

Report for:

Land and Partners Limited

Land at Long Copse Lane, Emsworth
Noise Impact Assessment

Status: Final

Date: 13.08.2021

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1. INTRODUCTION

1.1. Background

ACCON UK Limited (ACCON) has been commissioned by Pegasus Planning Group Ltd (Pegasus Group), on behalf of Land and Partners Ltd, to carry out a Noise Impact Assessment for a proposed residential scheme expected to comprise 210 dwellings.

Pre-application advice from Havant Council on the scope of the Noise Impact Assessment (following discussions with the Environmental Health Officer with Land and Partners Ltd) established that the location of the site is such that noise impact only needs to be assessed with regard to potential noise- or vibration-generating equipment such as pumping stations. A single pumping station is needed to drain a catchment of approximately 90 residential units at the northern part of the site where the landform falls away from the existing highway. A suitable location has been identified in the illustrative masterplan in the north east part of the development (Appendix E of the Utility Statement prepared by WSP). The rest of the site and the remainder of the allocation can drain southwards by gravity to the existing Southern Water foul sewer network. The surface water will not need to be pumped as this will utilise sustainable drainage system (SuDS) features in the landscape around the perimeter of the site.

1.2. Site Description

The site is located within the administrative boundary of Havant Borough Council (HBC), however; it is adjacent to the county border between Hampshire and West Sussex, with a number of nearby noise sensitive receptors located within the administrative boundary of Chichester District Council (CDC).

The site is located to the north of Emsworth, approximately 400 m to the south of Emsworth Common Road, approximately 330 m to the west of Monk's Hill and approximately 1.5 km to the north of the A27 dual carriageway. Long Copse Lane is located immediately to the south of the site. The site is currently comprised of fields for livestock and horses. Woodlands and fields bound the site to the north, east and west with residential dwellings to the south of Long Copse Lane. Hollybank House and grounds are located to the west of the site. A bed and breakfast business is operated at Hollybank House where wedding receptions and events can also be held. A site location plan is provided in **Figure 1.1**.

This aerial map shows the proposed Site, outlined in red, located in the Emsworth Common area. The Site is situated between Hollybank House to the west and Long Copse Lane to the east. The map also shows surrounding roads, including Emsworth Common Road, Monk's Hill, Spencer Rd, Grew Green, Edgell Rd, and Long Copse Lane. The Site is located on a grassy area, and the surrounding area includes residential developments and open fields.

The nearest noise sensitive receptors (NSRs) to the pumping station will be dwellings forming the proposed Land at Long Copse Lane development. These proposed properties will be located no closer than 15 m from the proposed pumping station. Existing NSRs are located on Long Copse Lane, at least 200 m to the south of the proposed pumping station. Hollybank House is located approximately 300 m to the west of the proposed pumping station.

2. THE NATURE, MEASUREMENT AND EFFECT OF NOISE

Noise is often defined as sound that is undesired by the recipient. Whilst it is impossible to measure nuisance caused by noise directly, it is possible to characterise the loudness of that noise. 'Loudness' is related to both sound pressure and frequency, both of which can be measured. The human ear is sensitive to a wide range of sound levels. The sound pressure level of the threshold of pain is over a million times that of the quietest audible sound. In order to reduce the relative magnitudes of the numbers involved, a logarithmic scale of decibels (dB) is normally used, based on a reference level of the lowest audible sound.

The response of the human ear is not constant over all frequencies. It is therefore usual to weight the measured frequencies to approximate the human response. The resulting 'A' weighted decibel, dB(A), has been shown to correlate closely to the subjective human response.

When related to changes in noise, a change of ten decibels, for example from 60 dB(A) to 70 dB(A), would represent a doubling in 'loudness'. Similarly, a 10 dB(A) decrease in noise, for example from 70 dB(A) to 60 dB(A), would represent a halving in 'loudness'. A change of 3 dB(A) is generally considered to be just perceptible¹. **Table 2.1** provides typical noise levels of common sources.

Table 2.1: Typical Noise Levels

Approximate Noise Level (dB(A))	Example
0	Limit of hearing
30	Rural area at night
40	Library
50	Quiet office
60	Normal conversation at 1 m
70	In car noise without radio
80	Household vacuum cleaner at 1 m
100	Pneumatic drill at 1 m
120	Threshold of pain

A Glossary of Acoustic Terminology is provided in **Appendix 1**.

