

R I C H A R D S
M O O R E H E A D & L A I N G L T D

LAND RESTORATION AT CEFN Y BEDD, WREXHAM

Measurement of background noise

for

MR J WILLIAMS

July 2012

2909/11 Background noise



LAND RESTORATION AT CEFN Y BEDD, WREXHAM

Measurement of background noise

for

MR J WILLIAMS

July 2012

2909/11 Background noise

©Copyright. This report and figures remain the copyright of Richards, Moorehead & Laing Ltd.
--

QUALITY ASSURANCE PROCEDURES: QP4

Prepared by:	Stephen Blunt	Date:	4.7.2012
Checked by:		Date:	
Approved by:		Date:	

Visit RML's web site at www.rmlconsult.com for the latest information on our services and staff.

CONTENTS

	Page no.
1 INTRODUCTION	1
1.1 Commission details	1
1.2 Site description	1
2 BACKGROUND NOISE MEASUREMENT METHOD	2
2.1 Instruments used	2
2.2 Weather during the survey	2
2.3 Procedure	3
3 RESULTS OF ASSESSMENT	3
3.1 Background noise recorded	3
3.2 Recommendation for noise limits during site restoration work	4

List of Tables

Table 1 Noise receptor locations	2
Table 2 Background noise measurement periods	3
Table 3 Background noise measurements	3

Appendices

APPENDIX 1 – NOISE MEASUREMENT REPORT

APPENDIX 2 – REVISION TO NOISE CHAPTER FROM ENVIRONMENTAL
STATEMENT DATED 07.12.2010

1 INTRODUCTION

1.1 Commission details

- 1.1.1 Richards, Moorehead & Laing Ltd ('RML') were commissioned to undertake a survey of the current background noise at the former gravel working off Park Road, Cefn y Bedd, to assist in assessing the likely noise impacts of the proposed infilling and land restoration.
- 1.1.2 The proposals, including working methods and predicted noise generation, are described in the supporting statement (ref 2909/11 Dec2010) accompanying the planning application submitted on 11th April 2011 and registered as reference P/2011/0272. Drawings 2909/02_Site Plan; 2909/03 r02 Restoration Plan; 2909/04 r02 Cross Sections and 2909/05 r03 Working plan show the site in its existing, restored and intermediate forms respectively.

1.2 Site description

- 1.2.1 The site is a former sand and gravel working, partially infilled to a level similar to that of surrounding land and partially at a level considerably below that of surrounding land. There is very little consistent noise during still weather conditions, and so the 'background' noise is made up of distinguishable, individual noise sources such as vehicles on the B5102 Llay Road and the A541, industrial estate operations, agricultural operations, aircraft and the unauthorised motorcycles which use the former sand and gravel working.
- 1.2.2 Adjoining land to the east and south of the site is used for agricultural grazing and hay / silage cropping. To the west lies Wat's Dyke which is now wooded, and beyond that the River Alyn valley. On the northern boundary of the site, at the level of the pre-extraction landform, are a childrens' day nursery and a bungalow. Beyond the nursery to the north-west is Gwastad Hall and a residential home for the elderly.
- 1.2.3 For the purpose of assessing the potential noise impact as part of the Supporting Statement, three locations were selected to represent the range of locations exposed to the potential noise from the restoration operations, as shown in Appendix 8 – Figure 8A01). These locations (Table 1) are exposed to road traffic noise (from either B5102 or Park Road) which would affect the northern or eastern facades of the

buildings. The proposed works would expose the southern or western facades to any noise arising from site operations. Figure 8A01 indicates a number of working scenarios which were modelled to assess the forecast noise.

Table 1 Noise receptor locations

Location reference	Name	Distance to nearest point of site boundary
1	Lane End (residential property)	10m
2	Day Nursery	1m
3	Coach House, Gwastad Hall	40m

- 1.2.4 The purpose of this background noise assessment was to determine the existing background noise, so that the effect of the forecast noise on these receptors could be assessed.

