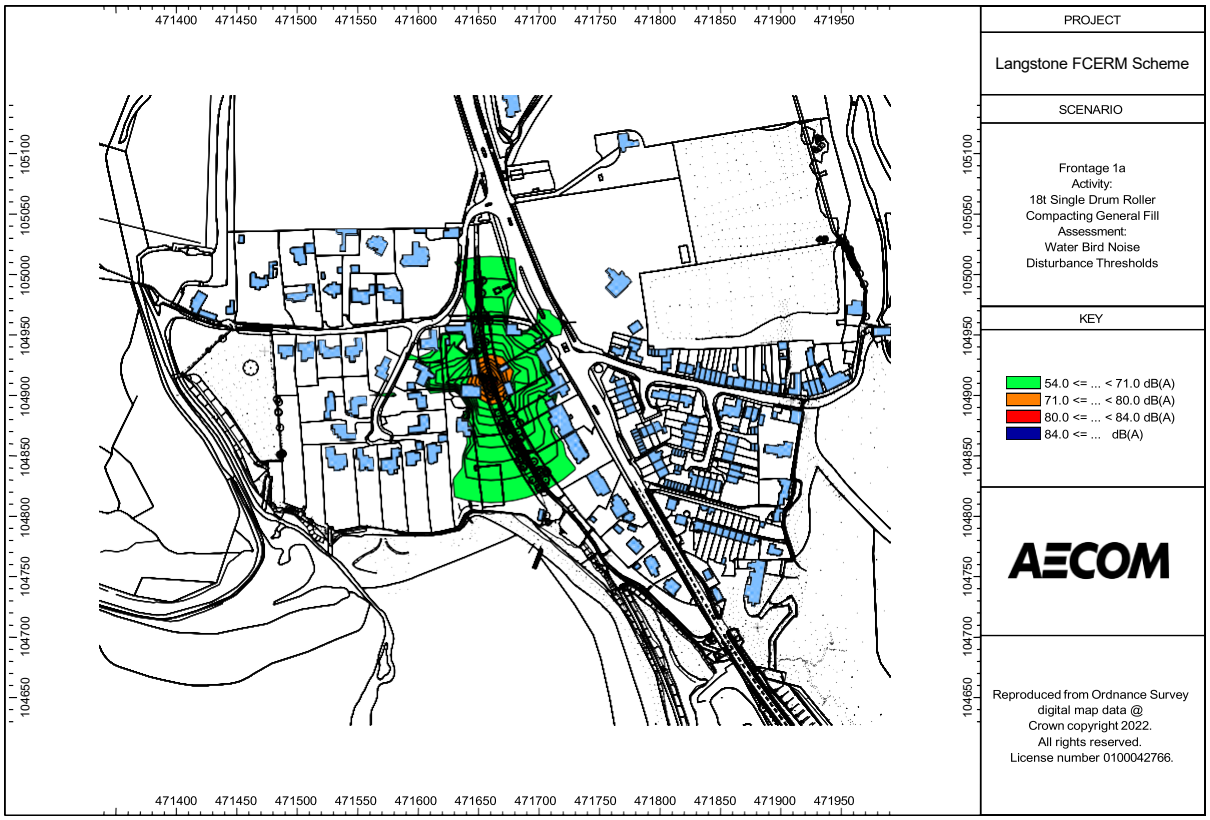


Figure 11.61 Frontage 1A Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting Aggregate

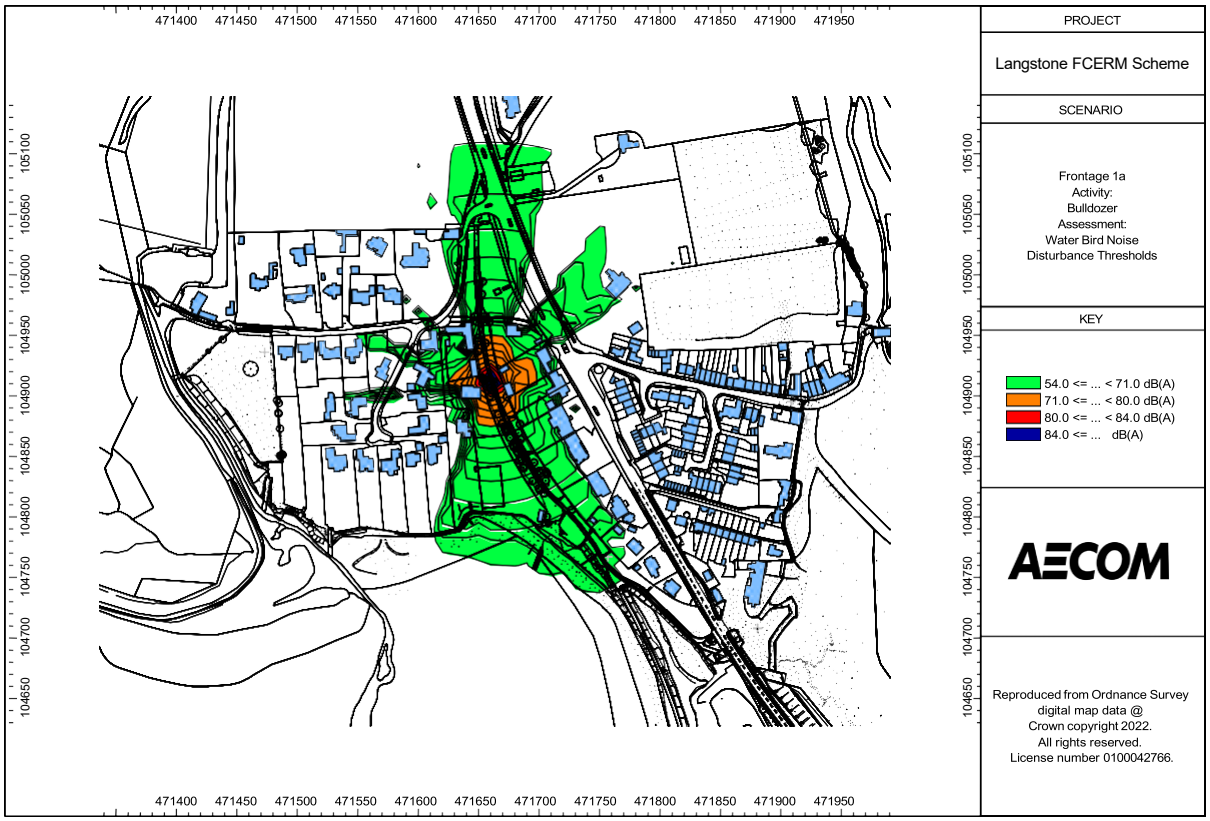


Figure 11.62 Frontage 1A Water Bird Noise Disturbance Contour - Bulldozer

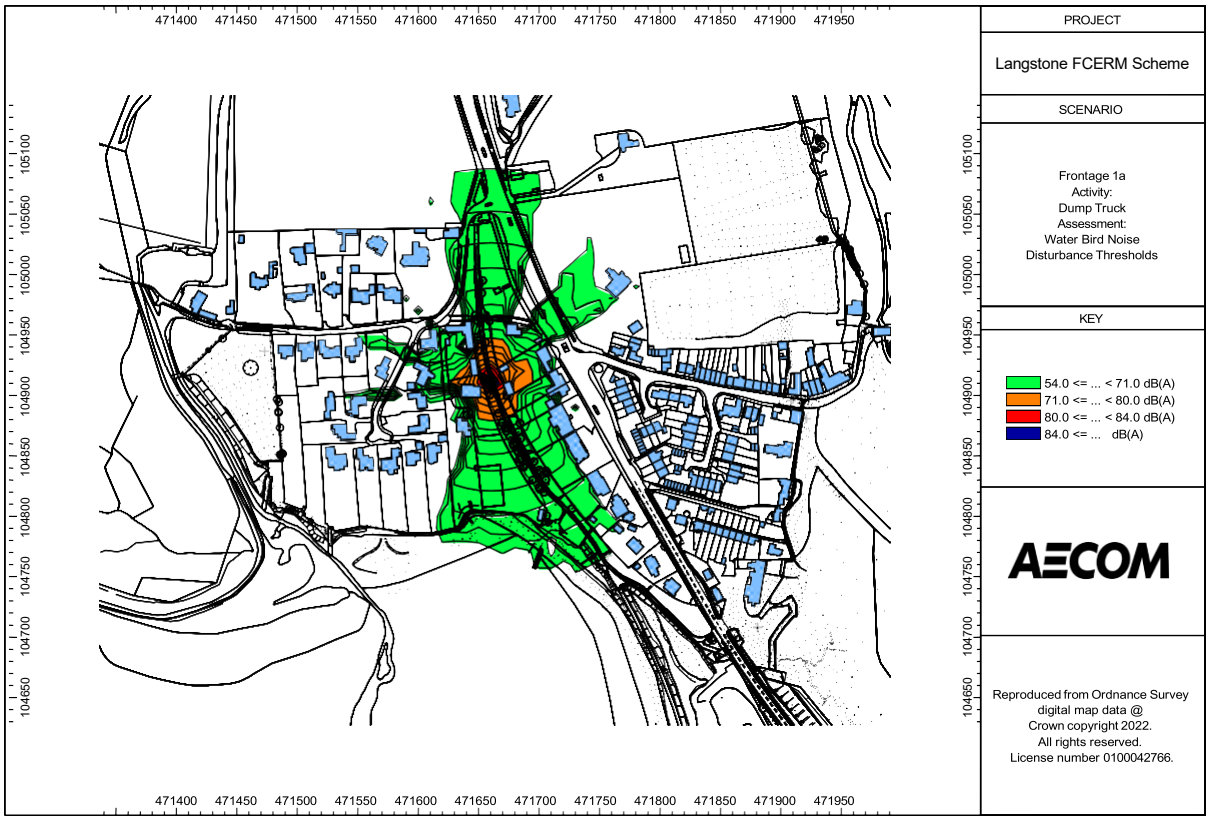


Figure 11.63 Frontage 1A Water Bird Noise Disturbance Contour - Dump Truck

F.2 Frontage 1B

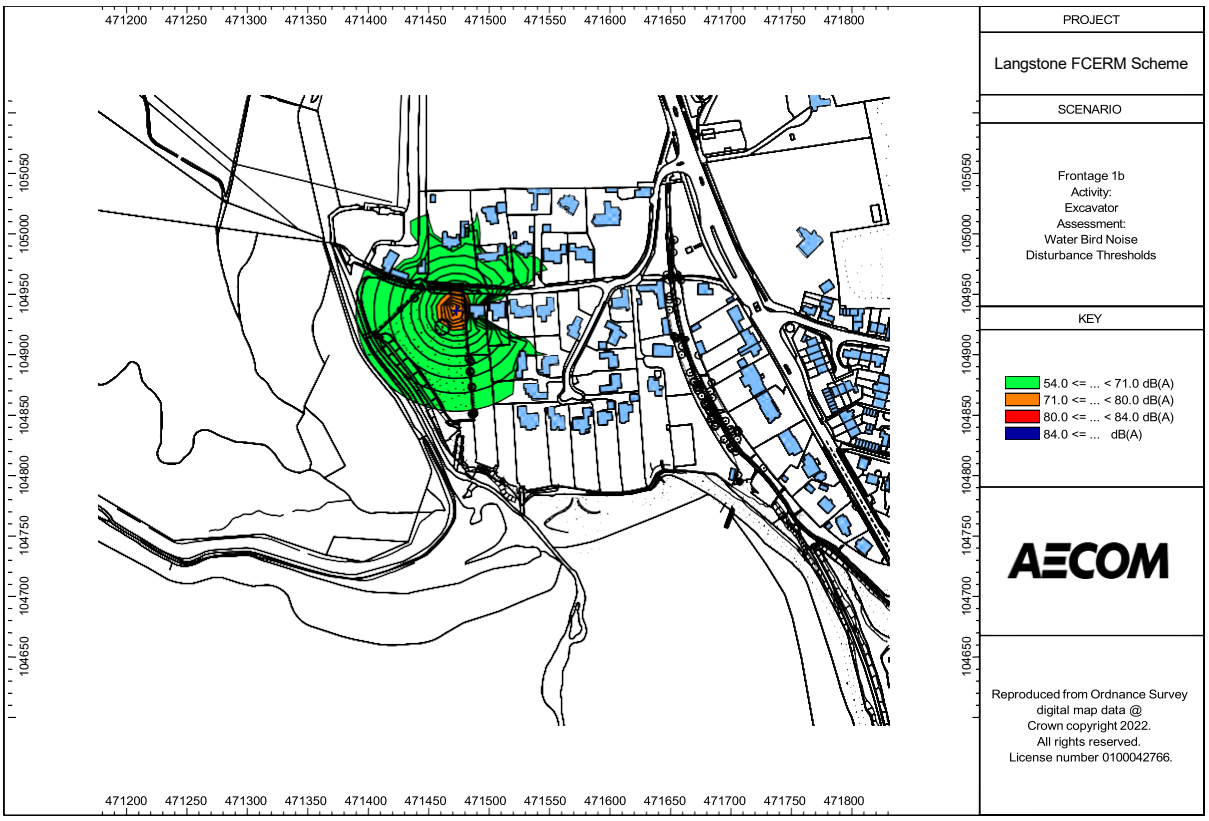


Figure 11.64 Frontage 1B Water Bird Noise Disturbance Contour - Excavator

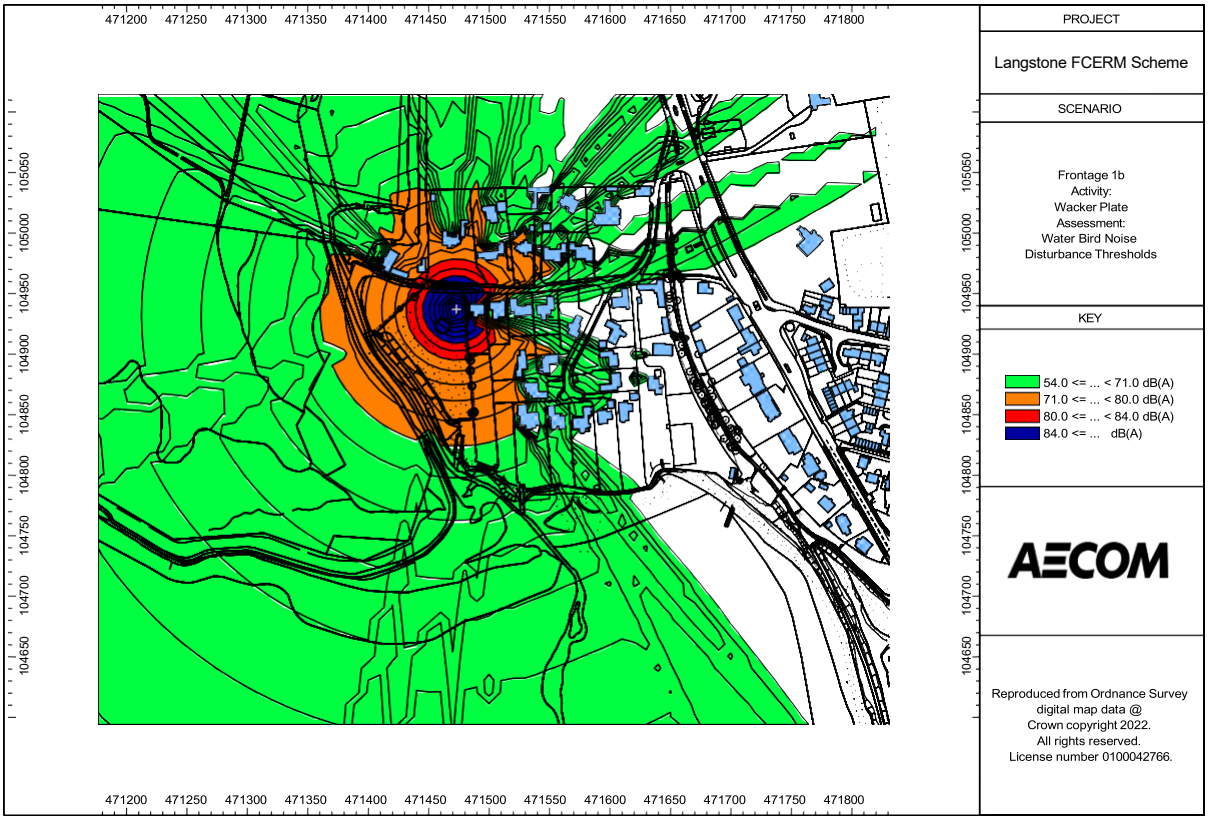


Figure 11.65 Frontage 1B Water Bird Noise Disturbance Contour - Wacker Plate

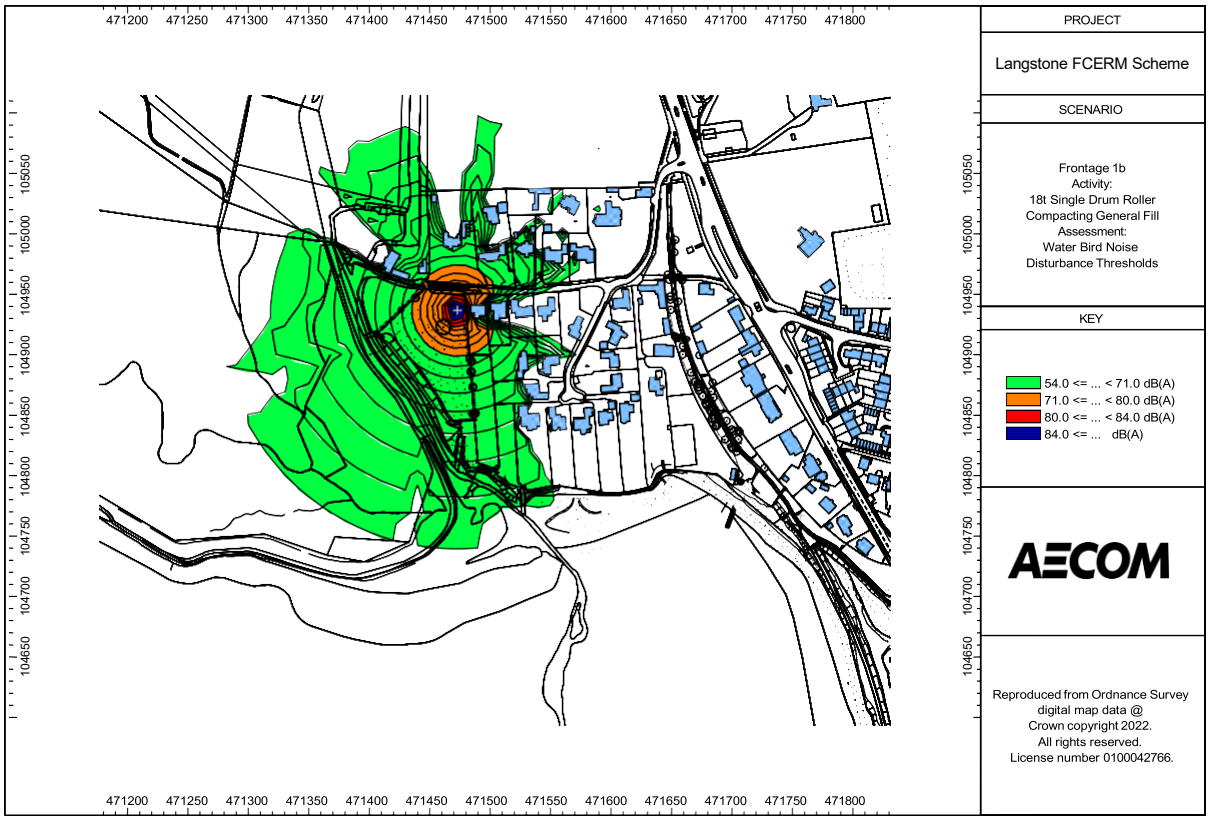


Figure 11.66 Frontage 1B Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting General Fill