¹ Institute of Environmental Management and Assessment (2014). Guidelines for environmental noise impact assessment.

3. NOISE ASSESSMENT CRITERIA

3.1. National Planning Policy Framework

The revised National Planning Policy Framework (NPPF as amended in July 2021) supersedes the 2012, 2018 and 2019 versions of the NPPF. The purpose of the planning system is to contribute to the achievement of sustainable development. There are three dimensions to sustainable development: economic, social and environmental. The environmental role is to contribute to protecting and enhancing our natural, built and historic environment; and as part of this, make effective use of land, help to improve biodiversity, use natural resources prudently, minimise waste and pollution, and mitigate to adapt to climate change including moving to a low carbon economy.

One of the core planning principles is to contribute to conserving and enhancing the natural environment. Allocations of land for development should prefer land of lesser environmental or amenity value, where consistent with other policies in the Framework (Paragraph 171). The planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability (Paragraph 170).

Paragraph 185 of the NPPF states:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life (see Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food and Rural Affairs, 2010));*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

Additionally, Paragraph 186 states:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

3.2. Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) aims to “*through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life”.*

Based on concepts from toxicology, it introduces three ‘Effect Levels’ relevant to the assessment of noise. These are:

- NOEL: No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise;
- LOAEL: Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected; and
- SOAEL: Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur.

3.3. Planning Practice Guidance

The Planning Practice Guidance for Noise (PPG-N) was published in March 2014 and most recently updated in July 2019. The PPG-N suggests that the most appropriate and cost-effective solutions to potential noise issues are best identified when good acoustic design needs to be considered early in the planning process.

The PPG-N provides the following advice on how to determine the noise impact on development:

“Plan-making and decision making need to take account of the acoustic environment and in doing so consider:

- *Whether or not a significant adverse effect is occurring or likely to occur;*
- *Whether or not an adverse effect is occurring or likely to occur; and*
- *Whether or not a good standard of amenity can be achieved.*

In line with the Explanatory note of the noise policy statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.” (Paragraph 003 Reference ID 30-003-20190722).

The document goes on to acknowledge the levels of noise exposure at which an effect may occur as provided in the NPSE and introduces a fourth effect level:

- UAE: Unacceptable Adverse Effect: Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise lead to psychological stress or physical effects.

It is important to understand that as the PPG-N does not specifically provide any advice with respect to noise levels/limits for different sources of noise, it is appropriate to consider other sources of advice and guidance documents when considering whether new developments would be sensitive to the prevailing acoustic environment and the PPG-N signposts a number of appropriate guidance documents.

3.4. Local Authority Guidance

3.4.1. Havant Borough Council

The HBC Local Information Requirements (October 2020) for submitting a planning application state:

"A Noise Impact Assessment will be required for developments that are considered to be noise sensitive and/or are close to existing sources of noise or vibration, e.g. major roads, national railway lines and industrial developments, wind turbine.

Proposals that raise issues of disturbance or are considered a noise sensitive development should be supported by a Noise Impact Assessment prepared by a suitably qualified acoustician. Further guidance is provided in the NPPF and Noise Policy Statement for England (March 2010) and by British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound'."

The HBC emerging Local Plan (submitted to the Secretary of State in February 2021) includes policy E22: Amenity and Pollution which states:

"Development proposals will be permitted where:

- a. Projected levels of noise, odour, vibration, light, water or air pollution do not have a likely significant negative effect on the amenity of existing and future users of the site, nearby occupiers or the wider environment; or*
- b. Measures are provided which are suitable for the purposes intended and will ensure that any likely significant negative effect on receptor(s) are mitigated to an acceptable level."*

Policy H8 of the emerging Local Plan relates to the proposed development site and identifies that a noise impact assessment is expected.

HBC Core Strategy (March 2011) sets out the following policies which are relevant to noise for this site. Policy CS16 High Quality Design states:

"Planning permission will be granted for development that is designed to a high standard, which helps to create places where people want to live, work and relax. All development should demonstrate that its design:

- 1. Responds to, draws inspiration from and respects local context and:*

[items a to d do not relate to noise]

- e. *The development does not cause unacceptable harm to the amenity of neighbours through smell, the loss of privacy, outlook, noise and overlooking."*

Policy DM10 Pollution is the primary policy in relation to noise:

"Development that may cause pollution of water, air or soil or pollution through noise, smell, smoke, fumes, gases, steam, dust, vibration, light, heat, electromagnetic radiation and other pollutants will only be permitted where all of the following relevant criteria can be met:

1. *The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk.*
2. *[items 2 to 6 do not relate to noise]"*

The supporting text to policy DM10 references the now revoked PPG24 Planning and Noise, BS 4142 and BS 5228 as sources of information for noise assessment.