2 BACKGROUND NOISE MEASUREMENT METHOD

2.1 Instruments used

- 2.1.1 A Cirrus Research sound level meter model CR:811C with microphone type B&K4180 was used to monitor the background noise levels affecting the potentially noise-sensitive dwellings. The level meter was mounted on a tripod at 1.5m above ground level. As wind speeds were low, a foam windshield was not used in any measurements. The instrument was checked before and after the surveys by means of an acoustic calibrator (Cirrus Research CR:515), and no significant drift was observed. The meter and the calibrator are subject to regular laboratory calibration.

- 2.1.2 Windspeed at each location was measured using a ‘Skywatch Atmos’ weather station throughout each noise monitoring period.

2.2 Weather during the survey

- 2.2.1 The weather during each noise monitoring period was either bright sunshine or cloudy with a light and varying breeze (up to 4m/s recorded) which fluctuated in strength but remained from a generally southerly direction.

2.3 Procedure

- 2.3.1 Three one-hour measurement periods were monitored at a central location as shown on Figure 1, during daytime hours on two dates (25th and 28th May 2012). The equivalent continuous sound pressure level LAeq, together with the statistical index LA90, was noted for each measurement period. The instrument stored a full suite of statistical data for each period, for later download to PC.
- 2.3.2 As the noise environment at each location was quiet, the surveyor noted the principal sources of noise such as passing vehicles or overhead aircraft during each period, for later use in the interpretation of the results.

Table 2 Background noise measurement periods

REF	TIME/DATE	GPS N	GPS W	COMMENTS
1	09.28 – 10.29 25.05.2012	53° 5' 40.9"	3° 1' 29.9"	Continuous distant traffic noise with individual vehicles distinguished. Intermittent birdsong, passing aircraft and tree canopy rustle. Occasional distant train. Voices from nursery.
2	13.26 – 14.26 28.05.2012	53° 5' 40.8"	3° 1' 27.6"	
3	14.32 – 15.32 28.05.2012	53° 5' 40.9"	3° 1' 29.9"	

3 RESULTS OF ASSESSMENT

3.1 Background noise recorded

- 3.1.1 The results of the background noise measurements are shown in Table 3. A fuller data set is provided in Appendix 1.

Table 3 Background noise measurements

Record	L ₉₀ , 1hr (dB A)	LAeq (dB A)	Target limit LAeq (dB A)
1	40.1	45.7	
2	39.5	46.4	
3	40.8	47.0	
MEAN	40.1	46.4	50.1

- 3.1.2 It can be seen that the background noise level is consistently low – all $L_{90, 1hr}$ readings lying within 1.3dB(A) range. On both days when measurements were being taken there were no agricultural operations, such as hay and silage-making or hedge cutting, in progress.

3.2 Recommendation for noise limits during site restoration work

- 3.2.1 Minerals Technical Advice Note (Wales) 1: Aggregates provides guidance on the planning considerations which Government expects to be applied to noise from surface mineral operations. It suggests that planning conditions are applied to ensure that noise emissions from extractive processes are reduced at source and thereby controlled to reasonable levels.
- 3.2.2 The guidance recommends that a maximum noise level of 55dB $L_{Aeq,1 \text{ hour}}$, is applied and that Mineral Planning Authorities and the site operator should seek to establish a noise limit at sensitive receptors which does not exceed the monitored background noise level ($L_{A90,F}$) by more than 10dB (A).
- 3.2.3 Taking the monitored background noise level as 40.1 dB(A) $L_{90 \text{ 1hr}}$ the target noise limit for working periods would be 50.1 dB(A). The guidance makes provision for higher noise limits during short-term periods of work such as the creation of finished levels and the completion of restoration.

APPENDIX 1 – NOISE MEASUREMENT REPORT

Environmental Noise Measurement Report

Measurement Details

Location: Park Road, Cefn y Bedd
 Description: Background noise assessment
 Date of Measurement: 25/05/2012 and 28/05/2012 daytime

