



Noise
Assessment:
St Mary's
Airport
Construction
Compound

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Prepared for:
Lagan Construction

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1. INTRODUCTION

1.1 General

URS has been commissioned by Lagan Construction Ltd. to prepare a Noise Assessment which considers the potential noise impact upon the closest residential receptors to a temporary construction compound associated with a proposal to surface the airport runway on St Mary's, Isles of Scilly and other related works.

It is understood that advantage will be taken of the asphalt batching plant being on the island to also undertake repairs to local roads.

It is also understood that site mobilisation will take approximately 6 weeks, and the operation of the site will be for a period of approximately 13 weeks. Decommissioning will take up to 3 weeks.

Details on noise perception and terminology are given in Appendix A.

1.2 Site Description

The site is located to the north of St. Mary's Airport, off the A3110. The site is currently farmland and the surrounding land use is also farmland, with some woodland.

The site is located within a slight 'hollow', with land rising to both the north and south. The land to the east of the site appears to fall away slightly.

The topography of the site is likely to provide a level of shielding, particularly to properties located to the south and west.

1.3 Closest Noise Sensitive Receptors

The closest residential receptors (R) to the site are:

- R1: Porthellick House, approximately 245m to the north-east;
- R2: Tremelethen, approximately 215m to the east;
- R3: 1 Airport Bungalows, approximately 230m to the south;
- R4: Water Meadow Barn, approximately 200m to the west; and
- R5: Parting Carn, approximately 200m to the north-west.

The locations of receptors are given in Figure B1 in Appendix B.

2. CRITERIA

2.1 National Planning Policy Framework (NPPF)

The NPPF¹ was introduced in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied. The NPPF replaces the previous guidance document PPG 24 'Planning and Noise'².

The NPPF provides for the production of distinctive local and neighbourhood plans by Local Authorities, in consultation with local people, which should be developed to reflect the needs and priorities of their communities.

Applications for planning permission must be determined in accordance with the Local Authority development plan (which includes any local plan or neighbourhood plans which have been adopted for the area), unless material considerations indicate otherwise. The NPPF must be taken into account in the preparation of local and neighbourhood plans, and is a material consideration in the determination of planning applications. Planning policies and decision must also reflect, and where appropriate promote, relevant EU obligations and statutory requirements.

The planning system is required to contribute to and enhance the natural and local environment. Consequently, the aim is to prevent both new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

The NPPF states that planning policies and decisions should aim to:

- *“avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established [subject to the provisions of the Environmental Protection Act 1990 and other relevant law]; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

With regards to 'adverse effects' and 'significant adverse effects' the NPPF refers to the Noise Policy Statement for England (NPSE) Explanatory Note³.

The statement sets out the long term vision of the government's noise policy, which is to *“promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development”*.

This long term vision is supported by three aims:

- *“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 improvements of health and quality of life.”*

The long term policy vision and aims are designed to enable decisions to be made regarding what is an acceptable noise burden to place on society.

The ‘Explanatory Note’ within the NPSE provides further guidance on defining ‘significant adverse effects’ and ‘adverse effects’ using the concepts:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The three aims can therefore be interpreted as follows:

- The first aim is to avoid noise levels above the SOAEL.
- The second aim considers situations where noise levels are between the LOAEL and SOAEL. In such circumstances, all reasonable steps should be taken to mitigate and minimise the effects. However this does not mean that such adverse effects cannot occur.
- The third aim considers situations where noise levels are between the LOAEL and NOEL. In these circumstances, where possible, reductions in noise levels should be sought through the pro-active management of noise.

The NPSE recognises that it is not possible to have single objective noise-based measures defining the SOAEL, LOAEL and NOEL that are applicable to all sources of noise in all situations. The levels are likely to be different for different noise sources, receptors and at different times of the day.

