URS

Shoreham Planning Noise Assessment

Renewable Energy Facility

Final

06 July 2012

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Prepared for:

Edgeley Green Power Limited

UNITED KINGDOM & IRELAND

REVISION SCHEDULE					
Rev	Date	Details	Prepared by	Reviewed by	Approved by
	06 July 2012	Final	Iain Jarvie Consultant, Noise & Vibration	Anne Elliott Principal Consultant, Noise & Vibration	Paul Shields Director, Noise & Vibration

URS
St George's House
5 St George's Road
Wimbledon
London
SW19 4DR

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1 INTRODUCTION

URS Infrastructure & Environment UK Limited (URS) was commissioned by Edgeley Green Power Ltd (the 'Client') to undertake a noise assessment for the proposed development of a renewable electricity power generating facility at Fishersgate Terminal, Shoreham.

This report assesses the noise and vibration impacts of the new power station during the construction and operational phases of the Development, and in particular considers the potential impacts on identified receptors in terms of the following activities:

- temporary noise and vibration from construction / demolition activities;
- noise and vibration from operational plant associated with the Development; and
- noise and vibration from any increases to road traffic attributed to the Development.

2 PROJECT DESCRIPTION

2.1 Background Information

The potential power station development will be located at the Fishersgate Terminal at Shoreham Port, and will be sited adjacent to the existing Scottish Power gas power station. The new power station will largely consume inedible oils and vegetable oils deemed unfit for human consumption which will be delivered direct to the port by sea.

The power plant is expected to consist of four power generating engines and will have a combined power output of up 32 MW. The power plant will be designed to operate 24 hours a day, seven days a week. Staffing levels are expected to exceed no more than 20 personnel during normal operations.

Vessels will unload the inedible oils and vegetable oils deemed unfit for human consumption from the quayside at Shoreham, so minimising any movements by road. These vessels will be unloaded via ship-based offloading pumps.

3 REPORT TERMINOLOGY

For the purposes of this report, the following terminology and abbreviations will be used:

dB(A) – The unit of noise measurement that expresses the loudness in terms of decibels (dB) based on a weighting factor for human's sensitivity to sound (A). Where decibel (dB(A)) levels are followed by a given noise duration (e.g., L_{Aeq}), then the annotation will read as dB L_{Aeq};

- L_{A1}, L_{A10}, L_{A50}, or L_{A90} – the noise level exceeded for 1, 10, 50, or 90% of the measured time, respectively;
- L_{Aeq} – The equivalent continuous sound level over a given period of time (t);
- L_{Amax} – The instantaneous maximum sound level over a given period of time; and
- L_{Amin} – The minimum sound level over a given period of time.
- All noise levels are quoted as dB re 20 µPa.

These parameters are explained in more detail in the Appendix A.

4 PLANNING POLICY AND STANDARDS

4.1 National Planning Policy

4.1.1 *National Planning Policy Framework (NPPF)*

The National Planning Policy Framework (Ref. 1) was introduced by the Department of Communities and Local Government in March 2012. The document sets out the Government's planning policies for England and how these are expected to be applied.

The Framework provides for the production of distinctive local and neighbourhood plans by Councils, 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 development plan (which includes any Local plan or neighbourhood plans which have been adopted for the area), unless material considerations indicate otherwise. The National Planning Policy Framework 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 reflect and where appropriate promote relevant EU obligations and statutory requirements.

4.2 Local Planning Policy

4.2.1 *Structure Plan 2001 - 2016*

The Structure Plan 2001 – 2016 (Ref. 2) was adopted on 25th October 2004 and sets out the strategic planning framework and guidance on how West Sussex will grow and develop over the years up to 2016 and beyond. There are no specific policies relating to the effects of noise from new industrial development.

4.2.2 *Adur Local Development Framework*

A Local Development Framework (LDF) (Ref. 3) is being prepared for the district to ensure the right amount of development takes place in the right locations up to 2026. As part of the LDF, a Core Strategy and Area Action Plan for Shoreham Harbour (the latter being prepared jointly with Brighton & Hove City Council and West Sussex County Council) is also being prepared.

4.3 Adur District Council Noise Policy

Adur District Council's noise management policy was first adopted in February 1997, and was reviewed and updated in April 2008 (Ref. 4). This document sets out the Council's policy on management of environmental noise from industrial, commercial and domestic sources. Part of the aim of the document, in relation to this particular development, is to:

- consider the requirements of the relevant legislation;
- review the Council's existing practice and policies in relation to dealing with noise; and
- review the needs of the residents of the Adur District in relation to noise control.