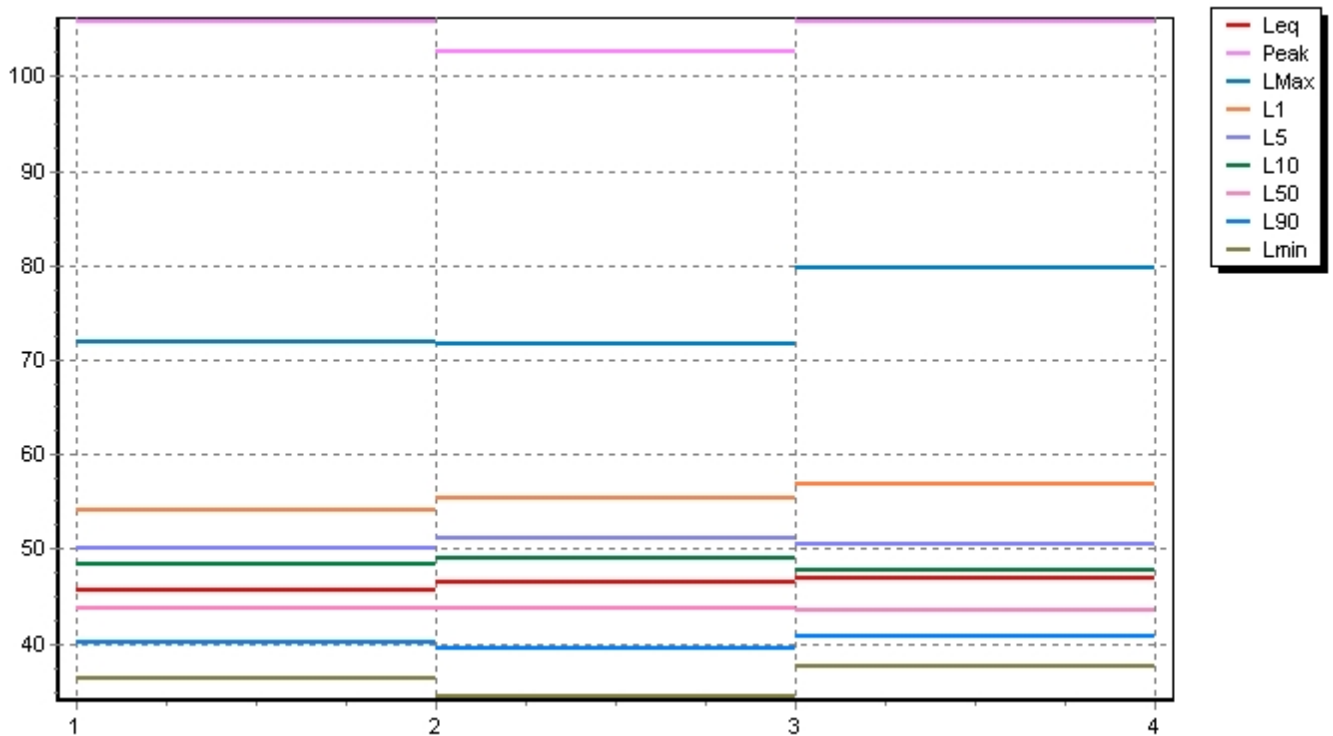
Instrumentation Details

Sound Level Meter: Cirrus Research plc CR:811C D21274FD
 Acoustic Calibrator: Cirrus Research plc CR:511E
 Calibration: Calibrated to 93.7dB on 28/05/2012 at 13:26:03
 Recalibration Due: 30/11/12
 Level Range: 30-100 dB
 Time Weighting: Fast (for Lmax and Lns)

Measurement Data

Start of Measurements: 30/12/1899 00:00
 No. of Measurements: 3
 Total Duration: 03:00:33
 Highest Lmax: 79.8
 Lmax Exceedance Count: 0 at or above 100dB

Date	Time	Run Duration (hh:mm:ss)	Leq dB	Lmax dB	Peak dBC	L1	L5	L10	L50	L90	Lmin
30/12/1899	00:00:00	01:00:26	45.7	72.0	105.8	54.1	50.1	48.4	43.7	40.1	36.3
28/05/2012	13:26:51	01:00:05	46.4	71.6	102.6	55.4	51.1	49.1	43.7	39.5	34.4
28/05/2012	14:33:00	01:00:02	47.0	79.8	105.7	56.9	50.5	47.8	43.5	40.8	37.5



Recommendations for Action

Use results in determining appropriate working noise limits

Environmental Noise Measurement Report

Assessment made by: Stephen Blunt

Date: 25 and 28/05/2012

APPENDIX 2 – REVISION TO NOISE CHAPTER FROM ENVIRONMENTAL STATEMENT DATED 07.12.2010

8 NOISE AND VIBRATION

8.1 Introduction

8.1.1 The objective of this assessment was to determine the likely impact of noise generated during the land restoration at Park Road, Cefn Y Bedd, Wrexham.