3.5. Noise Guidance

BS 4142 *Methods for rating and assessing industrial and commercial sound* provides a method for the measurement and rating of industrial type noise sources and background noise levels outside dwellings. The rating level (defined in the BS) is used to rate the noise level of the source (this is defined as the 'specific sound level') outside residential dwellings.

The rating level is determined by assessing the character of the noise and applying an acoustic feature correction, if appropriate, to the specific sound level. Corrections are applied for the tonality, impulsivity and intermittency of the noise source which can all increase the impact of noise.

The initial assessment described in BS 4142 to determine whether an adverse impact is likely is based on establishing the difference between the rating level and the background noise level outside the residential property of interest. The British Standard states that the following points should be considered:

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

Where it is considered that the initial assessment of the impact needs to be modified due to the context in which the noise is occurring, BS 4142 suggests that all pertinent factors are taken into consideration, including:

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

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

Where residual sound² levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

- 2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*
- 3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:*
 - i. *facade insulation treatment;*
 - ii. *ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
 - iii. *acoustic screening.*

There is also a requirement within BS 4142:2014 to consider the uncertainty in the measurement and assessment procedure.

² The residual sound is defined as the ambient sound level at the assessment location in the absence of the specific sound source

4. BASELINE NOISE LEVELS

A noise measurement survey was carried out at the site between 1030 hrs on Wednesday 24th March 2021 and 1430 hrs on Thursday 25th March 2021. The noise measurement survey comprised three unattended semi-permanent noise monitoring positions on the site for a 24-hour period.

The noise measurements used Svantek 971 and Rion NL-52 Class 1 sound level meters. All of the sound level meters hold current certificates of calibration which are available upon request. The sound levels meters were field calibrated before and after the noise measurement periods to ensure that there had not been a significant drift in calibration (± 0.5 dB).

4.1. Weather Conditions

The weather conditions throughout the noise measurement survey were mostly cloudy with 80% to 100% cloud cover. Daytime temperatures of up to 12°C and winds speeds of less than 3 m/s from a south-westerly direction were recorded.

A short, heavy rain shower occurred from approximately 1145 hrs on Thursday 25th March 2021. More than 24-hours of noise measurement data had been obtained at the unattended semi-permanent positions by the time the rain shower commenced.

The weather conditions during the noise measurement periods are considered to be suitable for obtaining noise measurements.

4.2. Unattended Noise Measurements

Table 4.1 provides the locations of the noise survey measurements which are identified on Figure F.1.

Table 4.1 Noise Survey Locations

Location Reference	Location Description	Measurement Duration	Observed Noise Sources
MP1	Free-field, on the eastern site boundary, approximately 350 m to the west of Monk's Hill. Microphone height: 1.5 m above ground level.	24-hours	Distant road traffic ¹ and birdsong.
MP2	Free-field, on the northern site boundary, approximately 500 m to the south of Emsworth Common Road.	24-hours	Distant road traffic ¹ and birdsong.

Location Reference	Location Description	Measurement Duration	Observed Noise Sources
	Microphone height: 1.5 m above ground level.		
MP3	Free-field, on the southern site boundary, approximately 15 m to the north of Long Copse Lane. Microphone height: 1.5 m above ground level.	24-hours	Occasional traffic ¹ on Long Copse Lane, distant road traffic and birdsong.
Note 1: Distant road traffic is generally assumed to be from the A27 approximately 1.5 km to the south of the site as well as traffic on the local roads in the surrounding area.			

A summary of the free-field noise levels measured at MP1, MP2 and MP3 is presented in **Table 4.2**.