2.2 NPPF Technical Guidance

Paragraphs 30 to 31 in the Technical Guidance that accompanies the NPPF⁴ details noise emission standards for minerals workings (considered relevant to the proposed development) in close proximity to residential communities. The following criteria are proposed:

- Subject to a maximum of 55 dB $L_{Aeq,1h}$ (free-field), mineral planning authorities should aim to establish a noise limit at the noise-sensitive property that does not exceed the background noise level by more than 10 dB(A). It is recognised, however, that in many circumstances it will be difficult to not exceed the background noise level by more than 10 dB(A) without imposing unreasonable burdens on the mineral operator. In such cases, the limit set should be neat that level as practicable during normal working hours (0700-1900) and should not exceed 55 dB $L_{Aeq,1h}$ (free-field).
- Night-time limits should not exceed 42 dB $L_{Aeq,1h}$ (free-field) at noise sensitive dwellings.
- All minerals operations will have some particularly noise short-term activities that cannot meet the limits set for normal operations.....Increased temporary daytime

noise limits of up to 70 dB $L_{Aeq,1h}$ (free-field) for periods up to 8 weeks in a year at specified noise-sensitive properties should also 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.

2.3 BS 5228 ‘Code of Practice for Noise and Vibration Control on Construction and Open Sites’

Noise and vibration levels generated by construction activities are regulated by guidelines and are subject to local authority control. No UK national noise limits exist for construction noise. However, guidance on acceptable noise levels is provided British Standard BS 5228: 2009⁵. Part 1 deals with noise control and Part 2 deals with vibration.

2.4 BS 8233 Guidance

BS 8233⁶ provides guidance on the recommended indoor ambient noise levels for bedrooms at night, assuming that no noise is generated from within the room itself (i.e. occupants are asleep) but that noise from outside may be heard within the room. Recommended noise levels are quoted as having a design range of ‘Good’ to ‘Reasonable’. The BS 8233 guidance is given in Table 2.1.

Table 2.1: Indoor Ambient Noise Levels Bedrooms (BS 8233)

Criterion	Type of situation	Design Range $L_{Aeq,T}$ dB	
		Good	Reasonable
Reasonable resting/sleeping conditions	Bedrooms	30	35

2.5 Council of the Isles of Scilly

Contact was made with the Council of the Isles of Scilly (IOS)⁷ to agree the assessment methodology and criteria. Initially, IOS suggested an absolute noise level of 70 dB $L_{Aeq,1h}$ at the closest residential receptors. However, URS recommended what it considered a more appropriate criteria of 55 dB L_{Aeq} during daytime hours and 42 dB L_{Aeq} at night (taken from the NPPF Technical Note) to ensure there would be no significant noise impact upon receptors, as well as an 8 week period whereby noise levels are no greater than 70 dB L_{Aeq} , to be implemented during construction and decommissioning of the site. This was agreed with IOS council as being more proportionate and reasonable.

2.6 Significance of Impacts

The significance of predicted construction and operational noise above the daytime and night-time criterion given in the Technical Guidance to NPPF for this project is given in Table 2.2 below.

Table 2.2: Significance of Impact for Construction Noise

Construction Noise Level above Criterion Level dB(A)	Significance of Impact
<0	Neutral
0>1	Negligible adverse
1>3	Minor adverse
3>5	Moderate adverse
5+	Major adverse

3. ASSESSMENT METHODOLOGY

Noise levels from the operation of the asphalt and concrete batching plants have been predicted using the methodology given in BS 5228: 2009 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'.

Noise levels generated by construction works or the operation of plant and experienced by local receptors depend upon a number of variables, the most significant of which are:

- the noise generated by plant or equipment used on site, road traffic and other sources, generally expressed as sound power levels (L_w);
- the periods of operation of the plant on site, known as its on-time;
- the distance between the noise source and the receptor;
- the attenuation due to ground absorption, air absorption and barrier effects; and
- in some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings.

The following major activities have been assumed during the construction and use of the proposed development:

- site preparation;
- installation of equipment;
- construction of car parking and accommodation;
- operation of asphalt batching plant;
- operation of concrete batching plant;
- movement of HGVs on site;
- decommissioning and removal of equipment; and
- restoration of site.

Specific details of site preparation, installation of equipment and car park and accommodation construction works are not currently available. Therefore, representative construction activities have been assumed based on experience of similar projects. If the activities and plant used in these noise predictions differ significantly to those actually used, it is recommended that construction noise levels be reviewed.

Details of assumed construction activities, plant and percentage on-times per hour are given in Table C1 in Appendix C.

4. SITE MOBILISATION AND DECOMMISSIONING NOISE LEVELS

4.1 Site Preparation and Mobilisation

Predicted free-field noise levels during site preparation and the installation of equipment are given in Table 4.1 below. It is assumed all site preparation and equipment installation activities will be undertaken during daytime hours. Predicted noise levels assume the topography and the presence of other buildings will provide a minimum level of shielding of 5 dB at all receptors other than R1.

