Cloughton-2 Appraisal Wellsite, Coastal Road, Burniston, Scarborough, YO13 0DB

Noise and Vibration Impact Assessment to support Planning and Environmental Permit Applications

Report ref.
ARC7281/24160/V3

Issued to
Europa Oil and Gas Ltd

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1. INTRODUCTION

Europa Oil and Gas Ltd is seeking planning permission to undertake to drill and test an appraisal well at Burniston Mill, Coastal Road, Burniston, Scarborough, YO13 0DB. This relates to the Cloughton Gas Field (PEDL343 licence).

The works involve four phases:

Phase 1: Construction
Phase 2: Drill
Phase 3: Proppant Squeeze and Flow Testing
Phase 4: Well decommissioning, site restoration and aftercare

Spectrum Acoustic Consultants has been instructed by Europa Oil and Gas Ltd to undertake a noise and vibration impact assessment (NVIA) for these activities to support both the planning application and, if required, an application for an Environmental Permit.

North Yorkshire Council (NYC) provided helpful guidance on the scope required of the NVIA in their pre-application advice of 11 June 2024, which is discussed in more detail later.

The particular requirements of an NVIA, or more particularly a Noise Impact Assessment (NIA), submitted to the Environment Agency (EA) for an Environmental Permit, are specified in a number of published documents.

The approach adopted in this NVIA was laid out in Noise and Vibration Scoping Report *(reference ARC7276/24160/V2, 25/9/2024)* issued to NYC and the EA. Responses have been received from both which have allowed modifications to be made to the approach and methodology used in the assessment. In particular this related to ensuring a significant and robust baseline noise dataset with appropriate post processing.

Responses from NYC to the pre-application guidance request and responses from both NYC and the EA in relation to the Noise and Vibration Scoping Report are discussed in more detail in section 5.

This NVIA report seeks to support both a planning application to NYC and an application for an Environmental Permit from the EA.

2. ABBREVIATIONS

BAT - Best Available Techniques
BS - British Standard
EA - Environment Agency
EIA – Environmental Impact Assessment
IEC - Internation Electrotechnical Commission
ISO - International Standards Organisation
LOAEL - Lowest Observable Adverse Effect Level
MPA - Mineral Planning Authority
NIA - Noise Impact Assessment
NML - Noise Monitoring Location
NMP- Noise Management Plan
NNG - Night Noise Guidelines for Europe
NPPF - National Planning Policy Framework
NPSE- Noise Policy Statement for England
NSR - Noise Sensitive Receptor
NSTA - North Sea Transition Authority
NTS - National Transmission System (Gas)
NQA - National Quality Assurance Limited
NVIA – Noise and Vibration Impact Assessment
NYC – North Yorkshire Council
PPG-N - Planning Practice Guidance – Noise
PPG-M - Planning Practice Guidance – Minerals
SOAEL - Significant Observable Adverse Effect Level
UKAS - United Kingdom Accreditation Service
WHO - World Health Organization

3. LOCATION OF PROPOSED APPRAISAL WELLSITE

The location of the proposed appraisal wellsite is immediately to the northeast of an existing solar farm of EV panels and associated invertors and other equipment. This in turn adjoins the operating Burniston Mill which manufactures animal feed. The site is accessed from Coastal Road (A165) on the southeast edge of Burniston village. To the north, east and south of the site is arable farmland. To the west is a small number of industrial and commercial premises and, beyond that, there is housing on the edge of the village of Burniston some 420m from the centre of the proposed appraisal well site. The location of the site is shown in Figure 1.

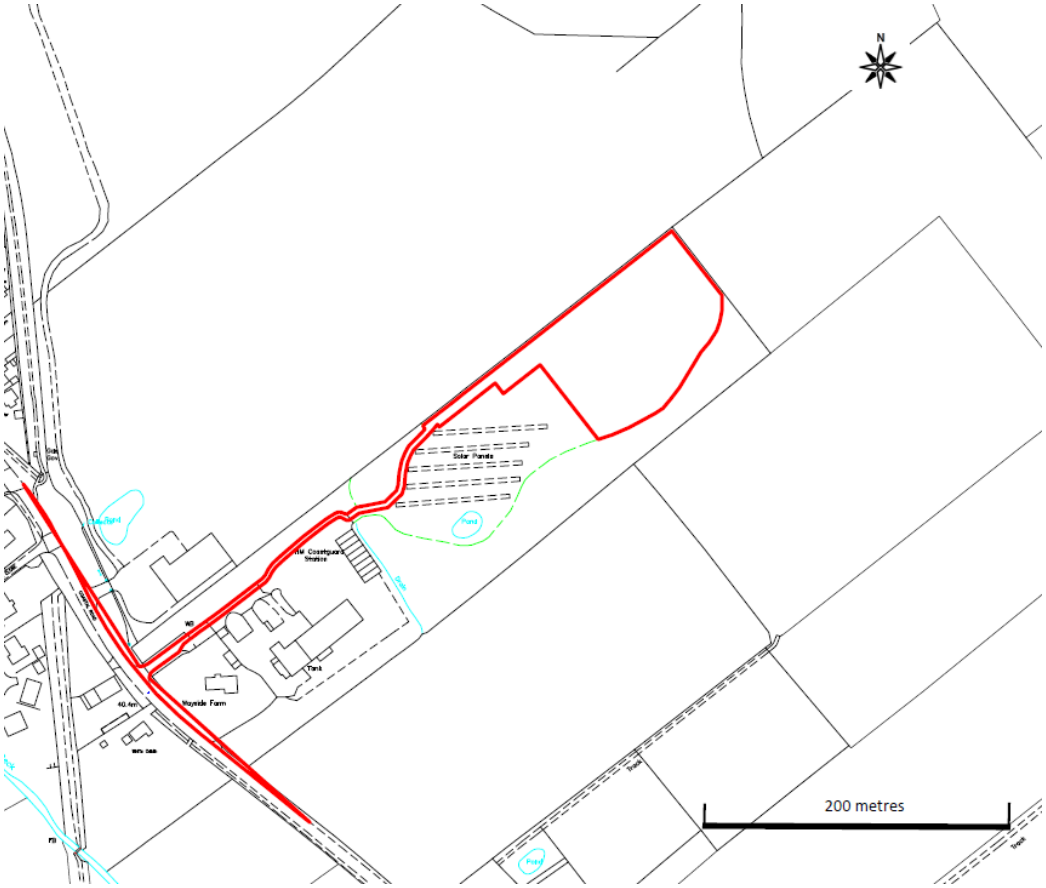

Figure 1: Proposed location of appraisal wellsite

The nearest noise sensitive receptors (NSR) are residential properties and are represented by four locations to the north, west and south of the proposed site. These are identified along with set back distances, in Table 1. Figure 2 shows their locations.

Noise sensitive receptor (NSR)	NSR Name	Distance (m) and Direction in relation to wellsite centre	OS grid reference
NSR1	Wayside Farm	350m SW	501788E, 492579N
NSR2	House on Field Lane	530m NW	501716E, 493199N
NSR3	House on Bridge Close	440m W	501637E, 492769N
NSR4	Flatts Farm	420m SW	502000E, 492383N

Table 1: Distances and directions from centre of development site to noise sensitive receptors (NSR)

Figure 2: Location Map showing Noise Sensitive Receptors (NSRs)

4. PROPOSED DEVELOPMENT

Table 2 shows the various phases of the development of the Cloughton-2 proposed appraisal well and identifies, following some consultation, which phases of the development are required to be included in the NVIA.

The planning application for whole of the appraisal development requires all phases to be included in the NVIA. The permit application relates only to the testing/appraisal phase. Phase 4 is not specifically included as the works and noise impacts are similar to Phase 1.

	Needs to be included in NVIA submitted for Planning or for Permitting	
	Planning	**Permit**
Phase 1: Construction of a temporary drilling pad.	Yes	No
Phase 2: Drill single appraisal well	Yes	No
Phase 3: Testing and appraisal including workover and proppant squeeze	Yes	Yes
Phase 4: Well decommissioning, site restoration and aftercare	No	No

Table 2: Stages of the development to be included in the Noise and Vibration Impact Assessments (NVIA)

Appendix A includes site layouts of each of these phases of work, showing the location of temporary equipment and plant on the site for each stage.

5. CONSULTATION RESPONSES

5.1 PLANNING – NORTH YORKSHIRE COUNCIL

In the response of 11th of June 2024 to the request for pre-application advice (NY/2024/0043/PRE), NYC refer to a number of relevant development plan policies. Those particularly relevant to noise and vibration matters are:

- policies M17 (Other spatial and locational criteria applying to hydrocarbon development) and D02 (Local amenity and cumulative impacts) both from the Minerals and Waste Joint Plan 2022; and

- policy DEC 4 (Protection of Amenity) from the Scarborough Borough Local Plan 2017.

Within this advice the Environmental Health Officer (EHO) requested in relation to the potential noise impact, that a noise assessment would be required and that consideration should be given particularly to the impact of 24-hour operation; the effects on ecology and on tranquillity

Subsequent to this, the EHO provided a further request (12th September 2024) that the noise assessment included consideration of the potential for vibration effects..

In response to the more detailed Noise and Vibration Scoping Report[1] issued to NYC specifically covering the proposed approaches and methodologies, as well as the particular aspects to be covered in the NVIA, NYC Environmental Health Services sought a site meeting with the applicant's noise consultant (Spectrum) to view the site and discuss relevant matters before NYC formally responded in writing. The site meeting took place on 11th October 2024. Following this, Environmental Health Services requested the following information to support the planning application:

Noise & Vibration

A full and complete noise and vibration assessment must be undertaken which assesses the impact on nearest sensitive dwellings and other premises for which there could be a material adverse impact being:

- *Noise from the construction phase of the drilling rig and associated infrastructure*
- *Drilling operations- including onsite equipment*
- *Deliveries and removal of materials*

[1] *Appraisal Well at Burniston Mill, Coastal Road, Burniston, Scarborough, YO13 0DB. Noise and Vibration Scoping Report ARC7276/24160/V2 25.9.24*

- *Vehicles onsite including reversing/noise audible warnings*
- *Flare noise*
- *Start-up alarms*
- *Noise from communications equipment*

Noise management plan and incident response protocols should be included

References to BS4142 & BS 5228 should be applied as appropriate.

Noise and vibration must be kept to a minimum by methods of work that conform with the 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' (See BS 5228-1:2009+A1:2014, and EC and UK Noise Legislation, as applicable).

The following can be confirmed:

- Noise aspects of tranquillity are considered with the NVIA
- Details of noise mitigation will be provided
- The issues raised in relation to matters such as disturbance through deliveries, reversing sounders/alarms on site vehicles and communications equipment, are considered and may be covered within standard NYC planning conditions.
- Vibration impacts, from mechanical sources, are assessed within the NVIA. This will predominantly arise during the drilling phase, where there is the potential for rotating equipment operating in the upper levels of the ground, to generate vibration.
- The potential for minor seismic and other effects from the application of proppant squeeze well stimulation is beyond the scope of this study. The seismic activity falls under the authority of the North Sea Transition Authority (NSTA) in conjunction with the EA and HSE, and in due course will involve a later and separate application to that authority with full details of the work to be done and the monitoring to be put in place to detect and act upon any minor seismic activity.

5.2 PERMITTING – ENVIRONMENT AGENCY

The Noise and Vibration Scoping Report[1] was issued to the EA following a request for pre-application advice (enhanced service).

Subsequently the EA (AQMAU) responded to the Noise and Vibration Scoping Report with detailed comments *(italic*). These are now included in full along with an explanation of how these responses are being incorporated into the proposed redevelopment (non-italic).

Review of the Noise scoping report

Section 6 – Noise sensitive Receptors
The Environment Agency would agree that those sensitive receptors identified in Figure 2 are the potentially worst affected receptors.

In terms of locations for background sound level surveys, the Environment Agency accepts that it can be difficult to place microphones in the exact location of noise sensitive receptors. In all cases clear justification of the locations used within the background sound level survey should be provided.

As stated in the Environment Agency guidance the background sound level survey should not be influenced by any sound emissions associated with the site, this would include any sound emissions from construction of the site.

Section 7 – Phases of the development
The document includes the following table:

	Propose to be Included In NVIA submitted for Planning or for Permitting	
	Planning	***Permit***
Phase 1: Construction of a temporary drilling pad.	*Yes*	*No*
Phase 2: Drill single appraisal well	*Yes*	*EA to advise*
Phase 3: Testing and appraisal including workover and proppant squeeze	*Yes*	*Yes*
Phase 4: Well decommissioning, site restoration and aftercare	*No*	*No*

Table 2: *Stages of the development to be included in the Noise and Vibration Impact Assessments (NVIA)*

-The drilling and construction activities do not fall under EA regulations; therefore, they do not need to be included in the noise assessment for the environmental permit. Please note that noise from drilling is sometimes considered if the operator combines the noise assessments for planning and EA purposes.

Section 8 – Matters to be scoped out

It is not clear what is meant by "cumulative effects/impacts" therefore we cannot comment on whether these aspects of the assessment can be scoped out.

Section 9 – Baseline noise survey

The document queries whether or not the length of the survey (2-3 week unattended survey with additional attended measurements where possible) is sufficient. A 2-3 week period, would normally be sufficient for a background sound level survey as long as enough of the measurement period is during acceptable weather as defined in BS 4142 and BS 7445. Note that the EA considers weekend to be a more sensitive time than during the week. Therefore, in line with BS 4142 a separate background sound level and subsequent BS 4142 assessment should be carried out during the weekend if operational hours of the site are over the weekend.

Section 10 – Assessment methodologies

The Environment Agency will be using the BS 4142 assessment to make decisions on the acceptability of impacts from the site. Within the BS 4142 standard the context does allow for other aspects to be considered.

Section 15 – Additional information required within an EIA

The document states "the applicant will consider mitigation of noise and vibration … However this will be extended in the event that an EIA is required". Noise mitigation measures should be proposed on site in order to appropriately control noise impacts caused by the site, regardless of whether an EIA is required or not. The impacts should be controlled to an acceptable level as defined by the Environment Agency guidance.

Further comments

It will be important that the submitted noise impact assessment clearly defines the process conducted during the Phase 3 of the operation of the site. For instance, where there are different operational scenarios occurring on site it may be necessary to consider the sound emissions of each of these different operational scenarios separately.

In Section 13 the consultant states that they may want to talk with a noise specialist to clarify these comments above, we would be happy to do this if they require any further clarification.

This concludes the EA responses to the Noise Scoping Report.

The following can be confirmed:

- The noise monitoring locations (NMLs) are considered to be representative of the noise sensitive receptors, and their selection is justified within the NVIA

- Whilst it is noted that the EA confirm that the drilling of wells can be excluded from the NVIA, it is included here to satisfy the MPA.

- The 'cumulative impacts' proposed to be scoped out would be those potential noise sources associated with other consented developments, which are not yet built. The impact would be on existing residential sensitive receptors (NSRs) and consented residential receptors.

- The baseline noise survey was carried out between 10.10.2024 and 5.11.2024 a period of 3 weeks and 5 days. This extended survey period meant that there is a sufficiently large dataset to evaluate the impact at weekends as well as weekdays, and to consider the influence of wind direction on the baseline noise.

- The EA consider weekends to be a more 'sensitive' period than weekdays and seek separate assessments for weekends as well as weekdays. This is not however reflected within the formal sections of BS 4142 (especially at night). The background levels during the weekend periods are compared to those during the week in the NVIA. Where these do not differ significantly, then a weekend assessment is not undertaken, as the BS 4142 impact would be the same.

- A single weather station was located close to one of the noise monitors to ensure weather data for the immediate area was used, rather than historic data from a commercial permanent weather station in a nearby airfield.

- Computer model files will be submitted in both the original formats as well as QSI data exchange format to the EA directly. The large excel spreadsheet output from the noise monitors (2,500 lines of data for each monitor) will be forwarded to the EA, if requested.

- Baseline noise survey data recorded and reported within this NVIA includes, as requested, date, time, $L_{A90,T}$ and $L_{Aeq,T}$ for each noise measurement. And for weather data this includes date, time, wind speed (average), wind direction and precipitation (including 1 hour after rains ceases which is considered the period when wet road surface water will be draining away).
- The soundscape is described from observations made at receptors regarding acoustically dominant and contributory sources, and subjective listening to short samples from a dataset of hourly recordings of highest digital sound quality.

- A Best Available Techniques (BAT) assessment is included within the NVIA regarding testing/appraisal phase noise, acknowledging this as fulfilling the requirements for a Cost Benefit Analysis of mitigation methods.

6. MATTERS SCOPED OUT

- Assessment of noise from vehicles associated with the proposed development, when travelling on public roads. (Vehicles travelling along the site access road within the red line development boundary are included in the assessment)

- Detailed assessment of noise impact to ecological receptors. This is a matter that applies, in the case of terrestrial ecology, primarily to bird species and then only at nationally designated areas. The nearest nationally designated site is the Iron Scar and Hundale Point to Scalby Ness SSSI, where disturbance to seabirds could be of concern. However, the setback distance is sufficiently large at 800m that typical noise impacts during drilling and appraisal would be less than 30 dBA. Natural England's recent report[2] (September 2024) on noise disturbance in the Solent advised that '*birds are more likely to respond to noise disturbance when the sound pressure levels at the location of the birds are at least 20.0 dB(A) above the typical background noise level. However, the visual nature of any noise disturbance is also likely to cause responses from the birds'.* With background noise levels being 30-40 dBA, the threshold of impact would therefore be 50- 60 dBA, which is much higher than the 30 dBA expected from activities from the proposed site.

- Any matters that would only normally be considered if an Environmental Impact Assessment was required.

[2] *Noise Disturbance – Baseline Level Monitoring in the Solent, September 2024, Natural England Commissioned Report NECR570*

7. POLICY CONTEXT

NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework (NPPF)[3] sets out the Government's planning policies for England and how these should be applied by establishing a framework within which locally prepared plans for development can be produced.

The NPPF requires (187) prevention of new or existing development from contributing to, or being adversely affected by, unacceptable levels of noise pollution.

New development (198) should be appropriate to its location taking into account the likely effects of pollution on health, living conditions and the natural environment. In doing so it is required to:

> *'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[4];*
>
> *'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'*

The NPPF also sets out a framework for the sustainable use of minerals, with a further three paragraphs being relevant to noise:

'*It is essential that there is a sufficient supply of minerals to provide the infrastructure, buildings, energy and goods that the country needs. Since minerals are a finite natural resource, and can only be worked where they are found, best use needs to be made of them to secure their long-term conservation'.* (222)

'P*lanning policies should* […] *when developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction'*. (223)

'When determining planning applications, great weight should be given to the benefits of mineral extraction, including to the economy. In considering proposals for mineral extraction, minerals planning authorities should: […]

b) *'ensure that there are no unacceptable adverse impacts on the natural and historic environment, human health or aviation safety, and take into account the cumulative effect of multiple impacts from individual sites and/or from a number of sites in a locality;*

c) *'ensure that any unavoidable noise* […] *and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties;* […]*'* (224)

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[3] *National Planning Policy Framework, MHCLG, December 2024*

[4] *See Explanatory Note to the Noise Policy Statement for England, paragraphs 2.23 and 2.24 , Department for Environment, Food & Rural Affairs,15 March 2010).*

NOISE POLICY STATEMENT FOR ENGLAND (NPSE)

The NPSE was published in March 2010 and sets out the long term vision of Government noise policy as follows:

- *'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.'*

The NPSE aims to clarify the principles and aims in existing policy documents, legislation and guidance that relate to noise. Its long term vision is supported by the following aims:

'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'*

These aims are developed by reference to concepts from toxicology, namely NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level). NPSE also refers to SOAEL (Significant Observed Adverse Effect Level).

It recognises that there is no universally applicable measure for the concepts. Consequently, the SOAEL is likely to be different for different noise sources and receptors and at different times. Even so, significant effects should be avoided, taking account of sustainability aims.

Where noise impact is between LOAEL and SOAEL, the NPSE requires that all reasonable steps should be taken to mitigate adverse effects while taking account sustainable development aims. It notes (Para. 2.7) that *'the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation.'*

MINERALS AND WASTE JOINT PLAN 2022

The following text relating to noise has been extracted from the relevant policies:

Policy M17: Other spatial and locational criteria applying to hydrocarbon development

The sections of this policy particularly relevant to noise impact are:

2) Cumulative impact

i) Hydrocarbon development will be permitted in locations where it would not give rise to unacceptable cumulative impact, as a result of a combination of individual impacts from the same development and/or through combinations of impacts in conjunction with other existing, planned or unrestored hydrocarbons development. Applications for appraisal and production activities should specifically address the potential for cumulative impacts of development upon climate change and where appropriate, propose such mitigation and adaptation measures as may be available and are consistent with Policy D11 and the requirements of other relevant regulators.

ii) Well pad density and/or the number of individual wells within a PEDL area will be limited to ensure that unacceptable cumulative impact does not arise. Assessment of the contribution to cumulative impact arising from a proposal for hydrocarbon development will include (but not necessarily be limited to) consideration of:

a. *The proximity of a proposed new well pad site to other existing, permitted or unrestored well pads, and the extent to which any combined effects would lead to unacceptable impacts on the environment or local communities, including as a result of any associated transport impacts;*
b. *The duration over which hydrocarbon development activity has taken place in the locality and the extent to which any adverse impacts on the environment or local communities would be expected to continue if the development were to be permitted;*
c. *The sensitivity of the receiving environment, taking into account the nature and distribution of any environmental constraints, proximity to local communities, the availability of adequate access links to the highway network and the need to ensure a high standard of protection in line with other relevant policies in the Plan.*

Where results from any earlier exploration and/or appraisal activity are available, proposals for production of unconventional hydrocarbons should include information on how the proposal is intended to fit within an overall scheme of production development within the PEDL area and should ensure as far as practicable that production sites are located in the least environmentally sensitive areas of the resource.

3) Local economy
Hydrocarbon development will be permitted in locations where a high standard of protection can be provided to environmental, recreational, cultural, heritage or business assets important to the local economy including, where relevant, important visitor attractions. The timing of short term development activity likely to generate high levels of noise or other disturbance, or which would give rise to high volumes of heavy vehicle movements, should be planned to avoid or, where this is not practicable minimise, impacts and take into account seasonal variations and peaks in traffic movements.

4) Specific local amenity considerations relevant to hydrocarbon development

i) Hydrocarbon development will be permitted in locations where it would not give rise to unacceptable impact on local communities or public health. Adequate separation distances should be maintained between hydrocarbon development and residential buildings and other sensitive receptors in order to protect against unacceptable adverse individual and cumulative impacts on amenity and public health, in line with the requirements of Policy D02. Proposals for surface hydrocarbon development, particularly those involving hydraulic fracturing, within 500m of residential buildings and other sensitive receptors, will only be permitted in following the particularly careful scrutiny of supporting information which robustly demonstrates how in site specific circumstances an unacceptable degree of adverse impact can be avoided.

ii) Proposals should refer to any relevant data from baseline monitoring and other available information to ensure that a robust assessment of potential impacts is undertaken, and that comprehensive mitigation measures are proposed where necessary.

Policy D02: Local amenity and cumulative impacts

d. Proposals for minerals and waste development, including ancillary development and minerals and waste transport infrastructure, will be permitted where it can be demonstrated that there will be no unacceptable impacts on the amenity of local communities and residents, local businesses and users of the public rights of way network and public open space including as a result of:

- *noise,*
- *dust,*
- *vibration,*
- *odour,*
- *emissions to air, land or water*
- *visual intrusion,*
- *site lighting*
- *vermin, birds and litter*
- *subsidence and land instability*
- *public health and safety*
- *disruption to the public rights of way network*
- *the effect of the development on opportunities for enjoyment and understanding of the special qualities of the National Park*
- *cumulative effects arising from one or more of the above at a single site and/or as a result of a number of sites operating in the locality*

Proposals will be expected as a first priority to prevent adverse impacts through avoidance, with the use of robust mitigation measures where avoidance is not practicable.

It remains a design objective of the proposed development to avoid significant adverse impacts and endeavour to avoid if possible, or minimise if not, those impacts which once mitigated remain marginally adverse.

SCARBOROUGH LOCAL PLAN (2017)

The main policy in the Scarborough local plan relating to noise is DEC 4: Protection of Local Amenity.

Policy DEC 4: Protection of Local Amenity

Proposals should ensure that existing and future occupants of land and buildings are provided with a good standard of amenity. Proposals for development should not give rise to unacceptable impacts by means of

a. overbearing impact;

b. overlooking and loss of privacy;

c. disturbance arising from such things as noise, light pollution and other activities;

d. emissions including smells and other pollutants; or

e. overshadowing or loss of natural light.

The criteria listed above are not exhaustive and development that causes significant harm to amenity by means of these or other impacts will not be permitted.

This policy broadly seeks to avoid unacceptable noise impacts, which would be taken to be those which were 'significant adverse' but does not go as far as National Policy and guidance which also requires that lesser impacts which come into the category of 'adverse impacts' should be mitigated to as low a level as possible.

8. GUIDANCE AND STANDARDS

PLANNING PRACTICE GUIDANCE – NOISE (PPG-N)

Planning Practice Guidance on Noise[5] (PPG-N) sets out government guidance on '*how planning can manage potential noise impacts in new development'*.

Whilst it does advise that noise can override other planning concerns, *'where justified'*, it states that *'it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users and its surroundings, as these can have an important effect on whether noise is likely to pose a concern' (paragraph 002)*.

It also details the hierarchy of noise exposure, including the thresholds LOAEL and SOAEL, based on the likely average response, referred to within NPSE[6]. The noise exposure categories are summarised below.

- No Observed Adverse Effect: Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response.
- Observed Adverse Effect: Noise can be heard and causes small changes in behaviour, attitude or other physiological response.
- Significant Observed Adverse Effect: The noise causes a material change in behaviour, attitude or other physiological response.
- Unacceptable Adverse Effect: Extensive and regular changes in behaviour, attitude or other physiological response, and/or an inability to mitigate effect of noise leading to psychological stress.

The guidance advises, in accordance with the first and second aims of the NPSE, that where there is no observed effect or no observed adverse effect, no specific measures are required to manage the acoustic environment; where there is an observed adverse effect, consideration needs to be given to mitigating and minimising those effects; where there is significant adverse effects, the planning process should be used to avoid these effects occurring; where there are unacceptable adverse effects, the situation should be prevented.

[5] *PPG - Noise, MHCLG, 22 July 2019*
[6] *Explanatory Note to the Noise Policy Statement for England*, *paragraphs 2.19 and 2.20, DEFRA,15 March 2010)*

In establishing values for LOAELs and SOAELs, which represent the onset levels of adverse effects and significant adverse effects, respectively, the guidance advises because of the subjective nature of noise, there is no simple relationship between noise level and its impact. It will instead depend on a number of factors in a particular situation. These will include:

- The source, its absolute level and the time of day.
- For intermittent sources, the number and duration of events;
- The spectral frequency content of the noise

And other factors will need to be considered in many cases, which are more fully described and detailed in paragraph 6 and 8 of the Noise PPG but include matters such as:

- The cumulative impacts with other sources
- Whether internal effects can be completely removed for example by closing windows (relevant with new residential development subject to ventilation being developed)
- Whether existing noise sensitive locations already experience high noise levels,
- Where Noise Action Plans, and, in particular Important Areas are identified nearby.
- The effect on wildlife especially on nationally designated sites.
- The use of external amenity spaces intrinsic to an overall design and including private gardens.
- The potential effect of a new residential or other sensitive development being located close to an existing noisy business or site, and for noise mitigation to be considered.
- Whether there are nearby areas of tranquility relatively undisturbed by noise from human caused sources that undermine the intrinsic character of the area and likely already valued for their tranquillity.

It should be observed that the PPG guidance does not provide any detail on the how such assessment including these factors, should be carried out. However, reference is made to documents published by other organisations, such as:

- *BS 8233:2014– Guidance on sound insulation and noise reduction for buildings (British Standards Institute 2014);*
- *Guidelines for Environmental Noise Impact Assessment (Institute of Environmental Management and Assessment, 2014);*
- *ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise- New Residential Development (Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health, May 2017).*

This should not be considered an exhaustive list, however, as reference may also be made to other existing British Standards, where relevant, and to scientific exposure-response studies or reviews relating to noise and its effects on human and, where appropriate, animal populations.

PLANNING PRACTICE GUIDANCE – MINERALS (PPG-M)

PPG-M (17 October 2014) provides further detail for noise assessment of developments specifically related to minerals extraction.

Paragraph 19 sets out how minerals operator should seek to control noise emissions. It advises that proposals for the control or mitigation of noise emissions should:

- *'consider the main characteristics of the production process and its environs, including the location of noise-sensitive properties and sensitive environmental sites;*
- *assess the existing acoustic environment around the site of the proposed operations, including background noise levels at nearby noise-sensitive properties;*
- *estimate the likely future noise from the development and its impact on the neighbourhood of the proposed operations;*
- *identify proposals to minimise, mitigate or remove noise emissions at source;*
- *monitor the resulting noise to check compliance with any proposed or imposed conditions'*

Paragraph 20 states that, '*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 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 21 states that '*mineral planning authorities should aim to establish a noise limit, through a planning condition, at the noise-sensitive property*.' During the daytime (07:00-19:00) and evening (19:00-22:00) periods the noise level from the proposed activities should not exceed the background sound level, $L_{A90,1hr}$, by more than 10dB. (Taking account of the acoustic character of the sound, this is at least equivalent to, and potentially greater than, the threshold of significant adverse impact as defined in BS 4142). It recognises, however, that this is often not achievable without imposing unreasonable burdens on the mineral operator and suggests that where this is the case, noise levels from operations should be as near that level as possible and should not exceed $L_{Aeq,1hr}$ 55dB.

Paragraph 21 also states, '*care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed.'*

During the night-time period (22:00-07:00) it is advised that noise from operations should not exceed $L_{Aeq,1hr}$ 42dB (free field). No reference is made to any comparison with the background sound level for this period, suggesting that a BS 4142 style assessment is not considered to be an appropriate assessment methodology for the night-time period.

Paragraph 22 suggests that it may be appropriate to set higher noise limits for some particularly noisy but short term activities, identifying '*activities such as soil-stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new permanent landforms and aspects of site road construction and maintenance*.'

It states, '*increased temporary daytime noise limits of up to 70dB(A) LAeq 1h (free field) for periods of up to 8 weeks in a year at specified noise-sensitive properties should be considered to facilitate*

essential site preparation and restoration work and construction of baffle mounds where it is clear that this will bring longer-term environmental benefits to the site or its environs.'

It further recommends that '*where work is likely to take longer than 8 weeks, a lower limit over a longer period should be considered*, and that, *in some wholly exceptional cases, where there is no viable alternative, a higher limit for a very limited period may be appropriate in order to attain the environmental benefits*.'

The suggested noise limits for minerals extraction sites, as set out in the PPG Minerals guidance, are higher than those that would typically apply to other permanent industrial/commercial developments. This reflects the position of the NPPF by recognising the economic and social benefits being derived from minerals extraction and that the range of potential site locations is limited by the location of the natural resource.

The guidance does not specifically define what noise level would be considered to represent a SOAEL. What is clear, however, is that the SOAEL varies with duration of impact and that any assessment must consider both the level and duration when establishing thresholds.

For site preparation works during the day, guideline levels are typically L_{Aeq} 70dB, reducing to L_{Aeq} 60dB for the first and final hour or so of daytime activity. During the night-time period, a guideline noise level of L_{Aeq} 45dB is indicated.

For operation of temporary sources such as a drilling rig, daytime guideline levels are up to L_{A90} + 10dB (in reference to the background sound level), reducing to L_{A90} + 5dB during the evening period. At night, the guideline level is L_{Aeq} 42dB.

For operation of permanent plant installations, Paragraph 112 advises '– *whilst planning conditions may be imposed to prevent run-off of any liquid from the pad, and to control any impact on local amenity (such as noise), the actual operation of the site's equipment should not be of concern to mineral planning authorities as these are controlled by the Environment Agency and the Health and Safety Executive*'

<u>BS 5228-1:2009+A1:2014 CODE OF PRACTICE FOR NOISE AND VIBRATION CONTROL ON CONSTRUCTION AND OPEN SITES – PART 1:NOISE</u>

Construction site noise is assessed differently to noise from permanent installations as it is recognised that some degree of noise is an inevitable by-product of required works and that the construction works are a transient activity.

Annex E of BS 5228-1 provides guidance on assessing the significance of noise effects resulting from construction activities. It sets out two general methodologies for assessment. The first is based on absolute noise limits, which was principally developed for the determination of eligibility for noise insulation. The second (ABC Method) is based on noise level change and is used to indicate a '*potential significant effect'*.