Table 4.2: Summary of Unattended Noise Monitoring Data

Position	Period (hrs)	L _{Aeq,T} (dB)	Average L _{A90,5mins} (dB)	Typical (modal) L _{A90,5mins} (dB)
MP1	0700 to 2300	46	39	40
	2300 to 0700	44	33	26
MP2	0700 to 2300	45	40	41
	2300 to 0700	43	34	28
MP3	0700 to 2300	51	40	42
	2300 to 0700	47	32	27
<p>Notes: The noise measurements were carried out over consecutive 5-minute periods. The L_{Aeq,T} noise levels are logarithmically averaged over the stated time period. The Average L_{A10,5mins} and L_{A90,5mins} are arithmetic averages. The typical L_{A90,5mins} is the lowest, most frequently occurring L_{A90,5mins}.</p> <p>The highest measured maximum noise levels during the night-time at all three positions are influenced by birdsong after 0500 hrs. Therefore, the tenth highest maximum noise levels are an overestimation of the noise impact from environmental noise sources such as road traffic.</p> <p>The L_{A10,T} typically represents road traffic noise and is not normally lower than the L_{Aeq,T}. However, due to the rural nature of the site and limited impact of road traffic noise at these locations, the L_{A10,T} parameter is equal to or lower than the L_{Aeq,T} noise levels.</p>				

4.3. Noise Measurement Limitations

The noise measurement survey was carried out during a period of national lockdown imposed by the UK Government in response to the Covid-19 pandemic. Schools were open at the time of the noise measurement survey, however, road traffic movements on the local roads

around the site may not have been as high as pre-pandemic conditions. The Department for Transport traffic statistics³ indicates that road traffic was at approximately 79% of an equivalent day in February 2020, prior to the pandemic restrictions being imposed. As the noise measurement results are being used to determine the existing background sound level at nearby noise sensitive receptors (NSRs), and reduced traffic flow has the potential to cause a lower background sound level than is typical, this Noise Impact Assessment is considered to provide a robust worst-case assessment.

³ Retrieved from <https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic> 25th May 2021.
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5. NOISE ASSESSMENT METHODOLOGY

5.1. Model Details

The CadnaA noise modelling software has been utilised to calculate the external noise levels from the proposed pumping station. CadnaA is a three-dimensional noise model developed by DataKustik and has been extensively used by ACCON and others to develop noise models for a wide variety of situations and noise sources. CadnaA utilises the methodology in ISO 9613 to predict noise from point, line and area sources.

The following information has been used within the noise model:

- Layout of the proposed development: WSP drawing 'Proposed Foul Water Drainage Strategy', reference 70052250-WSP-LG-00-DR-001 revision P03 dated July 2021
- Topography: Defra Survey Data.

5.2. Selection of Plant

Equipment noise levels have been provided by Pegasus Group. It has been advised that the pumping station will comprise a Type 3 facility (*"Having an incoming peak design flow rate of ≥ 1 litre per second (typically more than twenty dwellings) but with pumps rated no more than 30 kW"*⁴). It is understood that two 30 kW pumps will be the dominant noise sources and that each will have a design limit of 80 dB(A) 1 m from the pump unit centreline⁴. **Figure F.2** provides a typical Type 3 pumping station layout, as provided in the *Design and Construction Guidance for foul and surface water sewers*.

5.3. Wet Well Assumptions

Figure F.3 provides a cross section of a typical pumping station. **Figure F.3** illustrates that the pumps are located underground in a precast concrete or plastic chamber.

The internal noise level within the wet well has been calculated assuming a concrete-built cylinder with a height of 6 m and radius of 1 m. It is assumed that the manhole at the top of the wet well is a steel cover of dimensions 0.75 m x 0.75 m (length x width).

The sound reduction indices and absorption coefficient values provided in **Table 5.1** have been used within the noise calculations.

Table 5.1: Summary of Construction Material Assumptions

Item	Quality	Octave frequency band (Hz)					
		125	250	500	1000	2000	4000
Steel ⁵	R	28	32	33	32	32	33
Concrete	R	31	35	37	44	50	55

⁴ Design and Construction Guidance for foul and surface water sewers offered for adoption under the Code for adoption agreements for water and sewerage companies operating wholly or mainly in England ("the Code"), Approved Version 2.1, 25 May 2021

⁵ Bies, D., Hansen, C. (2003) *Engineering Noise Control*. Third Edition. New York: Spon Press.

Item	Quality	Octave frequency band (Hz)					
		125	250	500	1000	2000	4000
Top of wet well	R	31	35	37	43	47	50
Concrete ⁶	α	0.01	0.01	0.02	0.02	0.02	0.02

⁶ Smith, B., Peters, R., Owen, S. (1996). *Acoustics and Noise Control*. Second Edition. Harlow: Pearson Education Limited.