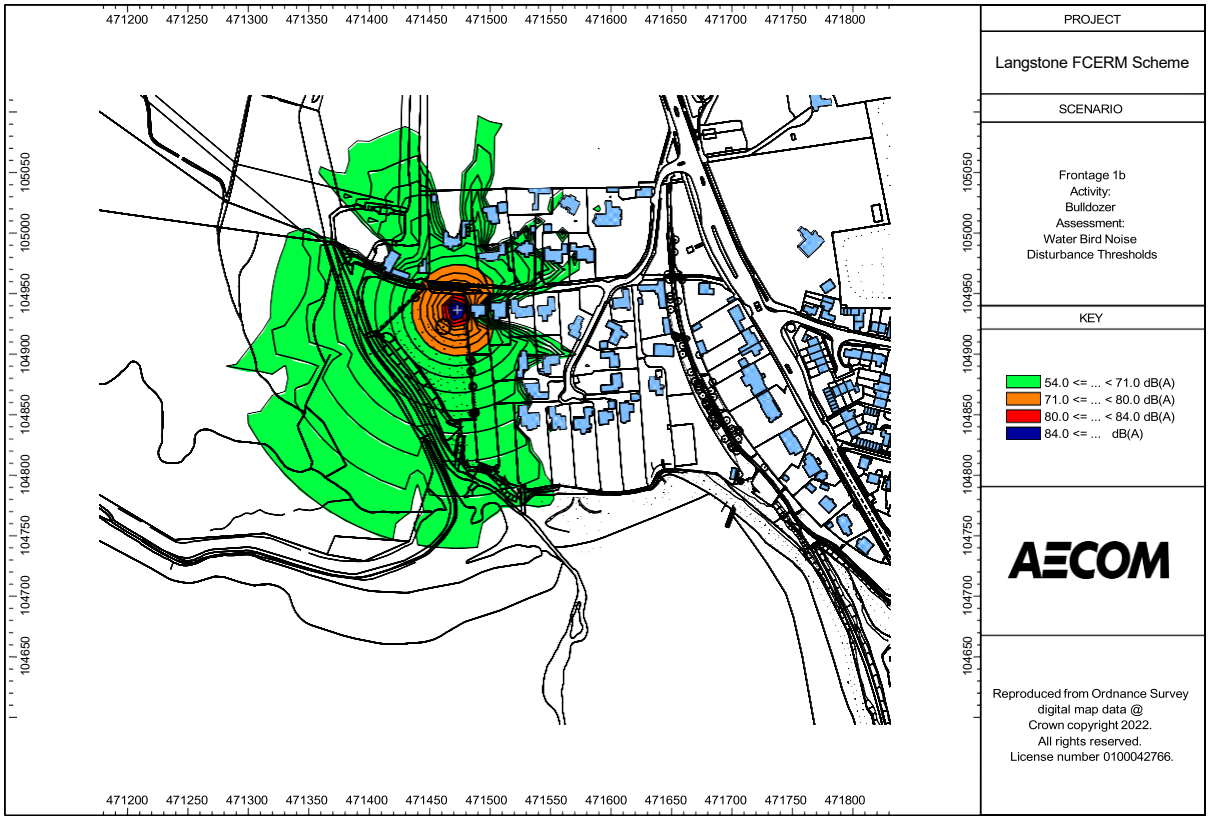


Figure 11.67 Frontage 1B Water Bird Noise Disturbance Contour - Bulldozer

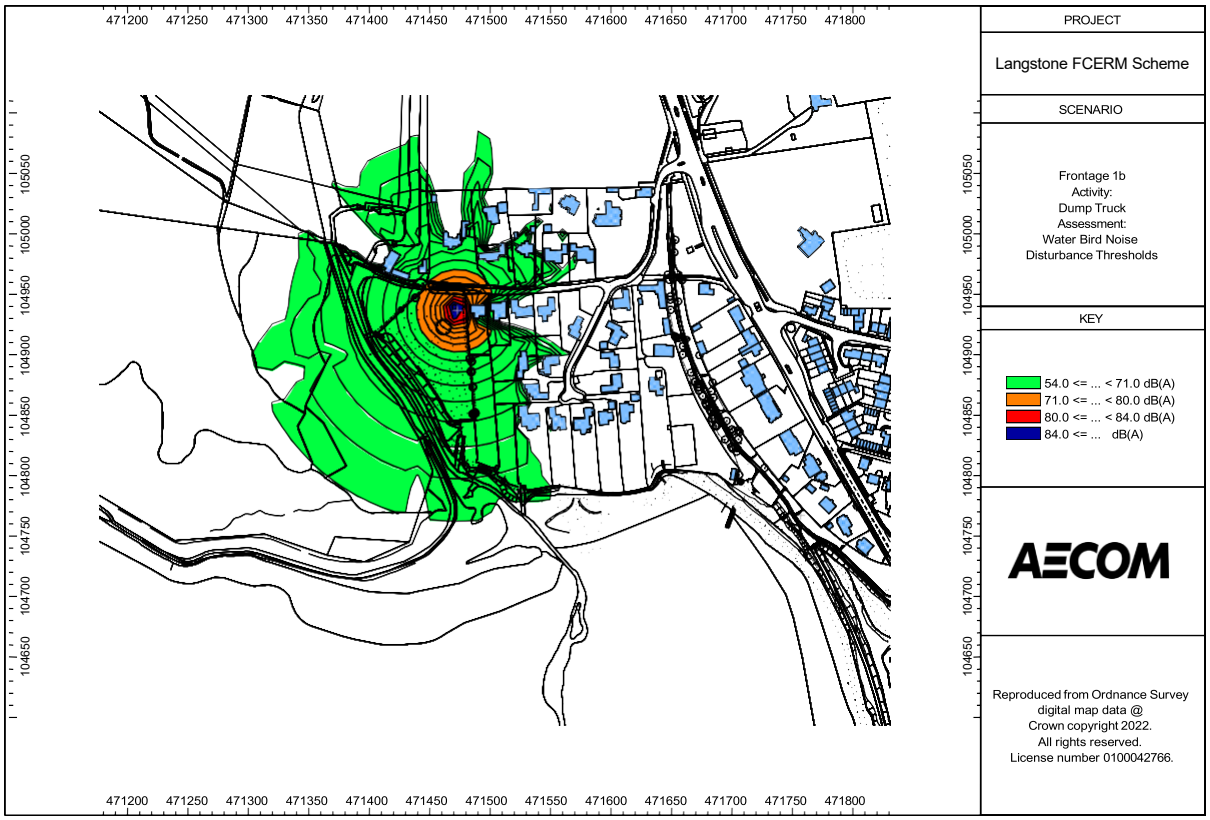


Figure 11.68 Frontage 1B Water Bird Noise Disturbance Contour - Dump Truck

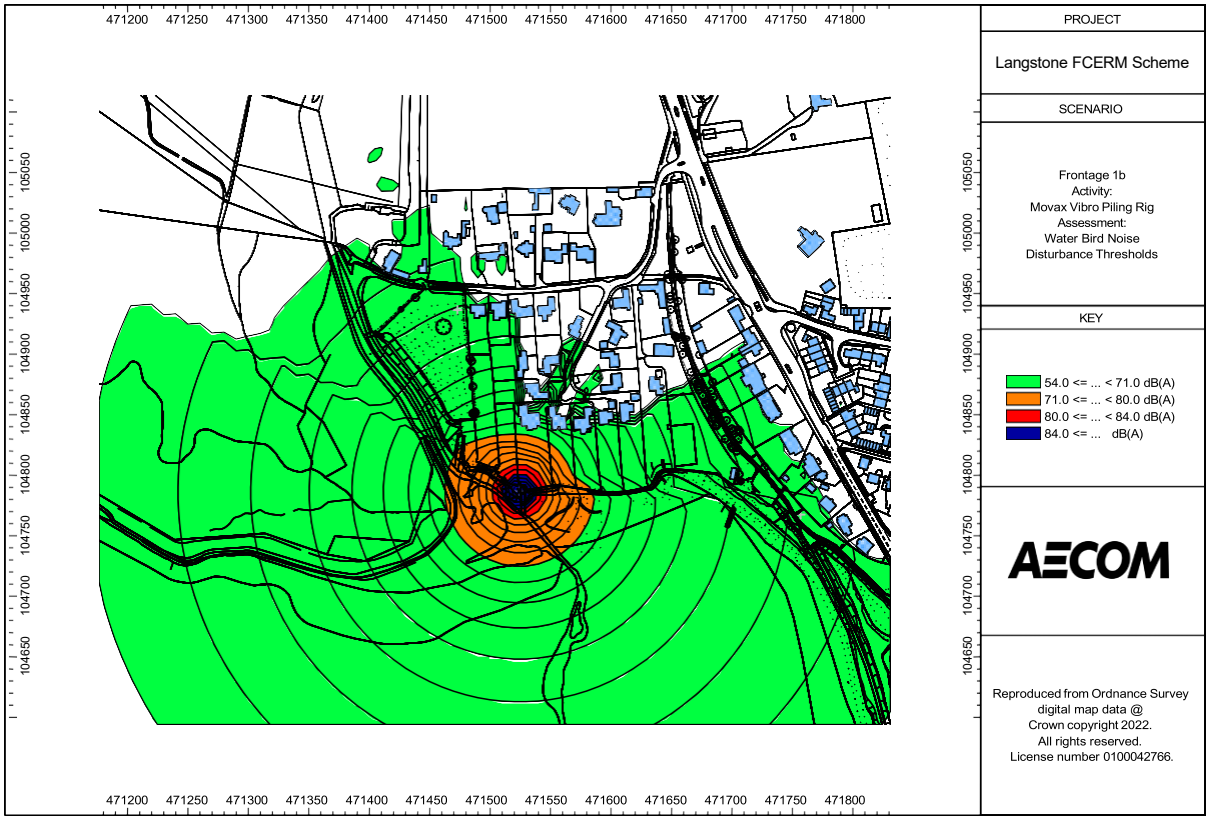


Figure 11.69 Frontage 1B Water Bird Noise Disturbance Contour - Movax Vibro Piling Rig

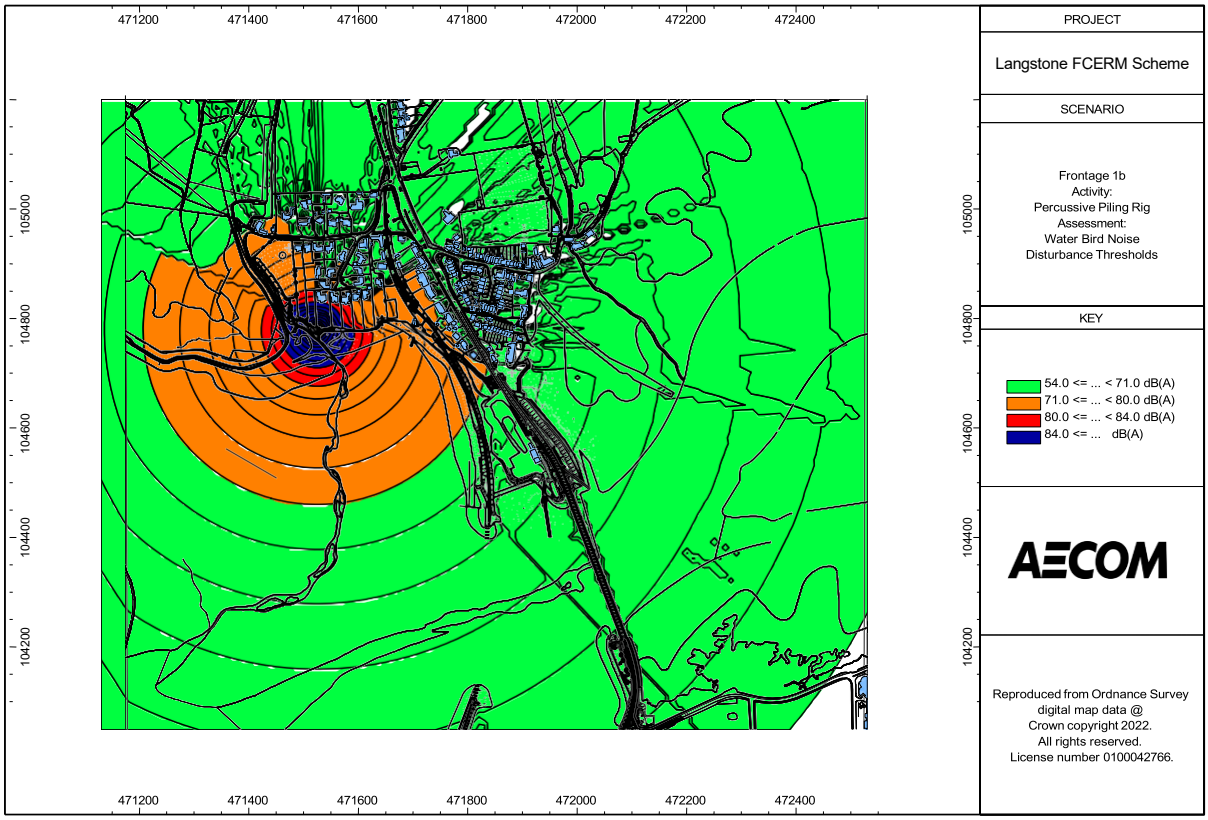


Figure 11.70 Frontage 1B Water Bird Noise Disturbance Contour - Percussive Piling Rig