As part of the Council's Strategy Statement, Adur District Council will:

- Ensure that its Noise Management Policy is published in a comprehensive Noise Guide and made available to the public.
- Keep under review all corporate objectives, targets and policies and noise management practices, so that exposure to environmental noise is minimised, so far as is reasonably practicable.
- Seek to ensure that as far as possible, exposure to noise pollution is minimised through appropriate use of land, noise buffering through sympathetic design, and separation of conflicting land uses.

4.4 Standards and Guidance Documents

The following technical standards are commonly used in noise and vibration assessments for developments of this type:

British Standard 8233 (1999): 'Sound Insulation and Noise Reduction for Buildings – Code of Practice' (Ref. 5) provides criteria for the assessment of internal noise for various uses including dwellings and commercial properties.

British Standard 6472 (2008): 'Guide to Evaluation of Human Exposure to Vibration in Buildings' (Ref. 6) presents recommended frequency weighted vibration spectra (for continuous vibration) and vibration dose values (VDV) (for intermittent vibration) above which adverse comment is likely to occur in residential properties.

British Standard 7385 (1991): 'Evaluation and Measurement for Vibration in Buildings' (Ref. 7) presents guide values or limits for transient vibration, above which there is a likelihood of cosmetic damage.

British Standard 4142 (1997): (Ref. 8) 'Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas' can be used for assessing the impact of industrial noise sources such as stacks and vents. The method compares the difference between the 'rating level' of the new noise with the 'background level' at a receptor position.

British Standard BS5228 (2009): 'Noise and Vibration Control on Construction and Open Sites' (Ref. 9). This standard provides an industry accepted guide for noise and vibration control and includes sound power level (Lw) data (based on DEFRA tables) for individual plant as well as a calculation method for noise and vibration from construction activities. The standard provides further guidance on the acceptable levels of construction noise and provides example criteria for the assessment of significance for construction noise impacts.

International Standard Organisation 9613 (1996): 'Attenuation of Sound During Outdoor Propagation' (Ref. 10) specifies methods for calculating the attenuation of sound during propagation outdoors.

Control of Pollution Act 1974 (CoPA): Requires that 'Best Practicable Means' (Ref. 11) (as defined in Section 72 of the CoPA) are adopted to control construction noise on any given site. The CoPA makes reference to BS5228 as best practicable means.

Environmental Advisory Leaflet 72 (AL72) (Ref. 12): Currently there are no notional standards or guidelines (except those mentioned in the latest version of BS5228) that provides noise

limits for construction sites. AL72 'Noise Control on Building Sites' provides some guidance on acceptable construction noise levels. Although now out of print, AL72 is used by local authorities to provide guidance on limits.

Calculation of Road Traffic Noise (CRTN) (Ref. 13): The Department of Transport/Welsh Office memorandum 'Calculation of Road Traffic Noise (CRTN) 1988 describes the procedures for traffic noise calculation, and is suitable for environmental assessment schemes where road traffic may have an impact.

Design Manual for Road and Bridges: The Highways Agency 'Design Manual for Road and Bridges Volume 11 Section 3 Part 7-Traffic Noise and Vibration' (DMRB) (Ref. 14) provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration impacts arising from all road projects, including new construction, improvements and maintenance.

5 EXISTING NOISE AND VIBRATION ENVIRONMENT

The proposed development will be located within the boundaries of Shoreham Harbour. The land identified for the development is located between an existing power station, operated by Scottish Power, and Parker Steel, a steel girder distributor. The area to the north of the proposed site, separated by the harbour canal, is largely residential, with an element of commercial/retail activity. The A259 runs directly along the north of the canal.

The harbour itself consists of a mixture of commercial port activity, including operational wharfs, an operational power station, water treatment plant, steel distributor, aggregates plant and storage facilities.

Other residential properties are located further west beyond Shoreham Fort. Southwick Beach lies to the south of the site with other public amenity areas much further to the east.