8.1.2 The approach to the noise assessment was to determine the likely noise levels from the operations and to comment on these within the context of Welsh Assembly Government guidance. The principal guidance documents ‘Technical Advice Note (Wales) 21 Waste’ and ‘Technical Advice Note (Wales) 11 Noise’ both refer to government guidance document MPG11 ‘Minerals Planning Guidance: the control of noise at surface mineral workings’ as the source of advice on noise generation and control. As the proposed operations have much in common with mineral working, this document is appropriate to the proposal. Noise from construction and open sites is commonly measured or modelled using British Standard BS 5228-1:2009 ‘Code of practice for noise and vibration control on construction and open sites’.

Human response to Noise

8.1.3 The human response to noise is subjective and affected by many factors, both acoustic and non-acoustic in nature. The likelihood of complaints in response to noise from mineral extraction is dependent upon factors including:

- The margin that noise produced by the movement or grading of materials exceeds the background noise level;
- The absolute noise level experienced;
- Time of day when the noise is heard;
- The change to the existing noise environment.

8.1.4 Most noise from surface mineral sites is generated by excavating plant, earth-moving plant, blasting activities, processing plant and other heavy traffic. Much of this plant is large and powerful but not necessarily noisy. Vibration is generally only associated with blasting activities, and as blasting is not relevant

to the restoration works at this site vibration will not be considered further in this report.

Minerals Policy Statement 2: Controlling and Mitigating the Environmental Effects of Minerals Extraction in England, Annex 2: Noise. (MPS2)

Minerals Technical Advice Note (Wales) 1: Aggregates

- 8.1.5 MPS 2 and MTAN 1 provide guidance on the planning considerations which Government expects to be applied to noise from surface mineral operations. It suggests that planning conditions are applied to ensure that noise emissions from extractive processes are reduced at source and thereby controlled to reasonable levels.
- 8.1.6 The guidance recommends that a maximum noise level of 55dB $L_{Aeq,1 \text{ hour}}$, is applied and that Mineral Planning Authorities and the site operator should seek to establish a noise limit at sensitive receptors which does not exceed the monitored background noise level ($L_{A90,F}$) by more than 10dB (A). In order to prevent sleep disturbance an absolute limit of 42 dB L_{Aeq} (free field) should be applied for any works to be undertaken during the night at all sensitive receptors.
- 8.1.7 All mineral operations generate noise from short term activities that cannot meet the limits set for normal operations. This often include works that take place at commencement or completion of the extraction process such as soil stripping, the construction and removal of baffle mounds, soil storage mounds and spoil heaps, construction of new or permanent landforms and aspects of site road construction and development. In this case increased temporary daytime noise limits of up to 70 dB $L_{Aeq, 1 \text{ hour}}$ (free field) may be permitted. Higher limits than these would normally only be permitted for defined periods of up to 8 weeks required to facilitate essential site work. Often work of this kind is expected to give long-term environmental benefits.
- 8.1.8 The guidance provided in MPS 2 / MTAN 1 and BS 5228 aims to help local planning authorities in their consideration of applications for mineral extraction licences adjacent to noise sensitive receptors such as residential dwellings and any site carrying national and international environmental designations.

8.2 Background noise

- 8.2.1 The site is a former sand and gravel working, partially infilled to a level similar to that of surrounding land and partially at a level considerably below that of surrounding land. There is very little consistent noise during still weather conditions, and so the ‘background’ noise is made up of distinguishable, individual noise sources such as vehicles on the B5102 Llay Road, industrial estate operations, agricultural operations, aircraft and the unauthorised motorcycles which use the former sand and gravel working.
- 8.2.2 Three locations were selected to represent the range of locations exposed to the potential noise from the restoration operations, as shown in Appendix 8 – Figure 8A01). These locations (Table 15) are exposed to road traffic noise (from either B5102 or Park Road) which would affect the northern or eastern facades of the buildings. The proposed works would expose the southern or western facades to any noise arising from site operations.