F.3 Frontage 2

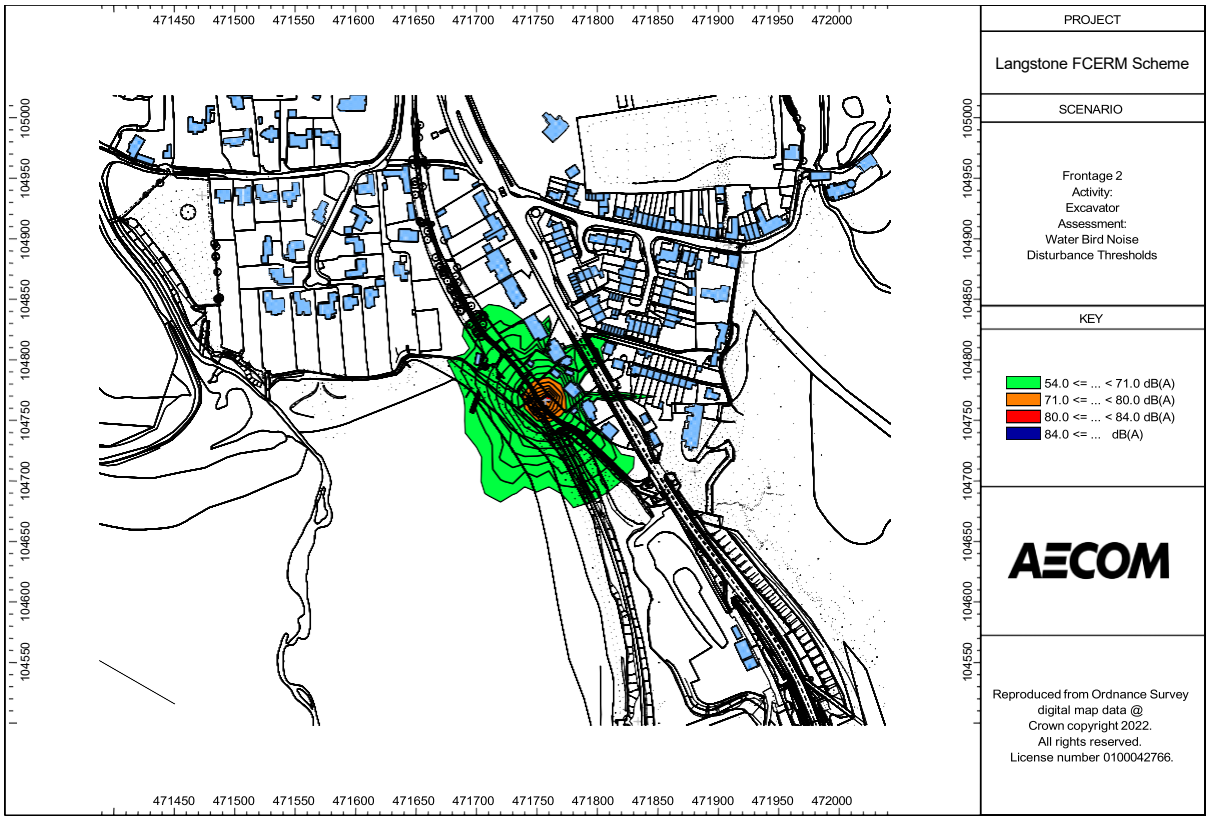


Figure 11.71 Frontage 2 Water Bird Noise Disturbance Contour - Excavator

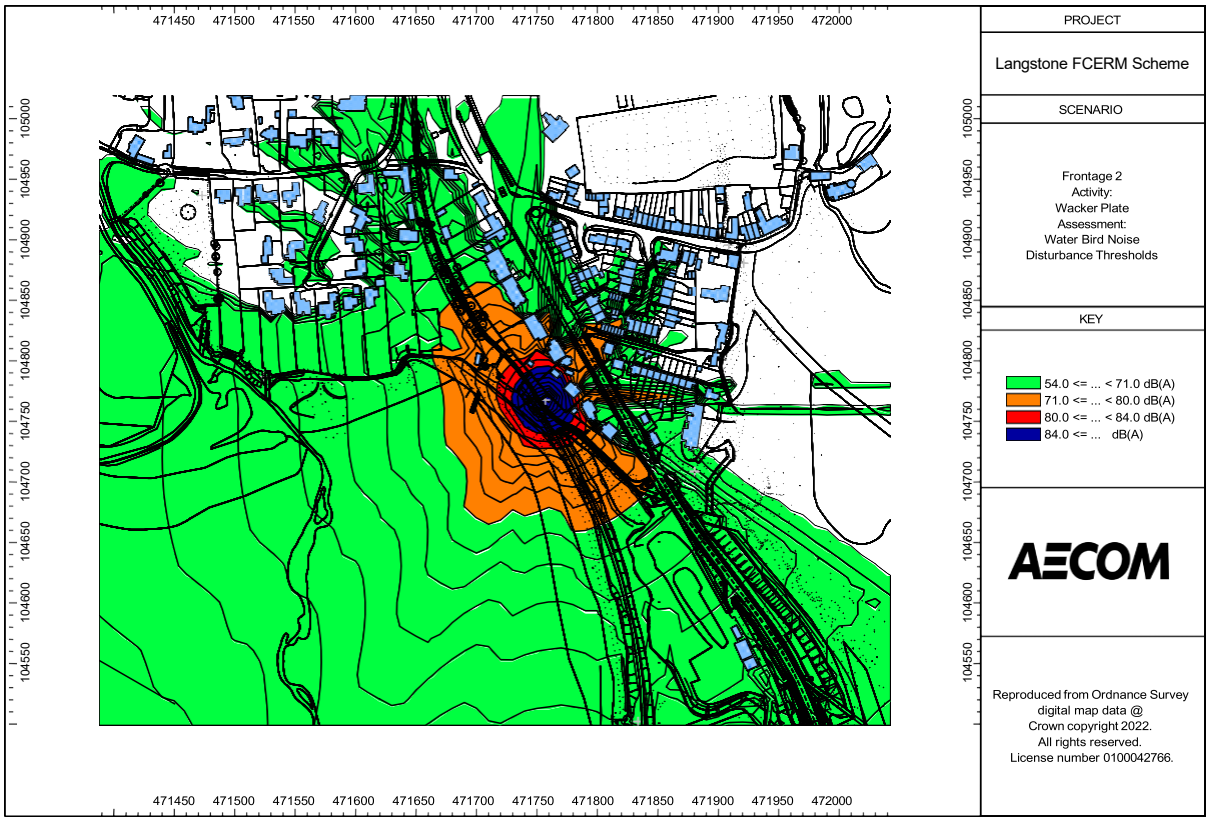


Figure 11.72 Frontage 2 Water Bird Noise Disturbance Contour - Wacker Plate

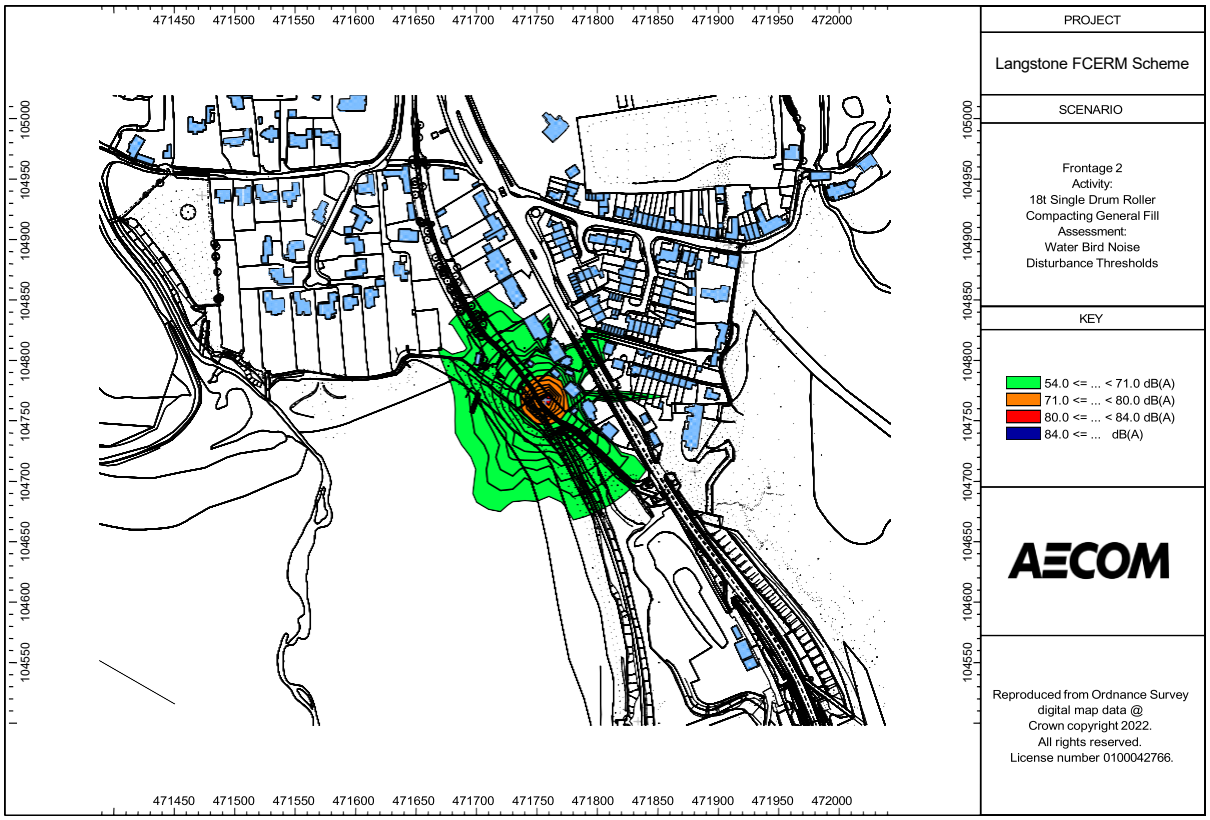


Figure 11.73 Frontage 2 Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting Aggregate

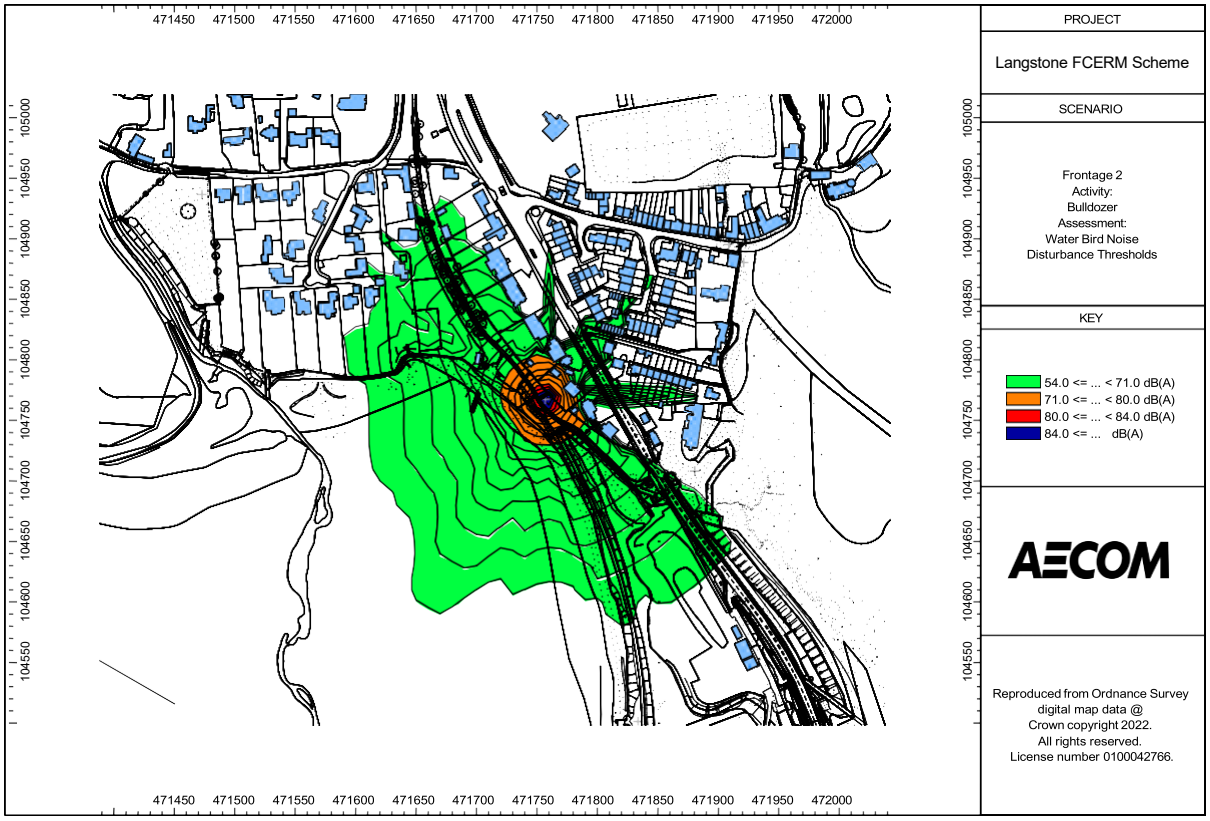


Figure 11.74 Frontage 2 Water Bird Noise Disturbance Contour - Bulldozer

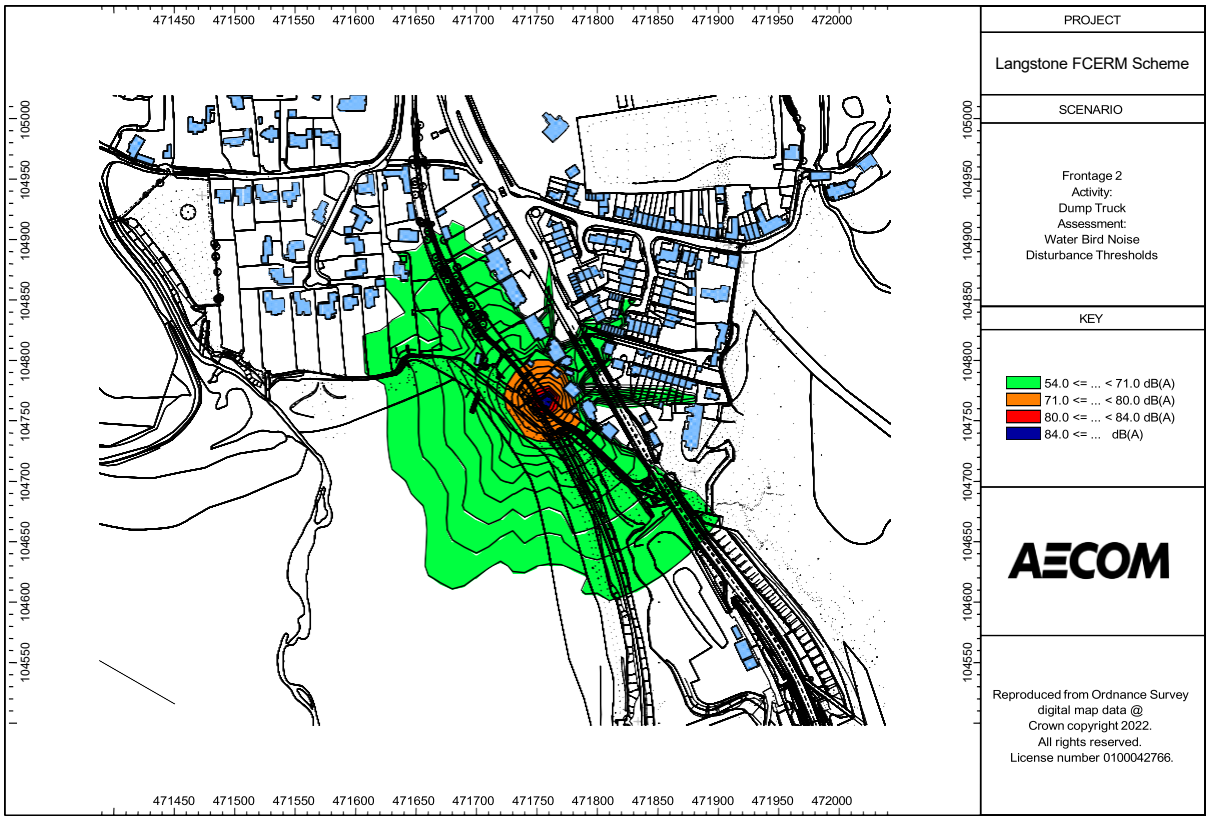


Figure 11.75 Frontage 2 Water Bird Noise Disturbance Contour - Dump Truck

F.4 Frontage 3

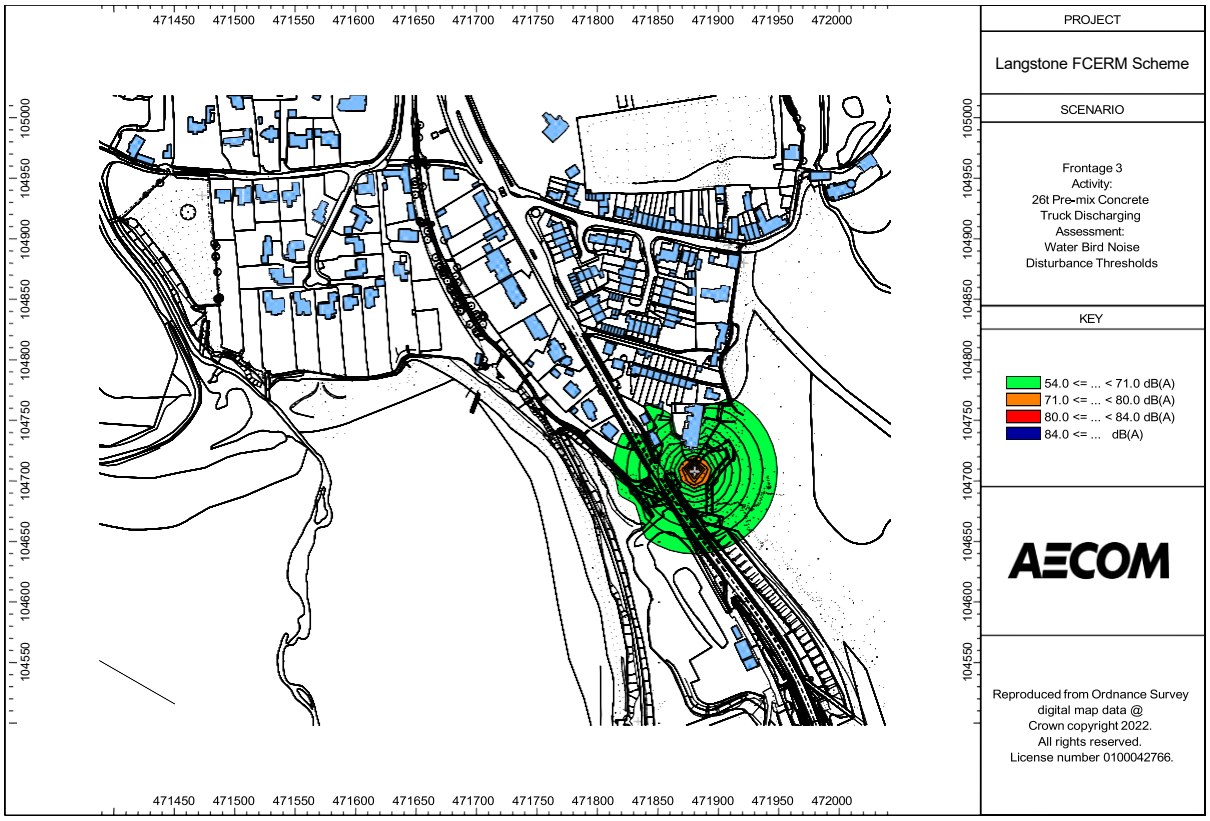


Figure 11.76 Frontage 3 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Discharging

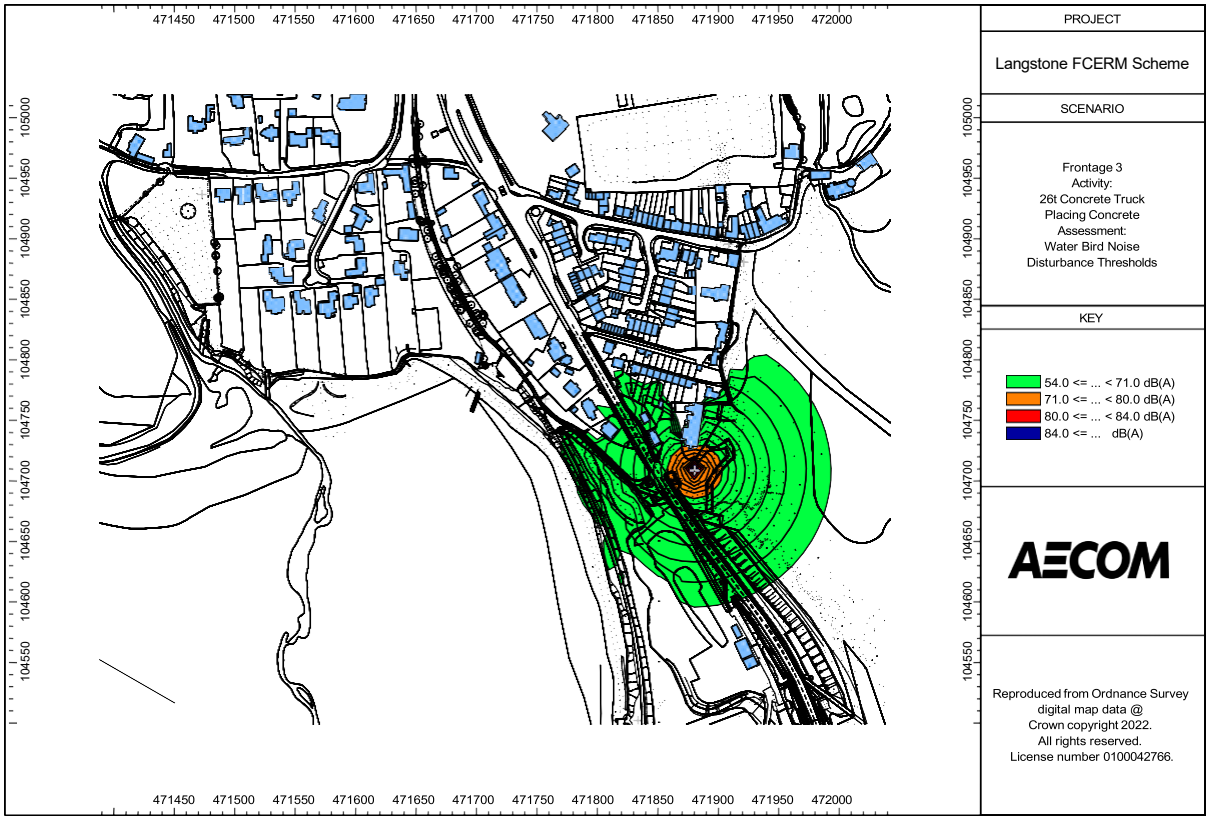


Figure 11.77 Frontage 3 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Placing Concrete