Table 4.1: Predicted Site Preparation Noise Levels (free-field)

Construction Activity	Predicted Free-Field Noise Level $L_{Aeq,1h}$ dB				
	R1	R2	R3	R4	R5
Site preparation	48	47	46	48	48
Installation of equipment	46	43	40	42	41
Construction of car parking and accommodation	49	43	45	48	48
Construction of access roads	47	44	47	46	47

As illustrated in Table 4.1, predicted site preparation and mobilisation noise levels will fall well below the 70 dB $L_{Aeq,1h}$ criterion for site preparation works.

4.2 Decommissioning and Site Restoration

Predicted free-field noise levels during the decommissioning of the site and site restoration are given in Table 4.2 below. It is assumed all decommissioning and site restoration activities will be undertaken during daytime hours. Predicted noise levels assume the topography will provide a minimum level of shielding of 5 dB.

Table 4.2: Predicted Decommissioning and Site Restoration Noise Levels (free-field)

Construction Activity	Predicted Free-Field Noise Level $L_{Aeq,1h}$ dB				
	R1	R2	R3	R4	R5
Decommissioning and removal of equipment/ accommodation	44	43	42	44	44
Site restoration	47	45	44	46	46

As illustrated in Table 4.2, predicted decommissioning and site restoration noise levels will fall well below the 70 dB $L_{Aeq,1h}$ criterion for site restoration works.

5. OPERATIONAL NOISE LEVELS

5.1 Source Data

Data for the operational noise levels of the asphalt and concrete batching plants have been taken from similar projects where on-site measurements were made by URS because data on the specific plant intended to be used were not available. It must be noted that the asphalt and concrete plants assumed in the noise model were much bigger, permanent operations and therefore the noise emitted from them is likely to be greater than the mobile batching plants to be installed for the St Mary’s project. Our assessment can therefore be considered a worst-case scenario.

The sound power levels for various processes are given below, along with the on-time **per batch** based on observations made at similar plants:

Asphalt batching plant

Table 5.1: Noise Data for Asphalt Batching Plant

Activity/ Process	Sound Power Level L _w dB	On time per batch (mins)	Data Source
Feed units	93	3	URS measurements – Brayford Asphalt Plant
Elevator head	99	3	URS measurements – Brayford Asphalt Plant
Burner	104	3	URS measurements – Brayford Asphalt Plant
Dryer	97	3	URS measurements – Brayford Asphalt Plant
Blower	102	3	URS measurements – Brayford Asphalt Plant
Exhaust fan	91	3	URS measurements – Brayford Asphalt Plant

Concrete batching plant

Table 5.2: Noise Data for Concrete Batching Plant

Activity/ Process	Sound Power Level L _w dB	On time per batch (mins)	Data Source
Excavator loading material into hopper	102	3	URS measurements – Llay Mortar Plant
Conveyer belt and engine	105	3	URS measurements – Llay Mortar Plant
Loading material into mixer	96	3	URS measurements – Llay Mortar Plant
Aggregate discharge into transport/ delivery vehicle	104	3	URS measurements – Llay Mortar Plant

Generators

It is understood that three generators will be located on site;

- 450kVA diesel generator to power the site, operational at all times;
- 900vVA diesel generator to power the asphalt plant when mixing; and
- 200kVA diesel generator to power the asphalt plant when not mixing (to maintain bitumen temperature).

No noise data were available for the diesel generators, although it is understood that they will be super silenced. Noise emission data have instead been sourced from BS 5228. A sound power level of 94 dB(A) has been assumed for all generators.

Transportation

Transportation of aggregates to the site, and also asphalt and concrete batches between the site and the airfield and the site and local roads, will be undertaken using 15/16 tonne tractor trailers. Noise emission data for a tractor has been taken from BS 5228, assuming a sound power level of 108 dB(A).

5.2

Predicted Noise Levels – Movements of Aggregate Material from Porthmellon Beach to Site

Aggregates will be transported to the island by vessels, landing on Porthmellon Beach. The aggregates will then be transported from Porthmellon Beach to the site by tractor trailers.

Details of the number of tractor movements and the duration and times of tractor movements are given in more detail within the Transport Assessment.