Table 4 Noise receptor locations

Location reference	Name	Distance to nearest point of site boundary
1	Lane End (residential property)	10m
2	Day Nursery	1m
3	Coach House, Gwastad Hall	40m

- 8.2.3 The background noise in the area of these properties was monitored ¹ and shown to be an average of 40.1dB(A) and so in accordance with the Minerals Technical Advice Note (Wales) 1: Aggregates the target limit for noise experienced at the properties during the proposed works would be not to exceed 50.1dB(A).
- 8.2.4 The potential impact during the land restoration would be minimised by:
- Avoiding night time works (proposed working hours stated in section 2),
 - Using the developing landform and soil stockpiles as a barrier to noise, where possible,

¹ Land Restoration at Cefn y Bedd – Background Noise Measurement 06/2012

- Operating static plant behind baffle mounds or stockpiles, where possible
- Careful control of noise during construction works, e.g. from vehicles, reversing alarms and mechanical tools,
- Switching off, or reducing to idle, the engines of plant which is not in continuous use,
- Maintaining vehicles to minimise avoidable noise, e.g. from rattles, squeaks and ‘body slap’,
- Maintaining haul routes used by vehicles to minimise rattles, squeaks and ‘body slap’.

8.2.5 Following initial noise modelling which indicated that target noise levels could be exceeded at some receptors if all operations were conducted simultaneously, patterns of working or ‘site rules’ were developed to avoid these ‘worst case’ circumstances coinciding. Noise-reducing fencing was introduced along the northern boundary of the site to protect the Day Nursery and Lane End. Fencing rated in accordance with BS EN 1793- 2:1998 - Category = B3 , would provide the noise reduction of -10 dB(A) used in the noise calculation results presented in 8.3, which reflect and describe these circumstances.

8.3 Prediction of noise level from the proposed operations

8.3.1 Details of the kinds of activities that would be carried out on site during the restoration operations have been provided by the applicant (see Supporting Statement section 2). This information has been used to calculate noise levels at each noise sensitive receptor following the procedures outlined in BS 5228. A simple phasing of the works has been developed and the working day has been assumed to be from 7.00am to 6.00pm although during the winter the period of working would be shortened by the available hours of daylight.

8.3.2 The land filling/regrading process covers a relatively small area of 2.9 hectares. However, within the site boundary plant would be moving variably closer and further away from the different receptors. Some activities, such as the transport of materials to and from the entrance on Park Road, will be the worst case for the nearest receptors. Activities such as the final grading, preparation and seeding of restored areas will take place close to receptors, though for short periods. These activities would be similar to the agricultural operations which take place adjacent to many residential properties in the area.

8.3.3 The following activities, or combinations of activities, were modelled to represent the range of working ‘scenarios’ which could occur at the site. They are shown diagrammatically in Appendix 8 - Figure 8A01.

1. Fill material brought by lorry from entrance to tipping point A, and tipped. Fill graded and tracked into place by excavator working at Location 1. No noise screen fencing. [modelled only to establish effect of noise screen fencing]
2. Fill material brought by lorry from entrance to tipping point A, and tipped. Fill graded and tracked into place by excavator and dozer working together at Location 1. Noise screen fencing erected.
PLUS crusher and screen, loaded by excavator, operating behind material stockpiles at Location 4.
3. Fill material brought by lorry from entrance to tipping point A, and tipped. Fill graded and tracked into place by excavator working at Location 2. Noise screen fencing erected.
4. Fill material brought by lorry from entrance to tipping point B, and tipped. Fill graded and tracked into place by excavator working at Location 3. Noise screen fencing erected.
5. Crusher and screen, loaded by excavator, operating behind material stockpiles at Location 4. Crushed re-usable material loaded to lorry by excavator. Noise screen fencing erected.