The ABC Method takes account of the existing baseline noise condition by defining three baseline categories (A, B, and C) for which different criteria apply. Noise from construction activities is then assessed against this criteria. Where a potential significant effect is indicated, further consideration of

other factors (number of affected receptors, duration, acoustic character, etc.) should be taken into account to establish whether or not there is a significant effect.

GUIDELINES FOR COMMUNITY NOISE (GCN) – WORLD HEALTH ORGANISATION (WHO), 1999

New guidance from WHO titled Environmental Noise Guidelines for the European Region (ENG) was published in 2018. The document takes a very different approach to guidance set out in the previous Guidelines for Community Noise (GCN) document by identifying separate thresholds for specific sources rather than for community noise as a whole. Consequently, much of the earlier guidance set out in GCN is now absent from ENG. While ENG was intended to supersede GCN, it recognises this absence and states that *'indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid.'*

GCN gives guidance on suitable noise levels for sleeping and resting conditions in dwellings. It recommends internal noise levels of 30dB(A) at night for bedrooms, and 35dB(A) during the day for living-rooms. The guideline levels are based on annual average data.

To avoid sleep disturbance in bedrooms during the night-time period, it also recommends that noise levels from single sound events should not regularly exceed L_{Amax} 45dB. WHO defines 'regular' as not more than 10-15 events per night.

WHO also gives guidance on suitable noise levels for outdoor living areas such as gardens. The WHO guidelines state that '*to protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB Laeq for a steady continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB Laeq'.*

The preface to GCN states that community noise includes road, rail and air traffic, industries, construction and public work, and the neighbourhood.

NIGHT NOISE GUIDELINES FOR EUROPE, WHO, 2009

Night Noise Guidelines for Europe (NNG) was published in 2009 as an extension to Guidelines for Community Noise (WHO) 1999. It provides additional guidance in relation to the observed adverse effects of noise on sleep and proposes two external noise level criteria for the purposes of limiting these effects. The lowest noise criterion is based on the LOAEL. However, it recognises that achieving LOAEL will not be feasible in many circumstances and suggests that a higher Interim Target (IT) may be used instead as a guideline. However, the IT is not related to health based observations and should not, therefore, be interpreted as a threshold for SOAEL, which may be higher.

The document states that '*all Member States are encouraged to gradually reduce the proportion of the population exposed to levels over the IT within the context of meeting wider sustainable development objectives.'* While the guidelines provide useful information relating to the effects of noise on sleep, they have not been adopted into UK legislation, standards or guidance. The suggested guideline night-time noise levels presented should not therefore be applied as a standardised criteria for assessment but may be useful when interpreting the significance of the impact of noise within the wider context of the development. Based on empirical evidence, it suggests that the LOAEL is $L_{night,outside}$ 40dB. Below

this level there would be no observable adverse effects. Therefore, there would be little value in setting limits below this level.

BS 4142:2014 METHOD FOR RATING AND ASSESSING INDUSTRIAL AND COMMERCIAL SOUND

The scope of BS 4142 states that it is aimed at the assessment of sound from fixed installations and mobile plant that form an intrinsic part of the overall sound emanating from an industrial/commercial premises or process. It is not intended to be used for the assessment of temporary activities such as construction and demolition, which are outside the scope of the Standard.

The principle of BS 4142 is to determine an initial estimate of impact of industrial/commercial sound on nearby residents by comparing the Rating Level (sound level from the industrial/commercial source, with a correction applied for any acoustic features that characterise the sound) with the Background Sound Level (L_{A90} as measured in absence of the industrial/commercial source).

Generally, the greater the difference by which the Rating Level exceeds the Background Sound Level, the greater the magnitude of impact. BS 4142 states that *'a difference of around +10 dB or more is likely to be an indication of a significant adverse impact […]. A difference of around +5 dB is likely to be an indication of an 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.'*

However, BS 4142 also advises that, in each case, the context in which the sound is placed must be considered and the initial estimate of impact should be modified accordingly. For example it advises '*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.'*

It also indicates that impacts estimated during '*the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.'*

Drilling, workover, and testing/appraisal are also all short term, temporary activities carried out. The equipment used cannot be considered a fixed installation nor a mobile plant that forms an intrinsic part of the overall sound emanating from premises or processes at the site over the long term.

Therefore, it is not supported in guidance to use BS 4142 to assess these activities. Other more relevant Standards and guidance are available for this purpose and these are well established. In them, it is recognised that sound levels that might be considered to cause a potential significant adverse effect over the long-term period, may be acceptable over the short term. A balance must be made between potential temporary adverse effects over the short term with the economic and social benefits afforded to the wider community over the long term.

RELEVANT PERMITTING GUIDANCE FROM THE ENVIRONMENT AGENCY

The Environment Agency provides appropriate guidance in relation to noise in the form of:

a) Noise and Vibration Management: Environmental Permits 31 January 2022 (32 pages)
b) Noise impact assessments involving calculations or modelling 18 August 2022 (5 pages)
c) Method Implementation Document (MID) for BS 4142 27 March 2023 (27 pages)

Further and detailed observations and comments on the three EA documents above, which was included with the Noise and Vibration Scoping Report. The detail of the guidance is summarised in these Appendices and should be read as an integral and key part of this report.

d) Onshore Oil and Gas Sector Guidance, 23 January 2020

Section 13.6: Mining waste and installation permits include a noise management condition. You may need to produce and implement a noise management plan. As part of this plan, you may be asked to survey potential sources of noise including:

- pumps
- diesel generators
- pneumatic controllers
- flares, engines and vents
- gas leaks

9. ASSESSMENT METHODOLOGY

The objective of any proposed noise mitigation is to achieve levels better (lower) than the SOAEL and approach the LOAEL, as far as is reasonably practicable, in line with NPSE and PPG guidance. The following sections set out the thresholds used in the assessment to determine the potential for significant adverse effects to arise and scope for mitigation as required to minimise these potential effects.

9.1 CONSTRUCTION NOISE

The assessment thresholds for construction noise are based on the values given in BS 5228-1:2009+A1:2014 Table E.1 (ABC Method) for the identification of potential significant effects. The table presented in the Standard is copied below in Table 3.

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

NOTE 1 A potential significant effect 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 noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect 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 Applied to residential receptors only.

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

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

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

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

Table 3: Construction noise assessment thresholds (table copied from BS 5228-1)

Construction activities would be carried out during the daytime period only. Where existing daytime ambient noise levels are less than $L_{Aeq,T}$ 63dB, the Category A threshold would apply. Under these conditions the SOAEL would be $L_{Aeq,T}$ 65dB. Where existing ambient noise levels are higher, a higher threshold for SOAEL would apply. The Standard advises that Category B thresholds apply when ambient noise levels are above $L_{Aeq,T}$ 63dB during the day and $L_{Aeq,T}$ 43dB at night. However, when this arises, there is an argument that for a robust assessment, a cautious approach is taken with the Category A values adopted anyway.

BS 5228 does not provide any indication of what might be considered a LOAEL for construction noise. WHO GCN, however, states that community noise includes construction and suggests that where noise levels do not exceed L_{Aeq} 50dB in external amenity areas, moderate annoyance would be avoided. This is, therefore, considered to be a reasonable threshold for LOAEL during the daytime period. If there is any construction activity at night WHO GCN suggests the value of the LOAEL is $L_{night,outside}$ 40dB. It suggests at night-time, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open. This value may be considered the SOAEL at night.

Assessment period	LOAEL $L_{Aeq,1hr}$ (dB)	SOAEL $L_{Aeq,1hr}$ (dB)
Daytime period (07:00-23:00)	50	65
Night-time period (23:00-07:00)	40	45

Table 4: Construction activity assessment (SOAEL and LOAEL) thresholds

9.2 NOISE FROM DRILLING AND TESTING/APPRAISAL

Drilling and appraisal are temporary activities of different durations.

During the short term drilling and appraisal phases, the various recommended criteria in the described policies, guidance, and Standards, reveal a consistent view of what is considered to constitute a significant adverse effect in relation to noise from the temporary activities such as those proposed at this site.

Drilling and some of the appraisal activities would be carried out over a 24 hour period. The night-time period will, therefore, be critical to the assessment of noise from these activities.

Although the proposed activities are short term and temporary and would, therefore, not be assessed under BS 4142, it may still be useful to consider some of the guidance provided within this Standard, as it does relate to noise from industrial sources, albeit aimed at permanent, long term installations. BS 4142 states that *'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.'* The Standard, therefore, recognises the importance of consideration of absolute noise levels and points to other Standards and guidance such as BS 8233 and WHO guidance. This is particularly relevant to rural areas.

Empirical evidence referenced by WHO NNG indicates that the night-time LOAEL is L_{night} 40dB, for all sources. WHO suggests this level as a target designed to protect the public, including the most vulnerable groups such as children, chronically ill and elderly people. Below this level there would be no observable adverse effects and little benefit in carrying out an assessment under BS 4142.

Likewise, an absolute threshold for SOAEL may also be considered, below which there would be no significant adverse effects. For industrial sound, BS 4142 indicates a difference between the onset of adverse impact and significant adverse impact of 5dB (i.e. SOAEL = LOAEL + 5dB). The SOAEL for industrial sound at night could, therefore, be considered to be L_{night} 45dB. Also WHO CGN aligns with this by suggesting at night-time, outside sound levels about 1 metre from facades of living spaces should not exceed 45 dB LAeq, so that people may sleep with bedroom windows open. This value may be considered the SOAEL at night. Above this value, the significance of industrial sound may then be considered in context with the existing acoustic environment, as per the methodology in BS 4142.

The NPPF requires that planning policies and decisions should ensure that new development is designed so as to mitigate and reduce to a minimum any potential adverse impacts. In other words, the aim of mitigation is to avoid exceeding the SOAEL and to approach and ideally achieve LOAEL as far as is reasonably practicable, within design constraints.

Additionally, PPG-M guidance states that local authorities should establish a planning noise level limit for minerals extraction sites, and suggests a value of $L_{Aeq,1hr}$ 42dB at night. Noise levels from minerals extraction activities, as referred to in the PPG-M, would typically be variable. The suggested night-time limit of $L_{Aeq,1hr}$ 42dB would, therefore, be a maximum allowable limit for any given one-hour period during the night. Accounting for some variation in operational noise levels, this might be equivalent to a long term annual average value of L_{night} 40dB, suggested to be the LOAEL by WHO.

The PPG-M (Para. 21) also states that *'care should be taken, however, to avoid any of these suggested values being implemented as fixed thresholds as specific circumstances may justify some small variation being allowed.'* This reflects the position of the NPPF (Para. 223g), which states that *'planning*

policies should […] when developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction.'

Table 5 summarises the assessment thresholds for drilling, completion and production testing both for the day and night-time periods. The daytime LOAEL and SOAEL is based on WHO GCN guidance for external amenity spaces. A cautious approach has been taken by setting the thresholds over one-hour periods, rather than the full day or night-time periods from which the values are derived.

Assessment period	LOAEL $L_{Aeq,1hr}$ (dB)	SOAEL $L_{Aeq,1hr}$ (dB)
Daytime period (07:00-23:00)	50	55
Night-time period (23:00-07:00)	40	45

Table 5: Drilling and appraisal assessment thresholds

9.3 VIBRATION FROM DRILLING AND OTHER MECHANICAL EQUIPMENT

The set back distances of NSRs is sufficiently large that vibration effects from mechanical equipment on site, to both buildings and sensed by people within buildings, will be highly unlikely to be noticeable at any stage during the proposed development.

However, an assessment of vibration from equipment was specifically requested during consultation with NYC, so it is included within this report.

Guidance on potential effects of vibration levels is provided in Annex B of BS 5228-2, with Tables B.1 and B.2 of the Standard providing, respectively, guide values for human response and cosmetic damage to buildings. The guidance is summarised in Table 6.

Effect on people/building	Vibration level Peak Particle Velocity (mms^{-1})
Vibration might be just perceptible in the most sensitive situations and at most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	0.14
Vibration might be just perceptible in residential environments.	0.3
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.	1.0
Vibration is likely to be intolerable for any more than a very brief exposure to this level.	10.0
Guide values to avoid cosmetic damage to buildings – Residential buildings.	15.0 at 4Hz increasing to 20.0 at 15Hz increasing to 50.0 at 40Hz and above
Guide values to avoid cosmetic damage to buildings – Industrial buildings.	50.0 at 4Hz and above

Table 6 : Effects of Vibration, taken from BS 5228-2

Note c) to Table B.1 of BS 5228-2 states that single, or infrequent occurrences at the levels indicated would not necessarily correspond to the stated effect, in every case.

In line with the above guidance, it is considered that assuming appropriate warnings are provided to residents, vibration levels of below 1.0 mms-1 would be tolerated and therefore would have a negligible adverse impact. Some degree of adverse impact would occur when vibration (either continuous, or for frequent periods) exceeds Peak Particle Velocity (PPV) 1.0 mms-1.

Whilst the table does not provide guidance as to the potential different effects within the PPV range 1–10 mms-1 the magnitude of adverse impact would likely increase from small (1-3mms-1), to medium (3-7 mms-1) to large (7-10 mms-1).

At PPV levels above 10 mms-1, the more usual concern is potential building damage and commonly a PPV limit is set at this level to ensure the PPV 15 mms-1 threshold for cosmetic damage is adequately protected.

10. ENVIRONMENTAL NOISE BASELINE

10.1 REQUIREMENTS IN BS 4142

An initial indication of the noise impact of activity during a long-term activity can be established using the procedure as outlined within BS 4142, although where Rating Levels and Background Sound Levels are low, the Standard accepts that absolute levels may be a more relevant indication of noise impact.

A cautious approach is adopted here that even though the noise impacts and background noise levels are expected to be low, a full baseline noise monitoring survey was undertaken to provide a fuller picture of the existing noise environment.

The survey has been carried out in accordance with both the requirements stated within BS 4142 but more importantly with the detailed requirements of the EA. In particular, the approach to the survey was fully described within the Noise Scoping Report[1] and detailed comments on the approach have been fully taken on board in its execution. This has resulted in a high-quality baseline noise data set, fully evaluated for 4 different wind directions. Other aspects studied are weekday/weekend differences. Data excluded is that when the local weather station recorded high wind conditions (>3.5m/s mean, to ensure most data is acquired < 5m/s gusting). Furthermore, data acquired when rain is falling and for 1 hour after this time, is also excluded. All this is done using Spectrum's suite of post-processing programs developed to establish high quality baseline noise datasets.

10.2 MEASUREMENT SURVEY METHODOLOGY

A noise measurement survey has been carried out at the site to establish the background (L_{A90}) and residual (L_{Aeq}) sound levels, at the nearest noise sensitive receptors (NSR).

Long term unattended measurements were made at NML 1 (near NSR 1) and NML 2 (near NSR 4) as shown in figure 3. The complete map in a larger scale is included in Appendix B.

Figure 3: Noise sensitive receptors (NSR 1-4) and noise monitoring locations (NML 1-2 unattended; NML 3-4 attended). Weather station located at NML 2

NML 1 and NML 2 are located near the closest and most critical NSRs to the wellsite, that is, Wayside Farm and Flatts Farm. Measurement data was obtained for a continuous period of 27 days/nights (10.10.24 – 05.11.24). Measurements at these locations are post processed in detail to establish the baseline and more particularly the $L_{A90,15min}$ background sound level in the area. During this period a temporary weather station was installed near NML 2.

Photos of the instrumentation in use at the receptors are included in Appendix B.

Short term attended measurements were made at NML 3 (close to NSR 3) and NML 4 (close to NSR 2) with the purpose of obtaining a small sample of data to establish instantaneous differences between each receptor and to calibrate against the long-term monitor values. These positions were sufficiently close to the sensitive receptors to be broadly indicative of the noise levels at the properties, being similar distances to the nearest roads. NML 3 was on the path immediately adjoining the rear gardens of properties in Bridge Close, however this path is set in a cutting and is some 2-3m below the surrounding land and so is likely to be particularly quiet compared to a position at or above ground level. In the case of NSR 4 in Field Lane, the lane was too narrow to park a vehicle without blocking the road to other vehicles. The position selected was the nearest 'passing point' so there was sufficient space for other vehicles to pass. NSR 4 is not considered a critical receptor in this study as it represents single storey properties which are substantially shielded by intervening higher ground in the direction of the proposed well site.

The following equipment was used in the course of the survey:

For unattended monitoring:

At NML 1 Wayside Farm

- Bruel & Kjaer Type 2250 Sound Level Meter s/n 2726905
- Bruel & Kjaer Type 4189 Microphone s/n 2710995
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2730220
- Weatherproof cases, carbon fibre microphone poles, all weather microphone protection.

At NML 2 Flatts Farm

- Bruel & Kjaer Type 2250 Sound Level Meter s/n 2739650
- Bruel & Kjaer Type 4189 Microphone s/n 2983518
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 3030452
- Davis Vantage Pro 2 Weather Station
- Weatherproof cases, carbon fibre microphone poles, all weather microphone protection.

For attended measurements

On 12.10.24
- Bruel & Kjaer Type 2250 Sound Level Meter s/n 3000713
- Bruel & Kjaer Type 4189 Microphone s/n 2780512
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 3001598

On 4.11.24
- Bruel & Kjaer Type 2250 Sound Level Meter s/n 3010857
- Bruel & Kjaer Type 4189 Microphone s/n 3060877
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 2291483

Before and after the survey, the sound level meters were field-calibrated in accordance with the manufacturer's guidelines; the calibration values, along with the date of instrument external calibration, are included within appendix B as required by the EA. Calibration certificates are available on request. However, the results show no significant drift duration the survey periods. The meters, microphones and field calibrators are laboratory calibrated biennially in accordance with UKAS procedures or to traceable National Standards.

10.3 MEASUREMENT RESULTS

Soundscape description

During the two attended measurement surveys near at NML 3 and 4, observations were made about the ambient noise environment. These are now summarised.

Attended measurements were made on 12.10.24 after midnight and then in the morning, and on 4.11.24 in the evening and then later that night. Wind was light during each of these surveys. During the daytime, occasional local traffic was audible; however, at night, no specific sources were generally discernible, although on occasions it was possible to hear distant road traffic. Wind speeds were very low on both occasions with the result that there was no noise from wind interactions with nearby trees and other vegetation.

Table 7 shows the results of listening to short samples of sound recordings made at the unattended monitor at NML 2 at 01:00 hours on a random sample of nights where average wind speeds were low (< 3.5m/s). This also enables a subjective observation of the sources of noise that contribute to the night-time soundscape in the area under a range of conditions.

Date	Wind direction	Sound description at NML2 near NSR 4 Flatts Farm (sound level La90)
12/10	SW	No discernible sources (29 dB)
20/10	WSW	Some distant traffic (33 dB)
25/10	SE	No discernible sources (27dB)
28/10	SW	Wind in trees (43 dB)
30/10	WSW	No discernible sources (21dB)
1/11	WSW	No discernible sources (30dB)

Table 7: Sound recordings analysis (Soundscape) at 01:00 on different nights at NML 2, Flatts Farm.

The range of background noise level at 01:00 was $L_{A90,15min}$ 21-43 depending upon weather conditions experienced at that moment.

Attended Noise Measurements

Although a snapshot, the attended measurements made during the nights of October 11/12 and November 4/5, and reported within Appendix B recorded NML 3/NSR 3, $L_{A90,T}$ values to be 23-25 dB, between midnight and 1am in the morning. At NML 4/NSR 2 the $L_{A90,T}$ levels on the same nights were 27-28 dB. At this period on these days the $L_{Aeq,T}$ values recorded at the two unattended noise monitors with microphone heights at around 2.5m above ground level were similar and both in the range 28-29dB. On both these occasions, however, the wind velocity was either not measurable or very low at < 1m/s. Under these circumstances, there would have been unusually low levels of wind noise within vegetation and trees. These levels were not representative of more typical conditions averaged over the whole period of measurement by the unattended noise monitors.

On the evidence from differences between attended measurements and unattended measurements from monitors during the period of the attended noise survey, the differences in levels between each

position (between midnight and 1am) is not significant and night-time background noise levels are quite similar at all four NML/NSR locations.

Unattended Continuous Noise Monitoring – Weather monitoring

The important baseline noise levels recorded were those at the two noise monitors NML 1 and NML 2 located close to NSR 1 and NSR 4 respectively.

The large dataset from 27 days of continual noise monitoring at each location, along with simultaneous weather data recorded in the area, means that data obtained under adverse wind and weather conditions can be filtered out, and results can be analysed for different wind directions.

Figure 4 shows graphs of wind direction and speed (mean); this is shown more clearly in Appendix B. The wind speeds shown are mean values for each 24 hour period, and smoothed. In practice there were many 15 minute periods where much higher wind speeds were recorded, and noise readings during these periods have been automatically discounted. Although there were some periods of rain and high winds, the conditions for most of the survey period were acceptable to enable representative baseline values to be established at each position.

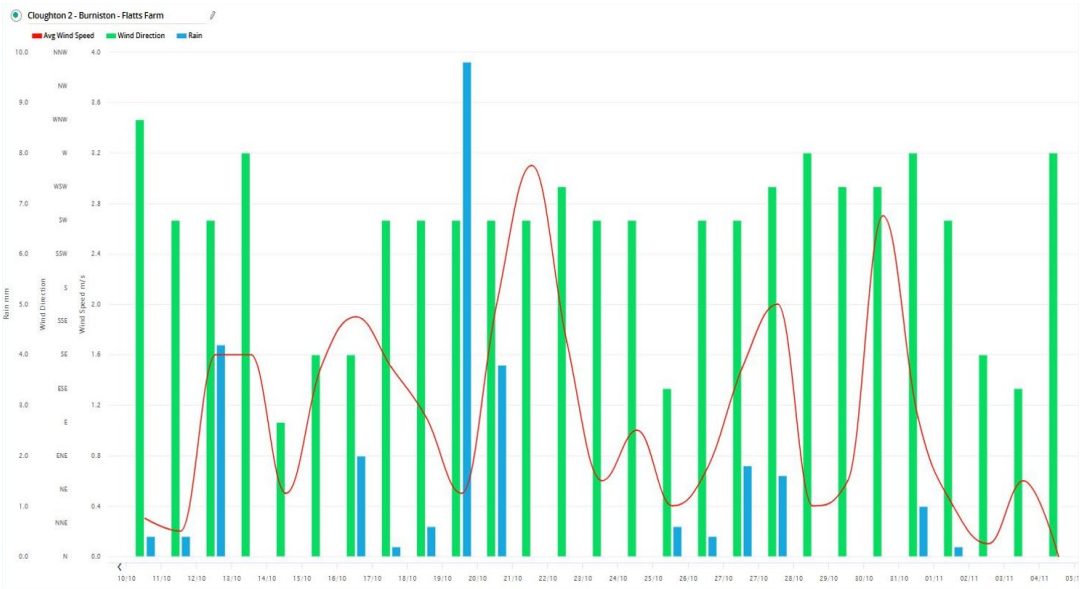


Figure 4: Wind direction and speed over the period of 27 days of the unattended noise monitoring at NSR4.

Similarly, the rainfall was monitored over 15 minute intervals throughout the survey period, and times when rain was falling and for a further 1 hour period after each occasion (to allow road surfaces to drain) were excluded from the dataset. Figure 4 includes days when rain fell, however Figure 5 shows each 15 minute period when rain was falling over a period of 8 days of the survey.

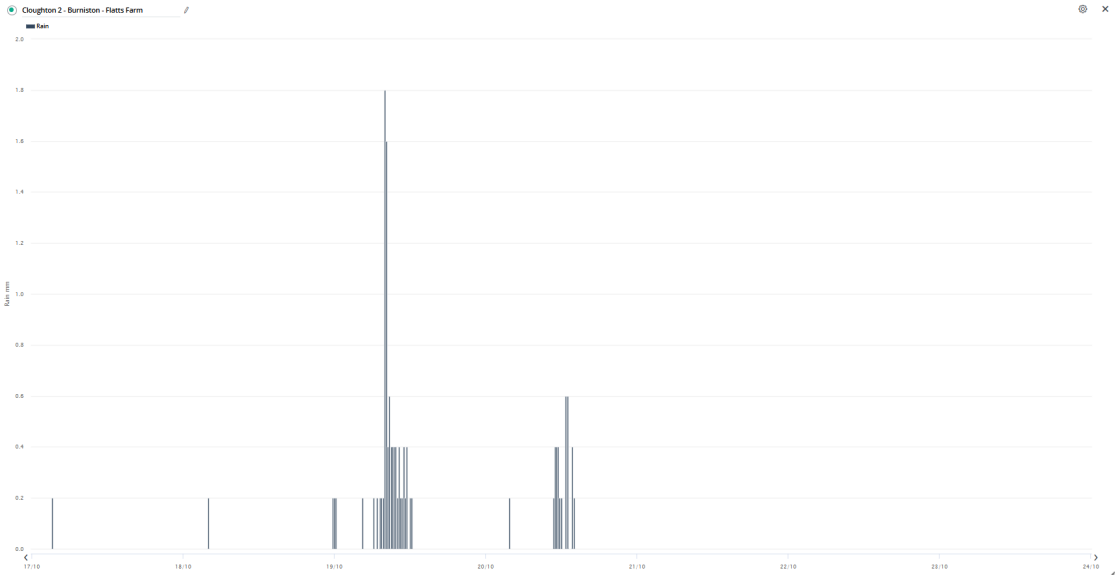


Figure 5: Rain measurement chart (15 minute periods) for part of the monitoring period.

Rain, sometimes heavy, was a characteristic of some of the dataset, with a result that further data was excluded from the post-processed dataset.

Unattended Continuous Noise Monitoring – Noise Data

Graphical representation of the noise monitor at NML 1 and NML 2 are included within Appendix B for the full period of 27 days; however, the first 6 days data is shown graphically for each of the positions in Figures 6a and 6b. This provides a helpful visual understanding of the change in noise levels each day and the reduction in noise when high wind speeds abated. The orange curve is residual sound level $L_{Aeq,T}$ which is essentially the energy average level. This is higher than the light blue curve, background sound level $L_{A90,T}$, the level exceeded for 90% of the time period.

It may be noted in Figure 6a that the constant noise of the Mill close to NML 1 is reflected in a high and steady daytime $L_{A90,T}$ (light blue curve) value at around 57 dBA each day. Also, the purple histogram generally shows the changing wind speeds recorded (see Appendix B for full chart details). Where these rise to a full scale value, this signifies rain was falling (plus 1 hour following), and so this data is discounted in the analysis.

The large dataset needs to be statistically analysed through post-processing in order to establish representative values for noise that can be used as part of an assessment.

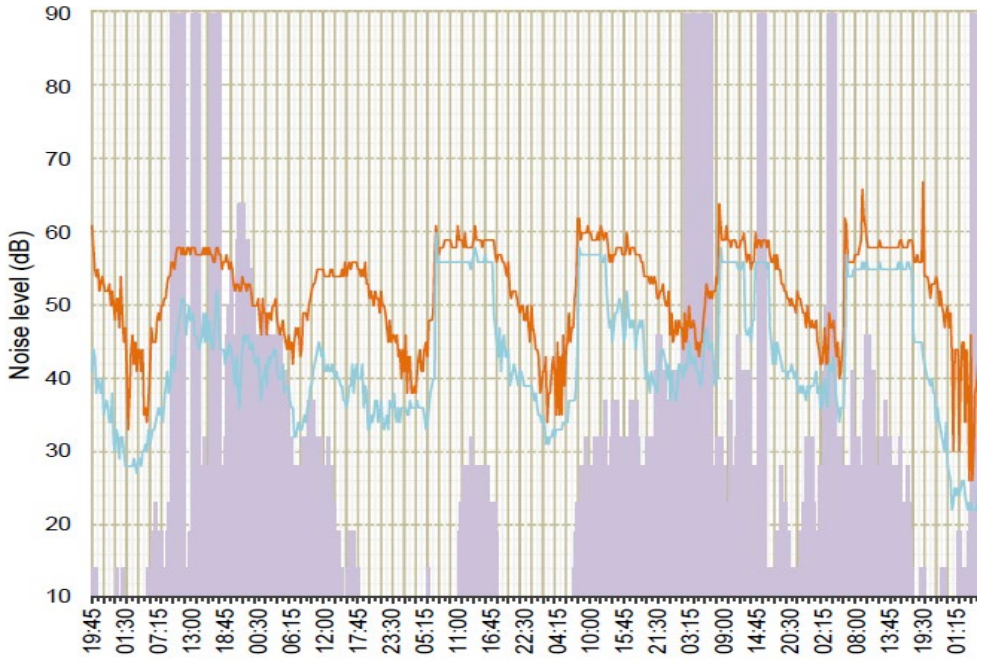


Figure 6a: Graphical noise profiles over first 6 days of the monitoring period at NML 1 near NSR 1 (Wayside Farm)

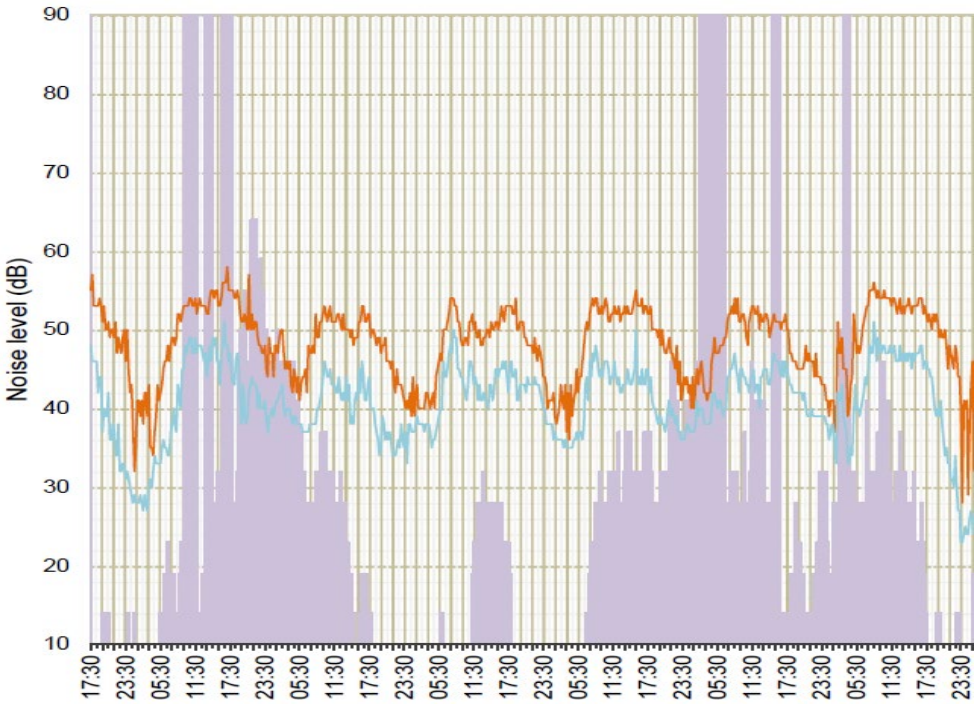


Figure 6b: Graphical noise profiles over first 6 days of the monitoring period at NML 2 near NSR 4 (Flatts Farm)

With data being captured every 15 minutes the raw noise dataset comprises 2500 items from each noise monitor. This is too large to report here , even within an appendix.

However, Appendix B includes the first page of printout of data, preceded by a table of statistical data values. The examples included in the appendix are night values with no filtering of wind direction, for the start of the survey at each of the measurement positions NML 1 and NML 2. Figure 6c shows the top part of this first data page for NML 2 at Flatts Farm. Statistical summary data heads the table.

Raw data and central tendencies for location NSR 4: Flatts Farm

Measure of central tendency	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFMax} (dB)
Modes	40	28	-
Mean	41	30	-
Mean - 1 s.d.	35	24	-
Log Average	44	-	-

Table 4: Night-time period (23:00 to 07:00)

Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFMax} (dB)	Wind direction (°)	Wind speed (m/s)
11/10/2024	23:00	49	33		225	0.00
11/10/2024	23:15	50	33		225	0.00
11/10/2024	23:30	46	31		247.5	0.00
11/10/2024	23:45	50	32		247.5	0.00
12/10/2024	00:00	45	31		247.5	0.40
12/10/2024	00:15	42	30		247.5	0.00
12/10/2024	00:30	43	29		225	0.00
12/10/2024	00:45	38	28		225	0.00
12/10/2024	01:00	32	29		225	0.40
12/10/2024	01:15	35	28		225	0.00
12/10/2024	01:30	41	28		225	0.00
12/10/2024	01:45	41	28		225	0.00
12/10/2024	02:00	39	29		225	0.00

Figure 6c: Top of a post processed data page of a noise monitor output

The statistical values determined for the complete valid datasets are mean for background sound level $L_{A90,T}$, and log average residual level for $L_{Aeq,T}$. These values extracted from this data set are included in tables 8a and 8b, which apply to NML1/NSR1 and NML2/NSR2 respectively. The first line of data is the total with all wind directions and the following 4 lines break these down for each wind direction, N, E, S and W.