The Transport Assessment indicates that on the days that aggregates are delivered there will be up to 24 tractor movements per hour, and that transportation is likely to be undertaken one day per week. The timing of transportation will also be dependent on the tides.

It has been assumed that tractors will be travelling at low speeds due to the rural nature of the roads (25 km/h).

The predicted free-field noise levels over an hour period at the closest receptors located along the haul route are given in Table 5.3 below.

Table 5.3: Noise from HGVs

Receptor	Predicted Free-field Noise Level of Tractor Trailer Pass-bys <i>L</i> _{Aeq,1h} dB
A1: 'Teeki', Hugh Town	62
A2: 6 Bay View, High Town	62
A3: Parting Carn	65

The predicted noise levels are greater than the longer term noise criterion of 55 dB $L_{Aeq,1h}$ for daytime operations, but do fall below the maximum noise criteria level of 70 dB $L_{Aeq,1h}$.

5.3 Predicted Noise Levels – Airside Operations

The asphalt and concrete batching plants will mainly be operational at night to allow the surfacing of the runways when the airport is closed.

For the purposes of the noise model it is assumed that the greatest number of asphalt batches in an hour period would be five, and that there would be one batch of concrete per hour.

Predicted worst-case free-field operational noise levels for the asphalt batching plant, concrete batching plant and associated tractor movements at night are given in Table 5.4 below. Figures in bold exceed the night-time criterion of 42 dB $L_{Aeq,1h}$, as agreed with the Council of Isles of Scilly.

Table 5.4: Predicted Operational Noise Levels – Airside (Night-time)

Operational Activity	Predicted Noise Level $L_{Aeq,1h}$ dB				
	R1	R2	R3	R4	R5
Asphalt batching plant	41	39	37	38	36
Concrete batching plant	34	31	27	29	28
Tractor movements	44	41	40	42	42
Generators	35	31	29	32	31
OVERALL NOISE LEVEL	46	43	42	44	44

At all receptors the operation of the batching plants individually and the associated generators do not exceed the 42 dB $L_{Aeq,1h}$ criterion.

The dominant noise source at all receptors will be the movement of tractor trailers running between the batching plants and the airfield. At all but one receptor, the operation of the tractor trailers does not exceed the 42 dB $L_{Aeq,1h}$ criterion. Only at receptor R1 is the criterion exceeded by up to 2 dB. This is due to the topography of the area, with the receptor being slightly elevated above the site. In addition, there are no buildings between receptor R1 and the site which could provide partial shielding of noise.

The total noise level (the combination of all operation activities over the hour assessment period) exceeds the recommended night-time criterion of 42 dB $L_{Aeq,1h}$ at all but one receptor, driven by noise from tractor movements. At Receptors R2, R4 and R5 there is predicted to be an exceedance of up to 2 dB, which is classed as minor adverse significance of impact.

At Receptor R1, there is an exceedance of the criterion level by up to 4 dB, a moderate adverse significance of impact. However, at this receptor internal noise levels, assuming a partially open window, will be around 34 dB(A). This falls below (i.e. better than) the recommended BS 8233 'reasonable' internal noise level for bedrooms at night of 35 dB L_{Aeq} .

It must be noted, however, that the assumed sound power levels for the processes involved in the operation of both batching plants have been taken from much larger, permanent

installations and therefore are likely to be greater than the noise levels emitted by smaller, temporary batching plants. Overall noise levels, therefore, will likely be lower than those given in Tables 5.4.

5.4 Predicted Noise Levels – Landside Operations

During the daytime it is understood that the asphalt batching plant will be used to repair some of the island’s roads. Although the batching plants will mainly be used at night, it has been assumed that the same number of batches will be required during the day for a worst-case assessment. Deliveries of material to the site will also be undertaken.

Predicted worst-case free-field operational noise levels for the asphalt batching plant, concrete batching plant, associated tractor movements and the delivery of materials to site during the day are given in Table 5.5 below. Figures in bold exceed the daytime criterion of 55 dB $L_{Aeq,1h}$, as agreed with the Council of Isles of Scilly.