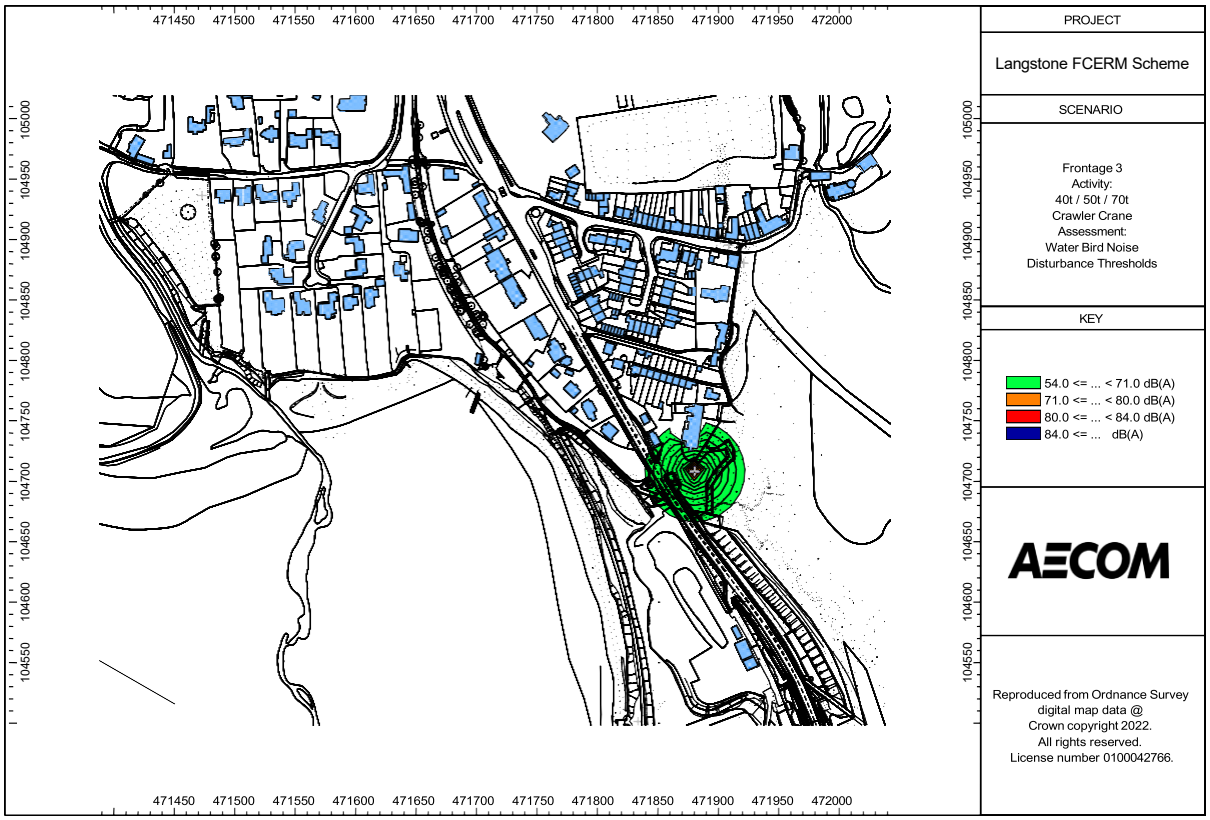


Figure 11.78 Frontage 3 Water Bird Noise Disturbance Contour - 40t / 50t / 70t Crawler Crane