Wind direction	*Log average residual sound levels* $L_{Aeq,T}$ (day/night)	*Mean background sound levels* $L_{A90,T}$ (day/night)
Total	56/43	47/30
N	56/-*	45/-*
E	57/43	47/31
S	56/44	38/28
W	56/43	47/30

*Note: * Insufficient data for this wind direction*

Table 8a: Post processed noise results for all days (day/night) at NML1/NSR1 Wayside Farm

The most important metric is the $L_{A90,T}$ during the night, which represents the background sound level. At NML1/NSR1 this ranges between 28-31dB depending upon wind direction. This range is so narrow that it can be concluded that the background noise level here at night is not significantly dependent on wind direction. The representative background sound level at NSR1 can be taken to be the value for the whole valid dataset at $L_{A90,T}$ 30 dB.

At the NSR 4/NML 2, levels measured are shown in Table 8b

Wind direction	*Log average residual sound levels* $L_{Aeq,T}$ (day/night)	*Mean background sound levels* $L_{A90,T}$ (day/night)
Total	50/41	42/30
N	48/-*	40/-*
E	50/41	42/32
S	51/41	43/31
W	51/41	42/30

*Note: * Insufficient data for this wind direction*

Table 8b: Post processed noise results for all days (day/night) at NML 2/NSR 4 Flatts Farm

At NML2/NSR3 the $L_{A90,T}$ at night for all the valid data is also 30dB, which ranges between 30dB with a prevailing W wind to 32 dB with an E wind. This again is not a large variation and again the representative background sound level at NML 2 can be taken to be the value for the whole valid dataset at $L_{A90,T}$ 30 dB.

Based upon the short sample of attended measurements of noise at the less critical locations NSR 2 and NSR 3 (see Appendix B) the levels of noise were lower both because of increased set back distances to road, but also on each of the two attended surveys, wind speeds were the unusually low for the whole duration of the unattended survey, and so cannot be considered representative. NML 3 (on the public path/disused railway line) near dwelling NSR 3 was also below ground level, and further sheltered from ambient noise. So, comparisons are shown in Table 8c of the daytime and night-time background sound levels measured at each NSR.

Receptor	Background sound level, $L_{A90,T}$ (dB) (day/night)	Quality of data	Representative ?
NSR 1 - Wayside Farm (Critical receptor)	47*/30	Very high. 27 days/night contiguous dataset	Yes
NSR 2 - House on Field Lane	35/28	Low quality from two short, attended surveys. Both calm wind days	No
NSR 3 - House on Bridge Close	37/25	Low quality from two short, attended surveys. NML below ground level so further sheltered. Both calm wind days.	No
NSR 4 - Flatts Farm (Critical receptor)	42/30	Very high. 27 days/night contiguous dataset	Yes

**Note: dominated by continuous noise during the day from nearby Burniston Mill*

Table 8c: Post processed values of background sound levels $L_{A90,T}$ at receptors NSR 1-4

The values shown in Table 8c show consistent noise data in the vicinity of the Site. The mill adjoining the nearest receptor, Wayside Farm (NSR 1) dominates the daytime background noise at this NSR. At night, when the mill shut down, the background noise levels at the two unattended monitors was the same at $L_{A90,T}$ 30 dB. This is typical of rural environments. The attended measurements at NSR 2 and 3 are a very small dataset, and on both attended surveys, the wind was calm and not representative of the weather conditions recorded for the whole 27 day survey, at the temporary weather station.

The short term attended measurements made at the less critical receptors NSR 2 and 3 are not considered to be 'representative' background levels as defined within BS 4142. Under these circumstances they cannot be used in a formal assessment.

It is considered however, that values that should be used in the assessments of daytime noise should be the daytime background noise level measured at NML 2 (end of rear garden at Flatts Farm) as Wayside Farm NML 1 was dominated by noise from the mill. At night, it is proposed to use the background noise level obtained at both NML 1 and NML 2 at the two receptors NSR 2 and NSR 3. The representative background sound level here was established at $L_{A90,T}$ 30 dB.

Finally, consideration is given to the potential higher noise impact at weekends, between Friday midnight and Sunday midnight. Guidance does not necessarily automatically consider the weekend to be a more sensitive period of time to weekdays, although some stakeholders consider they are. From a technical viewpoint, there is an assumption that weekend noise impacts can be greater because ambient and background sound levels are lower, often due to less road traffic noise. However, this is not always the case. So, this aspect is considered solely here by considering the ambient noise levels at weekends and comparing these with those during the weekdays. Ignoring the effects of wind direction, table 9 shows the post processed baseline values for the whole valid dataset, then the values for weekdays and then for weekends. NML2/NSR2 is considered here to demonstrate any potential differences.

Location	Day type	*Log average residual sound levels* $L_{Aeq,T}$ (day/night)	*Mean background sound levels* $L_{A90,T}$ (day/night)
NML2/NSR2	All days	50/41	42/30
NML2/NSR2	Weekdays only	51/41	42/31
NML2/NSR2	Weekends only	50/40	41/29

Table 9: Post processed noise results for weekdays and weekends (day/night) at NML 2/NSR 4 Flatts Farm

The results in this table show that the levels of background $L_{A90,T}$ noise levels at night are 2dB lower during weekends than during weekdays. 2dB however is not significant nor sufficiently large to undertake a separate formal assessment of noise impact for weekend periods. It may be noted that the values taken over the whole week are within 1dB of the values on either the weekdays or over the weekend. The values for the whole of the week are therefore considered to be sufficiently representative of both weekday and weekend periods to be used in just one assessment.

10.4 TRANQUILLITY

Earlier in this report (section 8) tranquillity was mentioned briefly in relation to PPG-N[5]. Paragraph 6 of this guidance explains further what is meant by tranquillity.

> ***What factors are relevant if seeking to identify areas of tranquillity?***
>
> *For an area to justify being protected for its tranquillity, it is likely to be relatively undisturbed by noise from human sources that undermine the intrinsic character of the area. It may, for example, provide a sense of peace and quiet or a positive soundscape where natural sounds such as birdsong or flowing water are more prominent than background noise, e.g. from transport.*
>
> *Consideration may be given to how existing areas of tranquillity could be further enhanced through specific improvements in soundscape, landscape design (e.g. through the provision of green infrastructure) and/or access.*

Care needs to be taken to establish a precise definition of tranquillity as it has meaning beyond consideration of noise. The PPG talks only of a *'sense of peace'* and *'sense of quiet'*, it does not talk about low noise levels per se. The term *'sense of'* is critical. It would be clear that a sense of peace can be achieved by a running mountain stream, or on a seashore, both places often having high ambient noise generated by natural non-anthropomorphic (man-made) sources. The PPG does indeed go on to link tranquillity also to a positive soundscape from natural sounds such as birdsong or flowing water. The key word used briefly as an example of a noise sources which counter tranquillity is '*transport'*. Transport noise, including road traffic, aircraft and trains, are considered in practice the main sources of noise that need to be absent for an area to be defined as tranquil.

A useful reference is published by CPRE[7] to assist in identifying areas of tranquillity. This is a tranquillity map of England and the section of this around the proposed site, extending from the North Sea coast into the North York Moors, is shown in Figure 7. The map essentially a pattern reflecting a

[7] Campaign for the protection of rural England, tranquility map of

road map, with the most tranquil areas, of which there are a large amount, shown as a green colour clearly remote from roads. The area around the proposed site is a mixed area and there is clearly evidence on the map that this is not a most tranquil area.

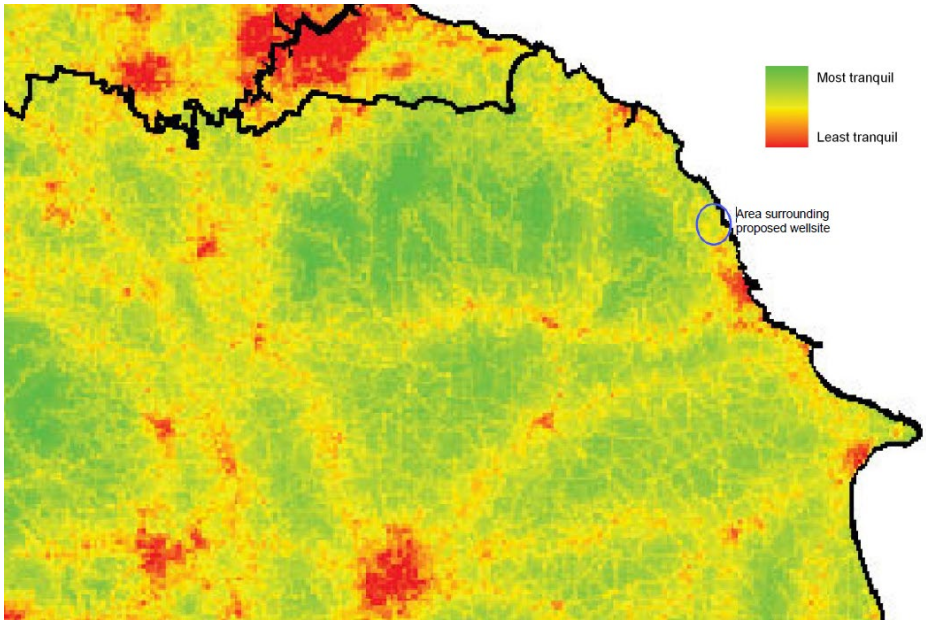


Figure 7: CPRE tranquillity map, 2007

The Bridleway and disused railway line running north south to the west of the proposed development (The Cinder Track) is close to the A165 Coastal Road, so walkers will experience traffic noise during the daytime. The Cleveland Way Long Distance Coast Path is too far from the proposed development for there to be any daytime noise impact. Whilst traffic noise levels at night drop away dramatically, it is only during the daytime, not at night, that that those outside would be enjoying the potential tranquillity of the countryside.

11. NOISE AND VIBRATION IMPACT ASSESSMENT

11.1 GENERAL AND NOISE MODELLING

The potential significant effects have been assessed during construction, drilling and testing/appraisal.

All noise predictions have been carried out using the highest available quality of calculation package. The particular prediction software used for this analysis is DGMR INoise which was the package formerly known as Softnoise Predictor. This acoustic model implements the procedures set out in ISO 9613-2:1996 “Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation to determine noise levels”, and is Quality Assured to all parts of ISO 17534:2015 “Acoustics – Software for the calculation of sound outdoors”. The INoise model takes account of the following features in its calculation procedure:

- Source sound power level (for point, line and area sources)
- Reflection from nearby structures and source directivity
- Distance from noise source (geometric spreading)

- Atmospheric absorption
- Acoustic screening of intervening structures and topography
- Ground absorption
- Ground effects (which includes the height of ground relative to the noise source)

Full details of the equipment modelled including existing equipment and their respective sound power outputs are presented in Appendix C. This model input data also includes information in relation to where this information was obtained (for example, for construction activity, mainly BS 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites – Part 1: Noise).* Data for drilling rigs is cited as being directly measured, with full information provided on where these were made. For normal oil and gas appraisal, measurements have been made on site on existing flow testing sources. Associated with this is a plan, developed to ensure Best Available Techniques are implemented as part of the Environmental Permit requirements of the EA, to implement noise mitigation measures where dominant sources have been able to be identified and where noise mitigation has not yet been installed to abate these.

Noise has been assessed for each of the three phases, at the nearest sensitive receptors to the site NSR 1, 2, 3 and 4, as shown in the site location plan of Figure 2. There are two noise results at each NSR. The first is at ground floor level and should be used for daytime noise assessment; the second is at first floor level and should be used for assessment at night. Where only one value is given, this indicates the dwelling is single storey.

11.2 CONSTRUCTION (PHASE 1)

This section assesses the potential noise impact of the construction of well pad and civils work associated with the construction of the well cellar.

The approach to be adopted in this is to consider a worst-case scenario covering the potential simultaneous activity of all equipment, during the construction phase. This is a robust worst-case approach.

The full results of the noise simulation for the construction phases is shown within Appendix D. The noise contour map is also shown in Figure 8.

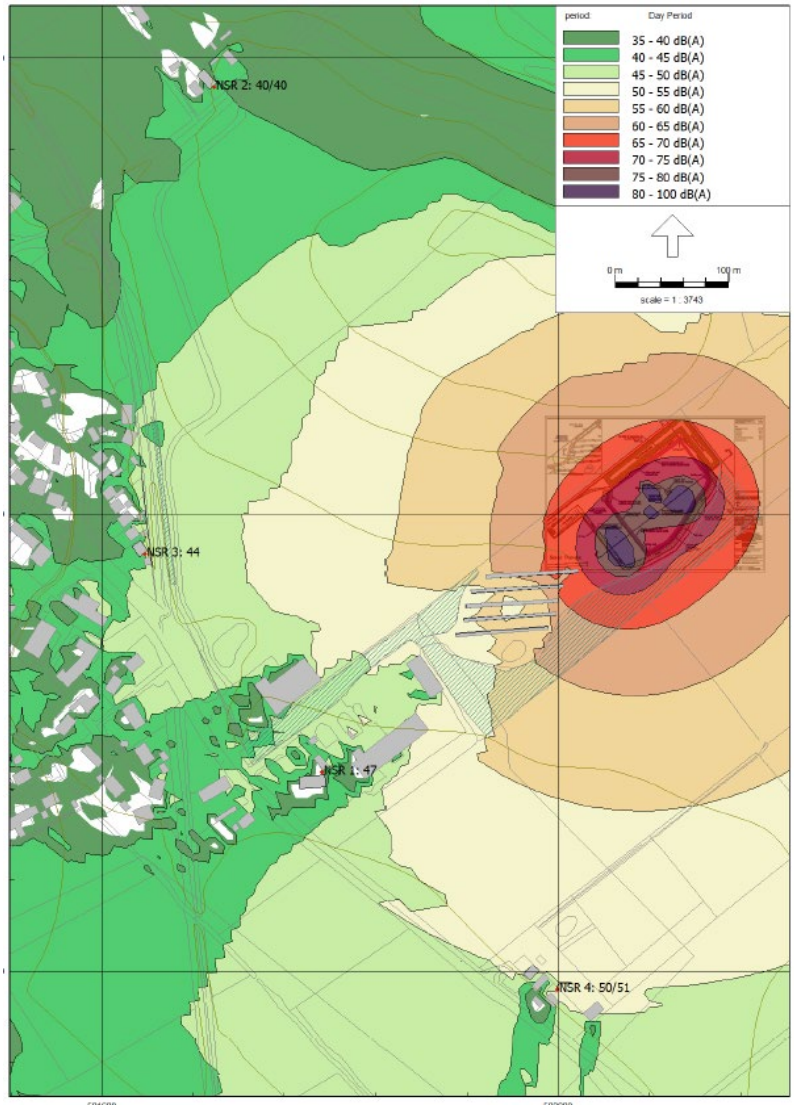


Figure 8: Predicted noise contours during daytime construction activity

Receptor	Noise level, $L_{Aeq,1hr}$ (dB)	Level of effect	Significant? (Yes/No)
NSR 1 - Wayside Farm	47	≤ LOAEL	No
NSR 2 - House on Field Lane	40	≤ LOAEL	No
NSR 3 - House on Bridge Close	44	≤ LOAEL	No
NSR 4 - Flatts Farm	50	≤ LOAEL	No

Table 10: Daytime predicted noise levels during construction phases

With the range of daytime noise predicted being $L_{Aeq,T}$ 40-50dB depending on location, all values are at or below the LOAEL for daytime construction noise which is 50dB. With the threshold of significance being much higher still at 65dB, the levels provided avoid significant impacts by a very large margin.

It may also be observed that the nearest NSRs are all upwind of the Site under typical SW prevailing wind conditions, and therefore most of the time the levels of noise at these NSRs will be at least 5dB lower than the values in Table 10.

There would be no construction activity in this phase at night.

11.3 DRILLING (PHASE 2)

One single appraisal well is proposed to be drilled. Drilling has to continue once started for well integrity reasons so it will operate 24 hours/day until the target depth has been achieved.

It is proposed that one of a number of candidate drilling rigs will be used.

- Consortium Rig 4 (with recently installed noise mitigation upgrades)
- Marriott Drillmec HH-220
- BDF Rig 28 Ideco BIR5625
- Edeco Rig 407
- Marriott Rig 18

Appendix E includes full details of some of these candidate rigs along with the sources of the noise data for each. Sound power levels LwA information in Appendix C, of these rigs are established as being LwA 105 dB +/- 3dB. Final rig selection will be made at a later date when timings and rig availabilities can be established.

During this period of activity, it will be the night period where the potential noise impact is greatest. The full results of the noise predictions during drilling are included in Appendix F, with Figure 9 showing the noise contours at night and Table 11 showing the levels at each NSR against the appropriate LOAEL criterion. The LOAEL for night drilling is $L_{Aeq,T}$ 40 dB and the SOAEL 45 dB.

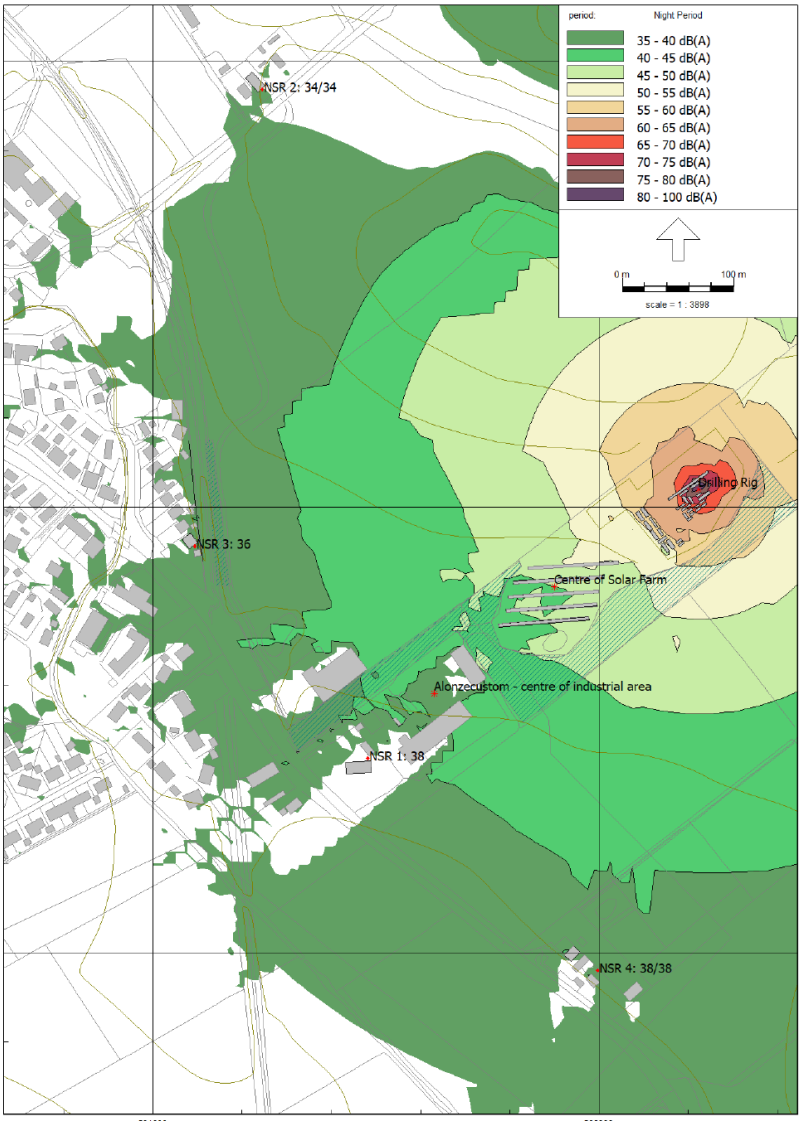


Figure 9: Predicted noise contours during night-time drilling

Receptor	Noise level, $L_{Aeq,1hr}$ (dB)	Level of effect	Significant? (Yes/No)
NSR 1 - Wayside Farm	38	≤ LOAEL	No
NSR 2 - House on Field Lane	34	≤ LOAEL	No
NSR 3 - House on Bridge Close	36	≤ LOAEL	No
NSR 4 - Flatts Farm	38	≤ LOAEL	No

Table 11: Night-time predicted noise levels during drilling phases

The results indicate that at all receptors, drilling noise levels would be below the LOAEL of $L_{Aeq,T}$ 40 dB and well below the SOAEL of $L_{Aeq,T}$ of 45 dB. Therefore, no adverse or significant adverse effects would arise at any of the residential receptors closest to the wellsite.

Additionally, drilling noise levels would be below $L_{Aeq,1hr}$ 42dB, suggested as a potential night-time noise level limit by PPG-M, for minerals extraction operational activities over the long term. Therefore, the noise impact resulting from the proposed shorter-term activities would be acceptably low.

It may also be observed that the nearest NSRs are all upwind of the proposed site, under typical SW prevailing wind conditions, and therefore most of the time the levels of noise at these NSRs will be at least 5dB lower than the values in Table 11.

11.4 PROPPANT SQUEEZE AND FLOW TESTING (PHASE 3)

Completion of the newly drilled well using either a workover rig and ancillary equipment, or a coil tubing unit, is required before testing of flows is carried out. Workover activities would normally be carried out during the day except in exceptional unforeseen circumstances, when activities take longer and cease later in the evening.

Following the completion of the appraisal well, flow test equipment will also be installed along with a temporary ground flare.

During this phase, three large pumps and associated equipment will be brought on site and will carry out a Proppant Squeeze activity for a period of typically 3-5 hours during the daytime period on one single day. Noise from the site will temporarily rise during this period.

Once the three pumps leave the site, there will be an ongoing phase of testing of resulting gas flows from the well. This will continue on a 24-hour basis. This will establish over a period of time, the commercial viability of gas production. Noise generated during the more sensitive night period is therefore an important consideration.

Noise from a temporary flare will vary depending upon the flowrates. A realistic range of gas flows might be 2,500-5,000 m^3/hr. Noise data for a typical ground flare system has been measured and full data is shown in Appendix H.

Flow noise is also generated at pressure reduction points in the temporary gas processing system of vessels, pipes and valves. Acoustic pipe insulation is commonly applied and is proven to reduce noise of this type.

Three subphases of Phase 3 have been modelled and will be separately assessed using the sound power level input data for individual equipment as detailed in Appendix C.

Subphase 3a – Well completion/workover (daytime only)
Subphase 3b – Proppant Squeeze (3-5 hours in one day, daytime)
Subphase 3c – Ongoing testing and appraisal (24hr/day)

11.4.1 Phase 3a – Well completion/workover (daytime only)

Figure 10 and Table 12 show the noise contours and noise level values at each noise sensitive receptor during workover activities. During this time some testing is assumed to be being carried out.

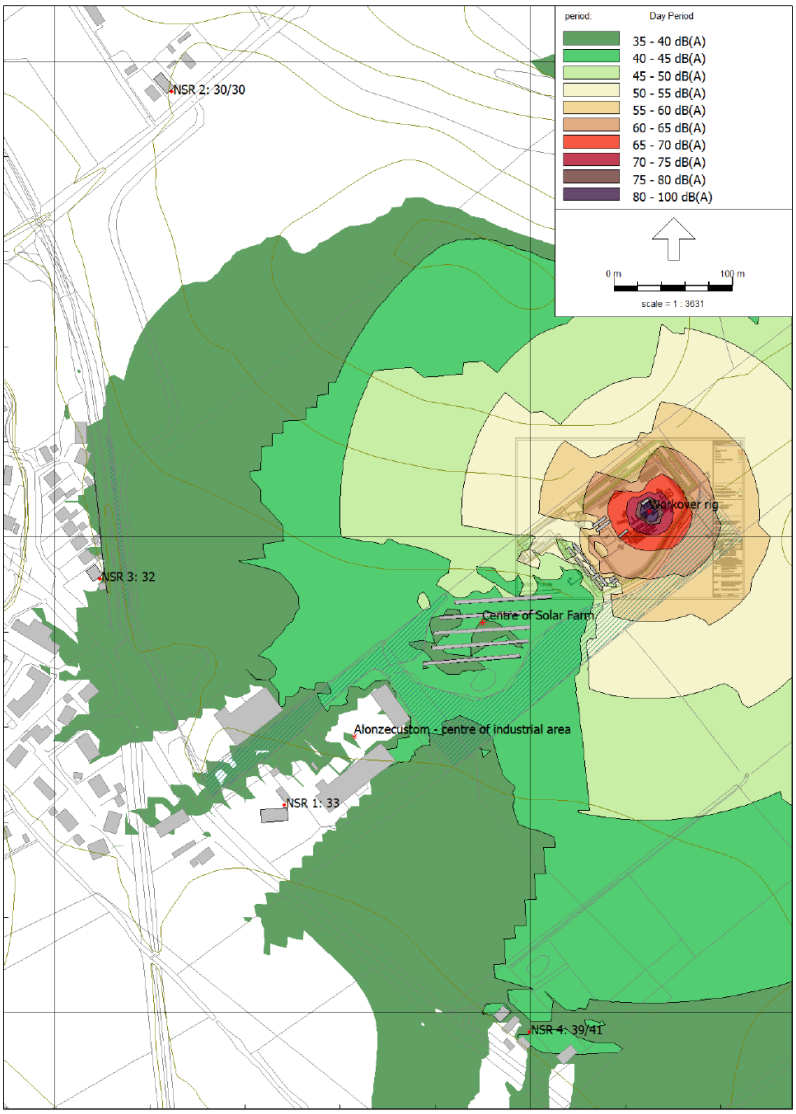


Figure 10: Predicted noise contours during workover activity (daytime).

During the day the LOAEL is $L_{Aeq,T}$ 50dB and the SOAEL is $L_{Aeq,T}$ 55dB

Receptor	Noise level, $L_{Aeq,1hr}$ (dB)	Level of effect	Significant? (Yes/No)
NSR 1 - Wayside Farm	33	≤ LOAEL	No
NSR 2 - House on Field Lane	30	≤ LOAEL	No
NSR 3 - House on Bridge Close	32	≤ LOAEL	No
NSR 4 - Flatts Farm	39	≤ LOAEL	No

Table 12 Daytime predicted noise levels during well completion and workover rig activity (at 1.5m height)

The noise impact range is $L_{Aeq,T}$ 30-39dB during workover activity, depending upon position, the highest levels being predicted at NSR 4 Flatts Farm. However, at this position the level of 39 dB is as much as 11dB below the LOAEL and 16 dB below the SOAEL. Therefore, the predicted noise impact is judged to be low and insignificant.

It may also be noted that, with the night-time LOAEL threshold for drilling being $L_{Aeq,T}$ 40 dB, levels of workover/completion noise at up to $L_{Aeq,T}$ 39 dB would also be within the LOAEL for night-time activity. Therefore should this activity be required during the night period for engineering/geological reasons, the noise impacts would also be low.

11.4.2 Phase 3b – Proppant squeeze (daytime only)

Figure 11 and Table 13 show the noise levels predicted for the very short period of 3-5 hours, during the daytime period of one day only.

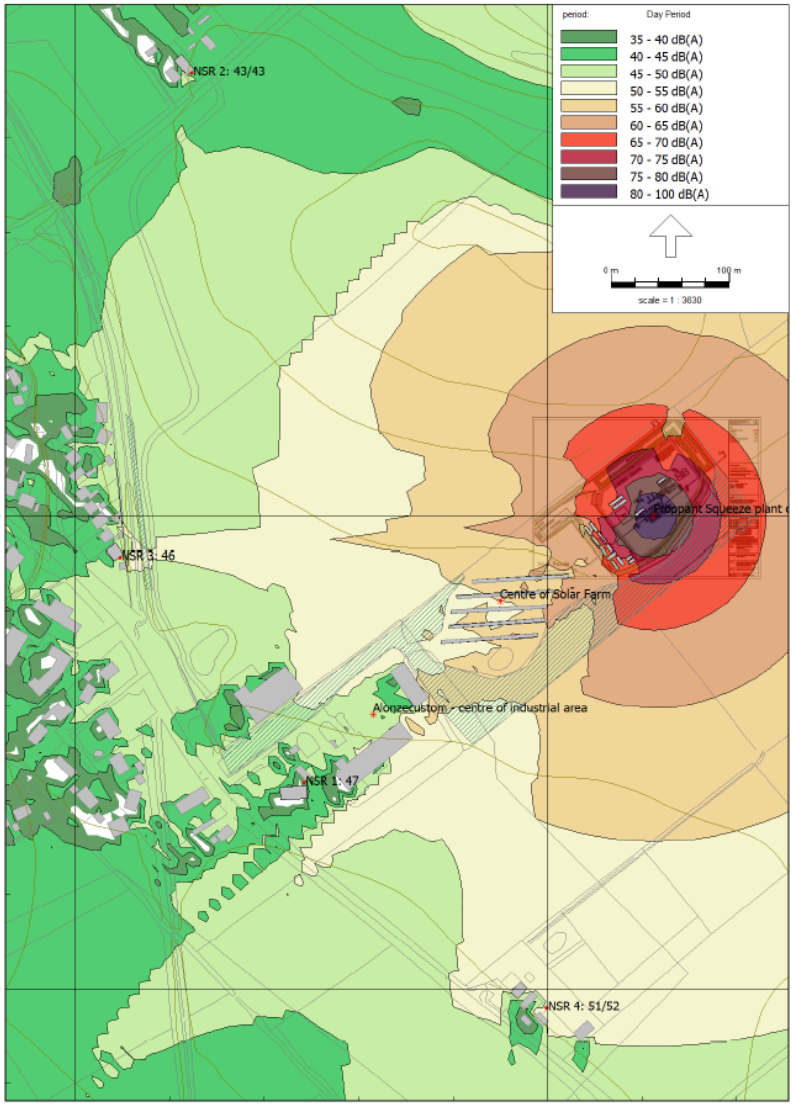


Figure 11: Predicted noise contours during 3-5 hour proppant squeeze daytime on one day only

This activity occurs for a very short period of time, and during the daytime only. The daytime LOAEL level for drilling activities is cautiously advised as being $L_{Aeq,T}$ 50dB. Proppant squeeze is a short duration activity and it is more appropriate to consider the more common noise thresholds applicable to the construction phase of the project, which are $L_{Aeq,T}$ 50 dB for LOAEL and $L_{Aeq,T}$ 65 dB for SOAEL.

Receptor	Noise level, $L_{Aeq,1hr}$ (dB)	Level of effect	Significant? (Yes/No)
NSR 1 - Wayside Farm	47	≤ LOAEL	No
NSR 2 - House on Field Lane	43	≤ LOAEL	No
NSR 3 - House on Bridge Close	46	≤ LOAEL	No
NSR 4 - Flatts Farm	51	≥ LOAEL ≤ SOAEL	No

Table 13: Daytime predicted noise levels during Proppant Squeeze on one day only for 3-5 hours.

The predicted impact would be low at NSR 1-3 but would marginally be in the 'adverse' impact category for the short duration of the proppant squeeze at just one location, NSR 4 – Flatts Farm. During this period the $L_{Aeq,T}$ from site activity would still be as much as 14 dB below the significant effect threshold, SOAEL which is a very large margin. The level of impact from the site in practice must be considered low, for during this short period, noise from the site would merely match the level of existing continuous road traffic noise (see Table 8b). In addition, the probability is high that the wind direction during this short 3-5 hour period would be from the prevailing W/SW direction, in which case the levels for NSR 4 would typically be 5 dBA lower than predicted in Table 13.

11.4.3 Phase 3c – 24-hour testing activity (day and night)

With the noisier daytime activities of the appraisal phase complete, there will be a period of testing of gas flows, along with ancillary activities. The testing will continue overnight with a certain amount of equipment running and noise being generated. The equipment will be low levels of noise sources and, being equipment designed to operate at night, will be fitted with appropriate noise mitigation to minimise radiated noise.

The full results of the noise predictions during overnight testing are included in Appendix F, with Figure 12 showing the noise contours at night and Table 11 showing the levels at each NSR against the appropriate LOAEL criterion.

The LOAEL for initial testing is the same as for drilling at night which is $L_{Aeq,T}$ 40 dB and the SOAEL is 45 dB.