6 NOISE SENSITIVE RECEPTORS

The proposed development has the potential to impact on nearby noise sensitive receptors. As described in Section 5, a mixture of residential, retail, commercial and industrial property lies close to the site. Receptors more sensitive to noise from the proposed development will include residential (both day and night-time), offices (daytime) and public amenity areas (day). Based on this, the following receptors have been considered for this assessment:

- R1 – Seaview Estate, Albion Street, Southwick approximately 180m north;
- R2 – West Road, Fishersgate approximately 500m north east;
- R3 – Blue Lagoon Public House, Hove approximately 1950m east;
- R4 – Shoreham Beach Residential Area approximately 1600 m west.

7 BASELINE INFORMATION

7.1 Baseline Surveys

A noise survey has been carried out in the vicinity of the proposed development, at nearby noise sensitive receptors and at the site itself. The locations are presented in Appendix D.

The results of the survey are summarised in Table 1. More detailed results, including survey methodology, instrumentation and weather conditions are presented in Appendix B.

TABLE 1: SENSITIVE RECEPTOR NOISE SURVEY RESULTS SUMMARY, DAYTIME		
Location	**Noise Levels, dB**	
	L_{Aeq}	L_{A90}
R1 – Seaview Estate, Albion Street	68.5 – 69.5	46.8 – 48.8
R2 –West Road, Fishersgate	59.5	45.8
R3 – Blue Lagoon Public House, Hove	55.5	46.8
R4 – Shoreham Beach Residential Area	57.2 – 58.8	48.1 – 50.8

Road traffic noise largely dominated the noise environment at the above locations during the day. Occasional activity from Shoreham Harbour was also audible.

TABLE 2: SENSITIVE RECEPTOR NOISE SURVEY RESULTS SUMMARY, NIGHT TIME		
Location	**Noise Levels, dB**	
	L_{Aeq}	L_{A90}
R1 – Seaview Estate, Albion Street	45.9 – 58.9	43.9 – 45.3
R2 –West Road, Fishersgate	44.1 – 55.5	37.0 – 40.8
R3 – Blue Lagoon Public House, Hove	48.2 – 49.0	39.2 – 41.7
R4 – Shoreham Beach Residential Area	42.4 – 43.4	39.6 – 41.8

The early part of the night was dominated by road traffic, however, later in the night as road traffic reduced significantly, noise from the existing power station at the port was audible, particularly at Locations R1 and R2.

TABLE 3: SITE BOUNDARY NOISE SURVEY RESULTS SUMMARY, DAYTIME		
Location	**Noise Levels, dB**	
	L_{Aeq}	L_{A90}
North Boundary – Daytime	57.1 – 59.6	53.4 – 55.0
North Boundary – Night-time	52.7 – 54.0	52.1 – 52.4
South Boundary – Daytime	57.6 – 60.0	51.3 – 54.7
South Boundary – Night-time	51.3 – 54.3	50.4 – 52.0

During daytime, noise levels at the site are dominated by road traffic noise from the A259 located to the north side of the harbour canal, and general port activity. Noise from the existing power station was just audible. During the night, noise from the existing power station

dominates the noise environment. Shipping and fishing boats regularly using the harbour were also audible.

8 POTENTIAL NOISE IMPACTS DURING AND AFTER DEVELOPMENT

8.1 Potential Impacts

Due to the nature and planned future use of the development, the main noise impacts associated with the development are considered as follows:

8.1.1 *Construction Noise*

Construction activity will occur during the development stages. This will have an impact on existing occupiers of residential and commercial properties close to the development. The main construction activity will be associated with the construction of the power generation building, tankage and ancillary external plant areas.

8.1.2 *Construction Traffic Noise*

During the construction phase, there will be additional vehicles associated with the delivery of material and plant equipment, and private vehicles associated with construction workers.

8.1.3 *Operational Noise*

The plant proposed for the site will consist of four new powering generating engines and ancillary plant located within a purpose built building. There will an exhaust stack associated with the plant and separate tankage and fuel import areas. The plant and exhaust stack are potential noise sources, either directly or through the building fabric. The plant will need to be designed to ensure noise emissions do not increase the existing background noise environment. In addition, there is potential noise during ship unloading operations.

8.1.4 *Operational Traffic Noise*

Once the development is completed the plant is expected to employ no more than 20 permanent staff.

8.2 Construction Noise Assessment

8.2.1 *Criteria*

The calculation method provided in BS5228 is based on the number and types of equipment operating, their associated sound power levels, and the distance to the receptor together with the effects of any screening. The methodology described in BS5228 has been used to predict construction noise levels at nearby receptors. The full calculations are presented in Technical Appendix C.