Table 5.5: Predicted Operational Noise Levels – Landside (Daytime)

Operational Activity	Predicted Noise Level $L_{Aeq,1h}$ dB				
	R1	R2	R3	R4	R5
Asphalt batching plant	41	39	37	38	36
Concrete batching plant	34	31	27	29	28
Tractor movements	44	41	40	42	42
Generators	35	31	29	32	31
Delivery of materials to site	47	44	42	43	42
OVERALL NOISE LEVEL	49	46	45	47	46

As illustrated in Table 5.5, predicted daytime operational noise levels will fall well below the 55 dB $L_{Aeq,1h}$ criterion at all selected receptors.

6. MITIGATION

The contractor will be required to follow Best Practicable Means to reduce the noise impact upon the local community during both site mobilisation and operational activities, including the following:

- All construction plant and equipment should comply with EU noise emission limits.
- Proper use of plant with respect to minimising noise emissions and regular maintenance. All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good efficient working order.
- Selection of inherently quiet plant where appropriate. All major compressors should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.
- Plant and equipment such as flat-bed lorries, tractor trailers, skips, etc. should be lined with noise attenuating materials. Materials should be handled with care and be placed, not dropped.
- All ancillary plant such as generators, compressors and pumps should be positioned so as to cause minimum noise disturbance, e.g. furthest from receptors or shielded by portakabins. If necessary, acoustic enclosures and/or acoustic shielding should be provided.
- Construction contractors should be obliged to adhere to the codes of practice for construction working given in BS 5228: 2009 and the guidance given therein regarding minimising noise emissions from the site.
- Reference should be made to the Building Research Establishment, BRE 'Pollution Control' guidelines, Parts 1-5. Noise Monitoring⁸.

7. SUMMARY AND CONCLUSIONS

7.1 Summary

A noise assessment has been undertaken to determine the potential for noise impacts arising from the use of the site as a temporary construction compound.

The prediction methodology given in BS 5228 was implemented and resultant noise levels assessed against the criteria levels given in the Technical Guidance to the National Planning Policy Framework.

7.2 Conclusion

During the mobilisation of the site, noise levels have been predicted to fall well below the 70 dB $L_{Aeq,1h}$ criterion, assuming all mobilisation activities are undertaken during daytime hours (0700-1900).

With regards to the operation of the site, predicted noise levels for the passage of trailer tractors transporting aggregate material between Porthmellon Beach and the site are below the 70 dB $L_{Aeq,1h}$ criterion but greater than the 55 dB $L_{Aeq,1h}$ criterion. However it is understood that the transportation of material will only occur approximately once a week.

During airside works (night-time), noise levels from individual activities are predicted to fall below the 42 dB $L_{Aeq,1h}$ night-time criterion, with the exception of noise from tractor trailer movements upon Porthellick House (receptor R1). Overall noise levels for a worst-case hour are predict to slightly exceed the night-time criterion at Tremelethen (R2), Water Meadow Barn (R4) and Parting Carn (R5), resulting in a minor adverse, but temporary, significance of impact. At Porthellick House (R1) the criterion is predicted to exceed the criterion by up to 4 dB, a moderate, but temporary, significance of impact. However, internal noise levels within bedrooms, assuming a partially open window, will fall below (i.e. better than) the 'reasonable' criterion given in BS 8233.

During landside works (daytime), overall noise levels are predicted to fall below the 55 dB $L_{Aeq,1h}$ criterion.

Best Practicable Means have been recommended to assist in keeping noise levels to a minimum.

8. REFERENCES

1. Communities and Local Government 'National Planning Policy Framework'. Department for Communities and Local Government, March 2012.
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3. Noise Policy Statement for England, March 2012. Department for Environment, Food and Rural Affairs (DEFRA).
4. Communities and Local Government 'Technical Guidance to the National Planning Policy Framework'. Department for Communities and Local Government, March 2012.
5. BS 5228: 2009 'Code of Practice for Noise and Vibration on Construction and Open Sites, Part 1: Noise'. British Standards Institute.
6. BS 8233: 1999 'Sound insulation and noise reduction for buildings – Code of practice', British Standards Institute.
7. Email correspondence between Ruth Sargent (URS) and Craig Dryden (Director of Place, Council of the Isles of Scilly). December 2013.
8. Building Research Establishment 2003 'Controlling particles, vapour and noise pollution from construction sites. Parts 1-5.

APPENDIX A NOISE PERCEPTION AND TERMINOLOGY

Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in pascals, Pa). Because of this wide range a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB (A) or LpA dB. Table A.1 below lists the sound pressure level in dB (A) for common situations.