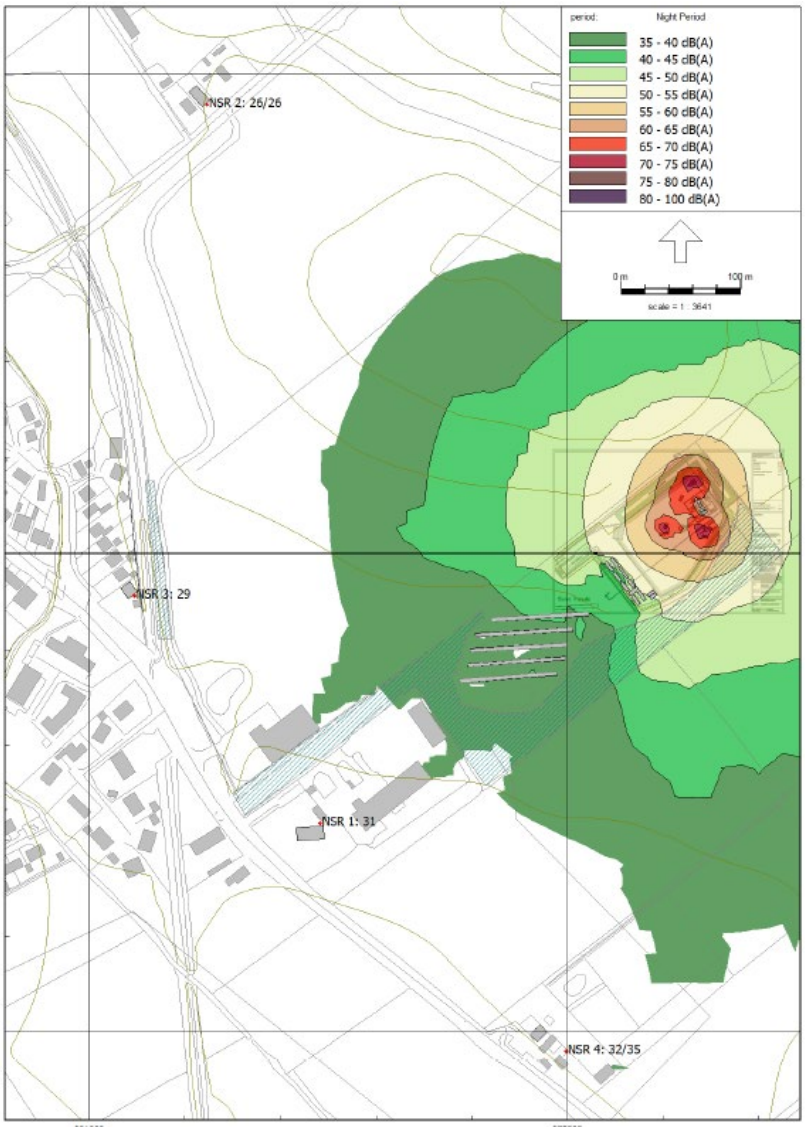


Figure 12: Predicted noise contours during night-time initial testing activity

Receptor	Noise level, $L_{Aeq,1hr}$ (dB)	Level of effect	Significant? (Yes/No)
NSR 1 - Wayside Farm	31	≤ LOAEL	No
NSR 2 - House on Field Lane	26	≤ LOAEL	No
NSR 3 - House on Bridge Close	29	≤ LOAEL	No
NSR 4 - Flatts Farm	35	≤ LOAEL	No

Table 14: Night-time predicted noise levels during initial testing.

The highest noise impact is predicted to arise at NSR 4 Flatts Farm and is just $L_{Aeq,T}$ 35 dB at night. This is well below the LOAEL of $L_{Aeq,T}$ 40 dB and the SOAEL of $L_{Aeq,T}$ 45 dB. The noise impact is considered to be low.

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*

For planning purposes, strict compliance with national and local policy and relevant guidance has been used, along with the necessary reference to LOAEL and SOAEL thresholds.

It is not considered essential therefore to consider how a short period of well gas flow testing might be assessed in accordance with other Standards, such as BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound.* This Standard for example is strictly applicable to permanent installations (for example, production well sites), and an appraisal well site is not a permanent installation. However, it is recognised that appraisal activities need to run for longer periods of time, and when this does happen, there is increased interest in what a BS 4142 assessment might conclude, particularly as this then considers the level of noise compared with the existing background noise. It is also of interest, even at this stage, as much of the process equipment used during appraisal, is similar in scale to that required in a producing well.

The Environment Agency have key responsibilities on noise in regulating well sites when they are producing gas. Although this planning application is not for a production site, the Environment Agency is a key consultee at this stage and make it clear that they would normally assess permanent operating noise using BS 4142:2014+A1:2019.

It is therefore proposed here to show the results of an indicative BS 4142 noise assessment for the initial testing subphase 3c of the proposal.

Empirical evidence referenced by WHO NNG indicates that the night-time LOAEL is L_{night} 40dB, for all sources. WHO suggests this level as a target designed to protect the public, including the most vulnerable groups such as children, chronically ill and elderly people. Below this level there would be no observable adverse effects and therefore it must be concluded that there is little benefit in carrying out an assessment under BS 4142.

Likewise, an absolute threshold for SOAEL may also be considered, below which there would be no significant adverse effects. For industrial sound, BS 4142 indicates a difference between the onset of adverse impact and significant adverse impact of 5dB (i.e. SOAEL = LOAEL + 5dB). The SOAEL for industrial sound at night could, therefore, be considered to be L_{night} 45dB.

However, for context reasons and to provide further reassurance to stakeholders a formal assessment will also be carried out in accordance with BS 4142,

The principle of BS 4142[8] is to determine an initial estimate of impact of industrial/commercial sound on nearby residents by comparing the Rating Level (sound level from the industrial/commercial source, with a correction applied for any acoustic features that characterise the sound) with the Background Sound Level (L_{A90} as measured in absence of the industrial/commercial source).

Generally, the greater the difference by which the Rating Level exceeds the Background Sound Level, the greater the magnitude of impact. BS 4142 states that *'a difference of around +10 dB or more is likely to be an indication of a significant adverse impact […]. A difference of around +5 dB is likely to*

[8] *BS 4142:2014 Methods for rating and assessing industrial and commercial sound*

be an indication of an 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.'

However, BS 4142 also advises that ' *when making assessments and arriving at decisions […] it is essential to place the sound in context'* so in each case, the context in which the sound is placed must be considered and the initial estimate of impact should be modified accordingly. For example it advises '*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.*' It also indicates that impacts estimated during '*the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.*'

Assessment of the predicted levels of noise during initial testing, in accordance with BS 4142 procedures is summarised in table 15. A precautionary character correction of +3dB is included, but only where the specific sound level is above the background level. Where it is at a lower level than even this, no character correction need be applied as the noise is generally unlikely to be audible.

The background sound levels in this assessment are those established in the baseline noise survey (see section 10.3)

Noise Sensitive Receptor	Specific sound level, Ls (dB)	Rating level, LAr,Tr (dB)	Background sound level LA90 (dB)	Difference or Rating minus Background levels(dB)	Initial Impact defined within BS 4142
Daytime					
NSR1	31	31	47	(-16)	Low
NSR2	26	26	42	(-16)	Low
NSR3	29	29	42	(-13)	Low
NSR4	32	32	42	(-10)	Low
Night-time					
NSR1	31	31	30	+1	Adverse
NSR2	26	26	30	(-4)	Low
NSR3	29	29	30	(-1)	Low
NSR4	35	38	30	+8	Adverse

Table 15 BS 4142 assessment of **initial** noise impact of the initial testing subphase 3c before considering context .

During the daytime periods, the initial indication of impact from this BS 4142 assessment is that it would be low.

During the night periods, the initial indication of impact from BS 4142 assessment is that it would be low at two of the NSRs, but a potentially adverse impact at NSR 1 and NSR 4. It should be noted that at night, the assessment is undertaken at bedroom window level heights of 4m. At NSR 4, the predicted noise level at this height is 3dB higher than at ground level.

In the analysis of background noise level differences at weekends, the typically 1dB lower value recorded during the weekends is very small, and in the context of the BS4142 would be of no consequence. The potential impacts during the weekend of initial testing noise would be unchanged from weekdays.

Context

BS 4142 describes a methodology for assessing noise impact, however it states clearly this is only an 'initial indication' of noise impact. Other factors need also to be considered before a final assessment can be concluded. This is the consideration of context. The EA provide additional notes regarding context.

At night at the most affected location (NSR 4) both the Rating Level (38dB) and the Background Sound Level (30 dB) are low. BS 4142 does indicate in this case ……. *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.*' It also indicates that impacts estimated during '*the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.*' The highest Specific Sound Level, i.e. the value before any character correction, is just 35dB and this is 5 dB below the LOAEL as defined earlier in this section. So every indication is that at NSR 4 where the level at night for this period is just $L_{Aeq,T}$ 35 dB, the level of impact is not adverse but low.

So in this case, because the levels of sound are low, consideration of absolute levels, as advised within BS 4142, are indeed a better method of assessment. The conclusion of consideration of absolute levels is that the noise impact is not adverse, but low, and the assessment of a BS 4142 assessment, after consideration of context is that whilst the initial indication of impact is adverse, the final conclusion is that the impact is low.

The conclusion that the noise impact is low when considered against both the LOAEL threshold and now the BS 4142 assessment thresholds, confirms that it may be considered low in overall noise assessment purposes.

It is also considered that as this is not a long term noise level, but instead one limited to a period not exceeding 15 weeks at the most, the impact will be less still.

And finally, the prevailing wind is from the SW and under these typical conditions of upwind noise propagation from the site to NSR4, the levels of noise will be at least 5 dB lower, at 30 dBA than the 35 dBA shown formally in the assessment. The number of nights where levels will be at a worst case are highly likely to be very few during the whole of phase 3c of the project.

There is some significant noise generated from current traffic passing on public roads, and the nearest residential receptors are affected to varying degrees, by road traffic, including at night. There is also some farm activity in the area, and this is present during the day and may be a contributor to night noise levels depending upon season.

The number of sensitive properties potentially affected by levels of noise in excess of Laeq 30 dB, is very small (1-2 only)

Taking note of the above context points the assessment concludes that both during the day and the night periods, the final level of noise impact is more appropriately assessed through consideration of absolute noise levels, and these show the impact to be low. Most importantly the predicted levels of noise at night under less common downwind propagation conditions (typically N, NE and E wind directions) are no greater than $L_{Aeq,T}$ 35 dB which is 5 dB below the LOAEL. Under more common prevailing wind conditions (typically W, SW, S) the levels will likely be not greater than $L_{Aeq,T}$ 30 dB

which is 10dB below the LOAEL, considered to be the most relevant threshold of noise impact for the well testing phase

Uncertainty

A noise impact assessment, carried out in accordance with BS 4142, must consider and report the level of the effect that uncertainty in measurements and calculations has on the assessment's overall conclusions. This will typically be expressed in qualitative rather than quantitative terms. The amount of effort put into minimising such uncertainties should be proportionate to the noise impact risk that the site presents,

With this project, uncertainty both in measurement data and also calculations, has been considered and minimised in the following way:

Reductions in uncertainty of measurement data

Measurements made have been post processed to ensure all data then used in the assessment has been obtained in appropriate weather conditions. That is in wind speeds (peak) less than 5m/s and other adverse weather conditions not significantly affecting data.

- All single measurements used to quantify particular noise sources have, where possible, been made in the acoustic far-field to avoid nearfield effects arising.

- A very large dataset has been generated for baseline noise, and sophisticated post processing of data on a large scale means increased confidence in the measurement summary.

- Where measurements have been made at particular locations, distances have either been directly measured on site, or identified precisely from maps or site plans, rather than being estimated.

- The noise sources arising and the potential time variations of noise level have been specifically investigated and accounted for in planning the times and durations of measurements made, and to ensure particular events and operating conditions are measured and assessed.

- Consistency in sound field description is achieved through all measurements being made under free-field conditions, unless specifically expressed as façade measurements.

- The instrumentation used to measure sound levels on this project is all classified class 1 (Precision Grade) to IEC 61672-1:2002/ BS EN 61672-1:2003. This offers lower uncertainty in measurement than class 2 (survey grade) instrumentation.

- All instrumentation is fully calibrated, and independently verified by external auditors and global certification body, NQA, to ISO 90001:2015 as part of Spectrum's Quality System. Records are kept of dates of calibration. Results of field calibration tests are reported where drift over the duration of the survey is found to have exceeded 0.5dB at 1kHz.

Reductions in uncertainty of calculations and assessment

- Where sound level predictions are extrapolated out to sensitive receptors, this has been done using appropriate algorithms having uncertainty reflecting the degree of risk the site presents[9].

- Substantial effort in the assessment has been put into minimising uncertainty, and this in spite of the predicted impacts of the production plant showing impacts, in most cases, comfortably within the low impact category.

Assessor Competency

- The uncertainty in the assessment conclusions is also minimised as it has been carried out by a competent person as defined within BS 4142. This is someone who is a qualified acoustician and can demonstrate competency in environmental noise work. The assessment has been carried out by Andrew Corkill, Principal Consultant level with an MSc in Acoustics, Noise and Vibration from Imperial College and over 35 years of acoustic consultancy experience. Assistance to the assessor was provided on site by Luke Lloyd, Acoustic Technician, BSc (Hons) TechIOA.

The measures taken to reduce uncertainty on this project along with the numerical difference between the Rating Level and Background Sound Level indicate a level of uncertainty will not change the outcome of the assessment.

11.5 VIBRATION FROM DRILLING AND OTHER MECHANICAL EQUIPMENT

The level of ground-borne vibration arising from drilling and mechanised construction works at a receptor position is difficult to predict, as there are a number of factors that may influence the production and transmission of vibration in the ground, including:

- Local ground (or soil) conditions at the site;
- The distance between source and receiver;
- The ground geology between source and receptor (the transmission path); and
- Local ground conditions at the receptor position

Whilst BS 5228-2 (Annex E) provides empirical formulae to allow the prediction of resultant PPV values from mechanised construction works, the parameter range for input distance only extends to 110 m, which would tie in with the expectation that prediction of vibration to larger distances would have limited accuracy.

Annex D and E of BS 5228-2 provides historic case data on vibration levels produced by various equipment including in its Table 6, rotary piling which is a similar activity to rotary drilling.

As would be expected, the majority of the presented data relates to vibration produced at short distances, with the highest furthest distances where measurements were made being 30m. Here

[9] For this critical site extrapolation calculations are undertaken using computer modelling adopting ISO 1996-2:2007 *Acoustics – Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels.*

values of up to 1 mms-1 were recorded. Table E1 of the Standard shows the fall off of vibration with distance, and between 30m and 350m (the nearest NSR) the attenuation is large such that residual vibration would typically be no greater than 0.01 mms-1.

The predicted level of vibration at the nearest NSR from mechanical equipment including a drilling rig on site would be no greater than 0.01mms-1. This is well within the threshold of human perception of 0.14mms-1 shown in table 6. There would be no vibration effects.

12. BAT ASSESSMENT

12.1 GENERAL

The EA require a BAT Assessment of noise control or 'appropriate measures justification' to be carried out as part of a permit application.

The EA guidance[10] sets out what information is required as part of a BAT assessment. The conclusion must be a justification that the applicant will be using BAT to prevent or minimise polluting noise emissions. The key elements in justifying noise mitigation measures stated in the guidance are:

- Concentrate on the dominant noise sources (and where necessary consider the influence of individual sub-components within a system)
- Detail all existing noise attenuation measures (enclosures, silencers, location of kit, operating time restrictions and maintenance regimes)
- For dominant noise sources, consider all noise reduction techniques an come to a reason determination of what is achievable.
- Where upgrades are identified – state the predicted impact of the works and commit to time completion timescales
- Develop a noise management plan (if there will be a noise impact beyond the site boundary)

In relation to noise (other impacts may be different) , the EA have confirmed in their response to the Noise Scoping Report that noise during construction activities and drilling need not be considered. The phases of the development that are of particular interest to them are therefore Phase 3. And they were concerned that there should be clear separation of the different sub-activities during this phase. The assessments that the EA are particularly interested in therefore have been split out as:

Phase 3a – Well completion/workover (daytime only)
Phase 3b – Proppant Squeeze (3-5 hours in one day, daytime)
Phase 3c – Ongoing testing and appraisal (24hr/day)

For the purposes of completing a BAT assessment for the EA, it is clear that with their focus on longer term noise impacts, it is Phase 3c (Ongoing testing and appraisal (24hr/day)) that they are primarily interested in. Short term temporary impacts are not their priority, and indeed not capable of being assessed using BS 4142, which is the only noise assessment methodology the EA consider should apply.

So this BAT assessment will cover only phase 3c.

[10] *Noise and vibration management: environmental permits, Environment Agency, updated 31 January 2022*

The EA does require noise impact to be reduced when levels are low, however will take the level into account when considering whether additional noise mitigation measures are required. With the level of impact being 5dB below the LOAEL or the threshold off an adverse impact, the margin is considered large enough for additional noise mitigation not to be required. Nevertheless, there is significant noise mitigation by design incorporated within the proposals and additional measures recommended for this project, in achieving these levels.

12.2 INDIVIDUAL SOURCE CONTRIBUTIONS

The underlying principle of BAT is firstly to identify individual sources of noise (equipment) and quantify their contribution to the overall noise arriving at NSRs. During phase 3c, the noise model shows the following contributions at the most critical receptor, NSR 4 – Flatts Farm

Rank ordered noise sources	Individual contribution ($L_{Aeq,T}$ at NSR 4 – Flatts Farm, dB)
Total from whole site	**34.8**
Ground flare	31.5
Lighting tower	27.1
Diesel generator	25.9
Air compressor	25.1
Lighting tower	23.2
Lighting tower	22.8
Other sources	Not significant

Table 16: Noise sources and contributions during Phase 3c ongoing testing and appraisal (24hr/day)

There are a number of sources contributing to the total noise, however approximately 50% of the acoustic energy generated is from the ground flare system.

12.3 CONTRIBUTORY SOURCE NOISE MITIGATION

Having, identified and quantified individual noise sources, it is then necessary to demonstrate that where any of these has the potential to contribute to an adverse, or significant adverse noise effect, information is provided to show that the noise from this individual item of equipment has been suitable mitigated through engineering or other means.

The noise mitigation strategy for equipment sources listed in table 16 are discussed in order of significance:

12.3.1 Ground Flare

The ground flare is a source of noise which is not readily silenced. The main component of noise is associated with combustion, although there are much lower levels of noise from gas flow within pipes. There would not be significant flow restrictions within the gas lines which would otherwise be a potential source of noise. Figure 13 shows a typical ground flare of a type that may be used at this site. Fully details are included within Appendix H, including noise data.

Figure 13: An example of a ground flare that may be used during ongoing testing and appraisal.

A number of natural air inlets at the base of the stack are fitted with opposed blade control dampers. These restrict flow of air for combustion to the precise amount required for optimal combustion to occur to minimise emissions as required by the EA. The noise levels generated however are typically higher at this condition, but this cannot be avoided. The noise data for the unit is given at this optimum combustion efficiency point.

The level of mixing noise of air flow entering the base of the stack and mixed gases exiting the stack outlet, is negligible; instead the dominant noise is created by the very local intense mixing of combustion gases within the combustion area at the base of the stack. Around 50% of the combustion noise emanates back through the louvered air intakes, and the other 50% exists the stack outlet, with most of this component of noise directed vertically, rather than horizontally to the community.

It should be noted that there is no noisy fan to boost the air entering the ground flare, but just natural flow air induced in by the natural combustion process.

Air inlets to this type of flare can have splitter type silencers fitted, however this has limited overall benefit as it doesn't reduce noise from the top of the stack, and potentially also increases combustion noise as it imposes additional flow resistance within the inlet air path, which has then to be overcome.

These items of equipment do not generate high levels of noise; the key element in ensuring that they are quiet is that they are correctly set up and properly maintained throughout their use.

12.3.2 Lighting towers

The arrangement of the site may require the use of individual self-contained lighting towers, powered by small engines. These are commonly used on construction sites where there is limited access to a stable reliable electrical power supply. Noise data is taken for these items of equipment from BS 5228-1 being information typically used in noise assessment studies.

Figure 14 shows a typical lighting tower arrangements, and it can be seen that the small engine is fitted with a silencer (typically residential grade) in the exhaust and fully enclosed within a close fitting acoustic canopy. Typical sound pressure levels at 1m are 80 dBA.

Figure 14: Example lighting tower (Towerlight VB9)

Depending upon the detailed design arrangement, it may be possible to incorporate a different configuration of lighting. This could be a central generator supplying a number of units on the site (cabled), although cabling brings other safety challenges compared with self-contained unit.

12.3.3 Air compressor/nitrogen generation

Nitrogen is required during the appraisal and testing and this is often best generated on site avoiding external regular HGV deliveries of bottled nitrogen. Nitrogen is present within atmospheric air and the most common method of generation is to combine a packaged air compression system, fitted within an acoustic enclosure, together with a benign membrane filter system, which itself does not generate noise. These units can be supplied separately or incorporated into one unit. In either case, the presence of an air compressor as a standard package systems will mean a unit having a silenced atmospheric air inlet system, and an acoustic enclosure structure to contain noise. Cooling air for the system will be provided through silenced ventilation apertures. Figure 15 shows an example nitrogen generation unit.

Figure 15: Typical NiGen N2 generator (air compressor and membrane system).

These units are provided fully silenced and have a high degree of noise attenuation. Typical sound pressure levels at 1m are in the range 70-75 dBA

12.3.4 Diesel generator

The arrangements for providing electrical power during the appraisal/ testing phase are not fully detailed at this stage, however provision is allowed for a significant temporary diesel generation to provide some electrical power to the site.

If a diesel generator is to be used during this phase, these are available as standard acoustically packaged units. A high performance system will have splitter type cooling air inlets and outlet silencers, a residential grade engine exhaust silencer and substantial steel acoustic panel wall and roof panels to the enclosure. A typical example is included in Figure 16. This unit generates a sound pressure level at 7m of 65 dBA

Figure 16: Typical acoustically enclosed diesel generator 100kVA (F G Wilson)

12.3.5 Process flow generated pipe noise

Noise associated with flow of gases within pipes and also the separation of liquids from gas is difficult to predict as this is affected significantly by the detailed design of the gas processing systems and of course the particular mix of gases and liquids within the particular field. Earlier exploration of the Cloughton field confirmed that it was primarily a gas field and therefore separation of any liquid hydrocarbons is not expected. However as a precaution, reference will be made to recent measurements of process flow noise associated with gas/liquid separation made at another site at which the Operator (Egdon Resources UK Ltd) is a stakeholder in this development. These

measurements were carried out by Spectrum at Wressle Wellsite at North Lincolnshire and were cited within a planning and permit application NIA for that project[11].

Effective noise mitigation is proposed for the Cloughton project which is the application of 50mm thick of acoustic insulation to piping downstream of any restriction and control elements within the piping system. This would be applied to all piping up to any downstream equipment or separation vessels. The extent of piping involved is not substantial and is shown for example at the Wressle site in Figure 17 below.

Figure 17: Typical process separation equipment (courtesy of Egdon Resources UK Ltd)

13. EA ENVIRONMENTAL PERMIT NOISE REQUIREMENTS

Whilst it would be consistent with normal planning policy for a Noise Management Plan (NMP) to be submitted for approval by the MPA, a separate NMP would not be required automatically in the case of an Environmental Permit. The appraisal stage, and in particularly the phase 3c 24 hour testing of flows is a short term activity expected to last no more than xx weeks. The wording of used to control noise in environmental permits by the EA historically has been standard, and considered appropriate for phase 3 of this development:

Possible wording within an EA Permit, protecting the community from noise:

[11] *Wressle-2 Oilfield Development Project Noise Impact Assessment to support Planning and Environmental Permit (Variation) Applications. ARC7235/23150/V3. 23.02.2024*

Emissions from the activities shall be free from noise and vibration at levels likely to cause pollution outside the site, as perceived by an authorised officer of the Environment Agency, unless the operator has used appropriate measures, including, but not limited to, those specified in any approved noise and vibration management plan to prevent or where that is not practicable to minimise the noise and vibration.

3.4.2 The operator shall:

(a) if notified by the Environment Agency that the activities are giving rise to pollution outside the site due to noise and vibration, submit to the Environment Agency for approval within the period specified, a noise and vibration management plan which identifies and minimises the risks of pollution from noise and vibration;

(b) implement the approved noise and vibration management plan, from the date of approval, unless otherwise agreed in writing by the Environment Agency.

By way of clarification, noise levels likely to cause pollution outside the site would reasonably be assumed to be levels in excess of SAOEL values referenced within the NVIA. Levels below this would not normally be considered pollution.

It is anticipated that a NMP would not therefore need to be submitted to the EA for their consideration and approval. However, knowing that an NMP related to the planning application is currently envisaged and drafted is expected to be sufficient to satisfy the EA.

14. OUTLINE NOISE MANAGEMENT PLAN

An outline Noise Management Plan including noise monitoring when required, is included within appendix K. If this was approved by the MPA, it could be implemented in order to protect the amenity of residents. However, it should be noted that there are large set back distances, the impacts to residents would not therefore be expected to be so great as to be of concern to residents. The NMP therefore represents a protocol that is set out to cover and be responsive to, potential noise issues from the development.

15. PLANNING CONDITIONS

Paragraph 21 of PPG-M advises that mineral planning authorities (MPA) should aim to establish a noise limit for normal mineral operations, to be set as a planning condition. Normal operations are considered to be those which would be typical operational activities that persist over the long term. While some phases within this application do not fall under this category, it would be reasonable to advise noise limits, to be set by the MPA as a Planning Condition.

As a general principle, the noise limits proposed for consideration by the MPA will be either the levels predicted within this study (+ 3dB design tolerance), or the LOAEL being the threshold for the onset of adverse effects, whichever is the higher. In all cases the proposed limit is well below the SOAEL which is the onset of a significant effect. Proposed limits are shown in Table 17.

Phase	SOAEL ($L_{Aeq,T}$)	LOAEL ($L_{Aeq,T}$)	Predicted in this study + 3dB ($L_{Aeq,T}$)	Proposed in planning condition limit ($L_{Aeq,T}$)
1: Construction (daytime)	65	50	50 + 3	**53**
2: Drilling (night-time)	45	40	38 + 3	**41**
3a: Appraisal – well completion/workover (daytime)	55	50	39 + 3	**50**
3b: Appraisal – proppant squeeze (daytime one day only)	65	50	51 + 3	**54**
3c: Appraisal – flow testing (night-time)	45	40	35 + 3	**40**

Table 17: Development of proposed noise limits ($L_{Aeq,T}$) at the nearest NSR, weekdays and weekends

The proposed wording for noise conditions to be considered by NYC is:

> *Condition A: Noise Management Plan*
> *Within one month of the date of this permission, a Noise Management Plan (NMP) shall be submitted to and approved in writing by the Mineral Planning Authority detailing the procedures to be adopted to minimise noise and also the process to be followed in the event of a noise complaint being received or a request being made by the MPA for suitable noise monitoring and actions to be undertaken within 48 hours of notification. The NMP shall be complied with at all times.*
>
> *Condition B: Noise Limits. The equivalent continuous sound level (LAeq) at the nearest noise sensitive properties to the site and attributable to the operations subject of this permission, shall not exceed the following values during daytime (07:00 -22:00) and nighttime (22:00- 07:00) weekdays, Saturdays and Sundays including bank holidays.:*

- *Phase 1 and 4 – Construction and site restoration : daytime $L_{Aeq,1hr}$ 53 dB and nightime $L_{Aeq,15m}$ 40 dB*
- *Phase 2 – Drilling : daytime $L_{Aeq,1hr}$ 55 dB and nightime $L_{Aeq,15m}$ 41 dB*
- *Phase 3 – Appraisal : daytime $L_{Aeq,1hr}$ 50 dB (54 dB during proppant squeeze) and nightime $L_{Aeq,15m}$ 40 dB*

An outline NMP is included as Appendix K to this report, for NYC to consider.

16. CONCLUSIONS

A noise and vibration impact assessment (NVIA) has been carried out for the proposed drilling of one appraisal well and to undertake a programme of testing at Burniston Mill, Coastal Road, Burniston, Scarborough, YO13 0DB.

This NVIA report seeks to address the requirements of both NYC and the EA as regards supporting the planning application and the application for an Environmental Permit.

A request for pre-application advice (NY/2024/0043/PRE) was submitted to NYC by Europa Oil and Gas in March 2024. NYC advice in respect of noise and vibration, dated 11th June 2024, has been taken into account in this Assessment.

A Noise and Vibration Scoping Report[1], detailing the approach and proposed scope of the NVIA was then prepared and issued to NYC and the EA. Subsequentially, at the request of NYC, Spectrum met with representatives of the Environmental Health Services department on site. Following this meeting, formal responses were received both from NYC and the EA.

The most relevant development management policy against which to assess the proposed development's effect upon noise is Policy D02 (Local amenity and cumulative impacts) in the Minerals and Waste Joint Plan 2022 which requires the applicant to:

> ……*demonstrate that there will be no unacceptable impacts on the amenity of local communities and residents, local businesses and users of the public rights of way network and public open space (subsequent list includes noise)'.*
>
> *Proposals will be expected as a first priority to prevent adverse impacts through avoidance, with the use of robust mitigation measures where avoidance is not practicable.*

In addition, Policy M17 in the Minerals and Waste Joint Plan 2022 (Other spatial and locational criteria applying to hydrocarbon development) is specific to hydrocarbon development and requires a high quality and robust assessment of noise requiring substantial details to be included.

Policy DEC 4: Protection of local amenity, in the Scarborough Local Plan (2017) has a very similar requirement.

It has been a design objective of the proposed development to avoid significant adverse impacts above the SOAEL (deemed to be those that are unacceptable) and endeavour to avoid if possible, or minimise if not, those impacts which once mitigated remain marginally adverse above the LOAEL, in accordance with local and national policy.

The set back distances between the proposed appraisal well site and the nearest sensitive receptors is large at 350m to 530m and this has an effect of ensuring lower levels of noise impact than might arise at many other sites.

The noise from all phases of the development have been considered and assessed. Noise generated during some of the shorter phases will not be required to be considered by the EA; however, they are required by NYC and are therefore considered helpful context in demonstrating to the EA, the applicant's approach to assessment of noise and its mitigation.

A worst-case scenario with downwind noise propagation conditions has been assumed throughout.

The conclusion of the assessments is that for all but one phase of the proposed development, the impacts will be low. During part of phase 3 (Flow testing), specifically subphase 3b (proppant squeeze), the threshold of adverse impact (LOAEL) of 50 dB, will be very marginally exceeded by 1dB at one location (NSR 4); however the levels will remain well below the threshold of a significant adverse impact (SOAEL) which is 65 dB. This marginal value will occur for just 3-5 hours on one single day, and for context represents about the same level of noise that is currently occurring from road traffic at this position, all day and every day. Also, this will only arise under downwind propagation conditions namely a N, NE or E wind. Under normal more common prevailing wind conditions the level of noise will typically be 5 dB lower at 46 dB.

Noise mitigation measures are outlined within this NVIA.

Matters raised by NYC relating to vibration impact from drilling and other mechanical equipment and also consideration of protecting tranquil environments have also been discussed within this report. Vibration impacts are predicted to be substantially below the threshold of perception. The area surrounding the proposed development site, during the day experiences substantial levels of road traffic noise, so it is explained, with reference to a tranquillity map, that the area cannot be categorized as being valued for tranquillity. Whilst the potential for noise impact to ecological receptors was raised, this is a matter that applies, in the case of terrestrial ecology, primarily to bird species and then only at nationally designated areas. With setback distances of 800m to the nearest nationally designated site (SSSI - Iron Scar and Hundale Point to Scalby Ness) noise levels are within the Natural England guidance levels.

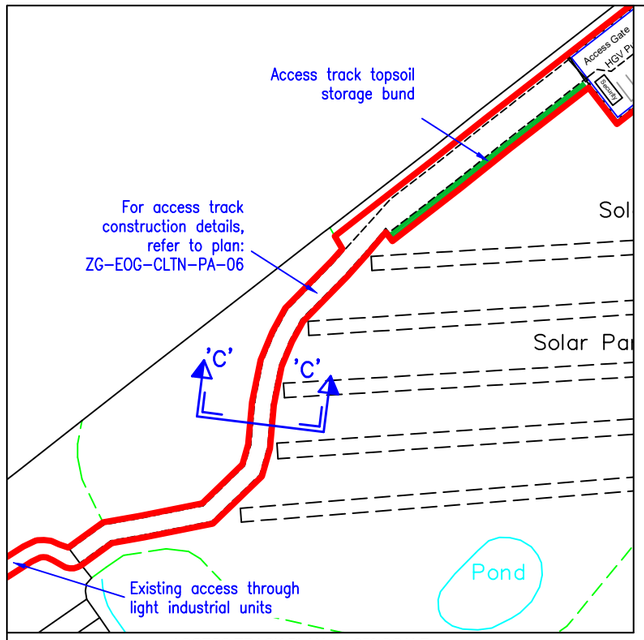
Draft planning conditions are proposed within this NVIA for consideration by NYC's Environmental Health Services.