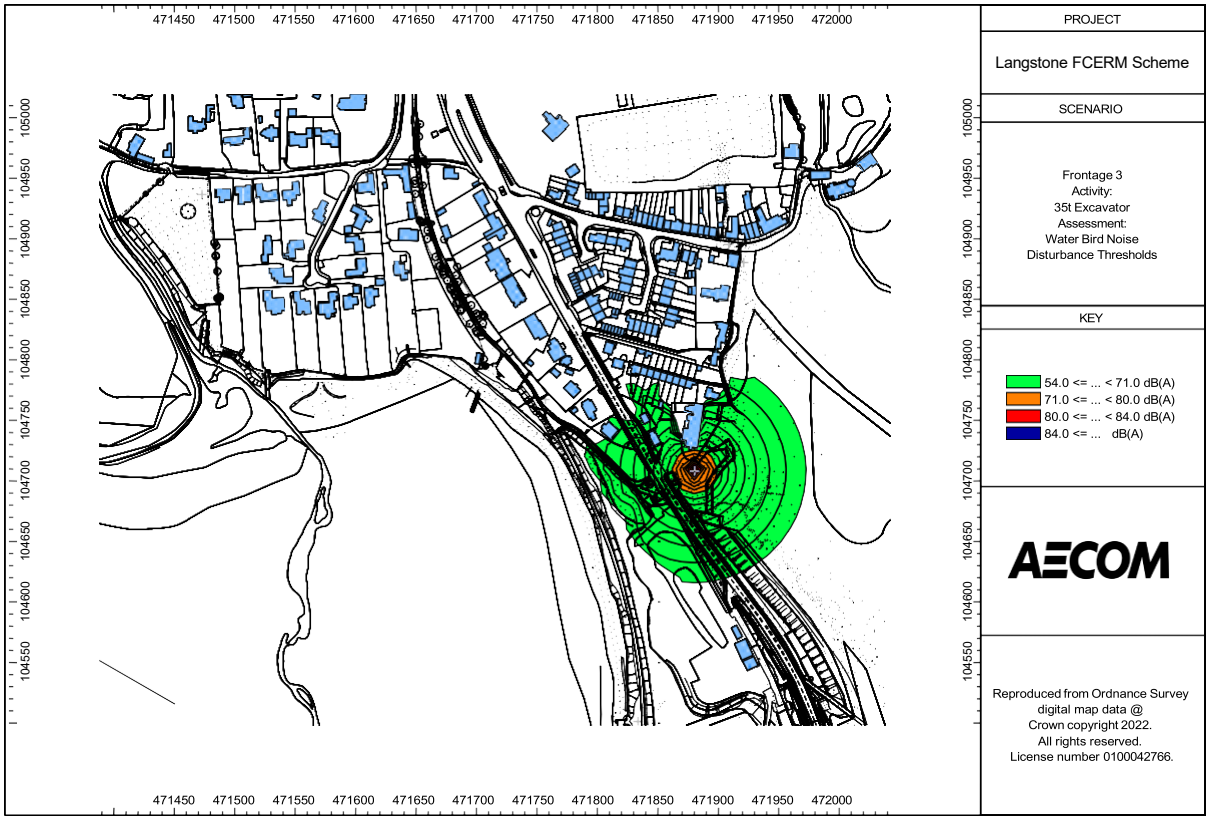


Figure 11.79 Frontage 3 Water Bird Noise Disturbance Contour - 35t Excavator

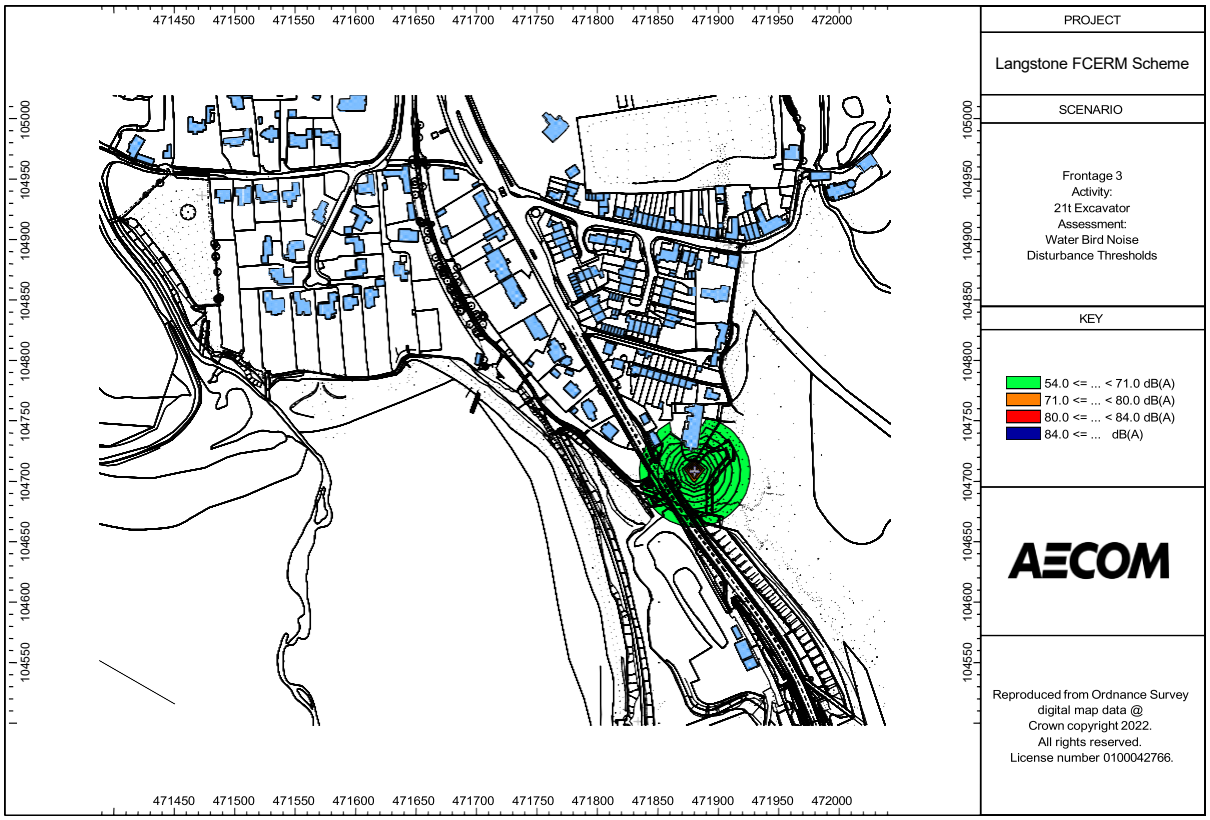


Figure 11.80 Frontage 3 Water Bird Noise Disturbance Contour - 21t Excavator

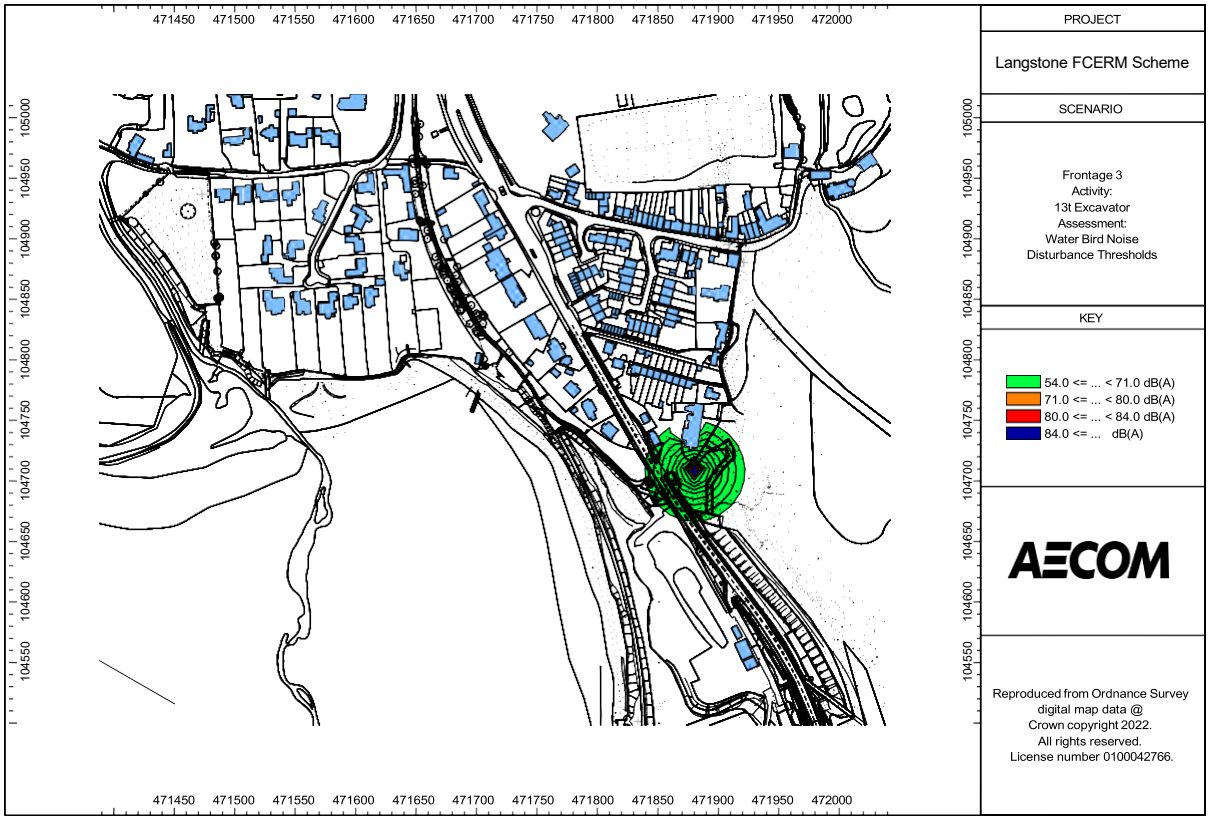


Figure 11.81 Frontage 3 Water Bird Noise Disturbance Contour - 13t Excavator

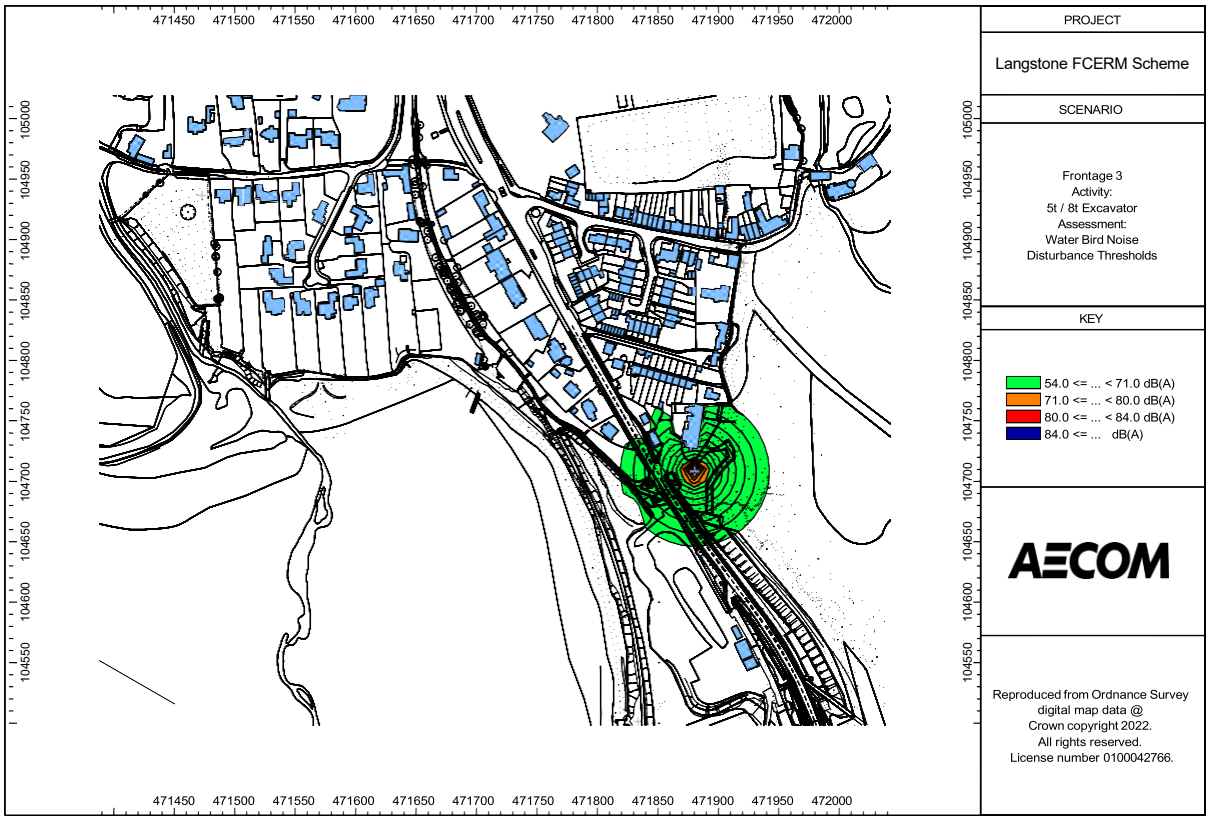


Figure 11.82 Frontage 3 Water Bird Noise Disturbance Contour - 5t / 8t Excavator

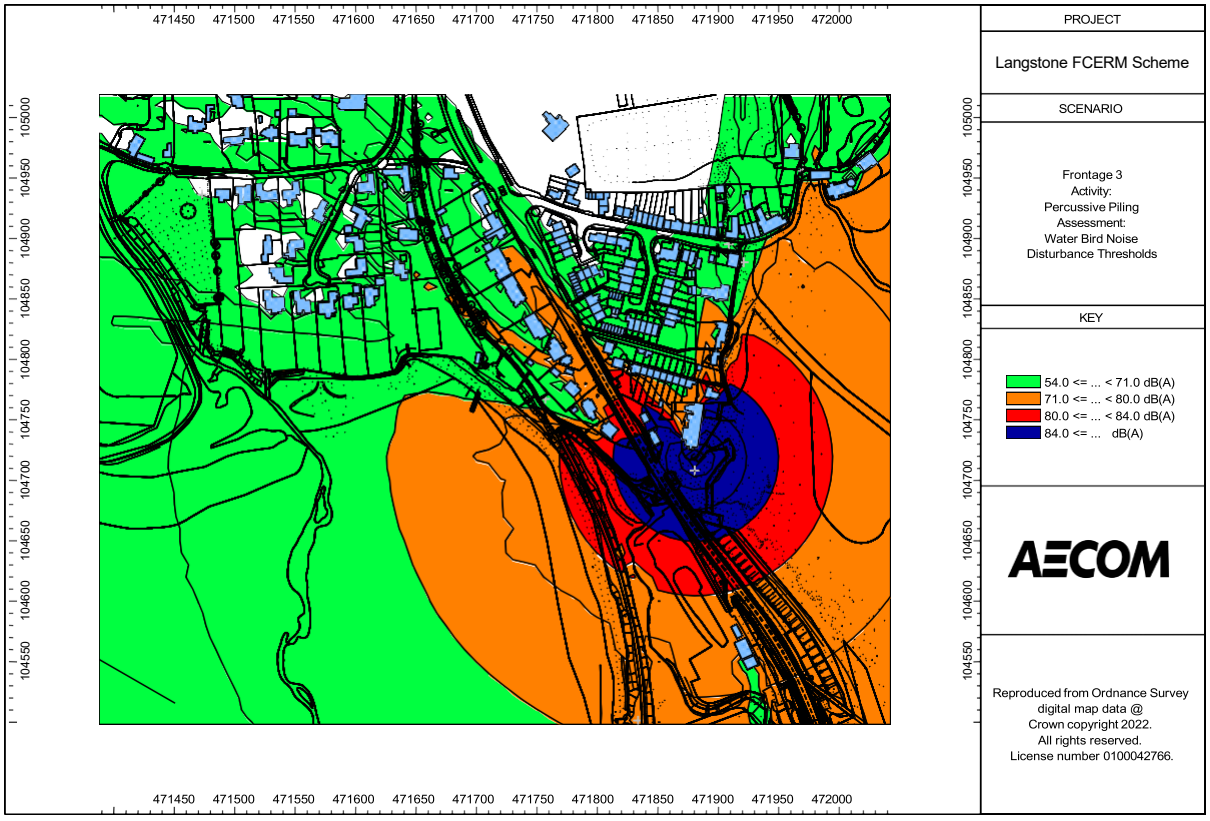


Figure 11.83 Frontage 3 Water Bird Noise Disturbance Contour - Percussive Piling

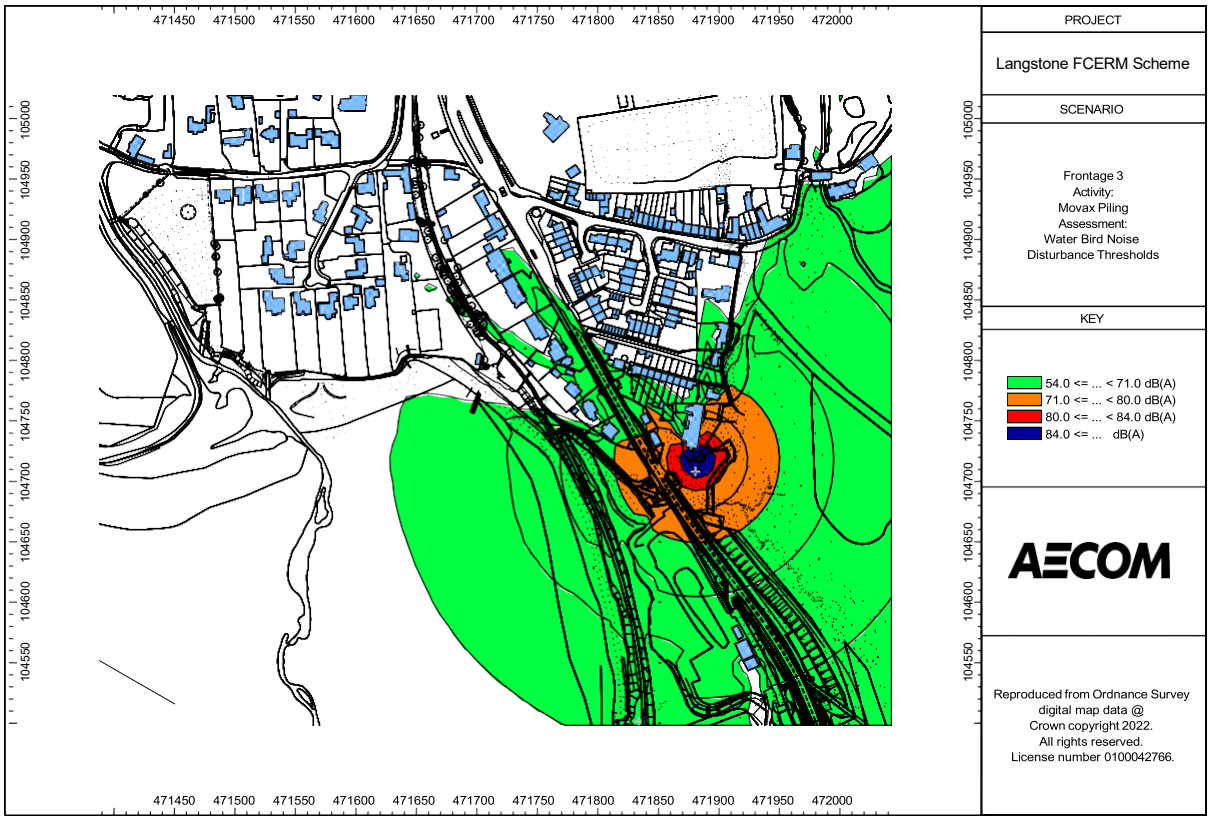


Figure 11.84 Frontage 3 Waterbird Noise Disturbance Contour - Movax Piling

F.5 Frontage 4

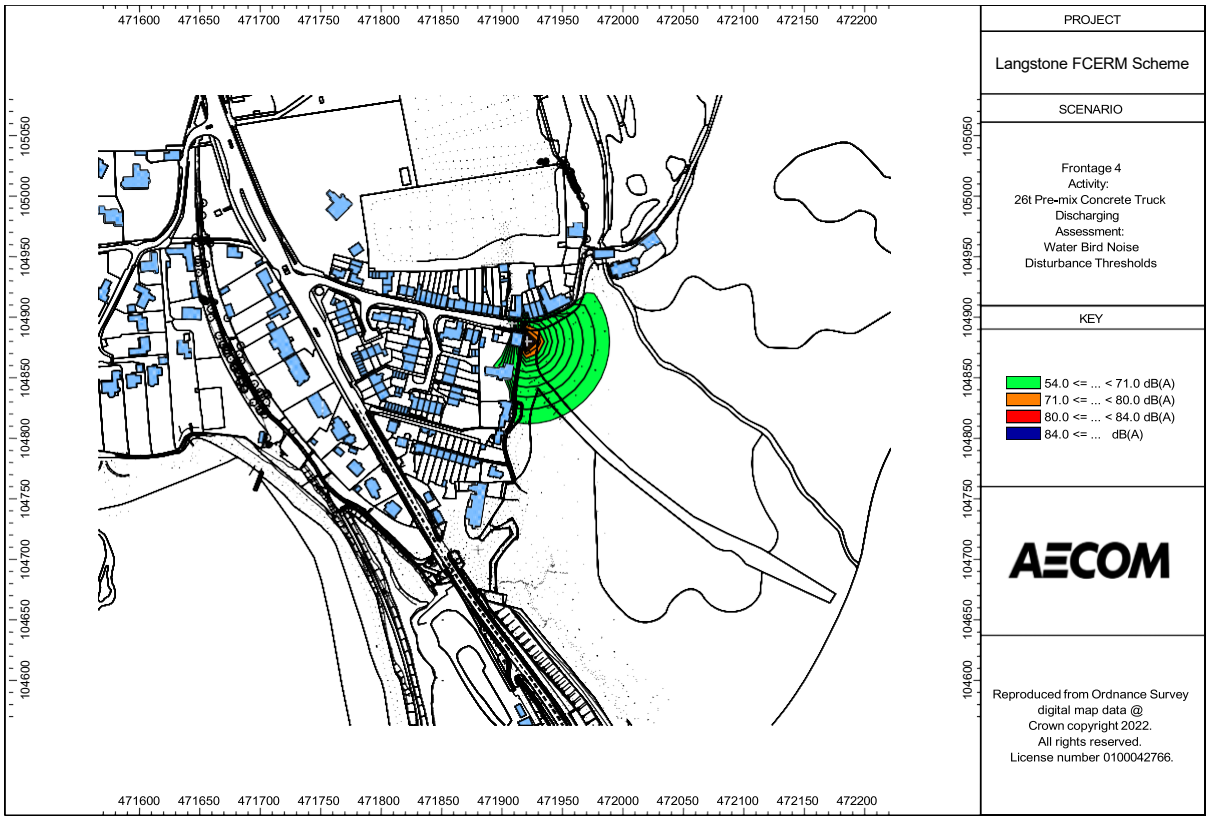


Figure 11.85 Frontage 4 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Discharging

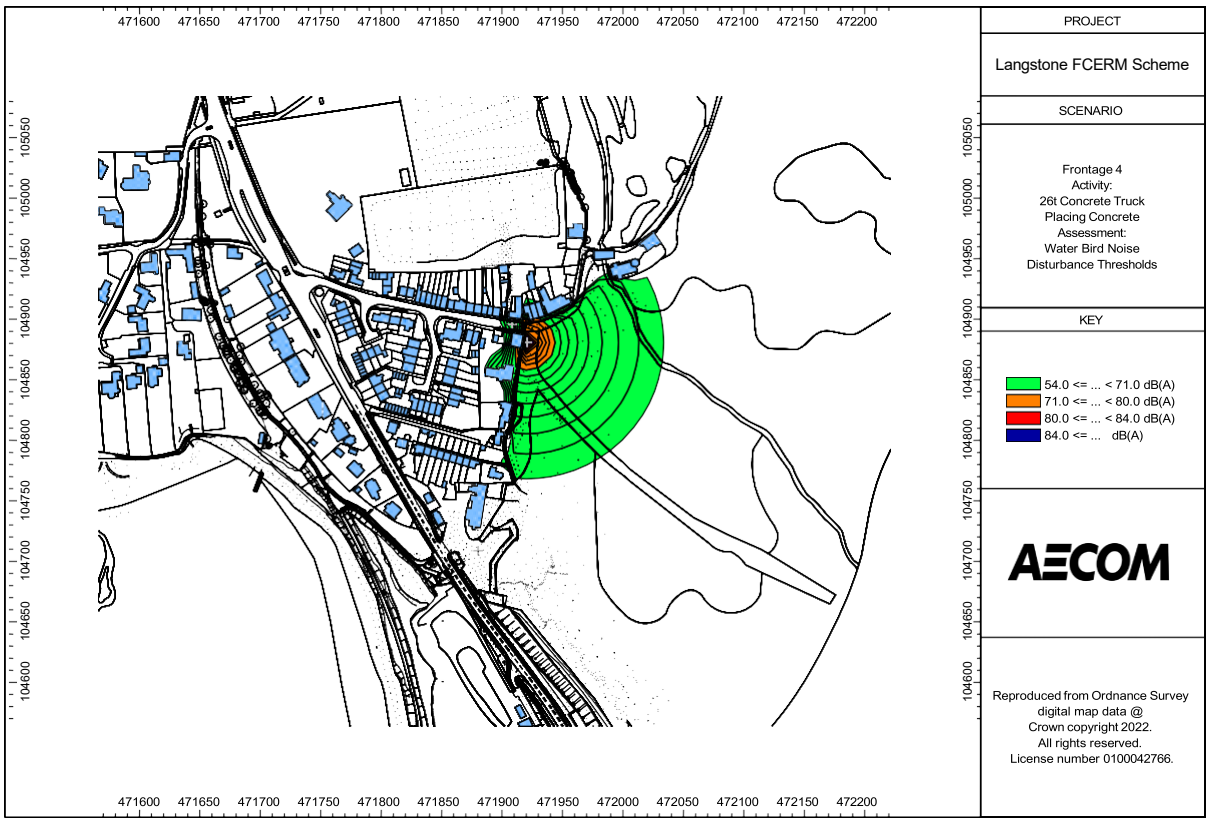


Figure 11.86 Frontage 4 Water Bird Noise Disturbance Contour - 26t Concrete Truck Placing Concrete