6. NOISE IMPACT ASSESSMENT

6.1. External Noise to Residential Receptors

The data from the noise measurement survey has been used to determine the impact that will be produced by any potential plant when assessed using the methodology in BS 4142.

6.1.1. Discussion of Context

The majority of the pumping station will be located underground with only a cabinet and a manhole cover observable from outside the pumping station boundary.

6.1.2. Noise from Pumping Station

The nearest noise sensitive receptors (NSRs) to the pumping station will be dwellings forming the proposed Land at Long Copse Lane development. These will be located no closer than 15 m from the pumping station. Existing NSRs are located on Long Copse Lane, at least 200 m to the south of the proposed pumping station. Hollybank House is located approximately 300 m to the west of the proposed pumping station.

Noise from the pumping station may be just perceptibly tonal, but will not be intermittent or impulsive, therefore a penalty of 2 dB has been applied for acoustic characteristics.

Table 6.1 provides a summary of the predicted rating noise levels from fixed plant associated with the development at the nearest NSRs.

Table 6.1: Fixed Plant Noise Levels Predicted at Residential NSRs

NSR	Nearest Noise Measurement Location	Representative Background Sound Level (L _{A90, T₁} dB)		Rating Noise Level (L _{Ar, Tr} dB)	Difference Between Background Sound Level and Rating Noise Level (dB)	
		Daytime	Night-Time		Daytime	Night-Time
Nearest Proposed Dwelling	MP1	40	26	25	-15	-1
Hollybank House	MP1	40	26	Below 0 dB	At least -40 dB	At least -26 dB
Dwellings on Long Copse Lane	MP3	42	27	Below 0 dB	At least -42 dB	At least -27 dB

Table 6.1 indicates that noise from the pumping station will not be audible at existing NSRs. The predicted noise level from the pumping station is up to 23 dB at the nearest proposed dwelling. This is 1 dB lower than the existing background sound level. BS 4142 advises that "Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

6.2. Increase in Road Traffic Noise

The pumping station is not anticipated to require regular vehicle access, therefore the increase in road traffic noise is considered to be negligible.

6.3. Vibration

The pumps should be adequately isolated to ensure that vibration levels are minimised. If properly isolated, it is not considered that the pumps will cause significant vibration levels to nearby NSRs.

6.4. Discussion of Uncertainty

6.4.1. Noise Survey

The noise survey was undertaken during national lockdown restrictions, as imposed by the UK Government on 4th January 2021. It is therefore possible that the measured background sound levels are lower than they typically would be. However, this is considered to provide a robust worst-case assessment in terms of comparison of the pumping station specific noise level with the background sound level.

6.4.2. Assessment

The assumptions used in the assessment are based on information provided by third parties (Pegasus Group and WSP), therefore the accuracy of the information cannot be verified. The dimensions of the wet well of the pumping station used in the calculation of the noise levels have been estimated from the 'Design and Construction Guidance for foul and surface water sewers'¹⁴.

Overall, it is considered that this noise assessment represents a reasonable assessment with a low level of uncertainty in the calculation procedure.

7. SUMMARY

A noise assessment has been carried out to consider the noise impact of the proposed pumping station at Long Copse Lane on the nearest existing and proposed noise sensitive receptors to the site.

An assessment of the noise impact of the proposed pumping station on residential NSRs has been completed in line with the methodology provided in BS 4142:2014+A1:2019. The assessment indicates that the rating noise level of pump noise will not exceed the background sound level.

The increase in road traffic noise due to the pumping station is considered to be negligible.

This assessment has demonstrated that the aims of paragraph 185 of the NPPF will be met as noise from the proposed pumping station will not result in any significant adverse impacts on health or quality of life with regard to noise to nearby NSRs.