It is considered that the noise mitigation, combined with suitable planning conditions that are proposed regarding the potential adverse noise effects, are appropriate and proportionate and will adequately protect the amenity of neighbouring residential properties. This therefore accords with Policy D02: Local amenity and cumulative impacts and Policy M17: Other spatial and locational criteria applying to hydrocarbon development, in the North Yorkshire Council Mineral Waste Joint Plan 2022 and Policy DEC 4: Protection of local amenity, in the Scarborough Local Plan (2017).

Similarly, whilst the EA has no reason to require an NMP as the predicted noise and vibration levels are well below the levels of a significant adverse impact, it is hoped that the proposed outline Noise Management Plan, included in Appendix K to this report to support the new planning application, provides the EA with some reassurance that the necessary controls will be in place should they be needed.

APPENDIX A

Site layouts of development phases



ACCESS TRACK PLAN 1:1,250 SCALE

KEY:

- PLANNING APPLICATION BOUNDARY
- CUT BATTER
- FILL BATTER
- PERIMETER CONTAINMENT DITCH
- SECURITY FENCING

NOTES:

CROSS-SECTION VIEW DETAILS INDICATED BY THE DIRECTION THE ARROWS ARE FACING, FROM POINT 'A' TO POINT 'A', AS SHOWN BELOW:

'A' 'A'

FOR SECTION DETAILS, REFER TO PLAN NO: ZG-EOG-CLTN-PA-06

REVISION HISTORY				
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–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
0	OCT24	JF	FIRST ISSUE	JF
REV	DATE	BY	DETAILS	APR

ZETLAND GROUP
FROM CONCEPTION TO COMPLETION

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SITE: CLOUGHTON WELLSITE, BURNISTON, NORTH YORKSHIRE

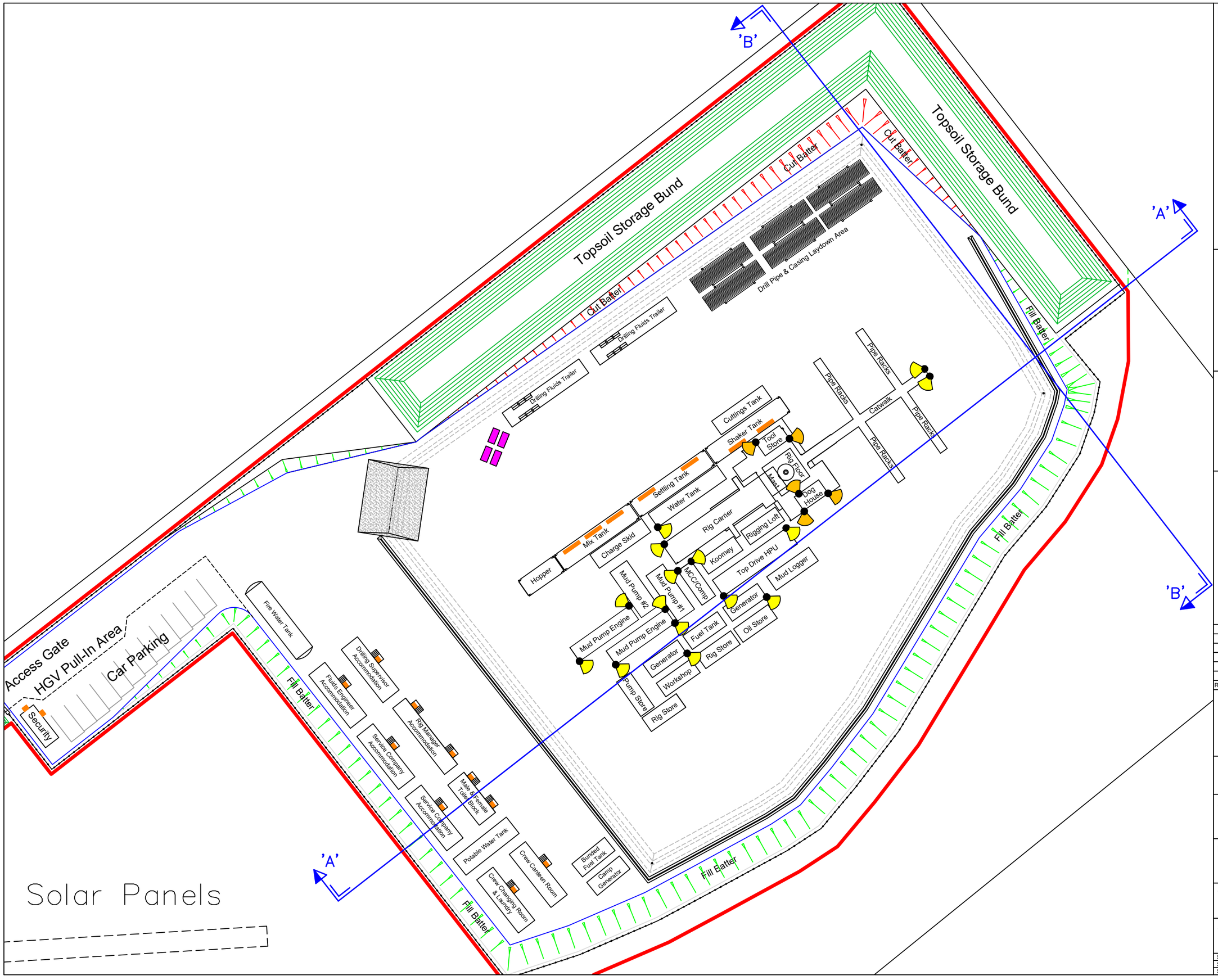
PROJECT: APPLICATION FOR PLANNING PERMISSION

TITLE: SITE LAYOUT PLAN - INDICATIVE CONSTRUCTION PHASE

CLIENT: EUROPA OIL & GAS LIMITED

Scale:	1:500
Size:	A3
Sheet:	1 of 1

DWG. No: ZG-EOG-CLTN-PA-05



N

KEY:

PLANNING APPLICATION BOUNDARY

CUT BATTER

FILL BATTER

PERIMETER CONTAINMENT DITCH

SECURITY FENCING

LIGHTING DETAILS:

LXFL20WBV2 (1 X 20W / 1613 ml)

DRILLING RIG 300W LED FLOODLIGHT

DRILLING RIG 212W HIGH BAY FLOODLIGHT

DRILLING RIG 75W LINEAR LED

MOBILE LIGHTING TOWER 4 X 300W LED (OR SIMILAR SPECIFICATION)

ABBREVIATIONS:

HPU: HYDRAULIC POWER UNIT
KOOMEY: ACCUMULATOR
V-DOOR: RAMP FROM CATWALK TO RIG FLOOR

NOTES:

CROSS-SECTION VIEW DETAILS INDICATED BY THE DIRECTION THE ARROWS ARE FACING, FROM POINT 'A' TO POINT 'A', AS SHOWN BELOW:

'A' 'A'

FOR SECTION DETAILS, REFER TO PLAN NO: ZG-EOG-CLTN-PA-08

REVISION HISTORY

REV	DATE	BY	DETAILS	APR
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
0	OCT24	JF	FIRST ISSUE	JF

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FROM CONCEPTION TO COMPLETION

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Registered in England No. 05864658. Registered office: The Innovation Centre, Kirkleatham Business Park, Redcar, TS10 5SH

SITE: CLOUGHTON WELLSITE, BURNISTON, NORTH YORKSHIRE

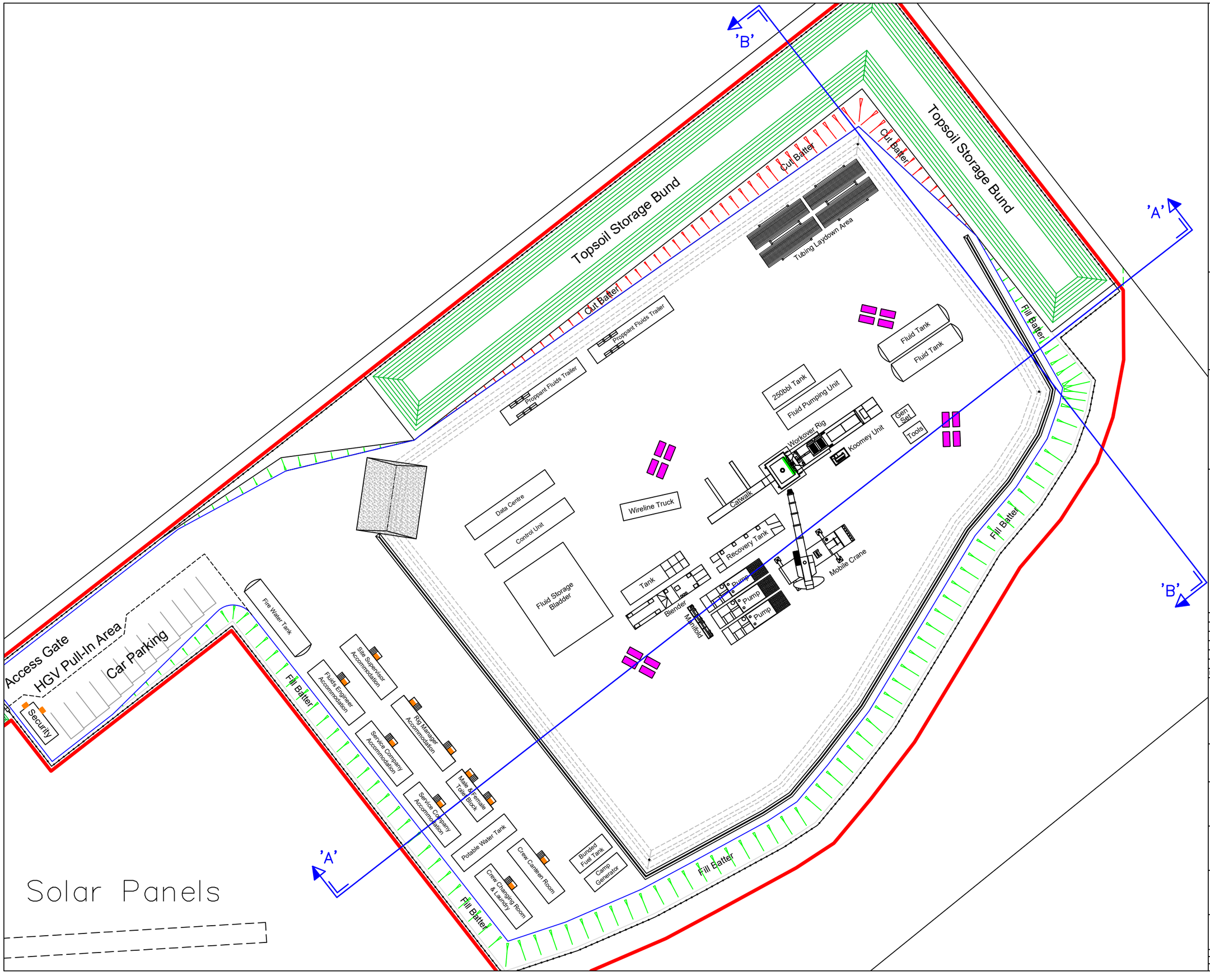
PROJECT: APPLICATION FOR PLANNING PERMISSION

TITLE: SITE LAYOUT PLAN - INDICATIVE DRILLING PHASE

CLIENT: EUROPA OIL & GAS LIMITED

Scale:	1:500
Size:	A3
Sheet:	1 of 1

DWG. No: ZG-EOG-CLTN-PA-07



N

KEY:

PLANNING APPLICATION BOUNDARY

CUT BATTER

FILL BATTER

PERIMETER CONTAINMENT DITCH

SECURITY FENCING

LIGHTING DETAILS:

LXFL20WBV2 (1 X 20W / 1613 ml)

WORKOVER RIG EXTERNAL EX LINEAR FLUORESCENT (CEAG 2 X 36W 3350 LUMENS)

MOBILE LIGHTING TOWER 4 X 300W LED (OR SIMILAR SPECIFICATION)

ABBREVIATIONS:

bbl:	BARRELS (147 LITRES)
GEN SET:	GENERATOR
KOOMEY:	ACCUMULATOR
TOOLS:	TOOL STORE

NOTES:

CROSS-SECTION VIEW DETAILS INDICATED BY THE DIRECTION THE ARROWS ARE FACING, FROM POINT 'A' TO POINT 'A', AS SHOWN BELOW:

'A' 'A'

FOR SECTION DETAILS, REFER TO PLAN NO: ZG-EOG-CLTN-PA-10

REVISION HISTORY

REV	DATE	BY	DETAILS	APR
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0	OCT24	JF	FIRST ISSUE	JF

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SITE: CLOUGHTON WELLSITE, BURNISTON, NORTH YORKSHIRE

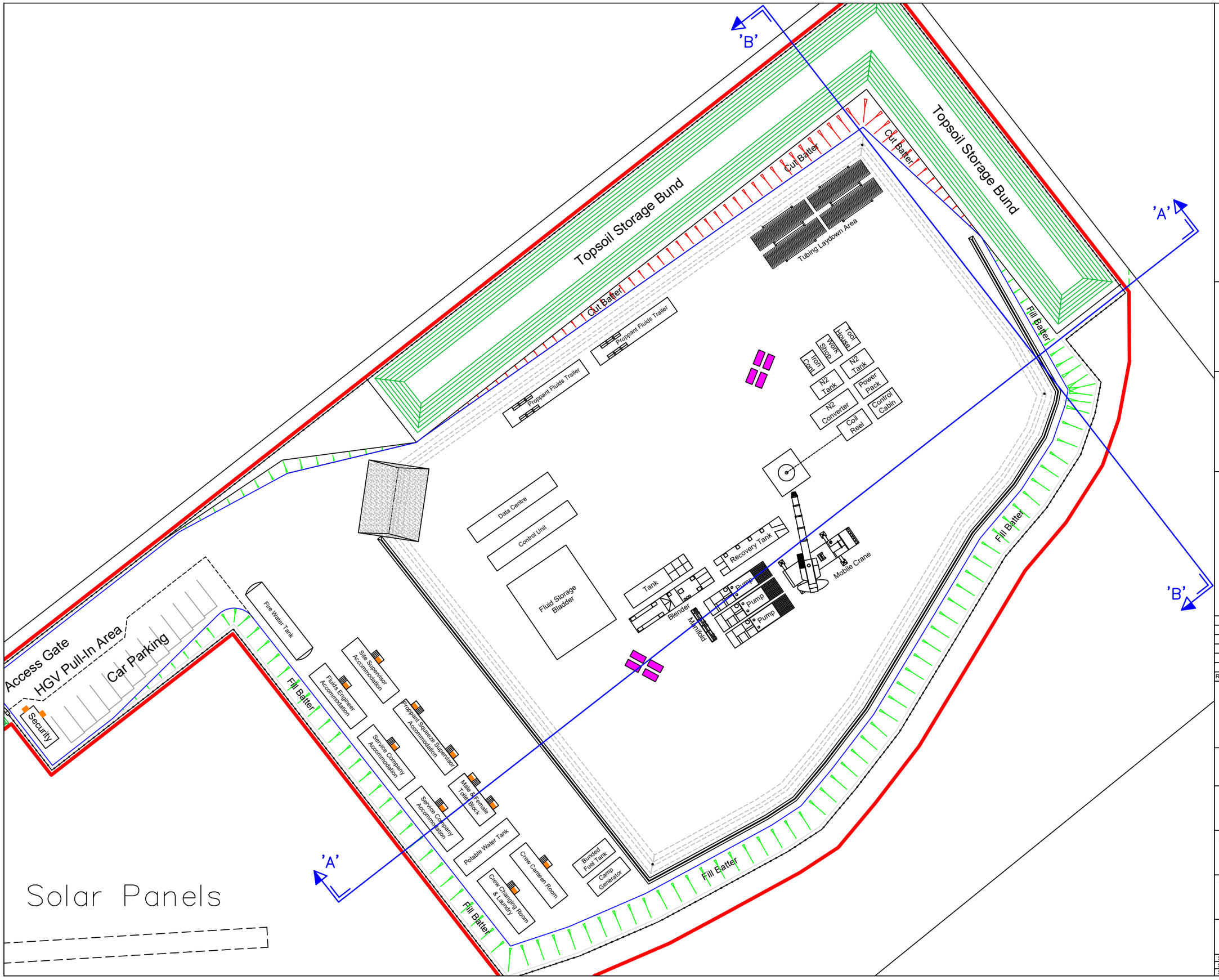
PROJECT: APPLICATION FOR PLANNING PERMISSION

TITLE: SITE LAYOUT PLAN - INDICATIVE PROPPANT SQUEEZE PHASE WITH WORKOVER RIG

CLIENT: EUROPA OIL & GAS LIMITED

Scale:	1:500
Size:	A3
Sheet:	1 of 1

DWG. No: ZG-EOG-CLTN-PA-09



N

KEY:

PLANNING APPLICATION BOUNDARY

CUT BATTER

FILL BATTER

PERIMETER CONTAINMENT DITCH

SECURITY FENCING

LIGHTING DETAILS:

LXFL20WBV2 (1 X 20W / 1613 ml)

MOBILE LIGHTING TOWER 4 X 300W LED (OR SIMILAR SPECIFICATION)

ABBREVIATIONS:

N2: NITROGEN
CONT.: CONTAINER

NOTES:

CROSS-SECTION VIEW DETAILS INDICATED BY THE DIRECTION THE ARROWS ARE FACING, FROM POINT 'A' TO POINT 'A', AS SHOWN BELOW:

'A' 'A'

FOR SECTION DETAILS, REFER TO PLAN NO: ZG-EOG-CLTN-PA-12

REVISION HISTORY

REV	DATE	BY	DETAILS	APR
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–	–	–	–	–
–	–	–	–	–
–	–	–	–	–
0	OCT24	JF	FIRST ISSUE	JF

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SITE: CLOUGHTON WELLSITE, BURNISTON, NORTH YORKSHIRE

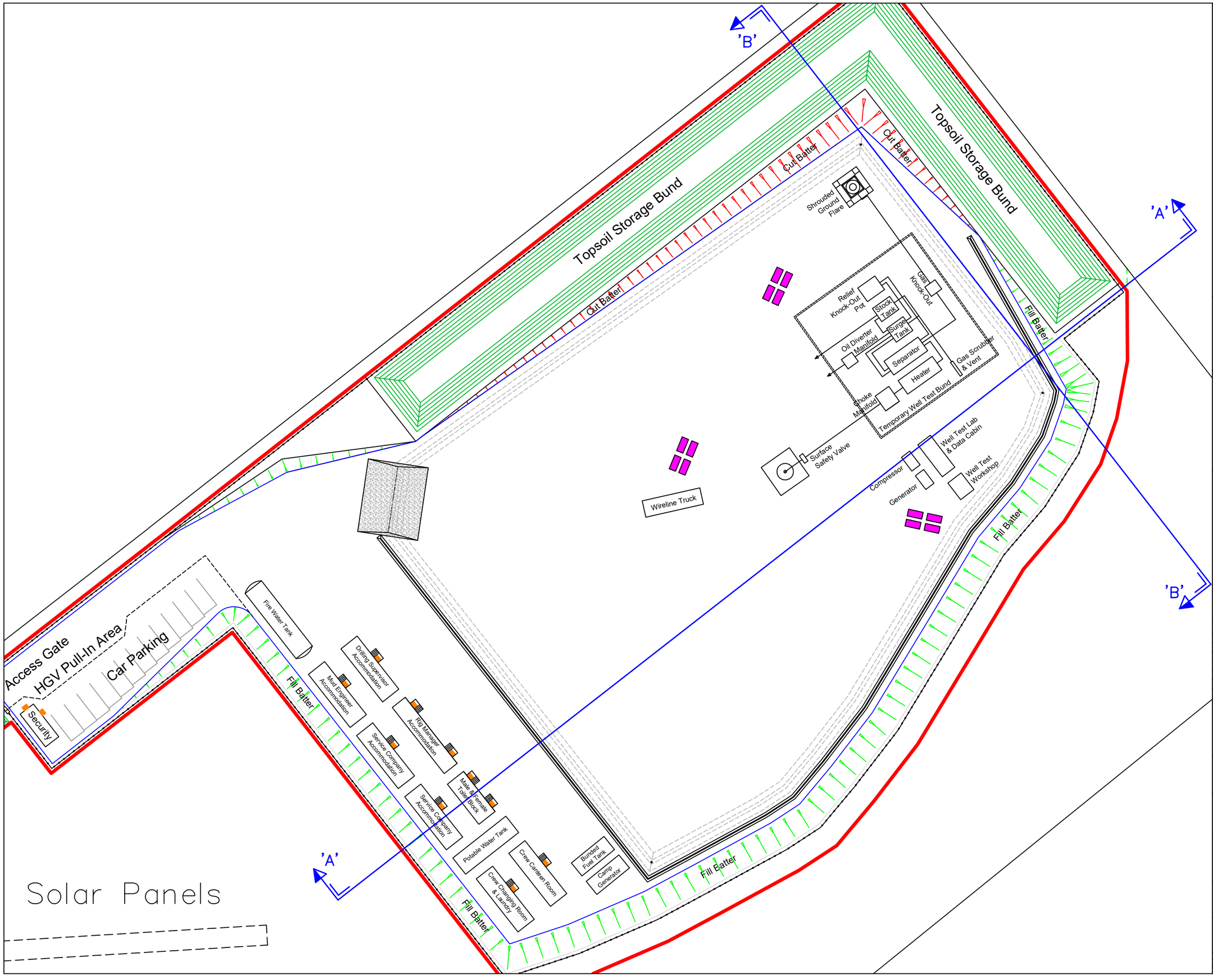
PROJECT: APPLICATION FOR PLANNING PERMISSION

TITLE: SITE LAYOUT PLAN - INDICATIVE PROPPANT SQUEEZE PHASE WITH COIL TUBING UNIT

CLIENT: EUROPA OIL & GAS LIMITED

Scale:	1:500
Size:	A3
Sheet:	1 of 1

DWG. No: ZG-EOG-CLTN-PA-11



N

KEY:

PLANNING APPLICATION BOUNDARY

CUT BATTER

FILL BATTER

PERIMETER CONTAINMENT DITCH

SECURITY FENCING

LIGHTING DETAILS:

LXFL20WBV2 (1 X 20W / 1613 ml)

MOBILE LIGHTING TOWER 4 X 300W LED (OR SIMILAR SPECIFICATION)

ABBREVIATIONS:

NOTES:

CROSS-SECTION VIEW DETAILS INDICATED BY THE DIRECTION THE ARROWS ARE FACING, FROM POINT 'A' TO POINT 'A', AS SHOWN BELOW:

'A' 'A'

FOR SECTION DETAILS, REFER TO PLAN NO: ZG-EOG-CLTN-PA-14

REVISION HISTORY

REV	DATE	BY	DETAILS	APR
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–	–	–	–	–
–	–	–	–	–
0	OCT24	JF	FIRST ISSUE	JF

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Registered in England No. 05864498. Registered office: The Innovation Centre, Kirkleatham Business Park, Redcar, TS10 5SH

SITE: CLOUGHTON WELLSITE, BURNISTON, NORTH YORKSHIRE

PROJECT: APPLICATION FOR PLANNING PERMISSION

TITLE: SITE LAYOUT PLAN - INDICATIVE WELL TESTING PHASE

CLIENT: EUROPA OIL & GAS LIMITED

Scale:	1:500
Size:	A3
Sheet:	1 of 1

DWG. No: ZG-EOG-CLTN-PA-13

APPENDIX B

Baseline noise measurement survey


NML 4
NSR 2 - House on Field Lane
APPRAISAL WELL SITE
NML 3
NSR 3 - House on Bridge Close
NSR 1 - Wayside Farm
NML 1
NML 2
NSR 4 - Flatts Farm

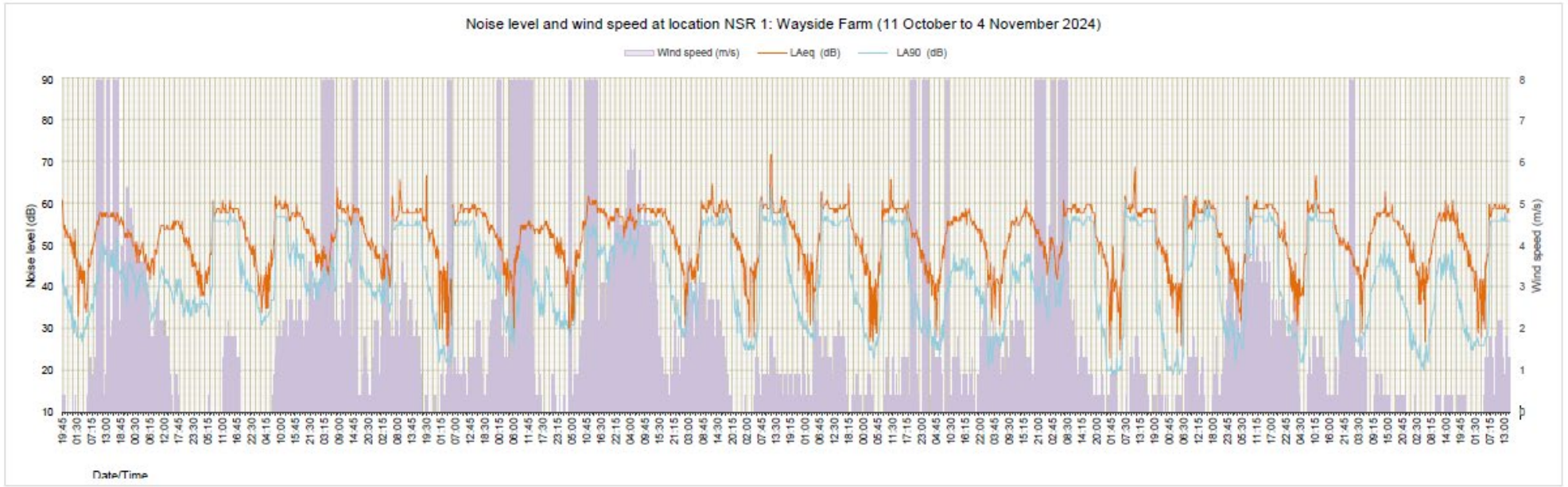
NSR 4 /NML 2 – Flatts Farm – unattended noise monitor

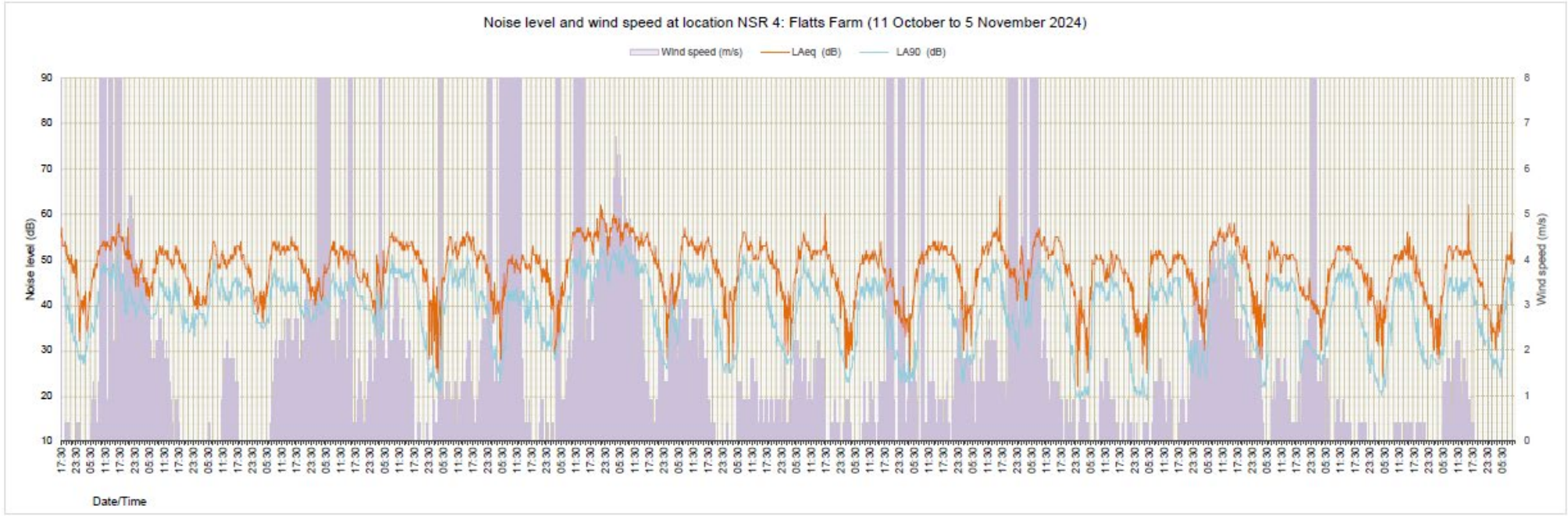
NSR 4 / NML 2 – Flatts Farm – unattended weather station

NSR 1/ NML 1 – Wayside Farm – unattended noise monitor

NSR 2 - Field Lane – attended noise measurements

NSR 3 – Rear of Bridge Close properties – attended noise measurement


Noise level and wind speed at location NSR 1: Wayside Farm (11 October to 4 November 2024)
Wind speed (m/s)
LAeq (dB)
LA90 (dB)
Noise level (dB)
Wind speed (m/s)
Date/Time


Noise level and wind speed at location NSR 4: Flatts Farm (11 October to 5 November 2024)
Wind speed (m/s)
LAeq (dB)
LA90 (dB)
Noise level (dB)
Wind speed (m/s)
Date/Time

Raw data and central tendencies for location NSR 1: Wayside Farm

Measure of central tendency	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFMax} (dB)
Modes	46	28	-
Mean	43	30	-
Mean - 1 s.d.	38	24	-
Log Average	47	-	-

Table 4: Night-time period (23:00 to 07:00)

Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFMax} (dB)	Wind direction (°)	Wind speed (m/s)
11/10/2024	23:00	50	34		225	0.00
11/10/2024	23:15	52	38		225	0.00
11/10/2024	23:30	50	31		247.5	0.00
11/10/2024	23:45	48	30		247.5	0.00
12/10/2024	00:00	51	33		247.5	0.40
12/10/2024	00:15	51	32		247.5	0.00
12/10/2024	00:30	47	29		225	0.00
12/10/2024	00:45	54	32		225	0.00
12/10/2024	01:00	49	32		225	0.40
12/10/2024	01:15	45	30		225	0.00
12/10/2024	01:30	47	28		225	0.00
12/10/2024	01:45	41	28		225	0.00
12/10/2024	02:00	33	28		225	0.00
12/10/2024	02:15	38	28		225	0.00
12/10/2024	02:30	44	28		225	0.00
12/10/2024	02:45	46	28		225	0.00
12/10/2024	03:00	42	29		225	0.00
12/10/2024	03:15	45	28		225	0.00
12/10/2024	03:30	41	27		225	0.00
12/10/2024	03:45	44	29		225	0.00
12/10/2024	04:00	44	29		225	0.00
12/10/2024	04:15	41	28		225	0.00
12/10/2024	04:30	44	30		225	0.00
12/10/2024	04:45	35	30		225	0.00
12/10/2024	05:00	36	31		225	0.00
12/10/2024	05:15	34	30		157.5	0.00
12/10/2024	05:30	37	33		225	0.40
12/10/2024	05:45	41	31		225	0.40
12/10/2024	06:00	47	32		247.5	0.40
12/10/2024	06:15	45	33		225	0.90
12/10/2024	06:30	45	33		247.5	0.90
12/10/2024	06:45	45	34		247.5	1.30
12/10/2024	**23:00**	**53**	**44**		**247.5**	**4.50**
12/10/2024	**23:15**	**52**	**44**		**270**	**4.50**
12/10/2024	**23:30**	**50**	**45**		**270**	**4.00**
12/10/2024	**23:45**	**50**	**43**		**270**	**4.00**
13/10/2024	**00:00**	**50**	**42**		**270**	**3.60**
13/10/2024	00:15	50	42		270	3.10
13/10/2024	**00:30**	**51**	**43**		**270**	**3.60**
13/10/2024	**00:45**	**48**	**40**		**270**	**3.60**
13/10/2024	**01:00**	**46**	**37**		**270**	**3.60**