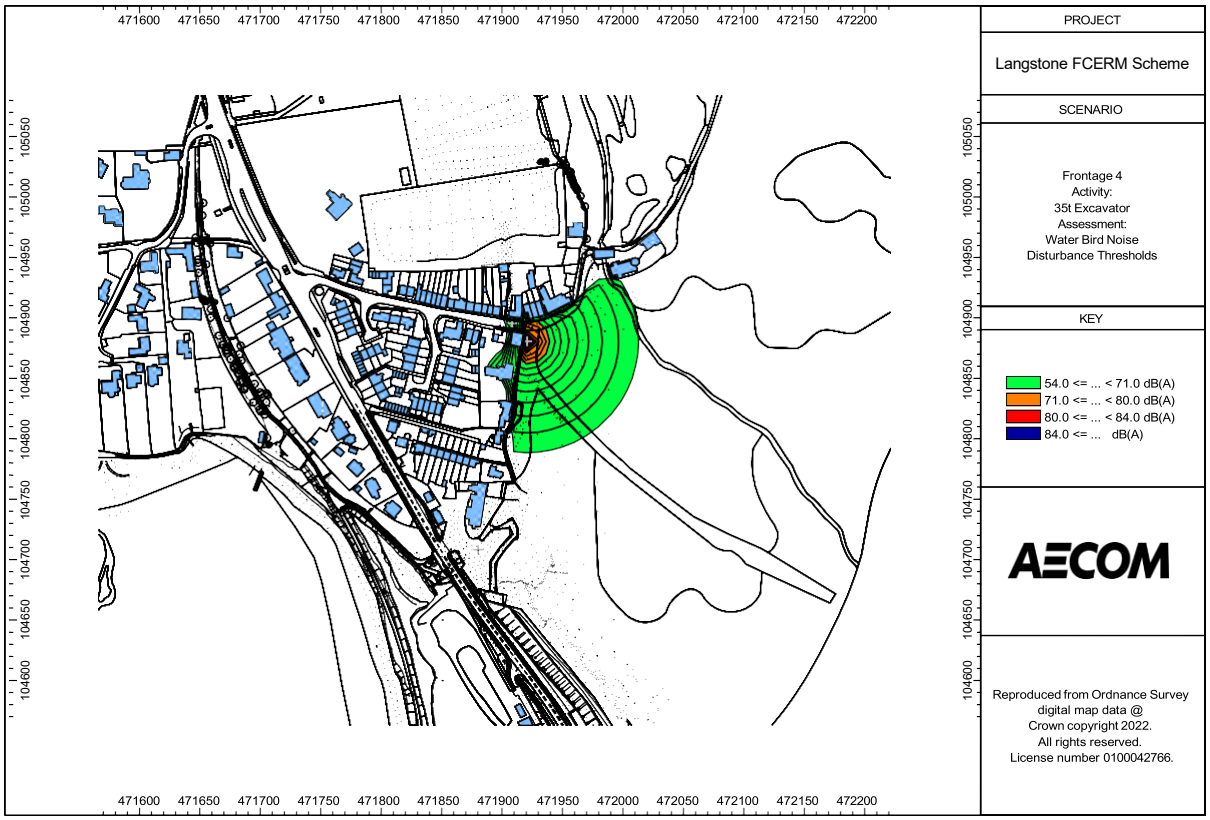


Figure 11.87 Frontage 4 Water Bird Noise Disturbance Contour - 35t Excavator

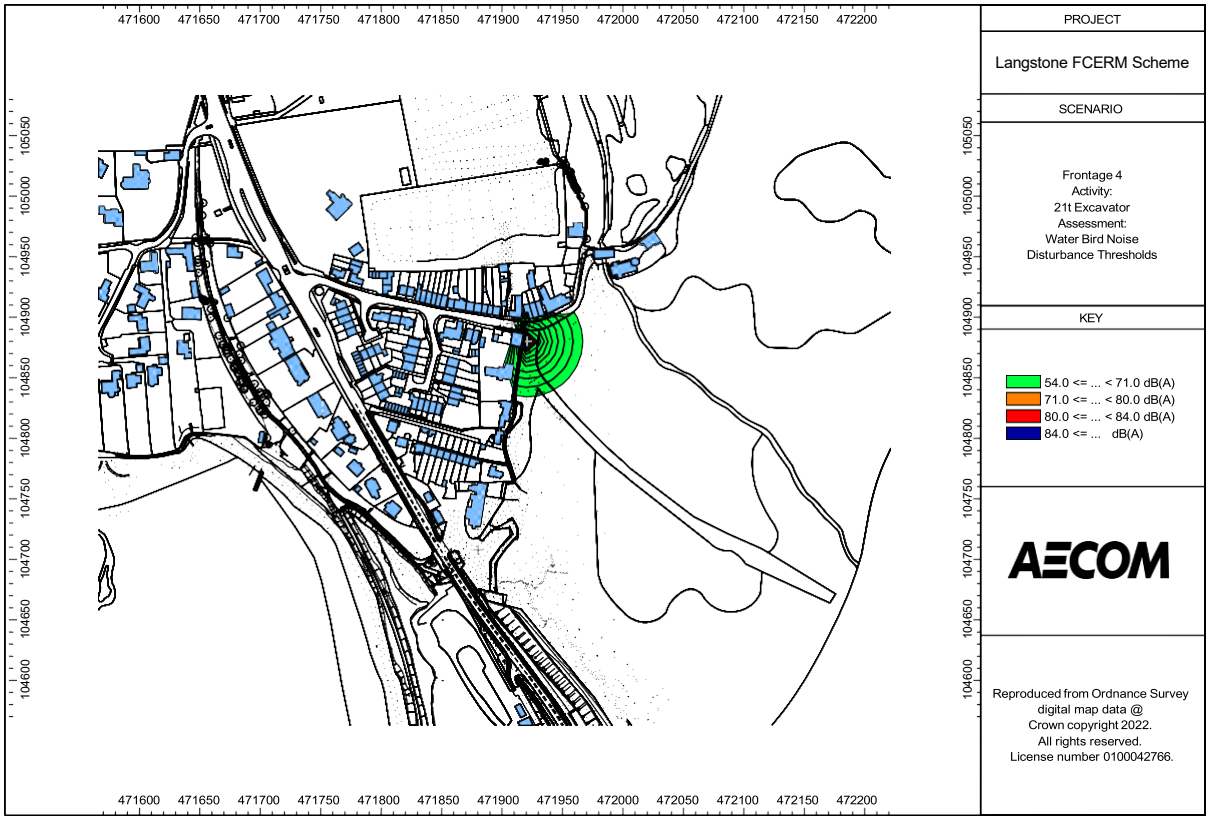


Figure 11.88 Frontage 4 Water Bird Noise Disturbance Contour - 21t Excavator

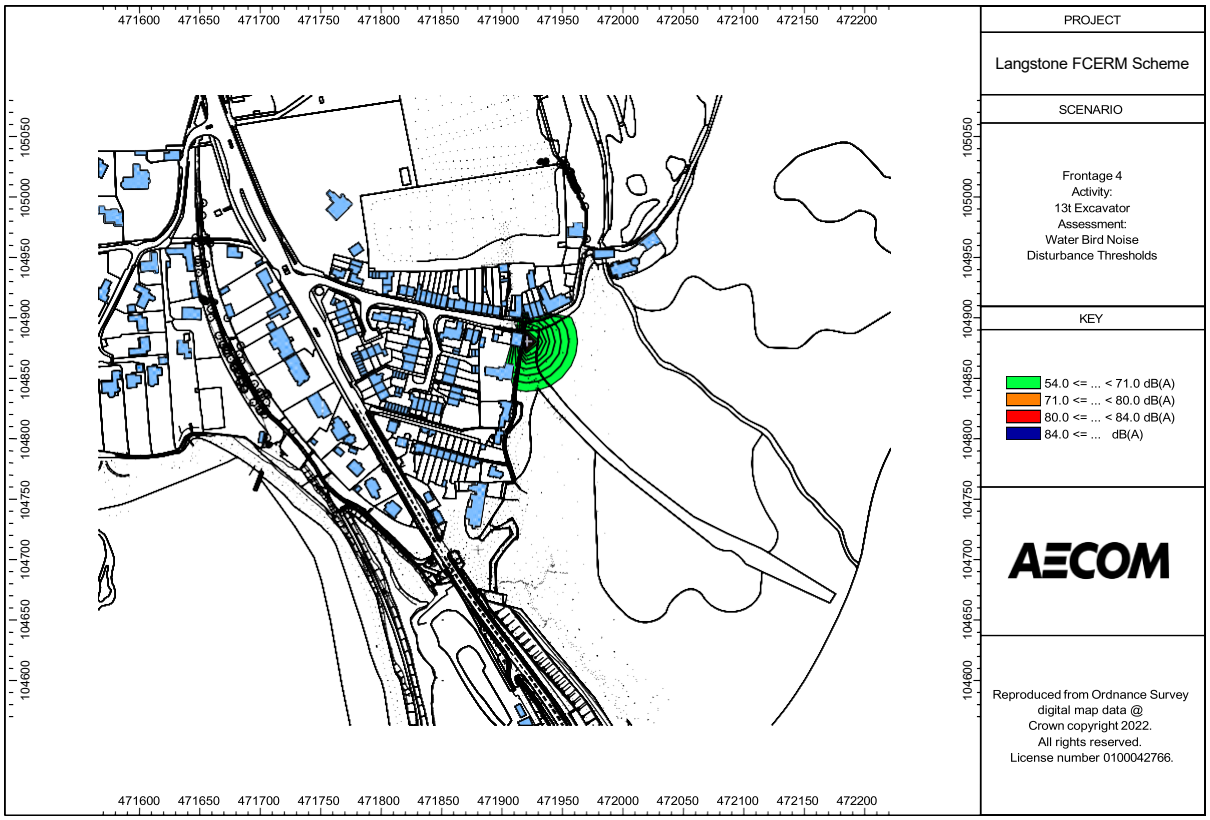


Figure 11.89 Frontage 4 Water Bird Noise Disturbance Contour - 13t Excavator

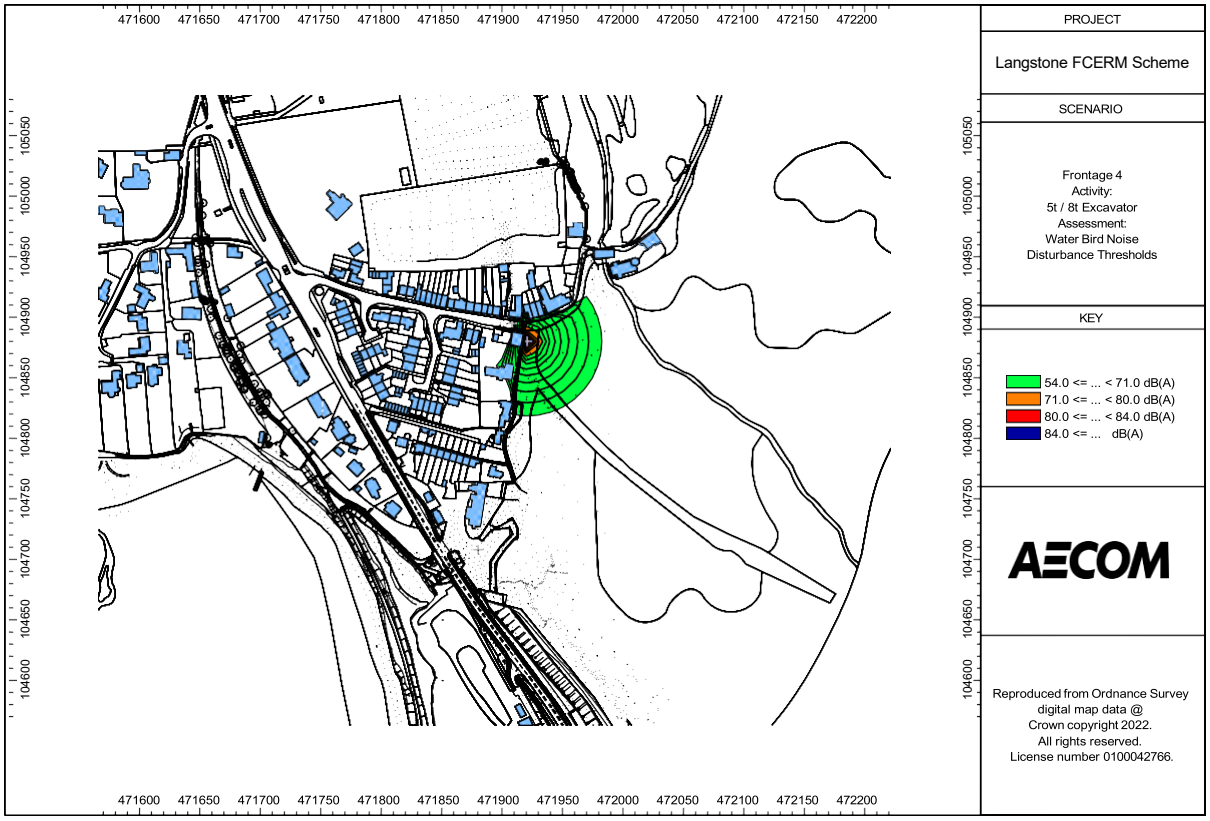


Figure 11.90 Frontage 4 Water Bird Noise Disturbance Contour - 5t / 8t Excavator

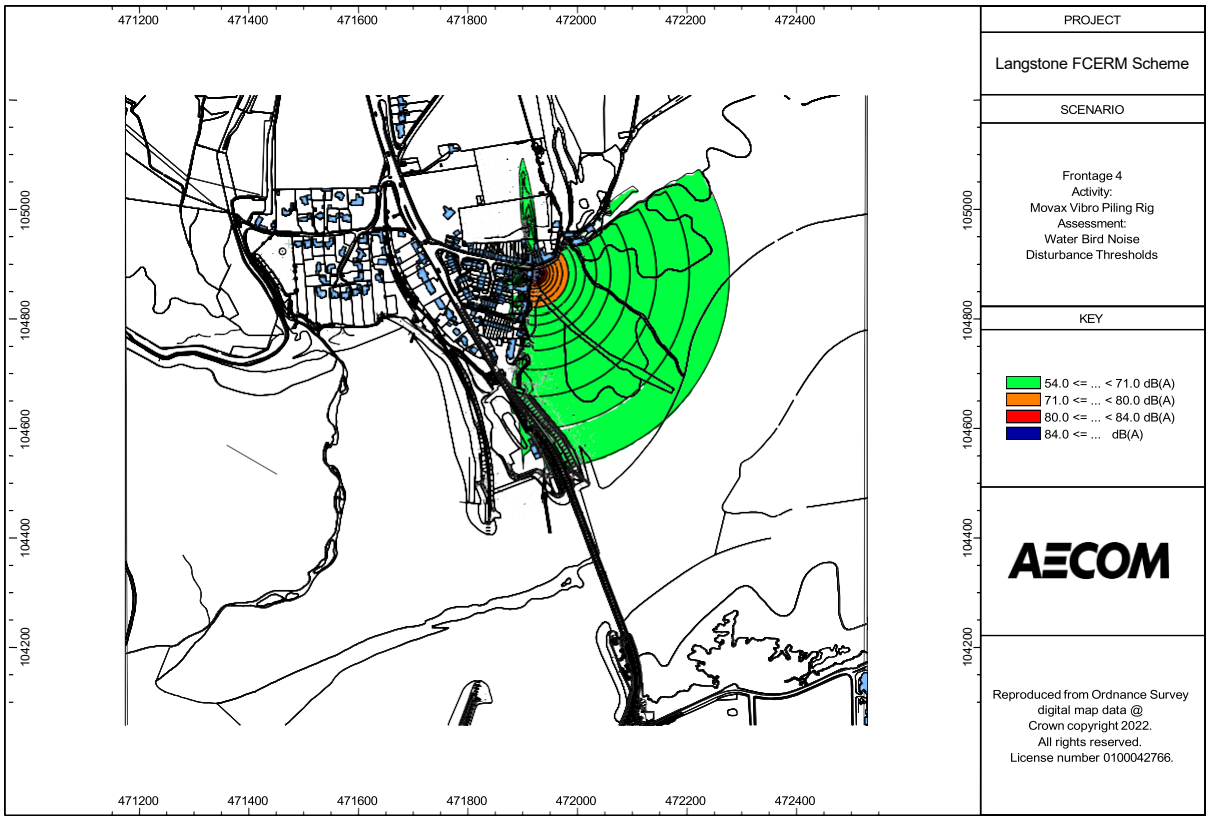


Figure 11.91 Frontage 4 Water Bird Noise Disturbance Contour - Movax Vibro Piling Rig

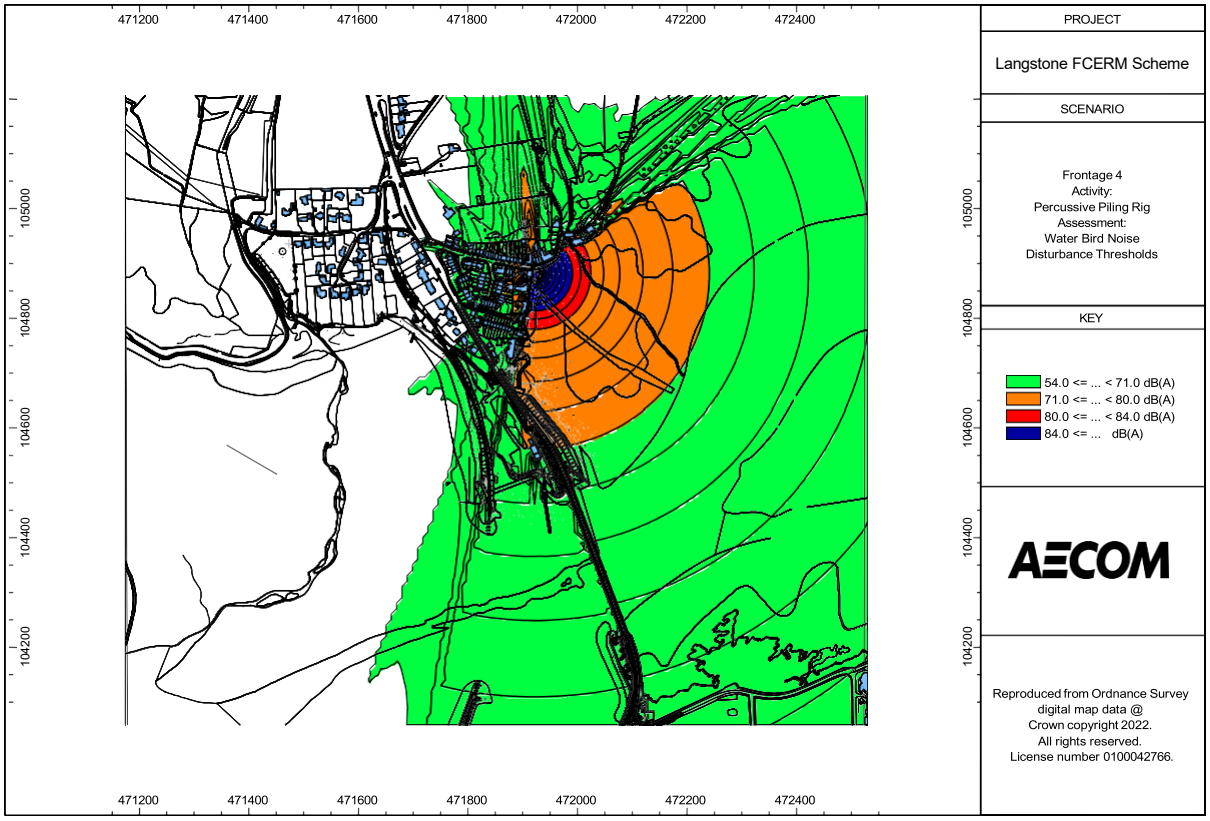


Figure 11.92 Frontage 4 Water Bird Noise Disturbance Contour - Percussive Piling Rig