ADDITIONAL FIGURES

Figure F.1: Noise Survey Locations



Figure F.2: Typical Pumping Station Layout: Plan View⁴

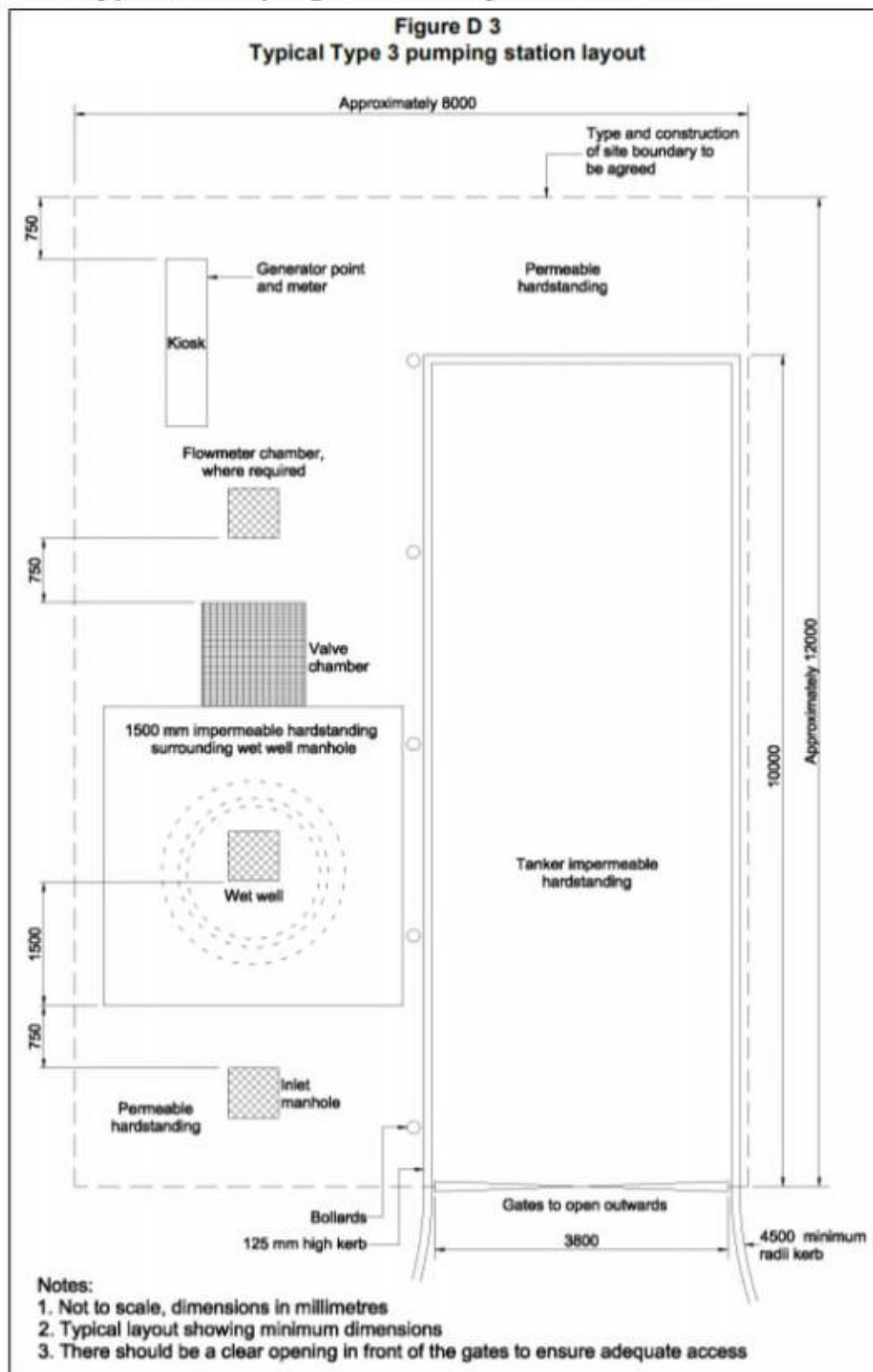
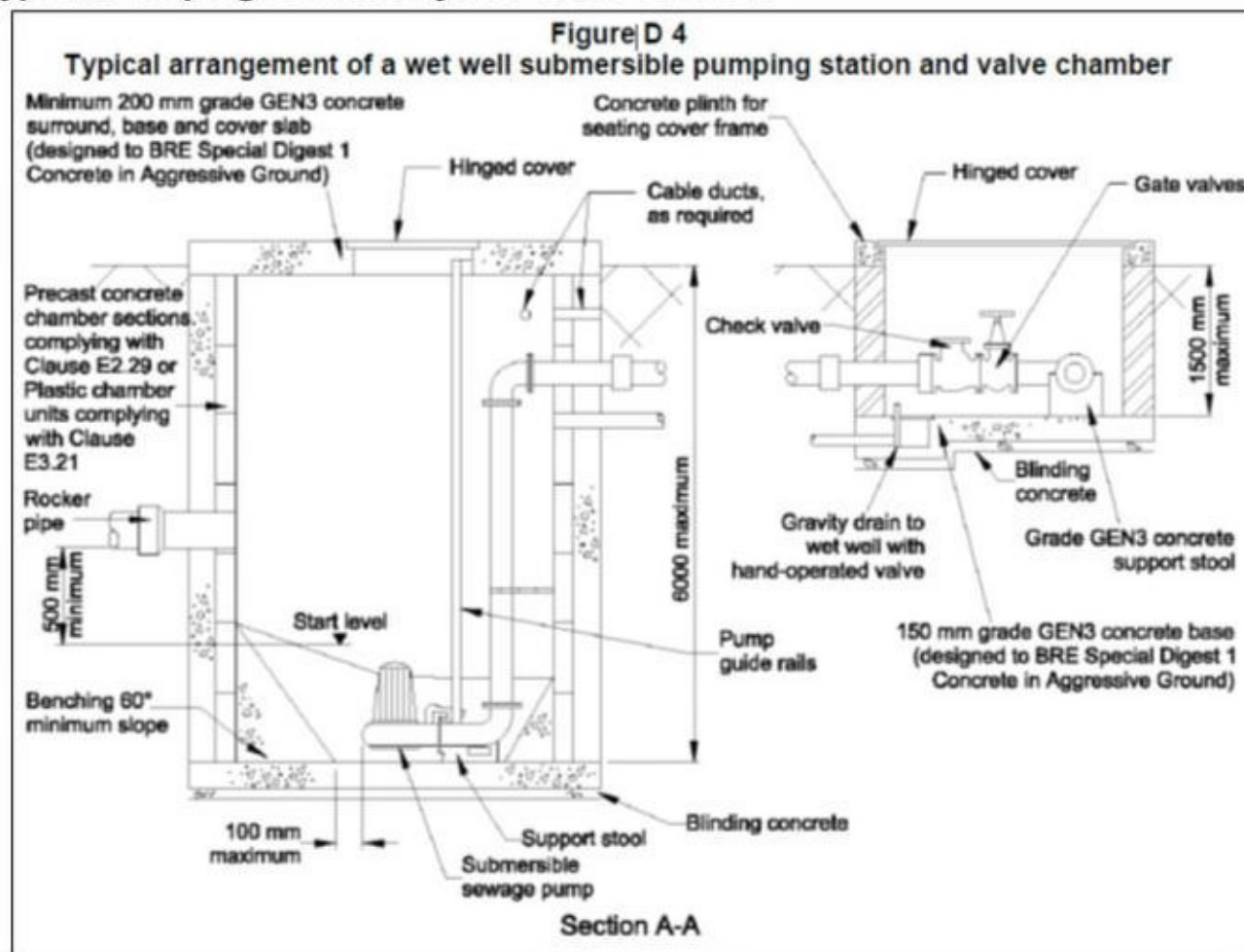