Raw data and central tendencies for location NSR 4: Flatts Farm

Measure of central tendency	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFMax} (dB)
Modes	40	28	-
Mean	41	30	-
Mean - 1 s.d.	35	24	-
Log Average	44	-	-

Table 4: Night-time period (23:00 to 07:00)

Date	Time	L_{Aeq} (dB)	L_{A90} (dB)	L_{AFMax} (dB)	Wind direction (°)	Wind speed (m/s)
11/10/2024	23:00	49	33		225	0.00
11/10/2024	23:15	50	33		225	0.00
11/10/2024	23:30	46	31		247.5	0.00
11/10/2024	23:45	50	32		247.5	0.00
12/10/2024	00:00	45	31		247.5	0.40
12/10/2024	00:15	42	30		247.5	0.00
12/10/2024	00:30	43	29		225	0.00
12/10/2024	00:45	38	28		225	0.00
12/10/2024	01:00	32	29		225	0.40
12/10/2024	01:15	35	28		225	0.00
12/10/2024	01:30	41	28		225	0.00
12/10/2024	01:45	41	28		225	0.00
12/10/2024	02:00	39	29		225	0.00
12/10/2024	02:15	41	28		225	0.00
12/10/2024	02:30	38	27		225	0.00
12/10/2024	02:45	42	29		225	0.00
12/10/2024	03:00	42	28		225	0.00
12/10/2024	03:15	39	27		225	0.00
12/10/2024	03:30	43	30		225	0.00
12/10/2024	03:45	35	31		225	0.00
12/10/2024	04:00	35	30		225	0.00
12/10/2024	04:15	34	32		225	0.00
12/10/2024	04:30	37	34		225	0.00
12/10/2024	04:45	39	33		225	0.00
12/10/2024	05:00	43	33		225	0.00
12/10/2024	05:15	41	33		157.5	0.00
12/10/2024	05:30	42	33		225	0.40
12/10/2024	05:45	43	35		225	0.40
12/10/2024	06:00	45	36		247.5	0.40
12/10/2024	06:15	46	35		225	0.90
12/10/2024	06:30	46	35		247.5	0.90
12/10/2024	06:45	48	34		247.5	1.30
12/10/2024	**23:00**	**47**	**40**		**247.5**	**4.50**
12/10/2024	**23:15**	**47**	**40**		**270**	**4.50**
12/10/2024	**23:30**	**48**	**41**		**270**	**4.00**
12/10/2024	**23:45**	**45**	**39**		**270**	**4.00**
13/10/2024	**00:00**	**44**	**37**		**270**	**3.60**
13/10/2024	00:15	49	39		270	3.10
13/10/2024	**00:30**	**47**	**39**		**270**	**3.60**
13/10/2024	**00:45**	**47**	**40**		**270**	**3.60**
13/10/2024	**01:00**	**44**	**39**		**270**	**3.60**

ATTENDED BASELINE NOISE MEASUREMENTS

Measurement Position	Start Time	Elapsed Time	LAFmax	Laeq	LAF90.0	Comment	Attended meter Start/End/Drift dB	Calibration Certificate date
NSR 3/NML 3	11/10/2024 23:33	00:13:57	63	42	**25**	Occasional local car, no other sources. Very quiet. No wind	93.8/93.9/0.15	28.08.2023
NSR 3/NML 3	12/10/2024 00:07	00:07:59	65	45	**37**	Continous distant road traffic. No wind	93.8/93.9/0.09	28.08.2023
NSR 3/NML 3	04/11/2024 19:03	00:15:00	60	44	**33**	Distant and local road traffic. Light wind	93.8/93.8/0.01	14.02.2023
NSR 3/NML 3	04/11/2024 19:53	00:15:00	56	42	**30**	Distant and local road traffic. Ligh wind	93.8/93.8/0.01	14.02.2023
NSR 3/NML 3	04/11/2024 23:27	00:15:00	64	42	**25**	Very distant road traffic. Light wind	93.8/93.8/0.01	14.02.2023
NSR 3/NML 3	05/11/2024 00:13	00:15:00	61	40	**23**	Very distant road traffic. Light wind	93.8/93.8/0.01	14.02.2023
NSR 2/NML 4	11/10/2024 23:56	00:13:30	53	34	**28**	Very faint distant road traffic. No wind	93.8/93.9/0.15	28.08.2023
NSR 2/NML 4	12/10/2024 07:36	00:15:08	67	41	**35**	Continous distant traffic noise. No wind	93.8/93.9/0.09	28.08.2023
NSR 2/NML 4	04/11/2024 19:29	00:15:00	57	34	**29**	Distant road traffic. Light wind	93.8/93.8/0.01	14.02.2023
NSR 2/NML 4	04/11/2024 20:16	00:15:00	50	35	**30**	Distant road traffic. Light wind	93.8/93.8/0.01	14.02.2023
NSR 2/NML 4	04/11/2024 23:04	00:15:00	60	32	**28**	Very distant road traffic. Light wind	93.8/93.8/0.01	14.02.2023
NSR 2/NML 4	04/11/2024 23:49	00:15:00	67	33	**27**	Very distant road traffic. Light wind	93.8/93.8/0.01	14.02.2023

The key measurement data is La90 Background Sound Level

APPENDIX C

Noise source equipment sound power levels

Equipment List Sound Power Levels - Construction phase

Equipment or source	Source Octave Band Sound Power Level, Lw (Linear)								Overall LwA (dB)	Comment (power, BS 5228 table ref.)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz		
Linear band Lp at 10m										
Excavator (wheeled)	87	84	80	81	78	75	69	67	**83**	63kW - Table C.4.56
Bulldozer	83	81	76	77	82	70	65	58	**83**	134kW - Table C.5.15
Crane (Wheeled mobile)	80	76	71	63	64	63	56	50	**70**	275kW - Table C.4.43
Concrete pouring	75	76	71	70	71	68	64	60	**75**	6T - Table C4.26
Concrete vibration poker	62	70	70	64	62	61	59	56	**69**	2.2kW - Table C.4.34
HGV aggregate lorry	87	79	77	74	73	73	70	64	**79**	44T - Table C.11.7
Compactor roller	82	80	76	73	70	70	63	59	**76**	95kW - Table C.5.21
Site generator	64	61	59	53	49	47	42	35	**56**	2T - Table C.4.82
Site compressor	84	73	64	59	57	55	58	47	**66**	1T - Table C.5.5
Lighting towers	78	71	66	62	59	55	56	49	**65**	15kW - Table C.4.86
Lw values at Lp at 10m + 28 dB										
Excavator (wheeled)	115	112	108	109	106	103	97	95	**111**	63kW - Table C.4.56
Bulldozer	111	109	104	105	110	98	93	86	**111**	134kW - Table C.5.15
Crane (Wheeled mobile)	108	104	99	91	92	91	84	78	**98**	275kW - Table C.4.43
Concrete pouring	103	104	99	98	99	96	92	88	**103**	6T - Table C4.26
Concrete vibration poker	90	98	98	92	90	89	87	84	**97**	2.2kW - Table C.4.34
HGV aggregate lorry	115	107	105	102	101	101	98	92	**107**	44T - Table C.11.7
Compactor roller	110	108	104	101	98	98	91	87	**104**	95kW - Table C.5.21
Site generator	92	89	87	81	77	75	70	63	**84**	2T - Table C.4.82
Site compressor	112	101	92	87	85	83	86	75	**94**	1T - Table C.5.5
Lighting towers	106	99	94	90	87	83	84	77	**93**	15kW - Table C.4.86

Equipment List Sound Power Levels - Phase 2 - Drilling

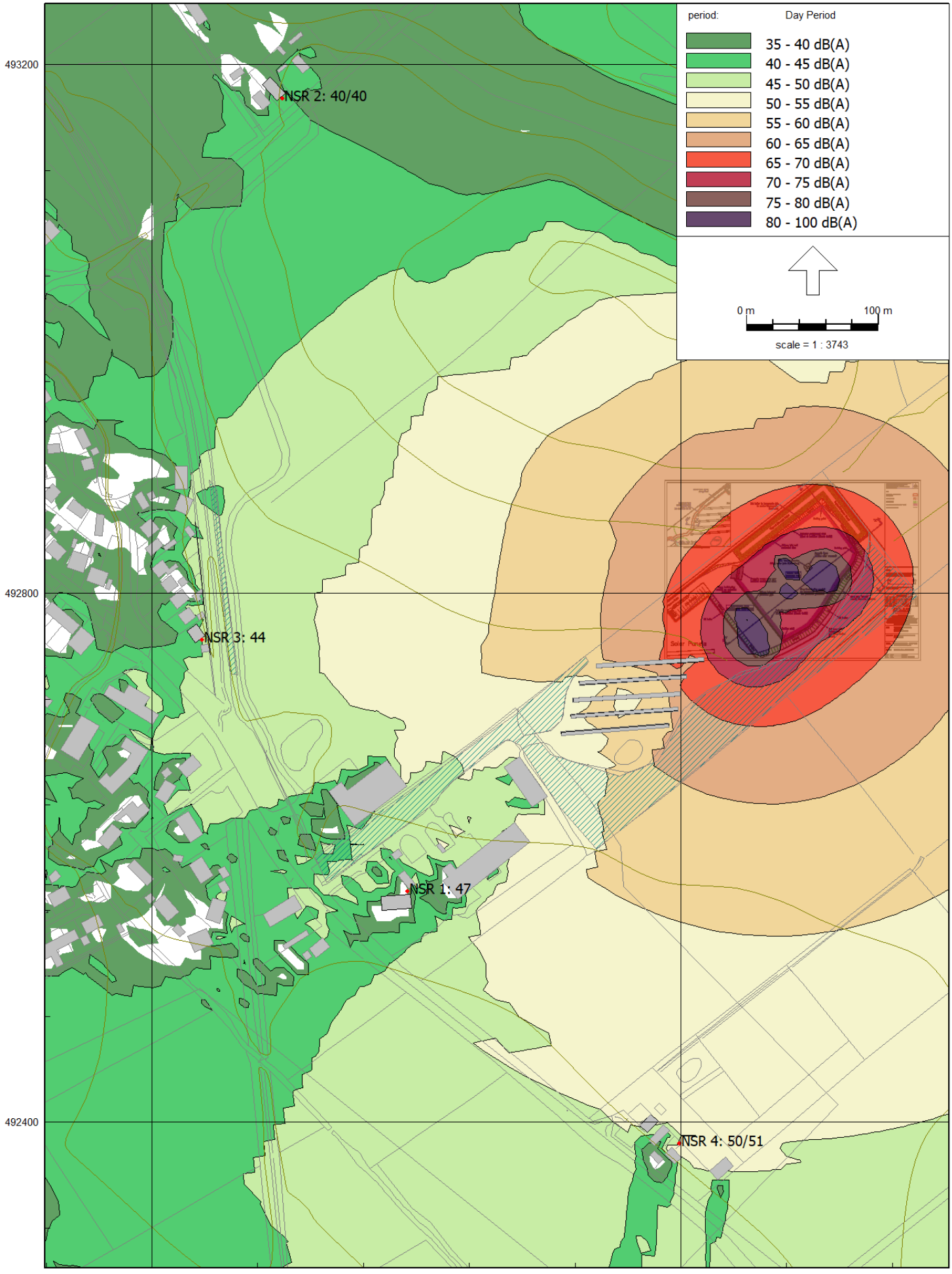
Equipment or source	Source Octave Band Sound Power Level, Lw (Linear)								Overall LwA (dB)	Comment (make, model, operating condition, etc)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz		
Drilling										
Cuadrilla Drillmec HH-220										Measured during Cuadrilla drilling at Preese Hall
BDF Rig 28 Ideco BIR5625 (drilling)										Provided by BDF
Edeco Rig 40										Measured during drilling for Caithness Energy at Lybster
Mean of candidate rigs above:	111	111	107	102	98	94	89	82	**105**	Mean of above values
Consortium Rig 4									**105**	Measured results provided by Vendor prior to extensive noise mitigation
										measures installed. Values are reported here to be attenuated by 5dBA
										which is likely to have been achieved.Updated field noise data is
										required for this rig to confirm stated values have been achieved, prior to any
										commitment.
Drilling rig noise output will vary depending upon ground conditions encountered. The likely range of noise levels experienced will be 105 dBA +/- 3dBA. Where situations are potentially highly noise critical, a cautious approach is advised for a fully robust assessment. + 3 dBA will be added to the mean sound power levels in the noise propagation modelling.										

Equipment List Sound Power Levels - Phase 3 - Appraisal

Equipment or source	Source Octave Band Sound Power Level, Lw (Linear) 63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	Overall LwA (dB)	Comment (make, model, operating condition, etc)
APPRAISAL										
Workover subphase activity (daytime only)										
										A coil tubing unit is an alternative to a workover rig, however its noise levels and operations are generally quieter.
Workover rig operating in full load hauling mode. This is the noisiest period of operation and once a lifting cycle is complete. Noise levels reduce. Typical on-time at this level is 20-30%. Average levels are 3-4 dBA less than this. Modelled noise output will be 107 dB for robust assessment. Active use of the workover rig in haul mode is generally limited to daytime, except in exceptional unforeseen circumstances.	108	105	104	102	101	99	98	95	**107**	Dominant noise source from a workover rig is the operation of the diesel engine drive train for the drawworks. This is integral with the trailor and incorporates its own acoustic enclosure. Noise data is based on Moor 475. Test report on Enerflow Mobile Service Rig advises Sound power level of 110 dBA. Octave band values estimated by Spectrum.) Noise mitigation to be used includes acoustic hood installed over trailer mounted engine and gearbox and EchoBarrier screens installed locally around trailer.
										Ancillary equipment, such as power generators and lighting generator continue to operate during the appraisal phase.
Proppant squeeze subphase activity (daytime only - one day)										
Proppant Squeeze	120	120	117	115	111	108	103	98	**117**	Based on measurements made during proppant squeeze at Wressle on 25 July 2021. 3 pumps used on site. 57 dBA measured at 149m from the pumps centre for a total of 1 hour during the daytime to complete the process. Noise is primarily from diesel engines powering the pumps.
24hr testing subphase activity (day and night) through Appraisal phase										
Upgraded Flare (Increased flow 2,400 m3/hr or more) typically	99	97	98	97	92	87	80	75	**98**	Operates only during appraisal. Increased noise as Vendor datasheet (+7dB). Typically Uniflow UF10 series.
Air compressor	88	90	95	90	85	80	75	70	**92**	Typically an acoustically packaged standard air compression system is only noise source generated 70-75 dBA sound pressure level at 1m.
Diesel Generator	100	97	95	89	85	83	78	71	**92**	F W Wilson 100 kVA
Lighting tower	106	99	94	90	87	83	84	77	**93**	Opeating in hours of darkness, 15kW - Table C.4.86 BS 5228-1
Process gas flow at flow control/separation	81	78	81	79	80	82	70	65	**86**	Measured at Wressle Wellsite, but with 50-75mm acoustic insulation (-12 dBA)

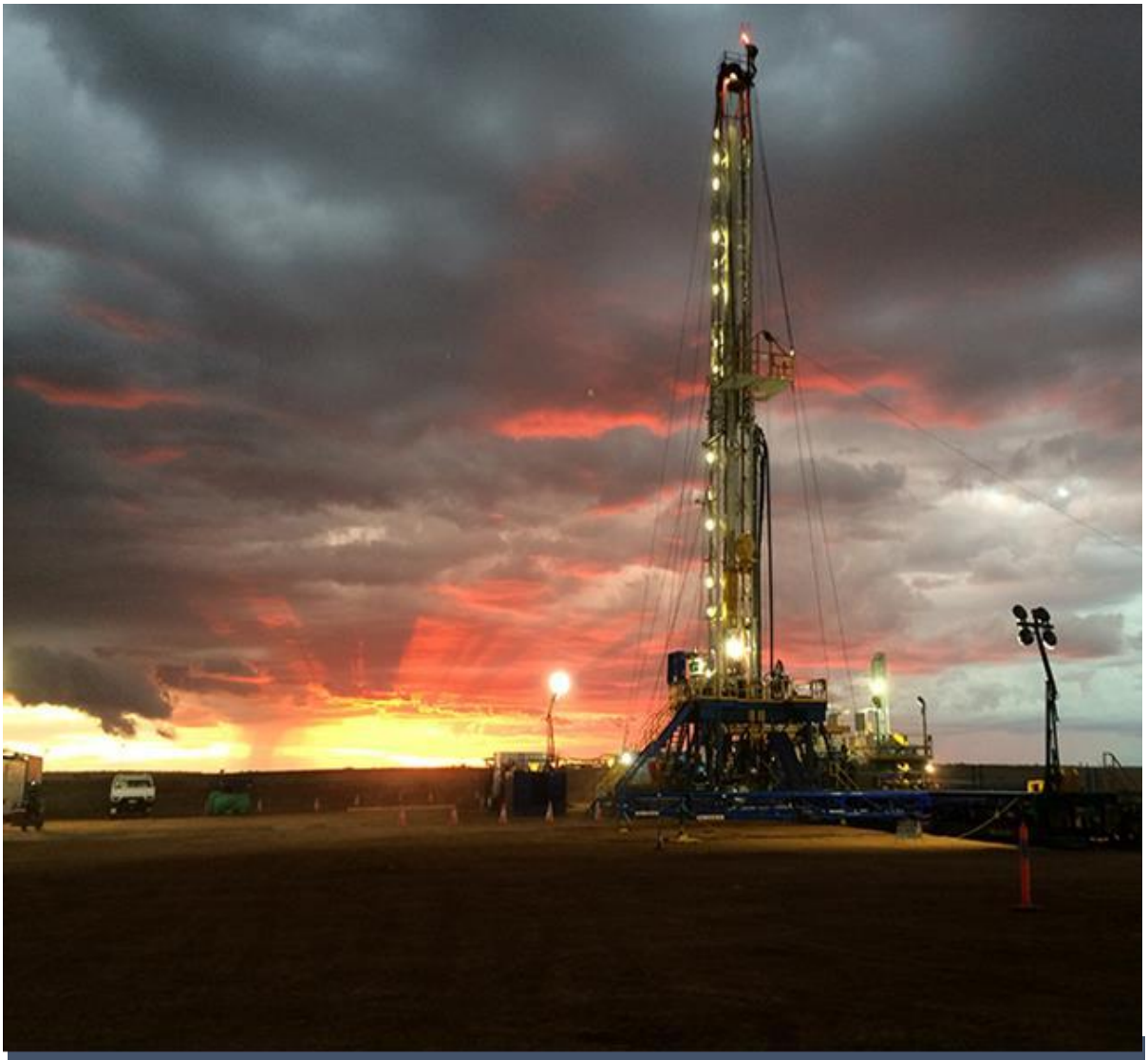
APPENDIX D

Predicted noise levels – Construction (Phase 1)


period: Day Period
35 - 40 dB(A)
40 - 45 dB(A)
45 - 50 dB(A)
50 - 55 dB(A)
55 - 60 dB(A)
60 - 65 dB(A)
65 - 70 dB(A)
70 - 75 dB(A)
75 - 80 dB(A)
80 - 100 dB(A)
0 m
100 m
scale = 1 : 3743
NSR 2: 40/40
NSR 3: 44
NSR 1: 47
NSR 4: 50/51
493200
492800
492400
501600
502000

APPENDIX E

Candidate drilling rigs



Consortium Drilling Ltd
Rig 4 Inventory

 | Uncontrolled, If Printed | 20230822 Rev 1, Issue 0

Stewart & Stevenson Crown CE 1000 SD

The S&S Crown CE 1000 120,000 lb. quad suspension trailer rig is a fully mobile Pad Skidding unit that can be positioned over any well in various configurations to best suit the programme and any other activities on the wellsite.

DEPTH RATING

4 in drill pipe (m)	:	16,500 ft. (5028 m)

RIG TRAILER

Manufacturer	:	Stewart & Stevenson (S&S)
Type	:	Crown King
Engines	:	Two x Detroit Diesel Series 60 diesel engines
Power (HP)	:	14.0L, with intermittent rating of 550 BHP Each
Transmissions	:	Two x Allison CLT-5861S 5-speed (compound)
PTO	:	Two x Chelsea PTO (Transmission Mounter)
Air Compressor	:	Two x Tru-Flo 1000
Hydraulic system	:	2500 psi x 50 gpm
Levelling Jacks	:	Eight (4 x hydraulic, 4 x Mechanical)
Rear axles	:	Four x 120,000 lb
Rear tyres	:	Sixteen x 315/80R22.5

DRAWWORKS

Make	:	Crown King
Type	:	CE 1000 SD
Rating (HP)	:	1000
Depth rating (m)	:	5000 m
Drilling line	:	1-1/4” EIPS
Main brake	:	Drum type
Auxiliary Brake	:	Eaton WCBD-336 Disc Brake
Hoisting speeds	:	6
Rotary speeds	:	6
Main drum	:	22 in x 46 in

MAST

Make	:	Stewart and Stevenson
Mast Guying	:	External or Internally Guyed for skidding
Design Spec	:	API 4F, using three-dimensional nonlinear dynamic finite element software
Height (ft)	:	118
No of lines	:	10
Capacity (lb)	:	440,000
Fast sheave	:	One x 42 in
Fleet sheaves	:	Four x 36 in
Deadline sheave	:	One x 30 in
Racking Board Gross Capacity	:	4-1/2 in drill pipe 16,500ft (5028m)
Standpipe	:	4 in x 5000 psi
Tong jacks	:	Two hydraulic make up/ break out tong pull jacks

TOP DRIVE

Make	:	Tesco
Model	:	HXI 700 Top drive system
Rated capacity	:	250 Ton
HP	:	700hp 522KW
Max. Continuous drill torque	:	24,000 ft-lb 3,254.5 daN-m
Make-up/Breakout torque	:	32,000 ft-lb 4,339.4 daN-m
Max. Speed	:	200 rpm
Prime Mover	:	D4P – 700 power unit, caterpillar 700 HP C-18 Prime Mover with a 4-pump drive.

SUBSTRUCTURE

Make	:	Stewart and Stevenson
Type	:	Telescoping type substructure
Rig Floor Height	:	18ft
Clear working height (m)	:	16ft
Set-back Capacity	:	300,000lbs
Rotary Support Capacity	:	500,000lbs

BLOCKS

Make	:	Brewster
Type	:	Clevis Block
Capacity (ton)	:	300 (5-sheave)

ROTARY TABLE

Make	:	Hacker International
Model	:	OB20.5
Opening size (in)	:	20 1/2”

RIG SKIDDING SYSTEM (OPTIONAL)

Make	:	Integrated Skidding System
Type	:	Mechanical claw indexing with minimal handling
Skid Ram Length	:	Two foot (2’) incremental skid cycle
Skid Length	:	Skid rail to accommodate0ft to 80ft inline skid

NOTE: Skidding system raises floor height (1) foot when utilized. Hydraulic supply can be powered off of either Top Drive PU or Rig Carrier.

MUD PUMP #1 & #2

Make	:	IDECO
Model & Type	:	T-1600 Triplex
Number	:	Two
Drive & Transmission	:	Cummins KTA50 c/w Allison 9000Series
HP	:	1600
Liner size (in)	:	5.50 to 7.00
Max pump press rating (psi)	:	5000
Max continuous (spm)	:	100
Pre-charge pump (in)	:	5 x 6

GENERATORS

MCC Power Generation (Sound Attenuated)

Make	:	C Dean electrical
Type	:	AC Generator Class H
Gensets Number	:	Two
Size	:	575Kva, 460Kw, 873A, 380-440V, @ 50Hz
Engine	:	Scania
Model	:	DC16-45A

MUD SYSTEM

Tank volume (bbl)	:	1000 (three tanks)
Mud mix pumps number	:	2
Size (in)	:	5 x 6
Power (hp)	:	50
Rpm	:	1750
Mix hoppers	:	2
Shakers	:	Three Brandt VSM 300
Degassers	:	Atmospheric and primary
Agitators	:	Four
Type	:	Brandt & Flygt
HP	:	10

BOP SYSTEM

NOTE: Well control system in line with current API STD 53

BOP stack	:	13 5/8” 5000psi A1, R2
	:	Blind Rams
	:	VBR 2 7/8” – 5”
Valves	:	2 1/16” 5000psi Kill x 2 manual 3 1/8” 5000psi Choke x 1 3 1/8” 5000psi HCR x 1
BOP handling details	:	Trolley system
WELL CONTROL SUBS	:	IBOP to suit drill string FOSV to suit drill string

BOP CLOSING SYSTEM

Accumulator	:	Advanced Pressure Inc.
Functions	:	5 station
Size (gals)	:	200
Choke Manifold	:	Quality Valve Works USA
Pressure Rating	:	5000psi
Valves	:	Eight

REMOTE CHOKE PANEL

Make	:	Smith Willis
Type	:	Super Choke
Adjustable choke	:	Willis
Press rating (psi)	:	5M
BOP test unit	:	Hydratron

INSTRUMENTATION

Weight indicator	:	Martin Decker
Pump pressure	:	Kane Instrumentation
Standpipe pressure	:	Kane Instrumentation
Stroke counters	:	ElectroFlow
Driller's console	:	Displays all key parameters
Tesco TDS Drillers panel	:	Drill torque and RPM
Travelling Block Crown and Floor Anti-collision system	:	Rig Control Products

HANDLING EQUIPMENT

Iron Roughneck	:	FH-80
Pipe Spinner	:	FH-80
Torque Wrench	:	3 ½" to 8"
Rotary Tongs	:	3 ½" to 13 3/8"
DP & DC Slips	:	SDXL and DCS-L
Elevators	:	18° center latch G Series
Hydraulic Catwalk	:	L'IL Pipe Wrangler c/w 4 x tumble Racks

WINCHES

Hoist Winch (2)	:	Two hydraulic winches
SWL	:	5te (12,000lbs)
Model	:	PD-12C-1

NOTE: One (1) controlled at Driller's position and one (1) controlled at pipe rack side of substructure floor.

Man Riding Winch	:	Ingersoll rand, Set at 150kg with height limit switch

FUEL TANK

Capacity (l)	:	20,000 One x double skin tanks

WATER TANK

Volume (bbl)	:	250
Water pumps size (in)	:	2 x 3” x 2” centrifugal pumps
Brake Cooling Skid		

BUILDINGS

Rig Managers Office
Canteen Shack/Change Shack
Doghouse/Driller's station
Toolhouse
MCC Building
Pump Spares Container
Sub & Tubular Container
Spares Container
Mechanical store & workshop
Tumble racks
Oil Storage Container (fully bunded)

SAFETY EQUIPMENT

Stretcher	:	Collapsible steel framed
First Aid kit	:	Two fully stocked kits
Eye wash Station	:	Three Eye wash stations
Fire extinguishers	:	Twelve 9 kg dry powder Foam and CO2 extinguishers
Breathing Apparatus	:	Five 10 min positive pressure escape packs
	:	Four 30 min positive pressure back packs
Mud Saver Bucket	:	3 ½” & 4” drill pipe
Other	:	One escape buggy Two derrick man riding belts Two full safety harnesses for mast Two fall arrester

CONSORTIUM DRILLING	Applies To: Consortium Drilling Ltd	CD-04-NS-001
Prepared By: Stuart Sinclair	Uncontrolled, If Printed	Rev: 0

Consortium Rig 4

RIH - run in hole
POOH - pulling out of hole
RWD - reaming while drilling
Reaming - enlarging a well diameter

Wellsite	Date	Location Point Source	Time	Duration	LAeq	Max.level	LCPeak	TWA	Dose	Projected dose	Comments	Weather/Wind Direction	Site Operations
B Site Saltfleetby	04/02/2023	5m N of BOP	13:00	5 mins	68.1	88.2	98.4	56.8dB	0.1%	14.5%	Live gas production ops in progress	13mph WSW	RIH
		10m N of BOP	13:10	5 mins	63.4	79.6	91.1	42.0dB	0.0%	0.5%	Live gas production ops in progress	13mph WSW	RIH
		20m N of BOP	13:20	5 mins	60.4	75.9	88.9	33.2dB	0.0%	0.1%	Live gas production ops in progress	14mph WSW	RIH
		Lease Fence North	13:30	5 mins	54.5	76.5	87.7	28.0dB	0.0%	0.0%	Live gas production ops in progress	14mph WSW	RIH
		5m S of BOP	13:55	5 mins	81.7	96.9	99.8	74.0dB	7.8%	757.2%	Live gas production ops in progress	13mph WSW	RIH
		10m S of BOP	14:05	5 mins	79.8	95	99.7	70.0dB	3.1%	305.1%	Live gas production ops in progress	11mph WSW	RIH
		20m S of BOP	14:15	5 mins	77.1	91	98.9	66.8dB	1.5%	161.4%	Live gas production ops in progress	11mph WSW	RIH
		Lease Fence South	14:25	5 mins	60.9	73.5	99.3				Live gas production ops in progress	12mph WSW	RIH
		Security Office NW of BOP 92m	14:45	5 mins	57	74.9	90.1				1x Skip lorry & 1x Car passed during test	11mph WSW	RIH
		House at Entrance 335m	15:00	5 mins	51.1	67.3	82.7				1x Telehandler & 1x Car passed during test	9mph WSW	RIH
		5m W of BOP	22:00	5 mins	72.7	93.7	99.8	62.2dB	0.5%	49..1%	Live gas production ops in progress	18mph WNW	RIH
		10m W of BOP	22:10	5 mins	67.9	87.5	95.2	56.2dB	0.1%	12.5%	Live gas production ops in progress	15mph WNW	RIH
		20m W of BOP	22:20	5 mins	61	74.3	89.6				Live gas production ops in progress	13mph WNW	RIH
		Lease Fence West	22:30	5 mins	56	63.8	83.7				Live gas production ops in progress	14mph WNW	RIH
		5m E of BOP	22:40	5 mins	66.3	80	93.2	46.5dB	0.0%	1.3%	Live gas production ops in progress	15mph WNW	RIH

Prepared By:	Checked By:	Approved By:	Issued:
Danny Benniston	Stuart Sinclair	Steve Rogan	07/02/2023