Details of plant to be used

8.3.3 Details of the types of plant which would be used during the importation, placing and grading of materials, are provided in Table 16 with their typical sound pressure levels when in use at a reference distance of 10 metres. These figures have been taken from tables contained within BS 5228:2009 Annex C. The source sound pressure level and the percentage of the working day that such plant normally operates, enables noise levels to be calculated at an identified receptor. Construction plant would not normally operate continually throughout the working day. A percentage ‘on-time’ of 100% has been assumed for the plant as a ‘worst case’ scenario. Haulage vehicles would arrive at the site, traverse to the tipping location, and then leave the site within an

operating period of less than 10 minutes. The noise contribution from this source has been modelled assuming a) the peak rate of importation stated in section 2 and b) the average rate.

- 8.3.4 For each of the working ‘scenarios’ described in 8.3.2 the predicted daytime noise levels were calculated for the selected noise sensitive locations, based on the data in Table 16. Noise for peak and average rates of infilling was calculated separately. Soft ground attenuation was assumed in deriving the noise levels only where appropriate, since for most scenarios the receptor is elevated from the working location and so transmission is largely in ‘free air’. Where screening by landforms or fencing is included, soft ground attenuation has been ignored in accordance with BS5228. The existing landform offers no screening between the modelled working locations and the Day Nursery or Lane End, and so only the screening of stockpiles around the crusher and screen, or noise fencing where erected, has been taken into account. The landform of the western boundary, together with the former quarry face and day nursery building, do provide screening for the Coach House and Gwastad Hall but this is ignored in scenarios 2 – 5 to avoid ‘double counting’ with the effect of noise fencing. The predicted maximum noise levels are for short duration ‘worst case’ impacts during filling works but in practice; noise levels would be lower for most of the time and absent during non-operational periods.

Table 5 Predicted noise levels from site operations: plant

Plant	Reference plant in BS 5228 Annex C	Activity Equivalent Continuous sound pressure level L_{Aeq} at 10m, dB	For use in:
Dozer Cat D4 , dozing	Table C8 item 6 138kW	78	Filling
Tracked Excavator JS220	Table C8 item 10 96kW	69	Filling
Screen	Table C10 item 14	81	
Crusher	Table C1 item 14	82	
Road Lorries, site haulage	Table C8 item 20	79	Haulage
Excavator, loading	Table C10 item 2 19t	76	Loading

Table 6 Calculated noise at receptor locations – all working scenarios

SCENARIO peak / average filling rate		Lane End Noise dB(A)	Day Nursery Noise dB(A)	Coach House Noise dB(A)
1. Filling location 1, no noise screen (landform and nursery screen Coach House)	peak	51.3	55.6*	42.9
	average	48.1	52.4*	38.9
2. Filling location 1 with dozer, noise screen PLUS crushing and screening	peak	52.9	53.4	
	average	50.6	51.4	
3. Filling location 2, noise screen	peak	47.7	50.5	
	average	42.7	49.5	
4. Filling location 3, noise screen	peak	51.1	48.0	45.4
	average	47.2	45.4	41.9
5. Crushing and screening location 4, lorries removing (continuous), noise screen erected	peak	55.9	51.9	
	No lorries	54.4	51.9	

* reduced to 45.6 and 42.4 dB(A) if noise fencing erected

8.4 Discussion of results of the noise assessment

8.4.1 The modelling results shown in Table 17 demonstrate that some combinations of operations can be conducted without exceeding the limit of 50.1dB(A) suggested in guidance, and that other combinations would exceed that limit if all operations were conducted simultaneously. The operator would therefore plan his works to limit the intensity of site working (rate of material import or number of simultaneous operations) to keep noise experienced at receptors within agreed limits. When no crushing and screening is taking place, the noise limit of 50.1dB(A) would not be exceeded if the rate of working is limited to rates between the proposed average and proposed peak.

8.4.2 The modelling indicates that crushing and screening activity would create noise levels at the receptor properties which exceed the proposed limit of 50.1dB(A) even when working behind baffle mounds. For this reason the applicant has

decided not to operate screening or crushing at the site. Material suitable for recycling would be taken elsewhere and not brought to this site.