Figure F.3: Typical Pumping Station Layout: Cross Section⁴



APPENDICES

Appendix 1 **Glossary of Acoustic Terminology**

Term	Description
'A'-Weighting	This is the main way of adjusting measured sound pressure levels to take into account human hearing, and our uneven frequency response.
Decibel (dB)	This is a tenth (deci) of a bel. A decibel can be a measure of the magnitude of sound, changes in sound level and a measure of sound insulation. Decibels are not an absolute unit of measurement but are an expression of ratio between two quantities expressed in logarithmic form.
Ambient /Period Sound Level, $L_{Aeq, T}$	The equivalent steady sound level in dB containing the same acoustic energy as the actual fluctuating sound level over the given period, T. T may be as short as 1 second when used to describe a single event, or as long as 24 hours when used to describe the noise climate at a specified location. $L_{Aeq, T}$ can be measured directly with an integrating sound level meter.
Background Sound Level, $L_{A90, T}$	The 'A'-weighted sound pressure level of the residual noise in decibels exceeded for 90 per cent of a given time (T). The $L_{A90, T}$ is used to describe the background noise levels at a particular location.
Rating Level, $L_{Ar, Tr}$	The specific sound level plus any adjustment for the characteristic features of the sound.
Specific Sound Level, $L_{Aeq, Tr}$	The equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr .
R	Sound reduction index. Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band



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