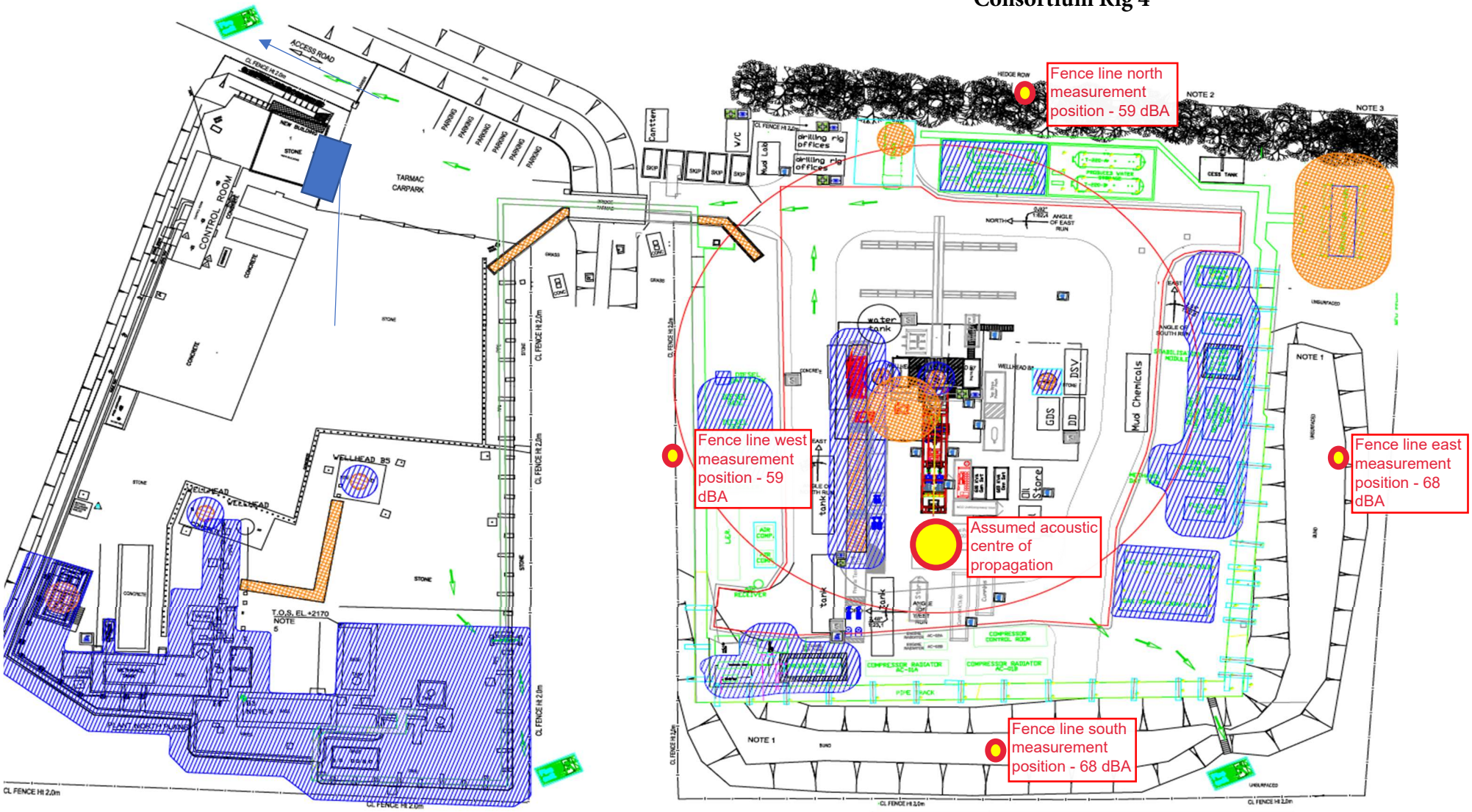
		10m E of BOP	22:50	5 mins	63.2	79.8	91.9	46.2dB	0.0%	1.2%	Live gas production ops in progress	15mph WNW	RIH
		20m E of BOP	23:00	5 mins	57.8	74.8	89.6				Diesel Jetwash started & then shut off	14mph WNW	RIH
		Lease Fence East	23:10	5 mins	57.4	69.4	92.5				Live gas production ops in progress	12mph NW	RIH
		Security Office NW of BOP	23:30	5 mins	51.1	68.2	86.5	40.6dB	0.0%	0.4%		10mph NW	RIH
		House at Site Entrance	23:45	5 mins	36.9	50.5	75.1	28.3dB	0.0%	0.0%	1x Car passed	9mph NW	RIH
	05/02/2023	5m W of BOP	12:00	5 mins	73.4	94	99.3	63.1dB	0.6%	60.7%	Live gas production ops in progress	6mph NNW	POOH
		10m W of BOP	12:10	5 mins	67.8	83.7	92.8	56.4dB	0.1%	12.9%	Live gas production ops in progress	6mph NNW	POOH
		20 W of BOP	12:20	5 mins	61.8	75.1	90.2				Live gas production ops in progress	5mph NNW	POOH
		Lease fence	12:30	5 mins	57.1	65	84				Live gas production ops in progress	4mph NW	POOH
		5m E of BOP	12:40	5 mins	71.1	89.2	99.6	60.1dB	0.3%	30.3%	Live gas production ops in progress	4mph NW	POOH
		10m E of BOP	12:50	5 mins	66.2	77.4	94.1	53.3dB	0.1%	6.0%	Live gas production ops in progress	5mph NW	POOH
		20 E of BOP	13:00	5 mins	53.2	67.6	87.8				Live gas production ops in progress	4mph NNW	POOH
		Lease Fence	13:10	5 mins	56.5	68.4	82				Live gas production ops in progress	4mph NNW	POOH
		Security Office NW of BOP	13:30	5 mins	58.1	75.8	91.1				Telehandler passed	3mph NNW	POOH
		House at Site Entrance	13:45	5 mins	51.9	67.7	84.1				1x Car & 1x tractor & trailer passed	3mph NNW	POOH
		5m S of BOP	21:45	5 mins	72.7	93.7	99.8	62.2dB	0.5%	49..1%	Live gas production ops in progress	7mph SSW	POOH
		10m S of BOP	21:55	5 mins	67.9	87.5	95.2	56.2dB	0.1%	12.5%	Live gas production ops in progress	7mph SSW	POOH
		20 S of BOP	22:10	5 mins	61	74.3	89.6				Live gas production ops in progress	7mph SSW	POOH

		Lease Fence South	22:20	5 mins	56	63.8	83.7				Live gas production ops in progress	6mph SSW	POOH
		5m N of BOP	22:35	5 mins	68.1	88.2	98.4	56.8dB	0.1%	14.5%	Live gas production ops in progress	6mph SSW	POOH
		10m N of BOP	22:45	5 mins	63.4	79.6	91.1	42.0dB	0.0%	0.5%	Live gas production ops in progress	7mph SSW	POOH
		20 N of BOP	22:55	5 mins	60.4	75.9	88.9	33.2dB	0.0%	0.1%	Live gas production ops in progress	7mp SSW	POOH
		Lease Fence North	23:05	5 mins	54.5	76.5	87.7	28.0dB	0.0%	0.0%	Live gas production ops in progress	9mph SSW	POOH
		Security Office NW of BOP	23:15	5 mins	51	67.7	86.1	41.6dB	0.0%	0.4%		11mph SSW	POOH
		House at Site Entrance	23:30	5 mins	37.5	50.8	76.2	27.3dB	0.0%	0.0%		12mph SSW	POOH
	06/02/23	5m N of BOP	09:30	5 mins	68.3	87.8	97.5	56.3dB	0.1%	14.1%	Live gas production ops in progress	8mph SSW	RIH
		10m N of BOP	09:45	5mins	62.9	78.7	90.6	41.6dB	0.0%	0.4%	Live gas production ops in progress	11mph SSW	RIH
		20 N of BOP	09:55	5mins	60.5	76	88.7	33.0dB	0.0%	0.1%	Live gas production ops in progress	12mph SSW	RIH
		Lease Fence North	10:10	5mins	54.2	76.1	87.4	28.0dB	0.0%	0.0%	Live gas production ops in progress	15mph SSW	RIH
		5m S of BOP	15:00	5mins	72.9	88.9	98.4	62.0dB	0.5%	48.8%	Live gas production ops in progress	9mph SW	RIH
		10m S of BOP	15:10	5mins	67.7	87.7	96.1	56.7dB	0.1%	12.5%	Live gas production ops in progress	10mph SSW	RIH
		20 S of BOP	15:25	5mins	62	75.1	90.1				Live gas production ops in progress	10mph SSW	RIH
		Lease Fence South	15:35	5mins	56	63.8	83.7				Live gas production ops in progress	8mph SSW	RIH
		Security Office NW of BOP	15:50	5 mins	67.1	87.3	99.1	56.9dB	0.1%	14.5%	1x Van passed	8mph SSW	RIH

		House at Site Entrance	16:00	5 mins	62.4	79.2	91.3	42.1dB	0.0%	0.5%	2x Car passed	9mph SSW	RIH
		5m W of BOP	22:00	5mins	71.3	83.4	96.2	60.9dB	0.1%	39.7%	Live gas production ops in progress	7mph SW	Reaming
		10m W of BOP	22:10	5mins	70.1	86.9	96.1	61.5dB	0.3%	31.9%	Live gas production ops in progress	7mph SW	Reaming
		20 W of BOP	22:20	5mins	61.8	62.8	86.7	53.9dB	0.1%	5.7%	Live gas production ops in progress	8mph SW	Reaming
		Lease fence	22:30	5mins	58.7	68.9	81.6	48.9dB	0.0%	2.4%	Live gas production ops in progress	8mph SW	Reaming
		5m E of BOP	22:45	5mins	74.3	91.9	96	64.5dB	0.8%	86.0%	Live gas production ops in progress	8mph S	Reaming
		10m E of BOP	22:55	5mins	77	78.3	95.1	66.9dB	1.5%	130.3%	Live gas production ops in progress	7mph S	Reaming
		20 E of BOP	23:05	5mins	74.2	76.1	96	64.7dB	0.9%	98.6%	Live gas production ops in progress	7mph S	Reaming
		Lease Fence	23:20	5 mins	68	70.5	93.1	57.8dB	0.2%	20.4%	Live gas production ops in progress	8mph SW	Reaming
		Security Office NW of BOP	23:30	5 mins	51.1	67.9	92.5	41.8dB	0.0%	0.5%		8mph SW	Reaming
		House at Site Entrance	23:45	5mins	37.9	51.3	76.9	28.0dB	0.0%	0.0%		8mph SW	Reaming
	07/02/2023	5m W of BOP	14:30	5mins	72.7	91.7	99.8	62.2dB	0.5%	49.1%	Live gas production ops in progress	12mph SSW	RIH
		10m W of BOP	14:40	5mins	67.9	87.5	95.2	56.2dB	0.1%	12.5%	Live gas production ops in progress	11mph SSW	RIH
		20 W of BOP	14:50	5mins	61	74.3	89.6				Live gas production ops in progress	10mph SSW	RIH
		Lease fence	15:00	5mins	56	63.8	83.7				Live gas production ops in progress	10mph SSW	RIH
		5m E of BOP	15:25	5mins	66.3	80	93.2	46.5dB	0.0%	1.3%	Live gas production ops in progress	10mph SSW	RIH
		10m E of BOP	15:35	5mins	63.2	79.8	91.9	46.2dB	0.0%	1.2%	Live gas production ops in progress	10mph SSW	RIH
		20 E of BOP	15:50	5 mins	57.8	74.8	89.6				Live gas production ops in progress	10mph SSW	RIH
		Lease Fence	16:00	5 mins	57.4	69.4	92.5				Live gas production ops in progress	10mph SSW	RIH

		Security Office NW of BOP	16:10	5mins	57	74.9	90.1				2x Car passed during test	10mph SSW	RIH
		House at Site Entrance	16:20	5mins	51.1	67.3	82.7				1x Car passed during test	8mph SSW	RIH
		5m N of BOP	22:25	5mins	71.1	83.6	97	61.3dB	0.1%	40.7%	Live gas production ops in progress	9mph SSW	Reaming
		10m N of BOP	22:35	5mins	70.2	84.3	96	60.5dB	0.3%	33.1%	Live gas production ops in progress	9mph SSW	Reaming
		20m N of BOP	22:50	5mins	62.8	63.9	87.4	52.9dB	0.1%	5.9%	Live gas production ops in progress	9mph SSW	Reaming
		Lease fence	23:00	5mins	59.1	69.7	82.4	49.3dB	0.0%	2.5%	Live gas production ops in progress	9mph SSW	Reaming
		5m S of BOP	23:10	5mins	74.4	92.5	96.1	64.6dB	0.9%	86.1%	Live gas production ops in progress	9mph SSW	Reaming
		10m S of BOP	23:20	5mins	77.1	78.2	95.7	67.1dB	1.6%	163.1%	Live gas production ops in progress	9mph SSW	Reaming
		20 S of BOP	23:30	5mins	74.9	76.5	96.1	64.8dB	0.9%	98.6%	Live gas production ops in progress	9mph SSW	Reaming
		Lease Fence	23:40	5 mins	68.2	70.1	93	58.1dB	0.2%	20.7%	Live gas production ops in progress	9mph SSW	Reaming
		Security Office NW of BOP	23:50	5mins	51.9	67.5	93.8	41.9dB	0.0%	0.5%	Telehandler passed	9mph SSW	Reaming
		House at Site Entrance	00:00	5mins	37.8	51.5	76.5	27.dB	0.0%	0.0%		9mph SSW	Reaming

Consortium Rig 4



Drawn By:	AK	Project	Saltfleetby SF7V Sidetrack
Checked By:	AH	Title	Field Layout - Drilling Operations
Date:	May 2022		
Status:	APPROVED	Drawing No:	Rev: 05

Measurement position (distance from acoustic centre)	Measured Sound Pressure Level (LpA)	20log(distance) + 10 (dB)	Sound Power Level, near field (LwA)
Lease fence N (68m)	59.1	46.7	105.8
Lease fence E (60m)	68.0	45.6	113.6
Lease fence S (33m)	68.2	40.4	108.6
Lease fence W (38m)	58.7	41.6	100.3
.			
Total Rig Sound Power Level (LwA)			**110**

Sound power level of Consortium Rig 4 (Drilling/Reaming) from measurements made at Saltfleetby 7/02/23

The levels appear to vary significantly in each direction, however these measurements are within the near field of the drilling rig equipment, and are both shielded and also subject localised noise sources. At distances greater than 200m, drilling rigs are generally not significantly directional in their sound radiation patterns.

Rig 18 Equipment Inventory

Rig	WEI DS 100 SLANT Hydraulic semi-trailer mounted fitted with independent hydraulic stabilizers for trailer & substructure. Manufactured 2013 (first commissioned 2019)
Drillers Control Cabin (Dog-house)	WEI hydraulically adjustable Heavy Duty steel accessible from ground level
Mast	220,000 lbs capacity 25.5 m height
Substructure	220,000 lbs setback capacity 4.45 m from GL to RT 4 m clear height under RT beams.
Catwalk	catwalk and pipe handling system, manual option used for coring 1.22 m (H) x 1.16 m (W) x 19.58 m (L)

Marriott Rig 18

Draw Works	WEI Hydrualic ram 220,000 lbs capacity 3 no. x 22 mm lines
Rig Engine	Caterpillar C-15 447 kW (600 HP)
Rig Generators	2 x Caterpillar 3406 (635 kVA)
Rotary Table	WEI non-rotating 40" maximum opening Rated to 220,000 lbs capacity c/w various size bowls
Top Drive	WEI DS100 S 220,000 lbs pull-up 3,000 psi Maximum rotary speed = 180 rpm Maximum continuous torque = 21,700 ft-lbs
Rig Floor Winches	3 no. (1t, 3t, rated capacity)
Hook	WEI casing/drill pipe Rated to 180,000 lbs
Mud Pumps	2 x 500HP Ideco T500 *(1000 HP electric drive pumps also available see Rates Table 4-1)*
Rotary Hose	3 ½" Diameter x 38 ft
Mud Tank System	Active 1 – 135 bbl Active 2 – 135 bbl Premix – 50 bbl Pill – 70 bbl Settlement – 115 bbl
Shaker Tank	120 bbl capacity
Pill Tank	70 bbl capacity
Trip Tank	30 bbl capacity
Mud and Solids Control	3 x 5" x 6" x 11" centrifugal pump 6 x 15kw Mud Agitators 2 x Derrick G 503 shale shakers 1 x Derrick G 503 desander/desilter
Mud Lab	1 x Mud lab c/w PPE store, cupboards, tool-kit, mud balance, marsh funnel, filtration kit, sand content kit and stopwatch
Water Storage Tanks	1 x 300 bbl capacity tank
Fuel Tank (Double Wall)	1 x 20,000 L double skinned Fuel Storage Tank 1 x 2,000 L mobile bunded tank
BOP Stack	7 1/16 in x 5000 psi Annular Preventer 7 1/16 in x 5000 psi Double Gate 10,000 Psi Barton chart recorder

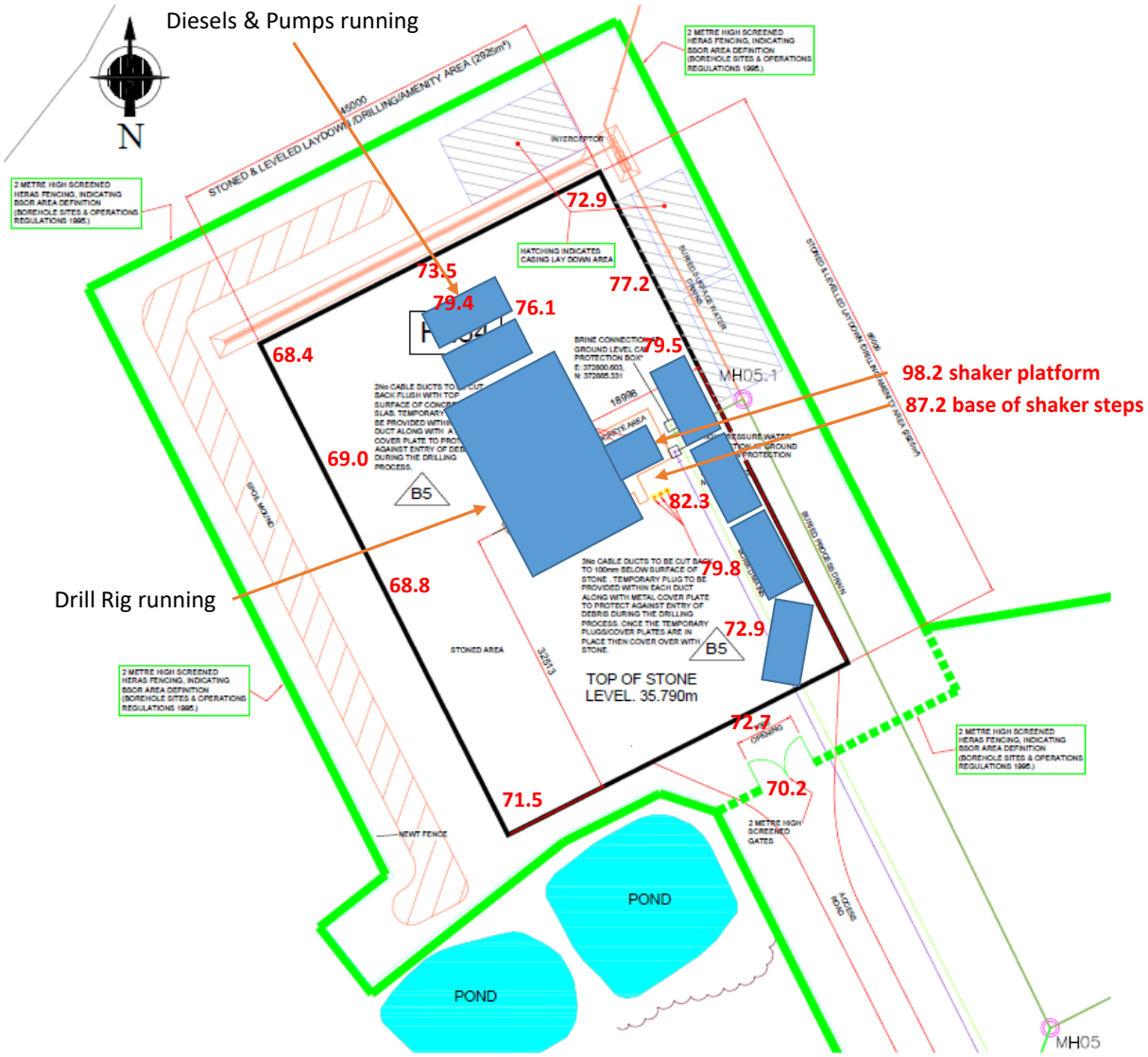
Marriott Rig 18

Koomey Unit	Control systems 26160 3B 20 Bottles - 5,500 psi working pressure 1 x electric driven hydraulic pump + 2 x air driven
Choke Manifold & Ancillaries	Sanyi 2 1/16" minimum ID (5000 psi max. working pressure) 2 1/16" Choke line 2" Kill line 2" armour cement hose x 35 ft (5000 psi)
Iron Roughneck	WEI Iron roughneck for DP tool joints and DC's from 3 ½" to 20" OD Maximum make-up torque = 57,940 ft-lbs
Compressors	1 x atlas copco GA22 13 Bar working pressure
Test Pump	1 x Enerpac 39 c/w chart recorder 15,000 psi pressure rating
Drill String Handling Tools	DP/Tubing Elevators – to suit 2 7/8", 3 ½", 4", 5" and 5 ½" Manual DP Slips - to suit 2 7/8", 3 ½", 4" and 5" Semi-automatic DP Slips - to suit 3 1/2" – 5" size range DC Slips – to suit 4 3/4" to 8 ½" size range Tubing Slips – to suit 2 3/8" to 3 ½" size range DC lift subs – 4 x 8", 8 x 6 ¾"
Elevator Links	1 x 2.6m long rated to 150 tons (3 1/8") 1 x 1.2m long rated at 50 tons (1 ¼")
Safety Valves, Crossovers and Subs	To suit all contractors drill string items provided above
Casing Running & Handling Equipment	1 x WEI make up device body – Casing make up device rotating tool for 5 ½" to 7", 7 5/8" to 9 5/8", 9 5/8" to 13 3/8" Casing bowls spider – DEN-CON 27 ½" with inserts for 5 ½ - 18 5/8" Manual casing slips – to suit 5 ½" to 13 3/8" range Side door casing elevators – to suit 5 ½" to 13 3/8" range
Bit Breakers & Gauge Rings	Bit breakers for Tri cone bits: 3 ½", 4 ¾", 6 ¾", 12 ¼", 14 ¾" and 17 ½"
Cup Testers	1 x 13 3/8" (Type F) 1 x 9 5/8" (Type F) 1 x 7 5/8" plug tester 4" IF Pin x 4" IF Box
Survey Equipment	1 x shore shot survey equipment (0-7degree range)
Buildings/Accommodation	1 x Rig Managers Office/Accommodation Unit 1 x Mechanics Accommodation Unit Spares and workshops for Contractors equipment
Pipe & Equipment Storage	Pipe baskets and half-racks to suit Contractors equipment
Forklift	Nominal 4 tonne, all terrain telehandler

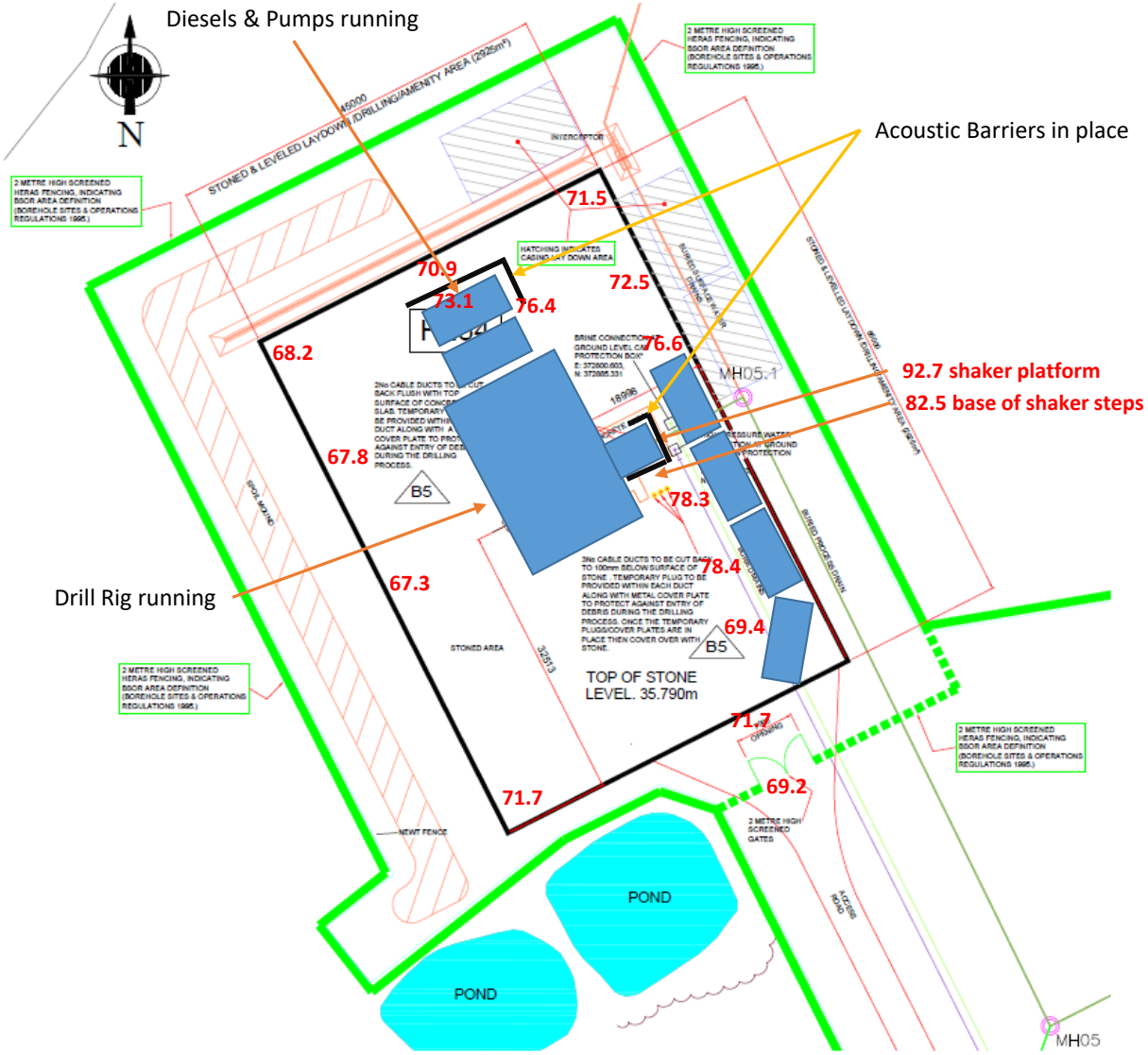
	c/w handling grab for safe operations with onsite tubulars
Welding Set	1 x 110 A Lincoln 305D Ranger portable welding set
Hand-held VHF radios	4 x Motorola VHF intrinsically safe
Safety Apparatus	2 x 30 min DRAGER BA Sets 1 x Defibrillator 1 x Stretcher 3 x H2S Detectors Fire extinguishers Pumpman escape sets 4 x First aid kits 4 x Eye-wash stations

Note

Rig inventory is subject to amendment by substitute items of equivalent size or capacity where equipment is dependent on availability and also if changes are agreed with the Company



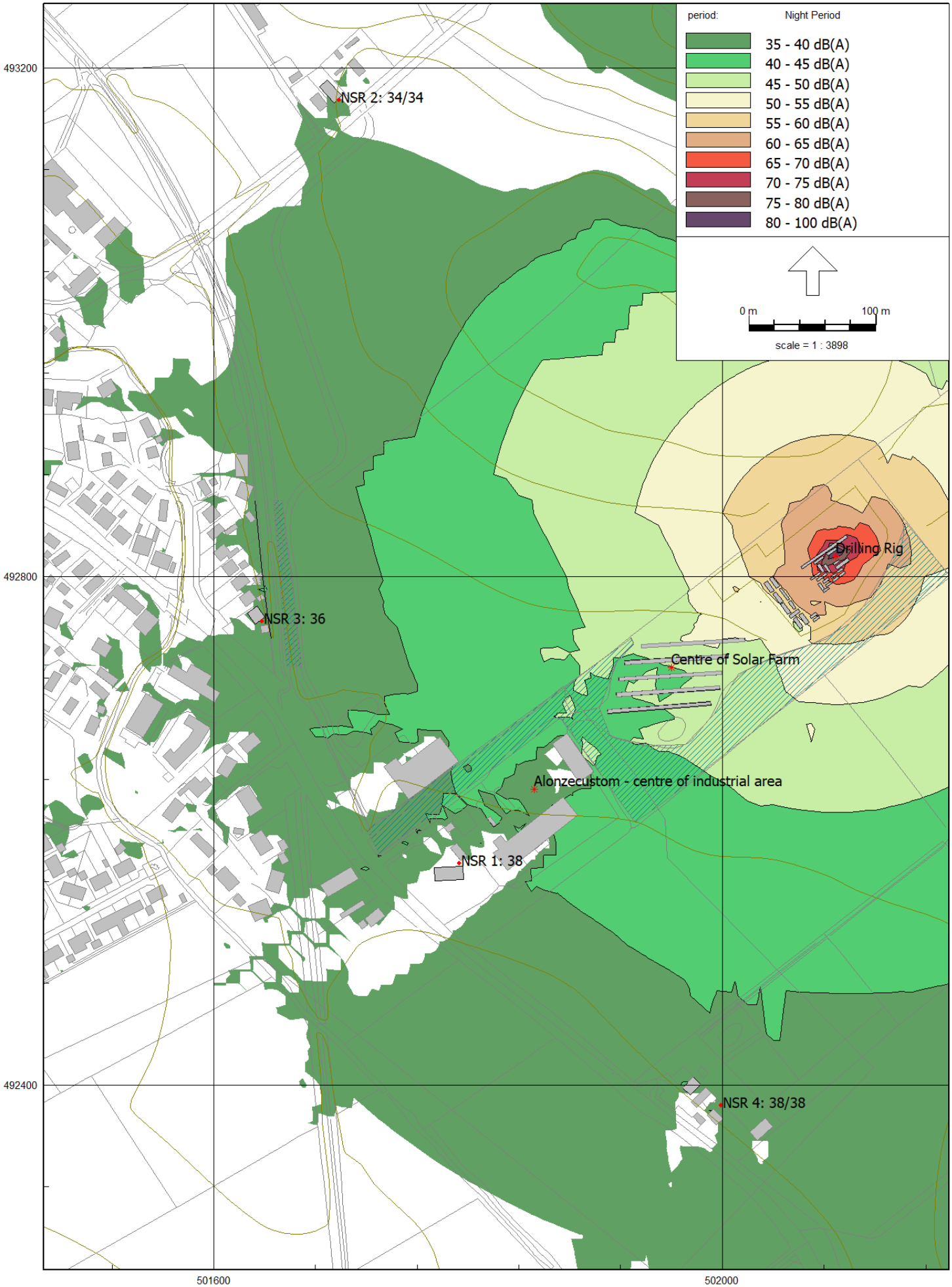
H254 Spot noise levels taken 10/06/19. Drill Rig running throughout, with the diesels, pumps & screen shaker running continuously. Intermittent vehicle movements throughout the survey, shuttling supplies to/from & around pad.



H254 Spot noise levels taken 29/07/19. Acoustic cladding fitted around the screen shaker and the diesel pumps.
Drill Rig running throughout, with the diesels, pumps & screen shaker running continuously. Intermittent vehicle movements throughout the survey, shuttling supplies to/from & around pad.