F.6 Frontage 5

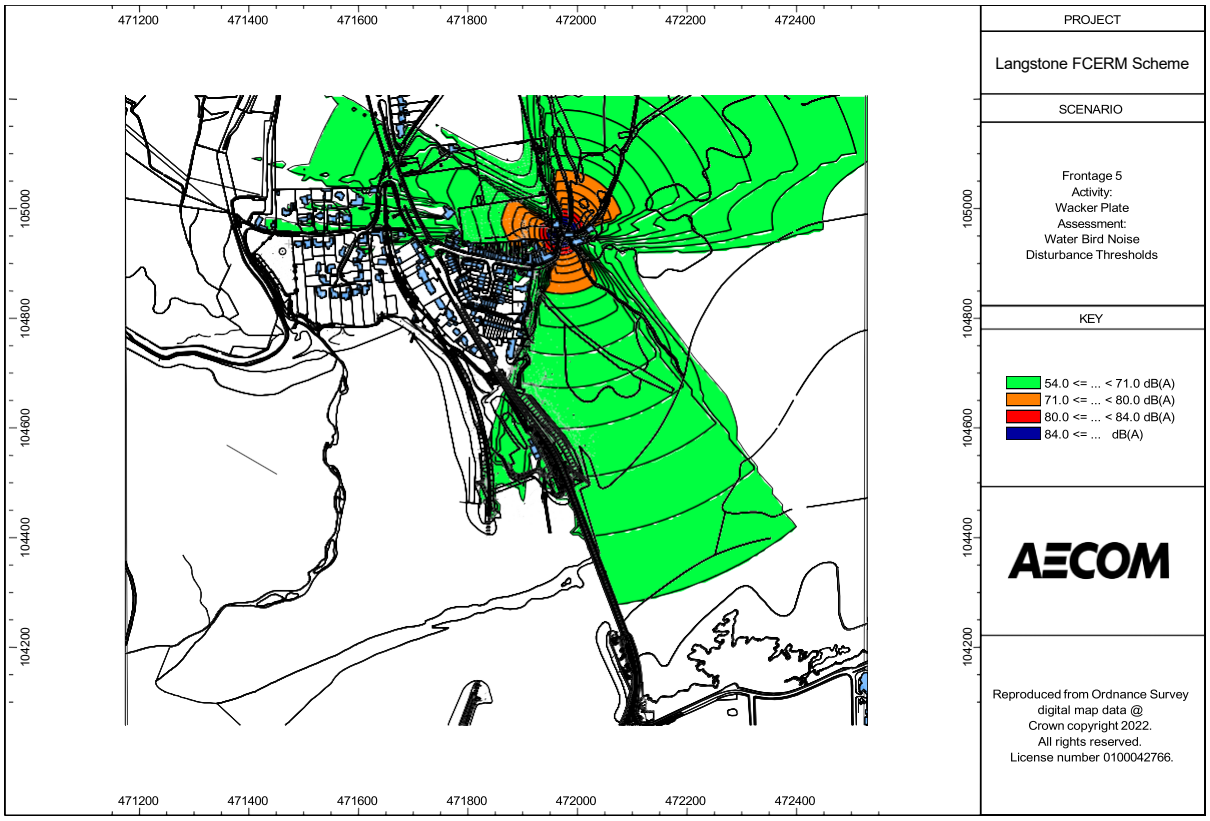


Figure 11.93 Frontage 5 Water Bird Noise Disturbance Contour - Excavator

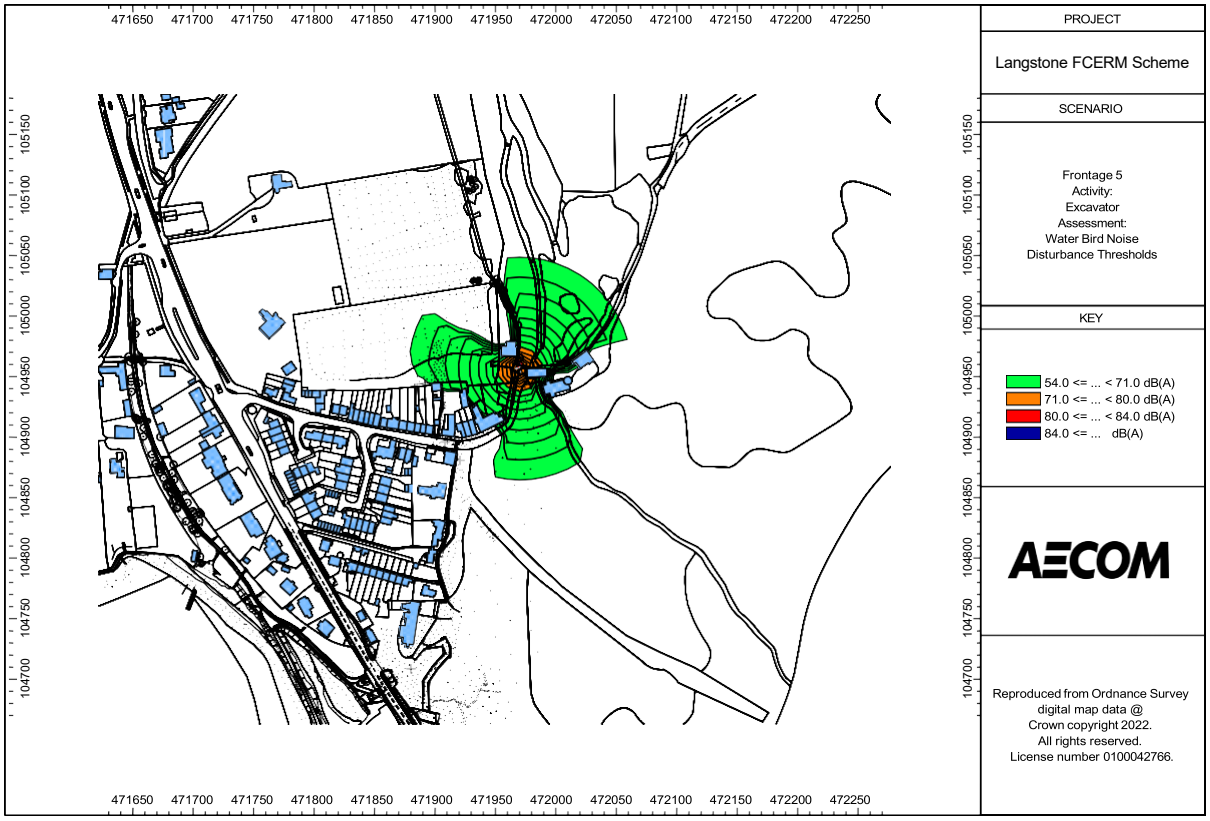


Figure 11.94 Frontage 5 Water Bird Noise Disturbance Contour - Wacker Plate

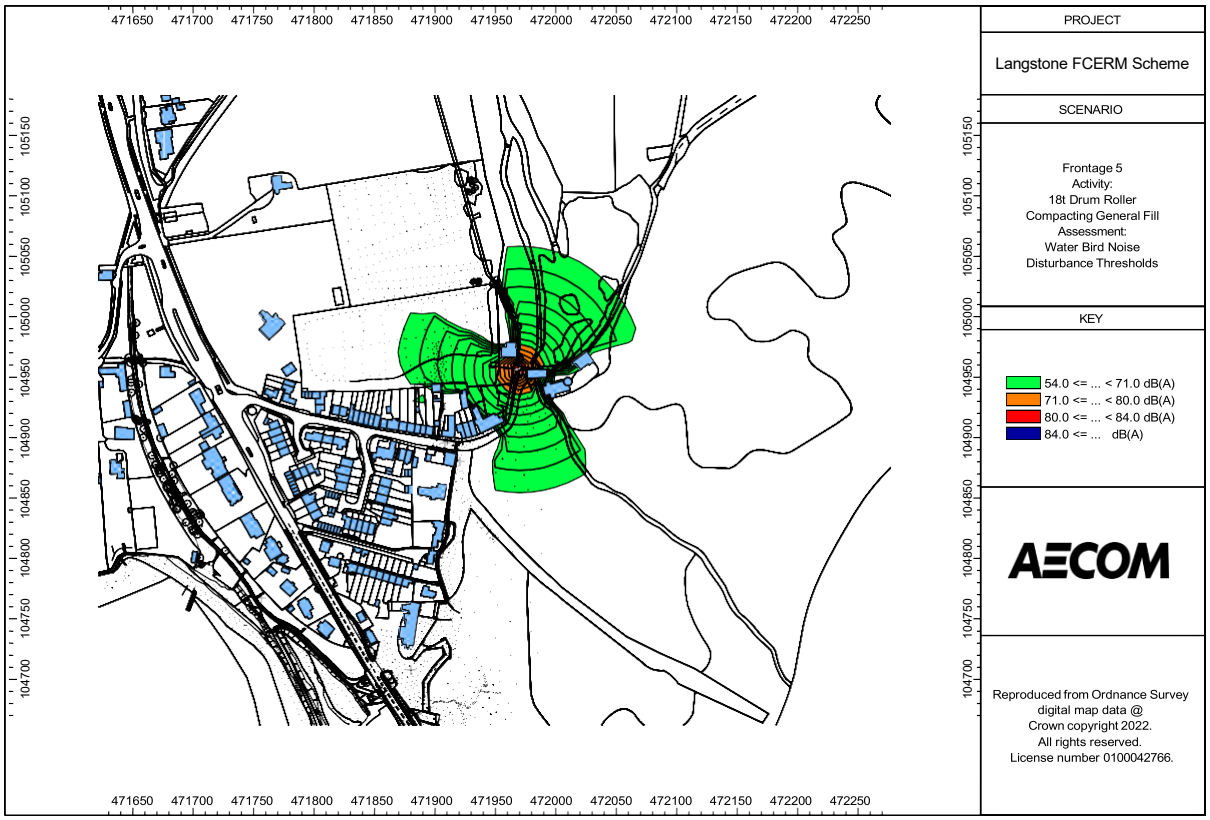


Figure 11.95 Frontage 5 Water Bird Noise Disturbance Contour - 18t Single Drum Roller Compacting General Fill

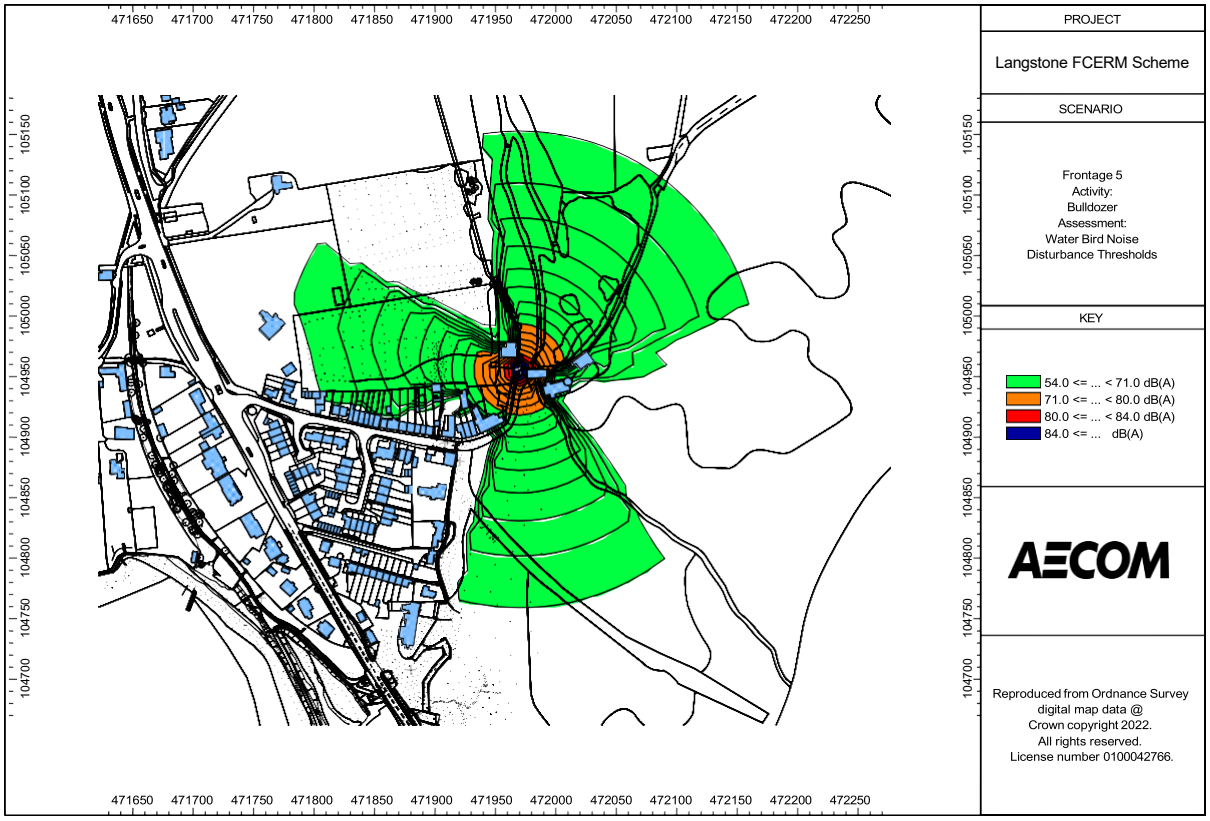


Figure 11.96 Frontage 5 Water Bird Noise Disturbance Contour - Bulldozer

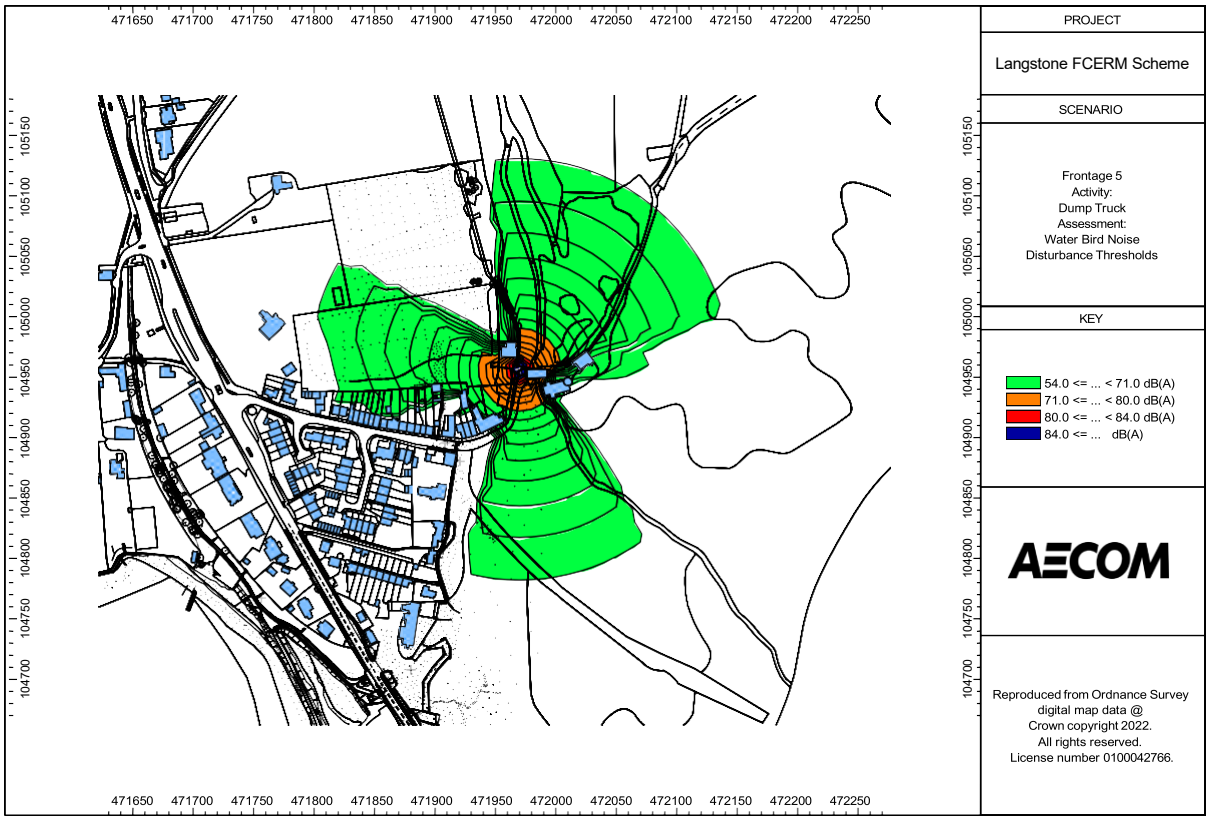


Figure 11.97 Frontage 5 Water Bird Noise Disturbance Contour - Dump Truck

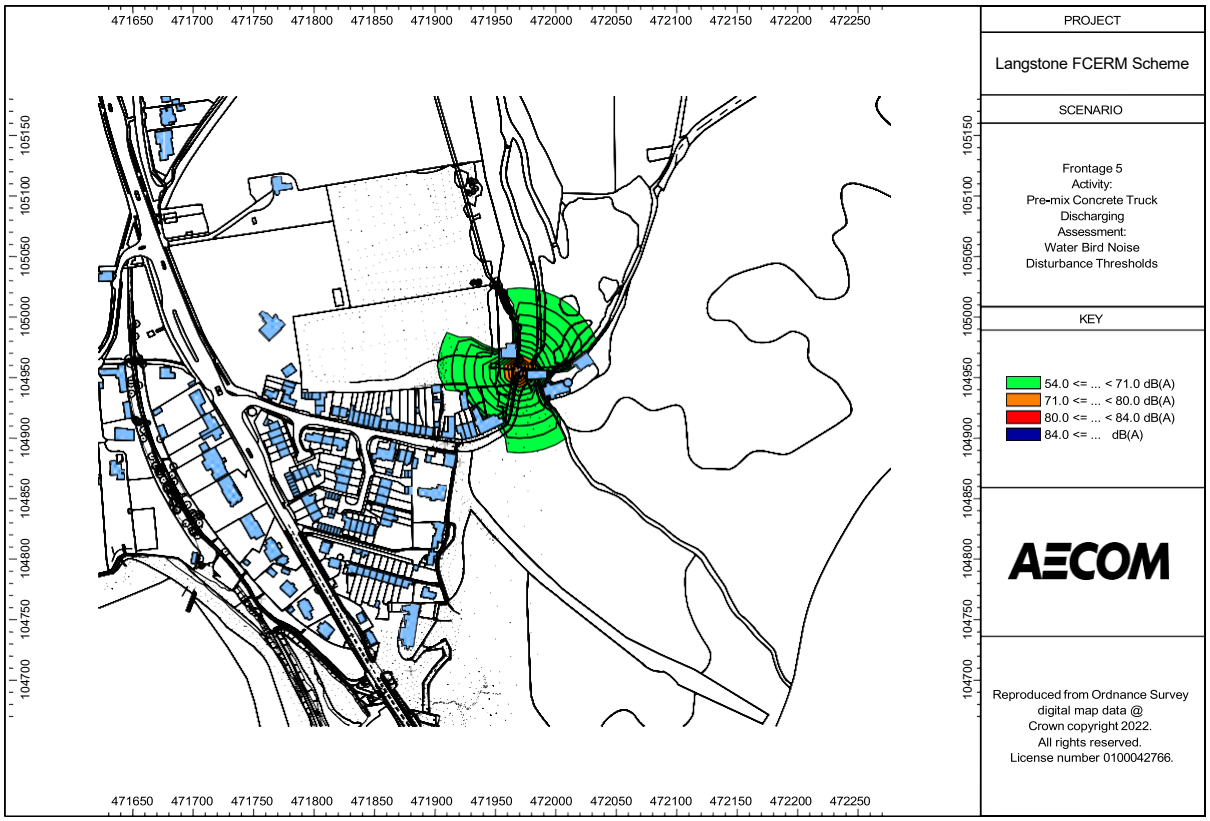


Figure 11.98 Frontage 5 Water Bird Noise Disturbance Contour - 26t Pre-mix Concrete Truck Discharging