8.4.3 To keep the noise generation within the proposed limit of 50.1dB(A) the working operations would be limited to the following scenarios:

1. Filling and grading at location 1, using tipping vehicles and 360° excavator only, with noise screen fencing erected to shield the Day Nursery. No landform screening of Lane End is assumed. Noise at Lane End would be managed by restricting the peak rate of vehicle movements until noise fencing was erected (scenario 2);
2. As scenario 1 but noise screen fencing erected to permit peak rate of importation within noise limits, and use of D4 type dozer to assist grading;
3. Filling and grading at location 2, using tipping vehicles and 360° excavator only, with noise screen fencing erected to shield the Day Nursery and Lane End. Peak rate of importation is possible within noise limits;
4. Filling and grading at location 3, using tipping vehicles and 360° excavator only, with noise screen fencing erected to shield the Day Nursery and Lane End. Rate of importation capped below peak to keep within noise limits at Lane End.

8.4.4 Table 17A shows the predicted noise generation from these four scenarios.

8.4.5 It is proposed that noise limits greater than 50.1dB(A) should be agreed through conditions for specified, limited durations in order that the operator should have some flexibility to respond to peak periods and to carry out particular operations at the start and end of the restoration works. For example the initial works near the receptor properties, and the surface treatment as part of vegetation establishment, may involve periods of greater noise generation. None of the initial scenarios modelled (Table 17) reached 56dB(A) at either receptor.

Table 17A – Predicted noise generation from proposed activities

SCENARIO peak / average filling rate		Lane End Noise dB(A)	Day Nursery Noise dB(A)	Coach House Noise dB(A)
1. Filling location 1, no dozer, noise fencing erected to Day Nursery only (landform and nursery screen Coach House)	peak	51.3	45.6	42.9
	average	48.1	42.4	38.9
2. Filling location 1 with dozer, noise fencing erected to Lane End and Nursery (landform and nursery screen Coach House)	peak	48.6	49.4	< 49.4 not calc.
	average	46.1	49.4	< 49.4 not calc.
3. Filling location 2, no dozer, noise fencing erected to Lane End and Nursery (landform and nursery screen Coach House)	peak	47.7	50.5	< 50.5 not calc.
	average	42.7	49.5	< 49.5 not calc.
4. Filling location 3, no dozer, noise fencing erected to Lane End and Nursery (landform and nursery screen Coach House)	peak	51.1	48.0	45.4
	average	47.2	45.4	41.9

8.4.6 The effect of additional distance and the landform in reducing noise at the Coach House can be seen in the Table. Modelling was not therefore extended to Gwastad Hall but this property is well screened by the landform and is at lower elevation so noise levels would be lower still.