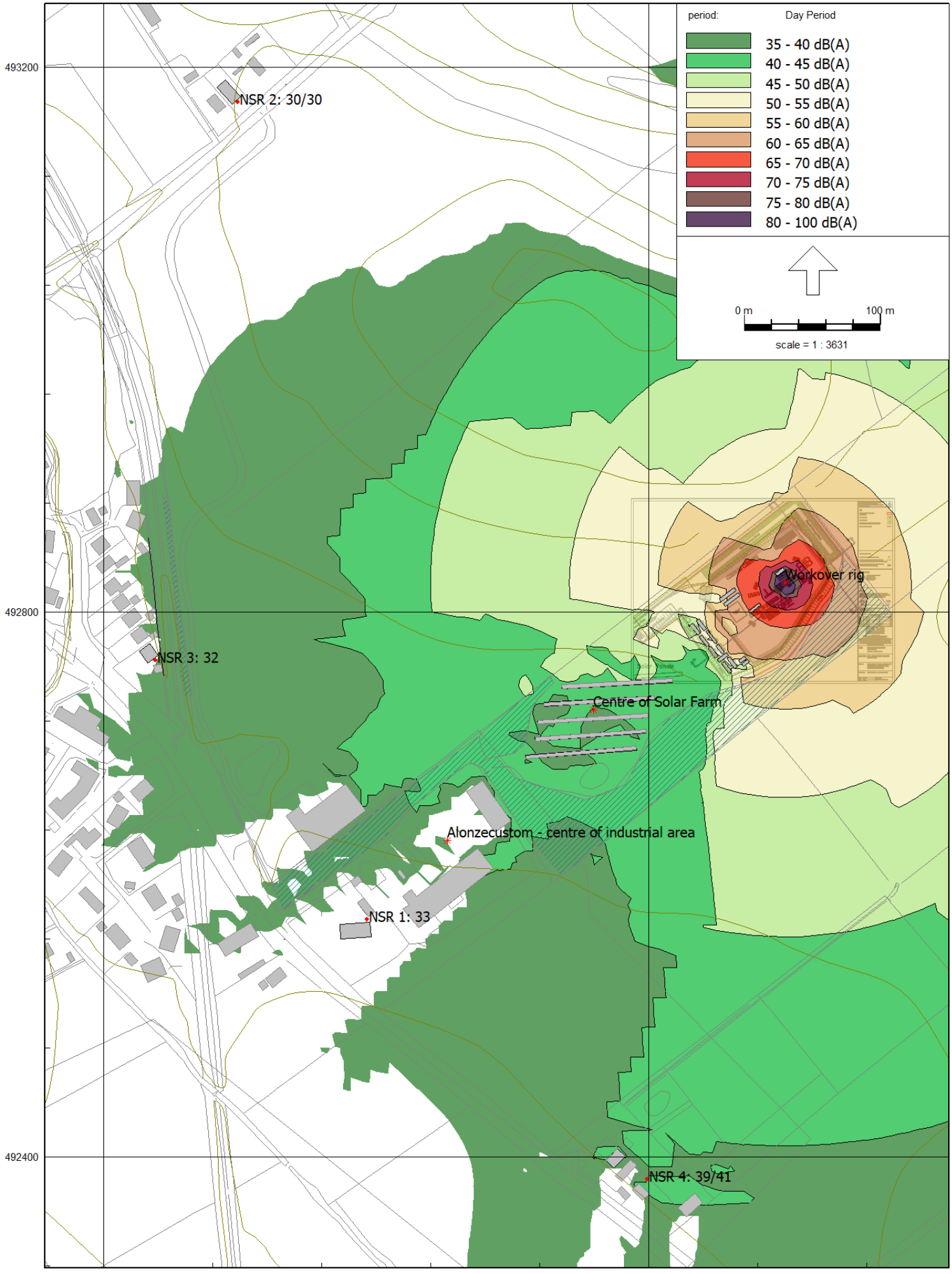
APPENDIX F

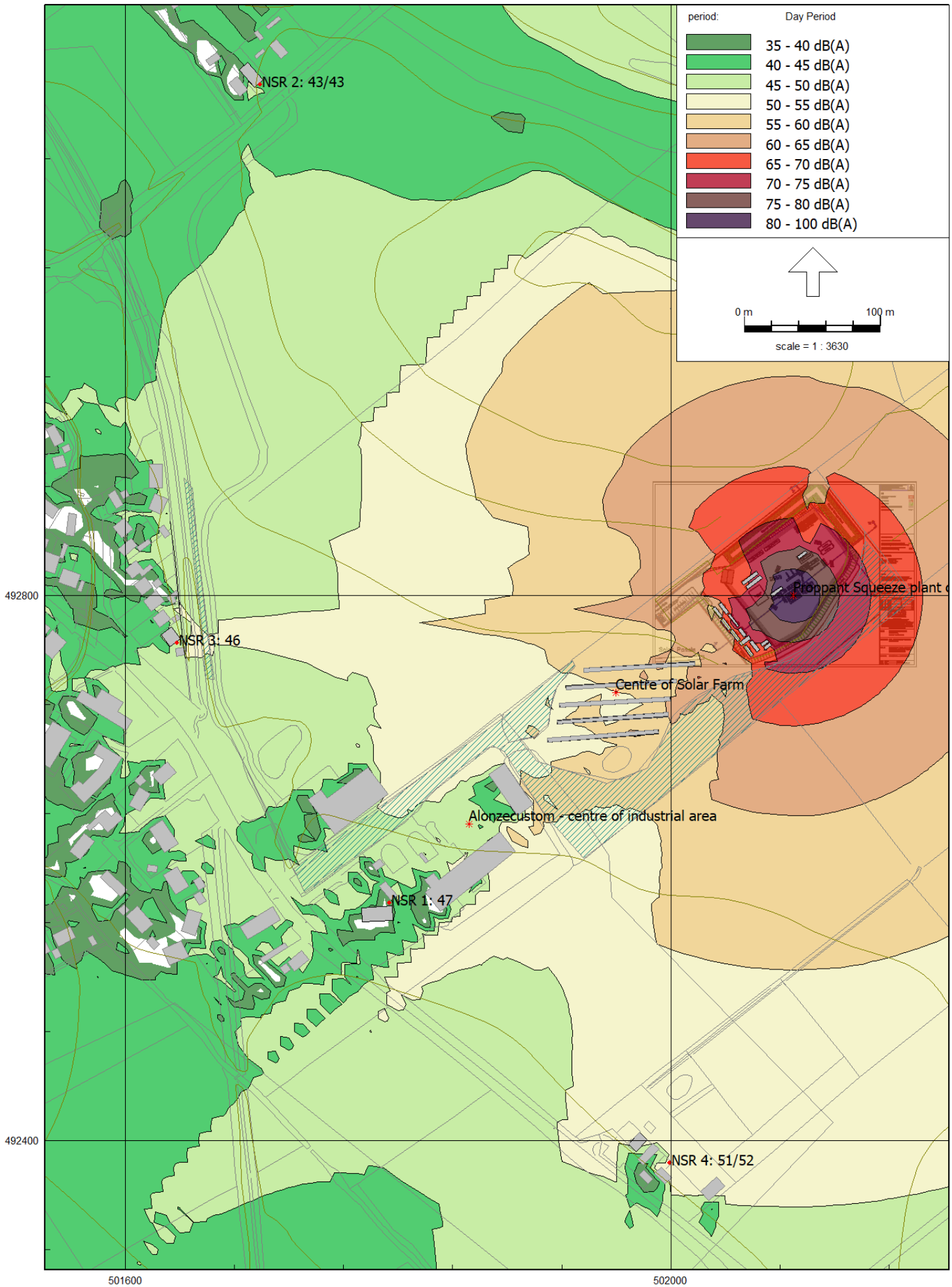
Predicted noise levels – Drilling (Phase 2)

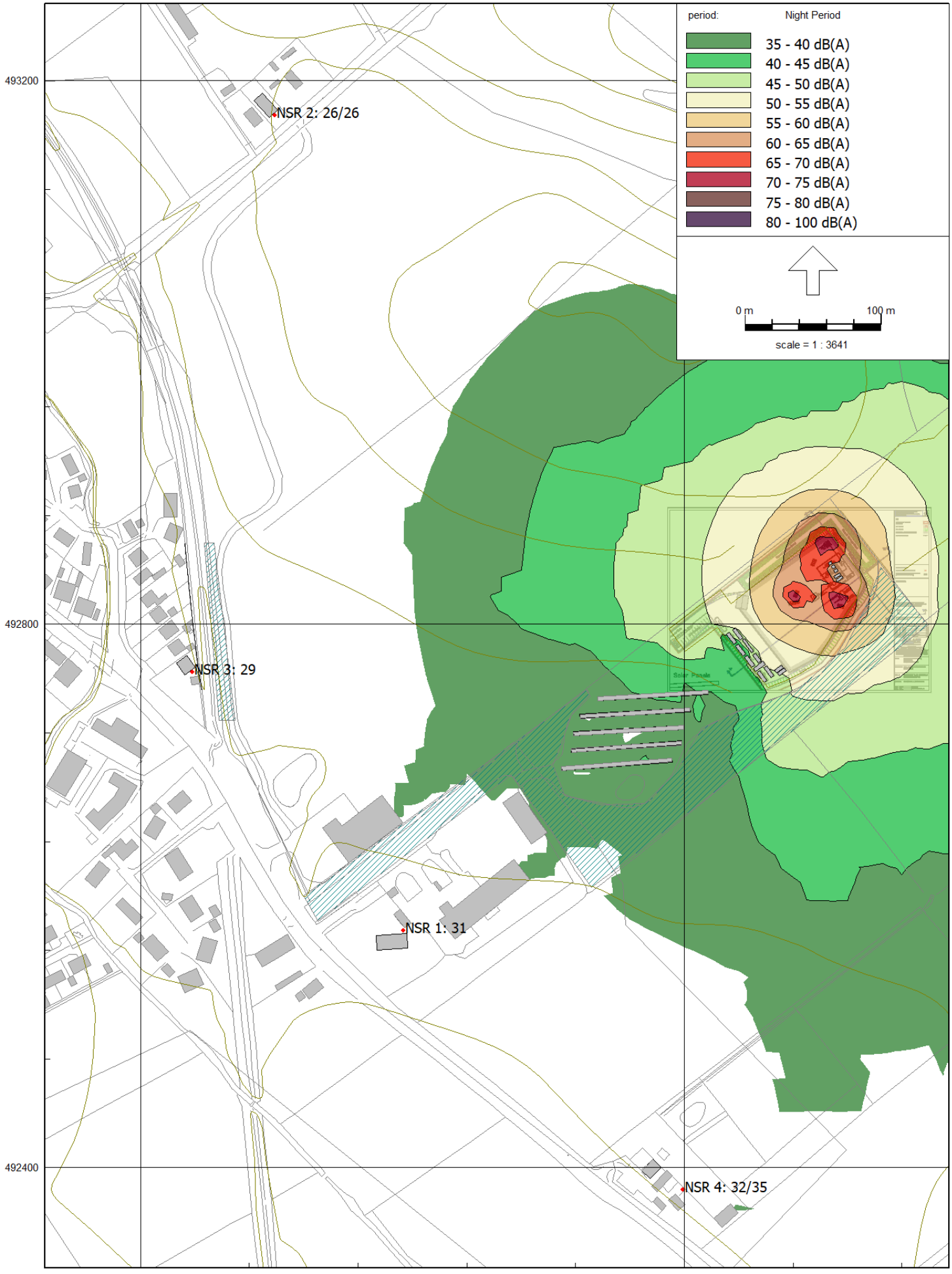

period: Night Period
35 - 40 dB(A)
40 - 45 dB(A)
45 - 50 dB(A)
50 - 55 dB(A)
55 - 60 dB(A)
60 - 65 dB(A)
65 - 70 dB(A)
70 - 75 dB(A)
75 - 80 dB(A)
80 - 100 dB(A)
0 m
100 m
scale = 1 : 3898
493200
492800
492400
501600
502000
NSR 2: 34/34
NSR 3: 36
NSR 1: 38
NSR 4: 38/38
Drilling Rig
Centre of Solar Farm
Alonzecustom - centre of industrial area

APPENDIX G

Predicted noise levels – Proppant squeeze and flow testing (Phase 3)


period:
Day Period
35 - 40 dB(A)
40 - 45 dB(A)
45 - 50 dB(A)
50 - 55 dB(A)
55 - 60 dB(A)
60 - 65 dB(A)
65 - 70 dB(A)
70 - 75 dB(A)
75 - 80 dB(A)
80 - 100 dB(A)
0 m
100 m
scale = 1 : 3631
493200
492800
492400
501600
502000
NSR 2: 30/30
NSR 3: 32
Workover rig
Centre of Solar Farm
Alonzecustom - centre of industrial area
NSR 1: 33
NSR 4: 39/41


period:
Day Period
35 - 40 dB(A)
40 - 45 dB(A)
45 - 50 dB(A)
50 - 55 dB(A)
55 - 60 dB(A)
60 - 65 dB(A)
65 - 70 dB(A)
70 - 75 dB(A)
75 - 80 dB(A)
80 - 100 dB(A)
0 m
100 m
scale = 1 : 3630
NSR 2: 43/43
NSR 3: 46
Proppant Squeeze plant c
Centre of Solar Farm
Alonzecustom - centre of industrial area
NSR 1: 47
NSR 4: 51/52
492800
492400
501600
502000


period: Night Period
35 - 40 dB(A)
40 - 45 dB(A)
45 - 50 dB(A)
50 - 55 dB(A)
55 - 60 dB(A)
60 - 65 dB(A)
65 - 70 dB(A)
70 - 75 dB(A)
75 - 80 dB(A)
80 - 100 dB(A)
0 m
100 m
scale = 1 : 3641
NSR 2: 26/26
NSR 3: 29
NSR 1: 31
NSR 4: 32/35
493200
492800
492400
501600
502000

Report: Table of Results
Model: New wellsite - Initital Testing
LAeq: by Source/Group for receiver NSR 4_B - NSR 4
Group: (main group)
Group Reduction: No

Name Source/Group	Description	Height	Night
NSR 4_B	NSR 4	4.00	34.8
	Air compressor	1.50	25.1
	Diesel Generator	1.50	25.9
	Ground flare	2.50	31.5
1	Lighting tower	1.00	22.8
1	Lighting tower	1.00	23.2
1	Lighting tower	1.00	27.1
Alonzocust	Alonzocustom - centre of industrial area	2.00	--
Group	LUKE LLOYD-293957-VML10K-BURNISTON-LLLO249...	0.00	--
Solar Farm	Centre of Solar Farm	2.00	--
WasteCentr	Waste and Recycling Centre	2.00	-17.9
Waterworks	Waterworks	2.00	--

All shown dB values are A-weighted

APPENDIX H

Flare Noise

UNIFLARE™
GLOBAL ENVIRONMENTAL TECHNOLOGY

Tel: +44 (0)1676 529118
Fax: +44 (0)1676 529119
enquiries@uniflare.co.uk
www.uniflare.co.uk

JOB 1805 - NOISE REPORT – UF10-5000

Title:	UF10-5000 Stack Noise
Description:	Noise Levels related to Uniflare 'UF10' Stacks
Creator:	Alex Hughes
Report Date :	16/11/2023
Sample Date :	03/05/2023

Flare Specification:

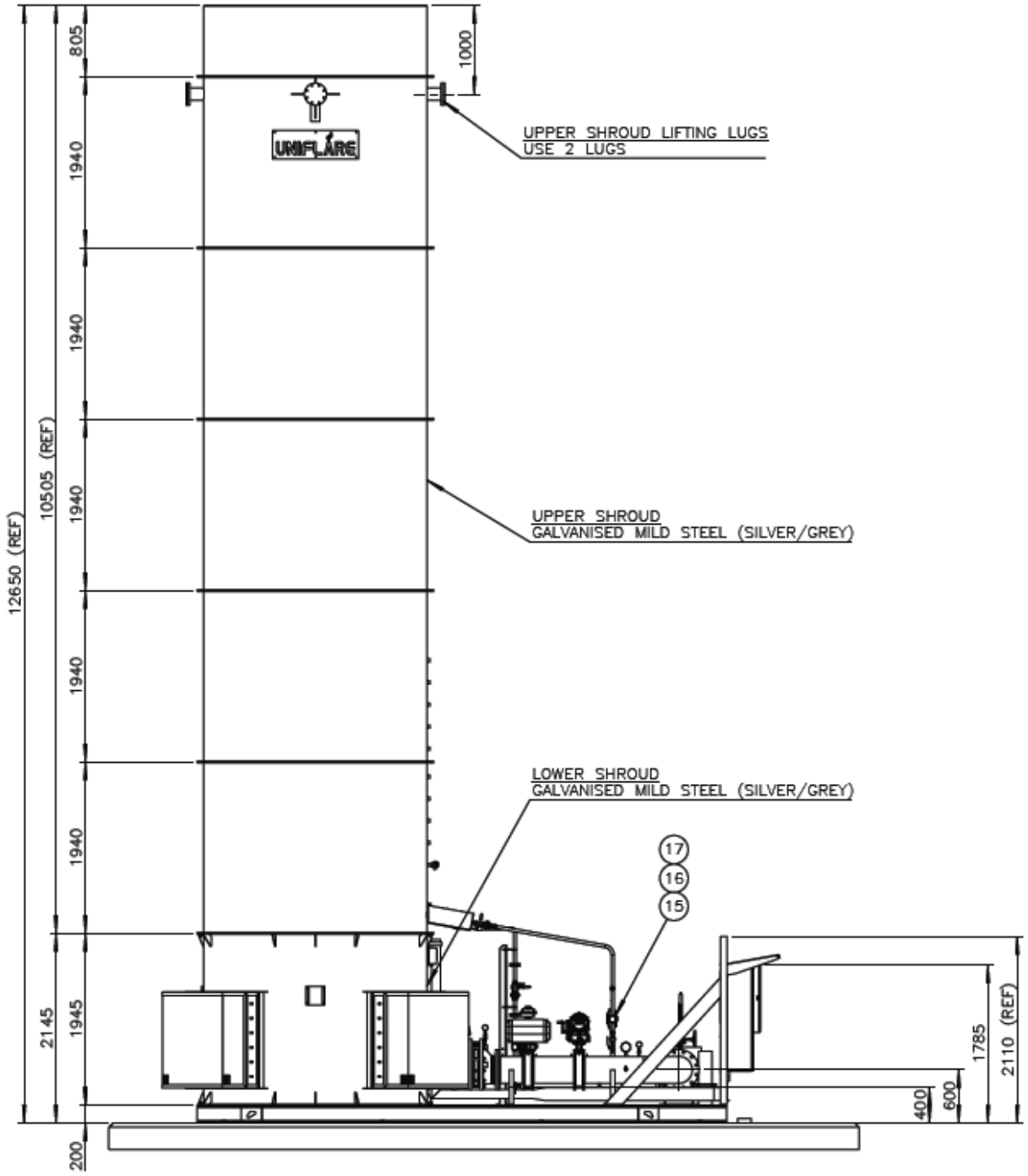
- UF10-5000 Bivalent Flare (Biogas & Biomethane)
- Stack Material : Galvanised Mild Steel 6mm THK.
- Lining Thickness : 100mm (Customer Spec)
- Design Flow Rate : 5000 Nm3/h

On Site Test Conditions

Flow Rate (Nm3/h)	5371
Gas Composition	57.1% CH4
Gas Pressure (mbar)	116
Flare Stack Temperature	1035
Ambient Noise (dB)	58

Sound Recording @ 1 metre

	dB
Sample 1	79.6
Sample 2	81.7
Sample 3	79.6



UNIFLARE LTD
UNIT 19
RUNWAY FARM TECHNICAL PARK
HONILEY ROAD
KENILWORTH
WARWICKSHIRE
CV8 1NQ

Registered in England No: 05689034
VAT No: 885 2500 14

Noise measurements on Enclosed Ground Flare – Wressle Wellsite 18.12.23

	dB(A)	Octave Band Centre Frequency (Hz) 31	63	125	250	500	1k	2k	4k	8k
Lp measured 1m from 90% closed air inlet	**70**	73	72	70	71	70	65	60	53	48
Lp 1m from 30% closed air inlet (+5dB) - calc	**75**	78	77	75	76	75	70	65	58	53
Lw of one 30% closed air inlet (+5dB) - calc	**80**	83	82	80	81	80	75	70	63	58
Lw of five 30% closed air inlets (+7dB) - calc	**87**	90	89	87	88	87	82	77	70	65
Lw of stack outlet approximately similar to air inlet	**87**	90	89	87	88	87	82	77	70	65

Table: Measurements (18.12.23 Wressle) and resulting sound power level (Lw) of enclosed ground flare (2,400 m^3/hr design; 500m^3/hr operating)

APPENDIX J

Phase 3c – Equipment noise contributions

Report: Table of Results
Model: New wellsite - Initital Testing
LAeq: by Source/Group for receiver NSR 4_B - NSR 4
Group: (main group)
Group Reduction: No

Name Source/Group	Description	Height	Night
NSR 4_B	NSR 4	4.00	34.4
	Ground flare	2.50	31.5
1	Lighting tower	1.00	27.1
	Air compressor	1.50	25.1
1	Lighting tower	1.00	23.2
1	Lighting tower	1.00	22.8
	Diesel Generator	1.50	17.9
WasteCentr	Waste and Recycling Centre	2.00	-17.9
Solar Farm	Centre of Solar Farm	2.00	--
Waterworks	Waterworks	2.00	--
Alonsecust	Alonsecustom - centre of industrial area	2.00	--
Group	LUKE LLOYD-293957-VML10K-BURNISTON-LLL0249...	0.00	--

All shown dB values are A-weighted

APPENDIX K

Outline Noise Management Plan

Cloughton-2 Appraisal Wellsite, Coastal Road, Burniston, Scarborough, YO17 0DB

Noise Management Plan (Draft)

Report ref.
ARC7287/24160/V1

Issued to
Europa Oil and Gas Ltd

Prepared by
Andrew Corkill MSc MIOA
Principal Consultant

Luke Lloyd BSc(Hons) Tech IOA
Acoustic Technician

Version	Authorised by	Remarks	Date
V1	ARC	For client comment	

SECTION **TITLE** **PAGE**

1. INTRODUCTION

This draft Noise Management Plan (NMP) seeks to put in place measures, including noise monitoring where required, that will provide the appropriate level of protection for sensitive noise receptors in the event that activity commences on the proposed Cloughton – 2 appraisal wellsite**,** Coastal Road, Burniston, Scarborough, YO17 0DB

For this current project, it is proposed to submit a full NMP, which is generally considered to be current best practice and is more comprehensive than a Noise Complaint Procedure. This covers general management of noise issues, as well as detailing the noise monitoring requirements and the procedure for dealing with noise complaints.

There are four main phases to this project, with phase 3 itself divided into 3 subphases. These are described in table 1.

	Needs to be included in NVIA submitted for Planning or for Permitting ?	
	North Yorkshire Council (NYC)	**Environment Agency (EA)**
Phase 1: Construction of a temporary drilling pad.	Yes	No
Phase 2: Drill single appraisal well	Yes	No
Phase 3: Testing and appraisal including workover and proppant squeeze		
Subphase 3a: Well completion/workover (daytime only)	Yes	No
Subphase 3b: Proppant Squeeze (3-5 hours in one day, daytime)	Yes	No
Subphase 3c: Ongoing testing and appraisal (24hr/day)	Yes	Yes
Phase 4: Either retain facilities or well decommissioning and site restoration	No	No

Table 1: Phases of the proposed development, including sub-phases, with whether each needs to be considered by key stakeholders

The anticipated noise generated during decommissioning and site restoration (Phase 4) is considered to be similar to that generated during site construction phase (Phase 1), with similar construction equipment. There is therefore considered no need to consider noise impact during phase 4.

It may be noted that whilst the planning authority NYC is concerned with noise issues arising during Phases 1, 2 and 3 of the project, as regards noise, the EA is focussed primarily on phase 3, and in particular subphase 3c (ongoing testing and appraisal 24hr/day), however in relation to the normal approach of the EA on noise, they need to approve a NMP only if it is likely that a significant noise impact might arise, which would be a breach of the SOAEL[1] threshold. Within the NIA[2], this threshold is advised to be $L_{Aeq,T}$ 45 dB at night whilst the predicted level is 10 dB lower at $L_{Aeq,T}$ 35 dB. It is considered then that the EA will not seek to review the Noise Management Plan.

This Noise Management Plan sets out how noise emissions to the community will be minimised and controlled.

[1] *Significant Observed Adverse Effects Level*
[2] *Cloughton-2 Appraisal Wellsite, Coastal Road, Burniston, Scarborough, YO17 0DB. Noise and Vibration Impact Assessment to support Planning and Environmental Permit Applications. ARC7281/24160/V1.*

2. PLANNING CONDITIONS PROPOSED BY THE APPLICANT

The NIA submitted with the planning application provided details of candidate drilling rigs and their noise levels, along with a description of noise mitigation measures incorporated into this equipment and also equipment used in other phases, notably the appraisal phase. The requirements to provide a BAT (Best Available Techniques) assessment of noise mitigation for the EA, including consideration of avoidance, where possible, of dominance of individual quantified sources during the appraisal phase, provides all the information required by way of describing a 'scheme of noise control' as well as demonstrating that further noise control measures, particularly in relation to the Appraisal phase, are neither practicable nor required, considering the low levels of noise predicted.

Potential noise limits have been developed within the NIA, along with wording for two draft noise conditions for consideration by NYC:

Condition A: Noise Management Plan
Within one month of the date of this permission, a Noise Management Plan (NMP) shall be submitted to and approved in writing by the Mineral Planning Authority detailing the procedures to be adopted to minimise noise and also the process to be followed in the event of a noise complaint being received or a request being made by the MPA for suitable noise monitoring and actions to be undertaken within 48 hours of notification. The NMP shall be complied with at all times.

Condition B: Noise Limits. The equivalent continuous sound level (LAeq) at the nearest noise sensitive properties to the site and attributable to the operations subject of this permission, shall not exceed the following values during daytime (07:00 -22:00) and nighttime (22:00- 07:00) weekdays, Saturdays and Sundays including bank holidays.:

- *Phase 1 and 4 – Construction and site restoration : daytime $L_{Aeq,1hr}$ 53 dB and nightime $L_{Aeq,15m}$ 40 dB*
- *Phase 2 – Drilling : daytime $L_{Aeq,1hr}$ 55 dB and nightime $L_{Aeq,15m}$ 41 dB*
- *Phase 3 – Appraisal : daytime $L_{Aeq,1hr}$ 50 dB (54 dB during proppant squeeze) and nightime $L_{Aeq,15m}$ 40 dB*

3. NOISE MANAGEMENT PLAN

3.1 PHASE 1: SITE CONSTRUCTION

Potentially noise-making equipment use for the site extension and installation of well cellars and related works, is listed below.

- Electrical generator for security personnel
- Compactor roller
- Excavator
- Aggregate vehicles HGVs

- Bulldozer
- Wheeled crane
- Concrete pouring
- Site compressor
- Lighting towers

Roadgoing HGVs are excluded from the noise management plan except when they are active on site or site access track within the red line boundary. HGVs on the public road network, do not fall within the noise scope of this plan.

All machinery will conform to the relevant EC Directives on the maximum permissible sound power levels emitted by construction equipment. Diesel exhaust silencers to the manufacturer's original specification shall be fitted and all deficiencies rectified before the machine is allowed to continue operating on site.

Engine covers and other noise control panels shall be kept properly closed whenever the machine is operating, and engines shall not be left running unnecessarily. At no time shall a machine operator leave the vicinity of his machine without first having switched off the engine. Any deficiencies in the manufacturer's original noise control equipment, including (but not limited to) broken, missing or deformed panels, missing insulation materials or faults in panel fasteners shall be rectified before the machine is permitted to continue operating on site.

The levels of noise predicted within the NIA[2] during construction, are low and do not breach the LOAEL adverse effect threshold value.

3.2 PHASE 2: DRILLING

Potentially noise-making machinery on site during drilling is listed below.

- Rig engine, drawworks and top drive
- Pumps
- Electrical generators
- Screw compressor
- Hydraulic power unit
- Solids control equipment including agitators and circulation pumps

Large pumps and generators, the screw compressor and the hydraulic power unit will be installed in purpose-built acoustically lined housings, fitted with attenuators to allow the passage of cooling air through the housing. Diesel engines will be fitted with high-performance exhaust silencers.

Doors to acoustic enclosures and all other noise control panels shall be kept properly closed whenever machinery within is operating and shall only be opened to allow personnel to enter or leave the enclosure. Any deficiencies in the noise control equipment will be identified by inspection at the earliest opportunity, and in any event no later than the night-time noise monitoring described later in this document. Deficiencies including (but not limited to) broken, missing or deformed panels and doors, missing insulation materials, faults in panel or door fasteners and damage to attenuators or exhaust systems shall be rectified before affected machinery is permitted to continue operating on site.

The levels of noise predicted within the NIA[2] during drilling are low and do not breach the LOAEL adverse effect threshold value.

3.3 PHASE 3: APPRAISAL

Potentially noise-making machinery which may be required for the testing phase of the development is listed below. These are the items that will run potentially during the longer 24 hr testing period of phase 3c.

- Electrical generator
- Pumps (small)
- Air compressor and N2 generator
- Separator system
- Enclosed ground flare

Earlier during testing, a workover rig may be required (phase 3a). Its activity is likely to be limited to daytime periods however, with the predicted sound pressure levels being just 39 dBA and the LOAEL[3] threshold of an adverse impact being 50 dBA, there is no requirement for additional noise mitigation over and above that assumed, which is an acoustic canopy over the main rig engine drive, and standard removable construction site acoustic panels around the rig trailer to a height of around 1.5m.

During a short period of typically 3-5 hours during one day of the project, additional pumps will be brought onto the site to carry out the proppant squeeze prior to full flow testing (phase 3b). Elevated sound pressure levels of up to 51 dBA during this period just reach the daytime LOAEL adverse effect threshold for a normal construction site, however just for a few hours. They remain 14 dB below the significant noise threshold (SOAEL[1]) The existing residual noise from road traffic noise is however 50 dBA, so activity noise will for a short period be similar in impact to constant road traffic levels. A standard construction site would be generating this level of daytime noise for weeks or even months. The main source of noise is associated with noise from the trailer mounted drive engines for the pumps. These are large and will have full silencers fitted to the engine exhausts. However, because of the need for access to the engine and also weight constraints for HGV vehicles, it is not always possible to fit silencing measures to all the main sources of noise.

3.4 DECOMMISSIONING AND SITE RESTORATION

Most of the equipment and machinery used during this final phase of the development will be similar to relevant items of plant used in site construction stage. In addition, a workover rig, circulation pumps and a cement pump will be needed to decommission and abandon the well.

All machinery will conform to the relevant UK legislation on the maximum permissible sound power levels emitted by construction equipment. Diesel exhaust silencers to the manufacturer's original specification shall be fitted and all deficiencies rectified before the machine is allowed to continue operating on site.

[3] Lowest Observable Adverse Effect Level

3.5 ALL PHASES

Training

The site induction programme and site rules during all phases will include instructions on good working practices for site staff, managers, visitors and contractors in order to minimise noise whilst working on the site. These practices will include, but not be limited to:

- The avoidance of unnecessary revving of engines;
- Plant used intermittently to be shut down when not actually in use
- Reversing to be avoided wherever possible without comprising any site safety considerations;
- Compliance with the site speed limit at all times;
- Reporting of any defective equipment or plant as soon as possible, so that corrective maintenance can be undertaken;
- Handling materials and tools in a manner that minimises noise.

Maintenance

Maintenance of plant will be carried out routinely and in accordance with the manufacturers' guidance. Scheduled inspections of all plant and equipment recognised as potential noise sources will be undertaken to ensure that:

- All plant is in a good state of repair and fully functional;
- Any plant found to be requiring interim maintenance is identified and taken out of use wherever practicable;
- Any acoustic enclosure fitted to plant is in a good state of repair;
- Any doors and covers remain closed during operation;
- Repairs are undertaken only by fully qualified maintenance staff.

4. NOISE MONITORING

4.1 TIMETABLE FOR MONITORING

Noise monitoring in accordance with this plan will normally be triggered if noise complaints are received or at the specific request of the local planning authority (LPA). Measurements will be obtained within 48 hours of a request being made by the LPA, subject to weather conditions being suitable for measurements.

4.2 LOCATIONS

The nearest noise-sensitive locations are shown in the table below. Some of these locations can only be accessed over private land, so a proxy noise measurement location may be appropriate. Unless access to private land has previously been agreed for that purpose, all measurement locations must be publicly accessible.

Noise Sensitive Receptor (NSR)	NSR Name	OS grid reference	Distance (m) and Direction in relation to wellsite centre
NSR1	Wayside Farm	501788E, 492579N	350m SW
NSR2	House on Field Lane	501716E, 493199N	530m NW
NSR3	House on Bridge Close	501637E, 492769N	440m W
NSR4	Flatts Farm	502000E, 492383N	420m SW

Table 2: Nearest noise sensitive receptors to the site

4.3 REPORTING

On completion of a noise survey, a report shall be made available in a format suitable for submission to the Mineral Planning Authority. The report shall be submitted within five working days of completion of the measurements.

The report shall contain, as a minimum:

- The measured sound levels LAeq,T during site activity;
- Details of the instrumentation used to include calibration dates;
- Weather observations for the date of the survey;
- Comments on the audibility of the site and regarding tonality and impulsive noise; and
- Details of any extraneous noise sources that may have influenced the noise climate.

The report shall compare the measured sound levels against the planning condition noise limits.

4.4 NOISE LIMITS

The noise limits against which noise monitoring results will be compared are those set out in planning conditions issued by NYC. Proposed noise limits are included within draft planning conditions in section 2 of this document.

4.5 NOISE MITIGATION

In the event of a breach of any noise limit the noise source(s) causing the excessive noise will be identified in consultation between the Noise Specialist and the site manager. If the breach is likely to continue then suitable mitigation measures shall be implemented, such as replacing faulty noise control equipment, substituting quieter replacement machinery, or the installation of additional noise reduction measures.

For drilling operations, a further period of night-time noise monitoring shall be undertaken after the noise mitigation measures have been implemented, in order to demonstrate the success of the action(s).

After any excesses have been rectified during other activities on site, further measurements or monitoring will be undertaken and reported to demonstrate the necessary noise reductions have been achieved.

5. COMPLAINTS PROCEDURE

In the event of a complaint from a resident or local business to the Minerals Planning Authority about noise during any operational phase, or a complaint made directly to the site manager or designated person, the following procedure shall be followed. Europa Oil and Gas Ltd shall record the issue as per the HSE Management System procedures, and specifically the Incident Management Procedure.

In the event that the source of the noise has already been monitored according to the procedures in the NMP and no excess found, this shall be taken as evidence that there is no breach of any noise planning condition. The complaint shall, however, be recorded.

In the event that either no noise monitoring has yet been conducted, such monitoring shall take place at the earliest opportunity and in any event within 48 hours of receipt of the complaint (subject to appropriate weather). The complainant shall be informed by North Yorkshire Council that investigations are under way. If the investigations demonstrate that a breach of the conditioned limits was likely to have occurred, remedial works shall be implemented to prevent a further breach. NYC shall be kept informed of progress.

If noise monitoring for the appropriate phase of operations has already been completed, and noise control actions are under way in consequence, the complainant shall be informed to that effect by NYC. In any event, all parties will be further informed of the results of noise mitigation measures, once these have been demonstrated by further noise survey(s) to have been effective in meeting the conditioned noise limits.

Figure 1: Nearest noise sensitive receptors to the well site.

In any instance of a breach of noise thresholds, across any development phases, Europa Oil and Gas's Production and HSE Manager must be informed immediately by the site manager.

Details of any action taken to reduce noise emissions shall be recorded, and the results of noise monitoring submitted to the Environmental Health team at NYC within 5 working days of completion of the site visit.

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