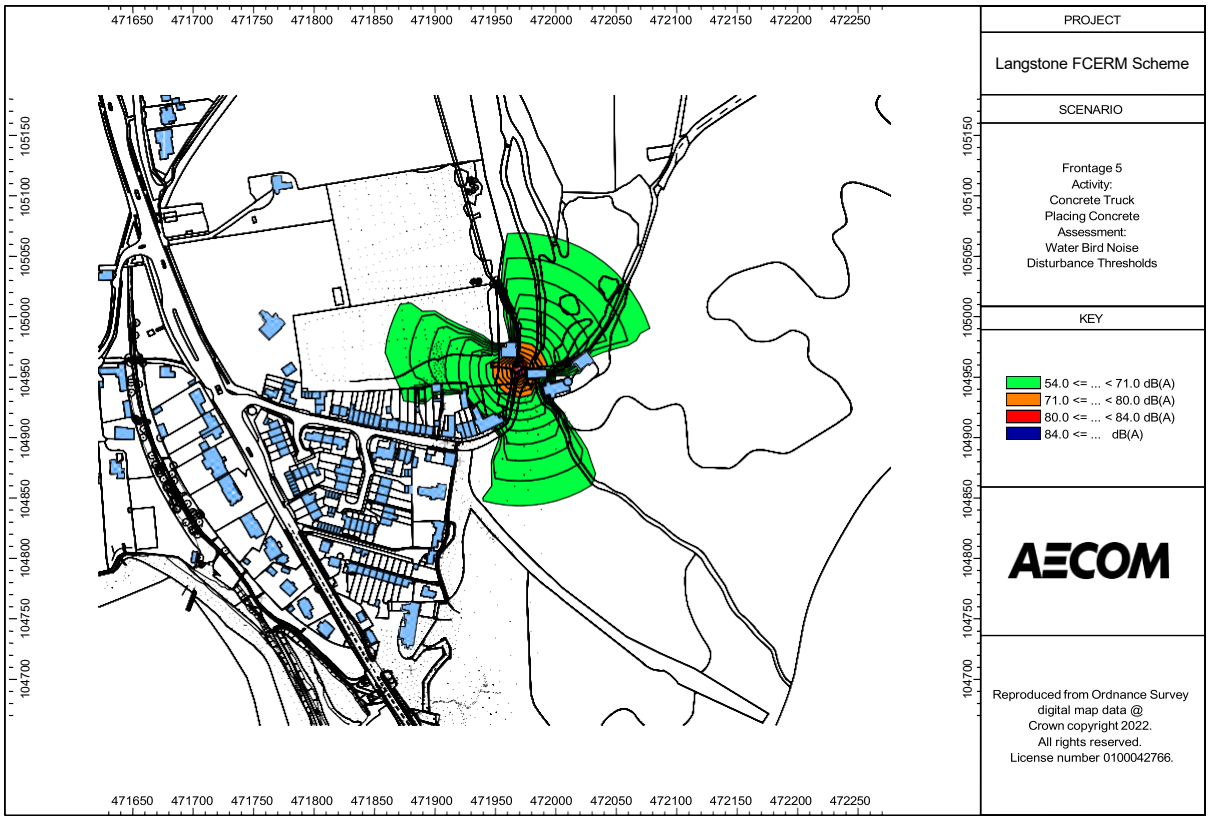


Figure 11.99 Frontage 5 Water Bird Noise Disturbance Contour - 26t Concrete Truck Placing Concrete

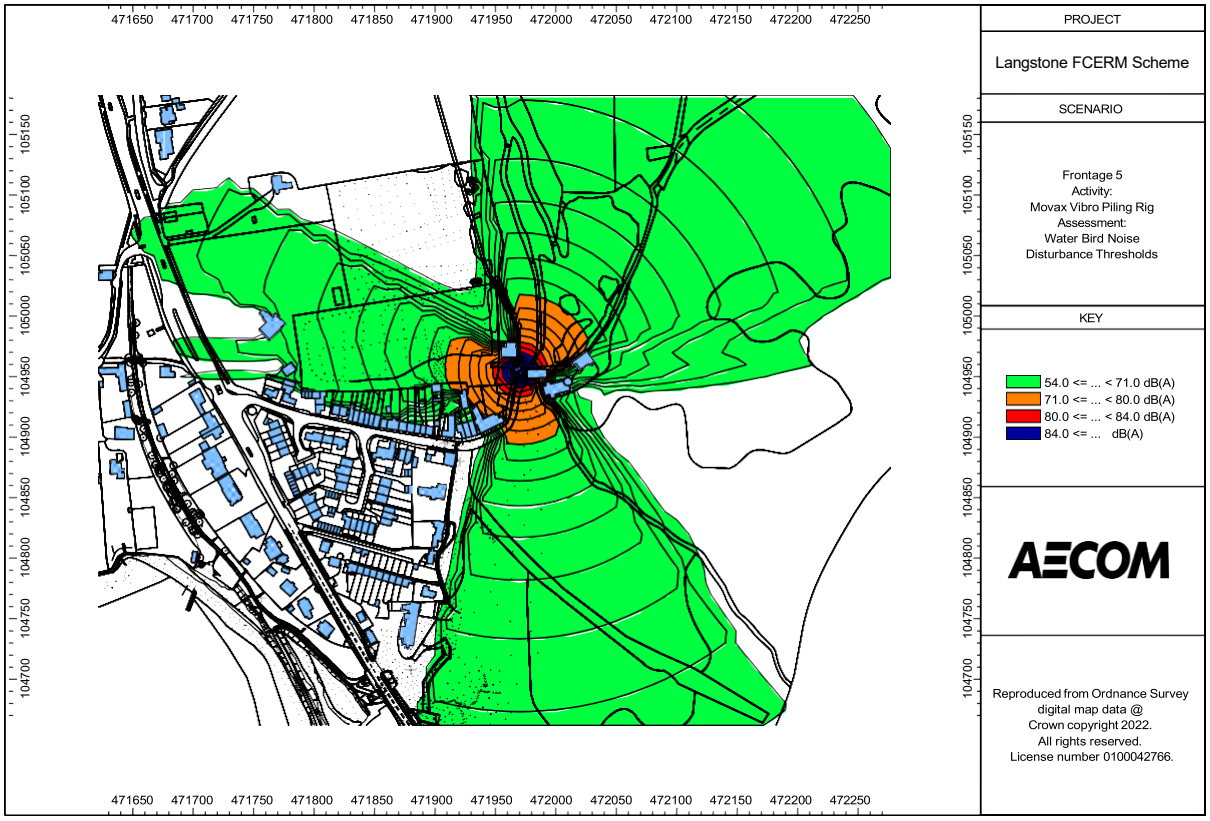


Figure 11.100 Frontage 5 Water Bird Noise Disturbance Contour - Movax Vibro Piling Rig

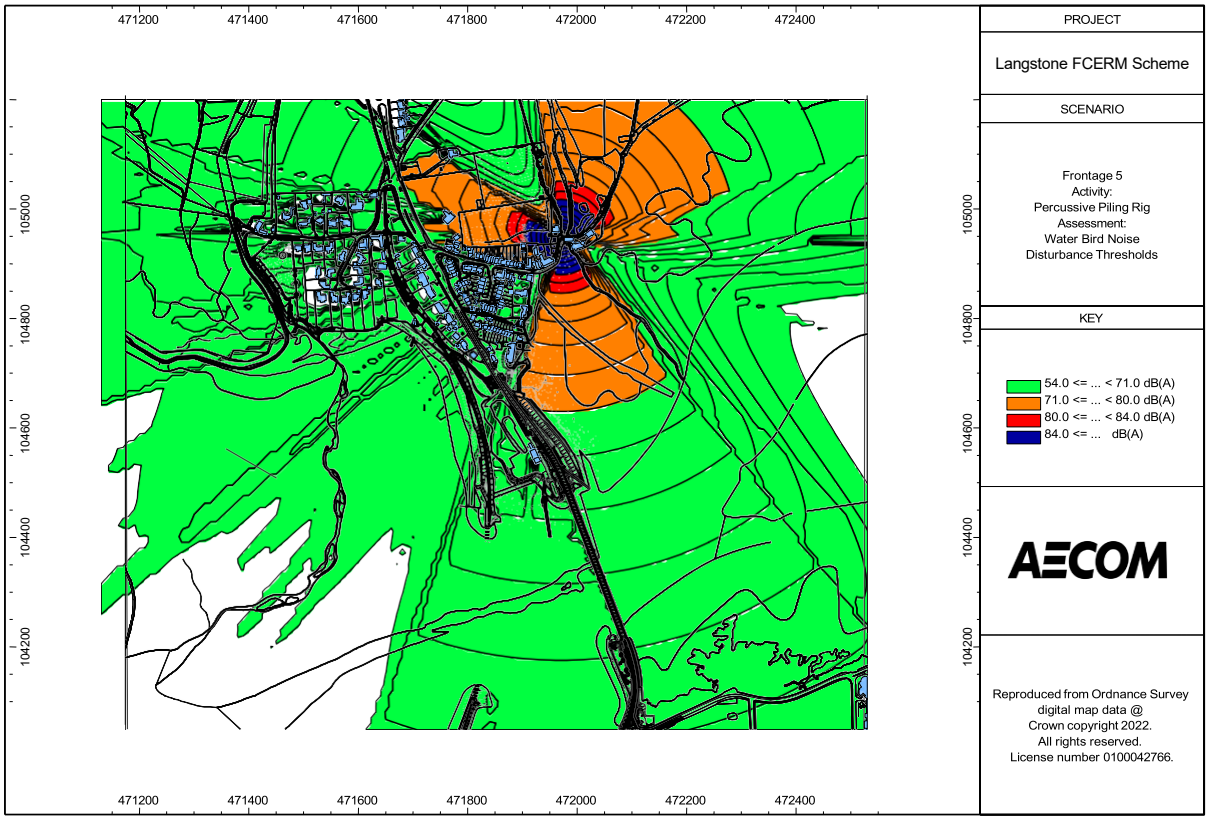


Figure 11.101 Frontage 5 Water Bird Noise Disturbance Contour - Percussive Piling

F.7 Frontage 6

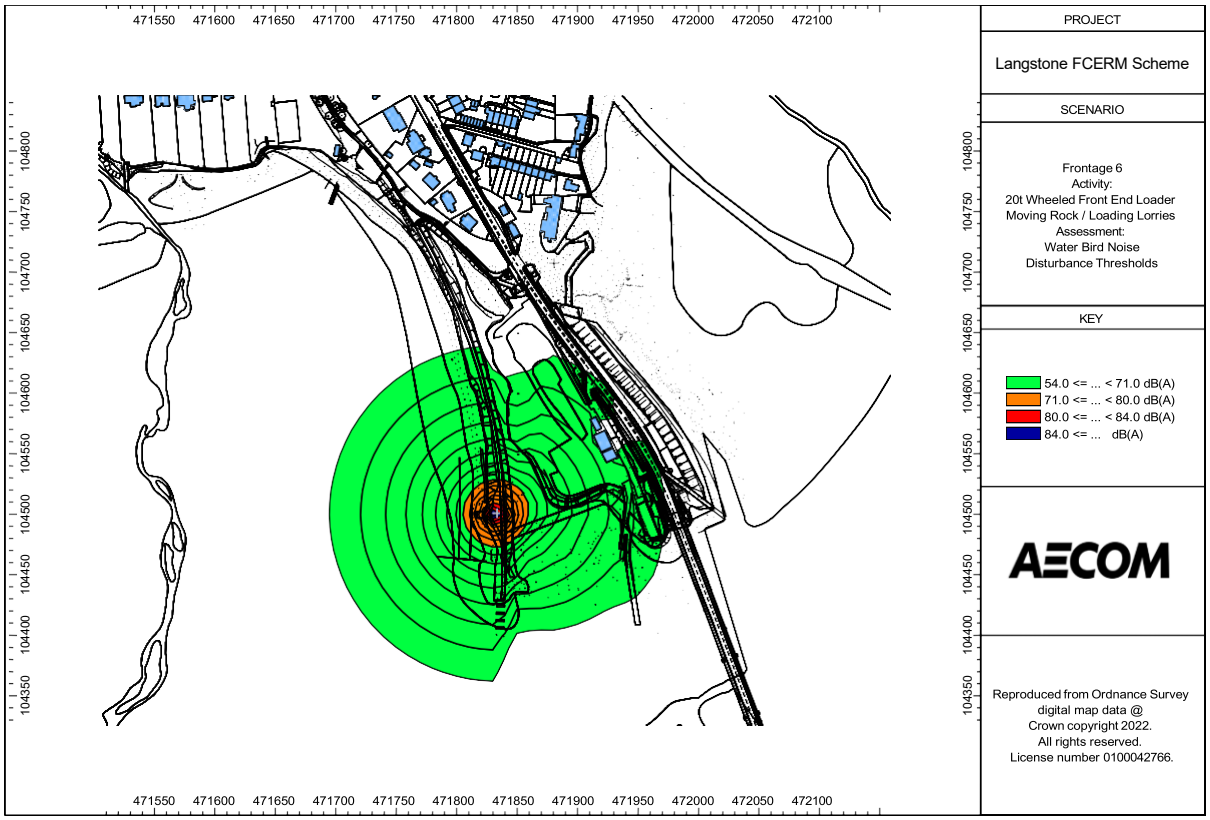


Figure 11.102 Frontage 6 Water Bird Noise Disturbance Contour - 20t Front Wheeled Loader Moving and Tipping Fill / Rock

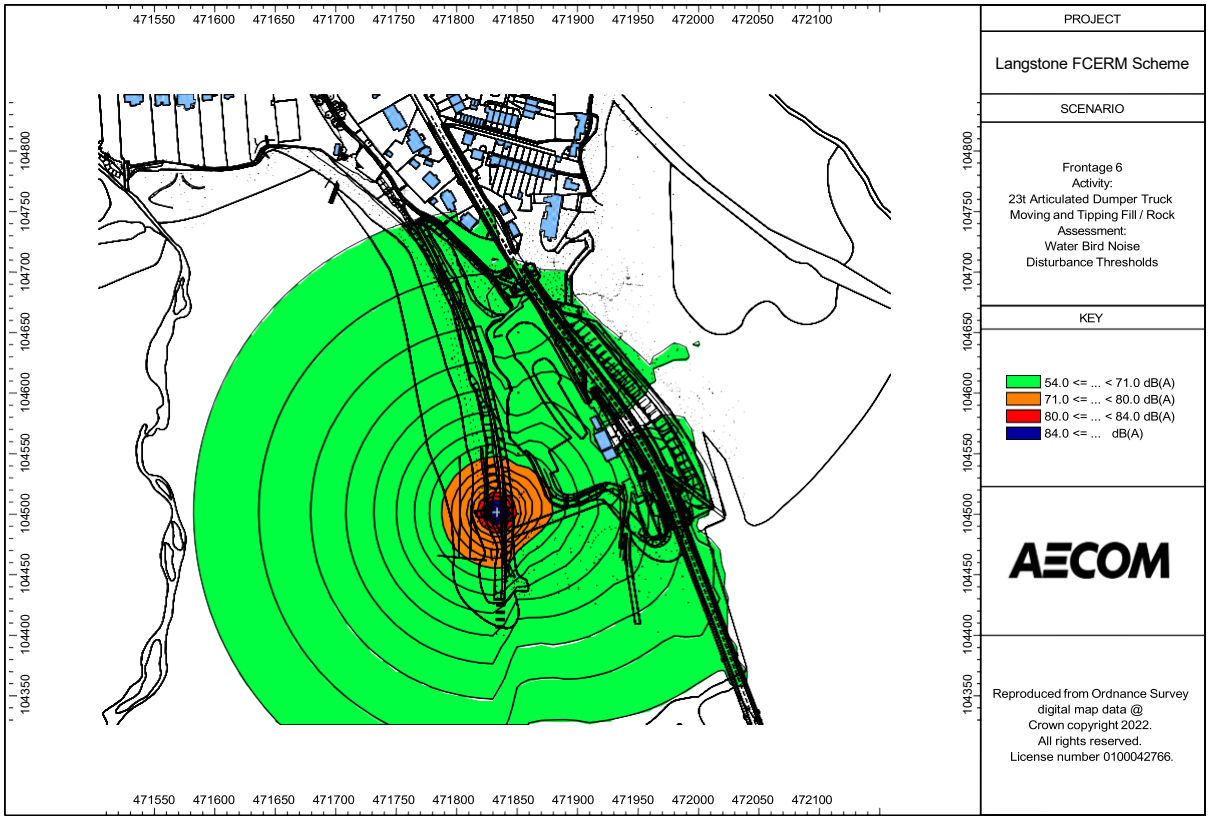


Figure 11.103 Frontage 6 Water Bird Noise Disturbance Contour - 23t Articulated Dumper Truck Moving and Tipping / Rock

Appendix G Extent of Dwellings Affected by Noise During the Daytime

Figure 1 and Figure 2 overleaf show indicative noise contour lines from the combined loudest items of plant for each frontage. The properties that are exposed to a significant impact during the daytime (07:00 – 23:00) period are identified. It should be noted that noise contour lines have been produced based on items of plant being placed in a ‘worst case’ scenario location where they have been deemed to have the most significant impact on residents. That being the case, as the items of plant move along the frontage, it may be that properties that currently show up as not exposed may then become exposed.



Revision: 0 Drawn: LL Checked: VC Approved: SF Date: 2024-01-25

Filename: \\na.aecomnet.com\ifs\EMEA\London-UKLON06\Legacy\UKLON06PFPSW001\UKLON06PFPSW001-V1DPEL\Library\GIS_DATA\Projects\Langstone Harbour\Layout\240124_LAN_Figure1_NoiseExposure.mxd

This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.

AECOM

PROJECT

Langstone Flood and Coastal Erosion Risk Management Scheme

CLIENT

Havant Borough Council

CONSULTANT

AECOM
Aldgate Tower,
2 Leman Street,
London, E1 8FA
aecom.com

LEGEND

- Core Scheme
- Area of Noise > 65dB

Properties Exposed to Noise > 65dB

- Properties Not Exposed
- Properties Exposed

NOTES

Reproduced from Ordnance Survey digital map data © Crown copyright 2023. All rights reserved. Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

60656877

FIGURE TITLE

Properties Exposed to Noise > 65dB

FIGURE NUMBER

Figure 1



This drawing has been prepared for the use of AECOM's client. It may not be used, modified, reproduced or relied upon by third parties, except as agreed by AECOM or as required by law. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that uses or relies on this drawing without AECOM's express written consent. Do not scale this document. All measurements must be obtained from the stated dimensions.

AECOM

PROJECT

Langstone Flood and Coastal Erosion Risk Management Scheme

CLIENT

Havant Borough Council

CONSULTANT

AECOM
Aldgate Tower,
2 Leman Street,
London, E1 8FA
aecom.com

LEGEND

- Core Scheme
- Area of Noise > 65dB

Properties Exposed to Noise > 65dB

- Properties Not Exposed
- Properties Exposed

NOTES

Reproduced from Ordnance Survey digital map data © Crown copyright 2023. All rights reserved. Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community.

ISSUE PURPOSE

FOR INFORMATION

PROJECT NUMBER

60656877

FIGURE TITLE

Properties Exposed to Noise > 65dB (Zoom In)

FIGURE NUMBER

Figure 2

Revision: 0 Drawn: LL Checked: VC Approved: SF Date: 2024-01-25

Filename: \\na.aecomnet.com\ifs\EMEA\London-UKLON06\Legacy\UKLON06PFPSW001\UKLON06PFPSW001-V1\DPE\Library\GIS_DATA\Projects\Langstone HarbourLayout\240124_LAN_Figure2_NoiseExposure_Zoom.mxd

aecom.com