Table A.1: Sound Pressure Levels for a Range of Situations

Typical Noise Levels dB(A)	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library. Refrigerator humming at 2m
50	Quiet office, no machinery. Boiling kettle at 0.5m
60	Normal conversation
70	Telephone ringing at 2m. Vacuum cleaner at 3m
80	General factory noise level
100	Pneumatic drill at 5m
120	Discotheque - 1m in front of loudspeaker
140	Threshold of pain

The noise level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local noise sources. Close to a busy road, the noise level may vary over a range of 5 dB(A), whereas in a suburban area this may increase up to 40 dB(A) and more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night time noise levels will often be smaller and the levels significantly reduced compared to daytime levels.

The equivalent continuous A-weighted sound pressure level, L_{Aeq} dB (or L_{eq} dBA), is the single number that represents the average sound energy measured over that period. The L_{Aeq} is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period.

Human subjects are generally only capable of noticing changes in steady levels of no less than 3 dB(A). It is generally accepted that a change of 10 dB(A) in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of the noise level. (These findings do not necessarily apply to transient or non-steady noise sources such as changes in noise due to changes in road traffic flow, or intermittent noise sources).

A parameter that is widely accepted as reflecting human perception of the ambient noise is the background noise level, L_{A90} . This is the noise level exceeded for 90% of the measurement period and generally reflects the noise level in the lulls between individual noise events. Over a 1-hour period the L_{A90} will be the noise level exceeded for 54 minutes.

The $L_{Amax,slow}$ and $L_{Amax,fast}$ measurement parameters are the maximum instantaneous sound pressure level attained during the measurement period (30 seconds, 5 minutes etc.), measured on the 'slow' or 'fast' response setting of the sound level meter. This is sometimes expressed as L_{Amax} dB or L_{max} dB(A). Even though sounds appear fairly steady to the human ear they are seldom if ever steady in level. To accommodate this factor, sound level meters (SLMs) are generally provided with at least two meter responses or exponential averaging circuits. Fast meter response has a time constant of 1/8th of a second (125ms) and approximates the integration time of human hearing. The slow time response (time constant = 1 second) is intended to obtain an approximate average value of rapidly fluctuating levels from simple meter readings.