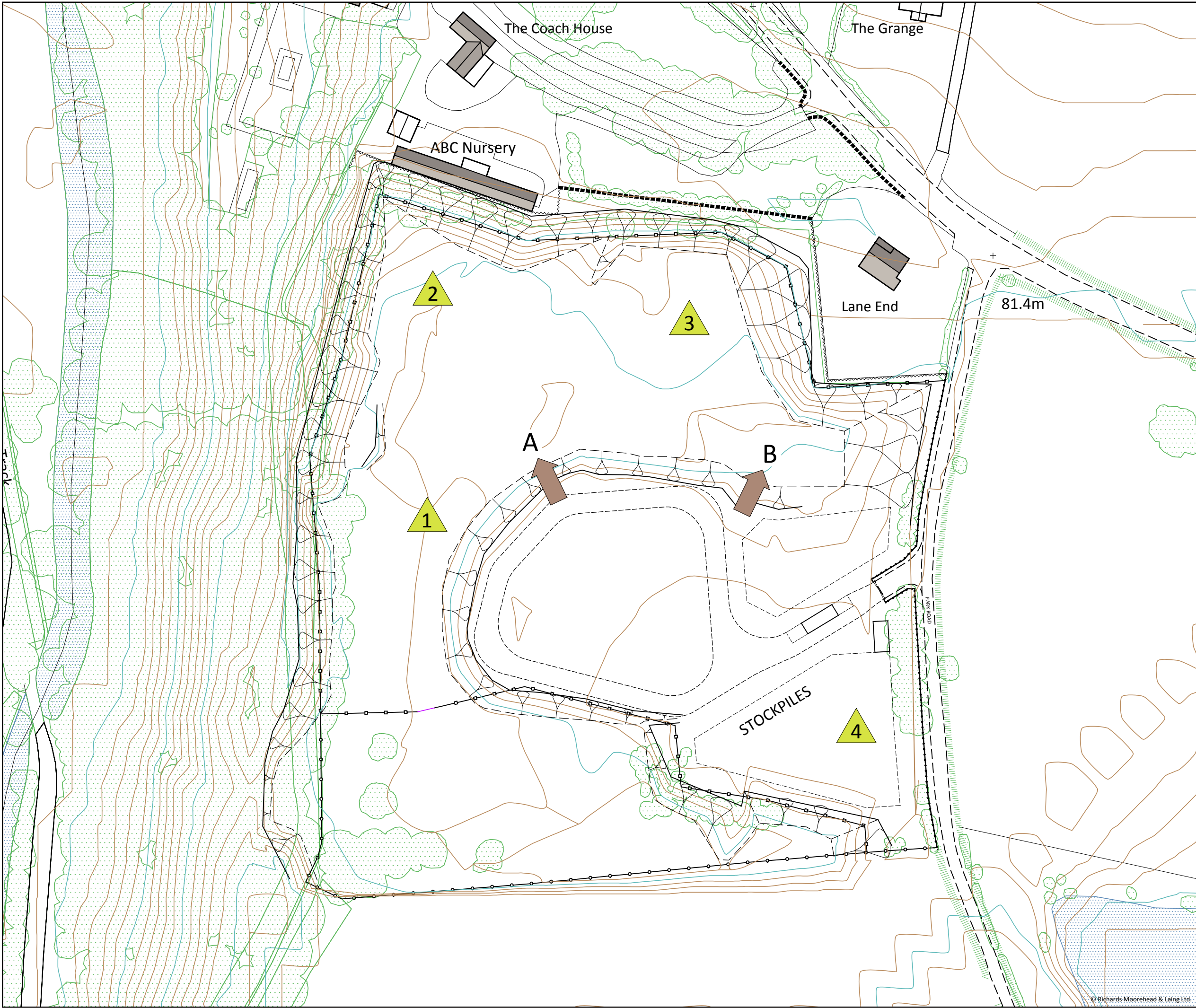
8.4.7 Moorbridge Construction recently filled the disused railway cutting between the A541 and River Alyn with inert waste, using similar working methods. No adverse comment was generated by this operation.

8.5 Conclusions

8.5.1 Noise from the proposed filling and restoration operations can be managed effectively so that noise exposure limits suggested in guidance can be met.

8.5.2 Conditions to be attached to a planning permission should a) be based on managing operations so that noise does not exceed background by more than 10dB(A), rather than restricting operations to specified activities, and b) reflect the intermittent nature of the proposed operations, and the need to operate at

various locations within the site. This will allow the operator the flexibility to respond to the availability of quieter equipment or to time operations so that short periods of noisier activity can be accommodated by shutting down other activity.



Cleient / Client:

MOORBRIDGE CONSTRUCTION LIMITED
Cedar Bank
12 Rhyddyn Hill
Wrexham LL12 9EB

Enw project / Project name:

RESTORATION OF LAND
PARK ROAD, CEFN Y BEDD

Teitl lluniad / Drawing title:

Noise Modelling Locations

Eglurhad / Key:

- # Modelled operating location
- ➔ Tipping point
- ▭ Modelled receptor

PRELIMINARY

0 5 10 20 30 40 50 m

Based upon the Ordnance Survey Digital Data with the permission of the Controller of Her Majesty's Stationery Office. Crown copyright reserved. Licence No. AL10004963

Graddfa / Scale (A3):	Dyddiad / Date:	Darlunwyd gan: Drawn by:
1:1,000 @A3	Aug 2010	RhE
Rhif lluniad / Drawing number:		Gwiriwyd gan: Checked by:
2909 / 8A.01		SMB
		Cymeriad: Revision:
		01

Darparwyd gan / Prepared by:

RICHARDS
MOOREHEAD & LAING LTD

55 Stryd y Ffynnon, Rhuthun, Sir Ddinbych, LL15 1AF.
55 Well Street, Ruthin, Denbighshire, LL15 1AF, UK.

Rhif Ffôn/Tel: +44 (0)1824 704366, Ffacs/Fax: +44 (0)1824 705450,
e-bost/e-mail: mi@rmikconsult.com, Gwefas/Website: www.rmikconsult.com