APPENDIX B SITE LOCATION AND CLOSEST NOISE SENSITIVE RECEPTORS

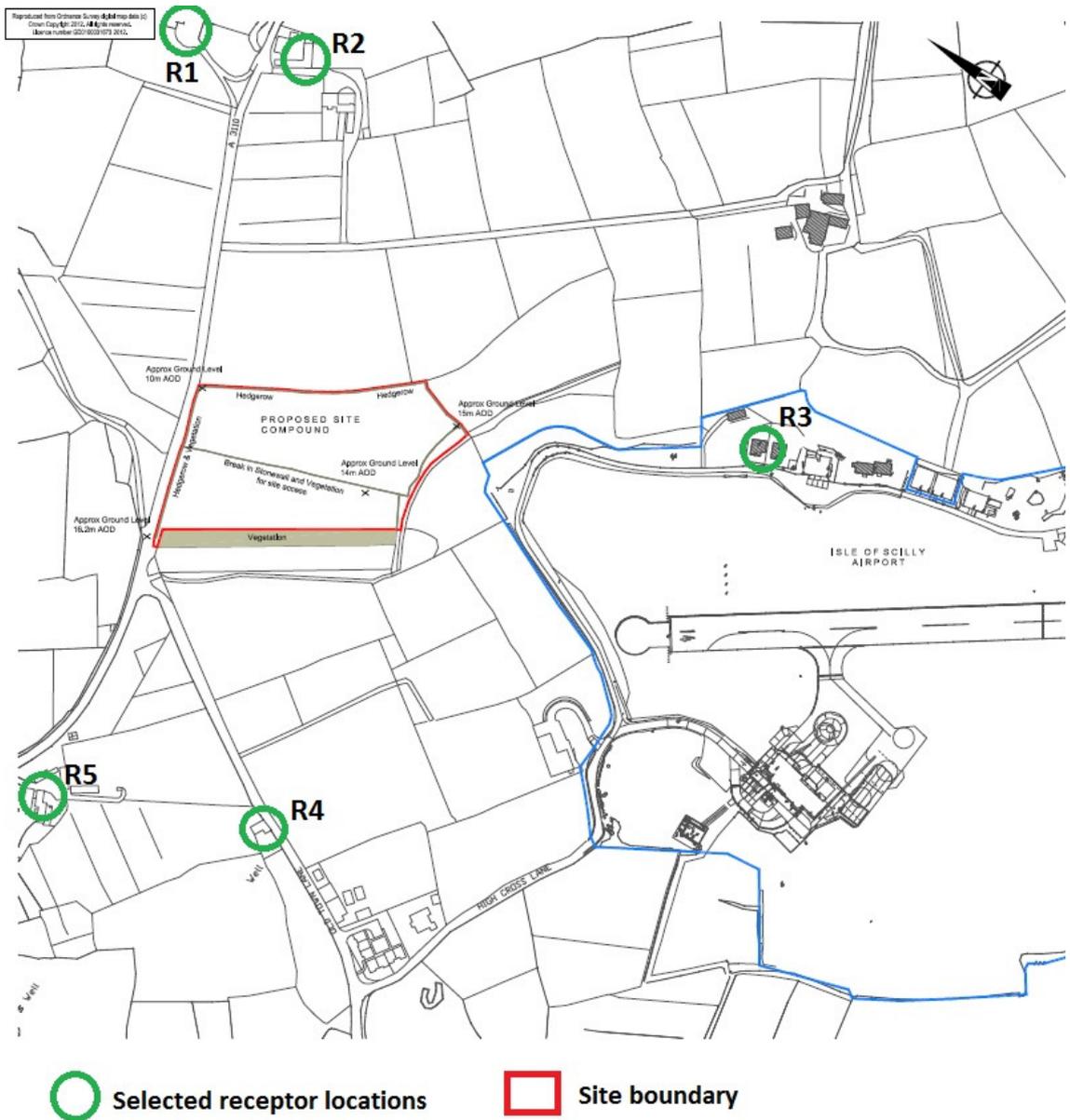


Figure B1: Site Location and Selected Sensitive Receptors

APPENDIX C SITE MOBILISATION DETAILS

Table C1: Construction Plant Details

Activity	Item of plant	Lw dB(A)	% ontime in hour	Source
Site preparation	Chainsaw	114	5	BS 5228 Table D.2 no 14
	Dozer	108	40	BS 5228 Table C.2 ave no.s 10-13
	Dumper	111	40	BS 5228 Table C.2 ave no.s 30-31
	Excavator	102	40	BS 5228 Table C.2 average no.s 14-25
	Loading lorries	106	50	BS 5228 Table C.2 ave no.s 26-28
Installation of equipment	Generator	94	83	BS 5228 Table C.4 no. 32
	Welding plant	102	50	BS 5228 Table C.3 no. 31
	Electric drills	107	50	BS 5228 Table D.6 no. 54
	Tractor trailer	108	20	BS 5228 Table D.7 ave no.s 121-122
Car park construction	Excavator	102	75	BS 5228 Table C.2 average no.s 14-25
	Dumper	109	50	BS 5228 Table C.5 no.s 16
	Dump truck tipping fill	107	75	BS 5228 Table C.2 no 30
	Road roller	103	75	BS 5228 Table C.5 average no.s 25-28
Access road construction	Asphalt Plant	108	25	URS measurement
	Asphalt Loading	100	25	URS measurement
	Excavator loading material	102	25	URS measurement
	Generator 200	94	17	BS 5228 Table C.4 no. 32
	Generator 900	94	83	BS 5228 Table C.4 no. 32
	Excavator	102	50	BS 5228 Table C.2 average no.s 14-25
	Tractor	108	50	BS 5228 Table C.4 average no.s 74-75
	Road roller	103	50	BS 5228 Table C.5 average no.s 25-28
Removal of	Generator	94	83	BS 5228 Table C.4 no. 32

Activity	Item of plant	Lw dB(A)	% ontime in hour	Source
equipment	Welding plant	102	50	BS 5228 Table C.3 no. 31
	Electric drills	107	50	BS 5228 Table D.6 no. 54
	Tractor trailers	108	20	BS 5228 Table D.7 ave no.s 121-122
Site restoration	Excavator	102	40	BS 5228 Table C.2 average no.s 14-25
	dump truck	111	40	BS 5228 Table C.2 ave no.s 30-31
	Loading lorries	106	50	BS 5228 Table C.2 ave no.s 26-28