The Department of the Environment (DoE) Leaflet AL72: Noise Control on Building Sites from 1976 is out of print, but the leaflet provides some guidance on acceptable levels of construction noise; this is still deemed relevant and is referenced within BS5228. The leaflet states that during the daytime period (defined as 07:00 to 19:00 hours), the noise level outside the nearest occupied room should not exceed the values in Table 4. Noise levels are generally taken as façade L_{Aeq} values.

TABLE 4: RECOMMENDED CONSTRUCTION NOISE LIMITS	
Environs	**Recommended Daytime (07:00 to19:00) Façade Noise Level dB(A)**
Urban areas close to main roads	75
Rural, suburban and urban areas away from main traffic and industrial noise source areas	70

BS5228 (which makes reference to AL72) provides some further guidance on acceptable levels of construction noise and provides example criteria for the assessment of significance of construction noise impacts.

Significance criteria for operational noise have been derived from BS5228 and BS7385. A semantic scale for the construction impacts is presented in Table 5.

TABLE 5: SEMANTIC SCALE FOR DESCRIPTION OF CONSTRUCTION NOISE AND VIBRATION IMPACTS	
Impact Category	**Description**
No Impact	Daytime noise levels less than the ambient L_{Aeq}, or less than or equal to 65 dB L_{Aeq}.
Negligible	Daytime noise levels between 65 and 70 dB L_{Aeq}.
Minor Adverse	Daytime noise levels between 70 and 75 dB L_{Aeq}.
Moderate Adverse	Daytime noise levels greater than 75 dB L_{Aeq} (for a total of less than 10 days in any 15-day period, or for a total of days less than or equal to 40 in any 6-month period).
Major Adverse	Daytime noise levels greater than 75 dB L_{Aeq} (for a total of 10 or more days in any 15-day period, or for a total of days exceeding 40 in any 6-month period).

Significance criteria for construction traffic noise have been derived from Table 3.1 of DMRB and are presented in Table 6.

TABLE 6: TRAFFIC NOISE CHANGE CRITERIA	
Change in Noise Level	**Significance of Effect**
0 dB(A)	No change
0.1 – 0.9 dB(A)	Negligible
1 - 2.9 dB(A)	Minor
3 – 4.9 dB (A)	Moderate
5 dB(A) or more	Major

8.2.2 *Proposed Construction Activity*

The development of the proposed power station will involve significant construction work.

The construction part of the project is expected to take between four and six months to complete. The main noise producing equipment expected to be used or associated with the works will include:

- Excavators;

- Pneumatic plant and associated mobile compressors;
- Mobile generators;
- HGV deliveries and loading;
- Cranes; and
- Powered hand tools.

8.2.3 *Assessment*

A construction noise assessment has been carried out based on the equipment and plant highlighted in Section 8.2.2. Different aspects of construction have been considered taking into account the phasing of the development:

- Site Clearance;
- Piling and Foundation;
- General Construction;
- Fit Out;
- Landscaping

Full details of the calculations have been provided in Appendix C, however a summary of predicted results is presented in this section:

Two scenarios have been use to assess the impacts:

- **Scenario One (worst case):** This scenario assumes construction equipment is located at the site boundary and is on for 100% of the time, all equipment is operating simultaneously and no attenuation due to site hoarding has been assumed.
- **Scenario Two (likely case):** This scenario assumes construction equipment is located at the centre of the site and is on for 50% of the time. A 5 dB(A) reduction due to on-site screening is assumed.

8.2.4 *Scenario One (worst case) Construction Noise Predictions*

The predicted 'worst case' noise levels for each stage of the construction are presented in Table 7.

TABLE 7: CONSTRUCTION NOISE IMPACTS 'SCENARIO ONE'

Noise Sensitive Receptor	Distance (metres)	Site Preparation (dB LAeq)	Piling an Foundation Work (dB LAeq)	Building and General Site Work (dB LAeq)	Fit Out (dB LAeq)
R1	180	71	72	71	67
R2	500	62	63	62	58
R3	1950	50	51	50	47
R4	1600	52	53	52	48

Table 8 presents the predicted 'worst case' range in noise levels during the construction and the resulting impacts.

TABLE 8: CONSTRUCTION NOISE IMPACTS 'SCENARIO ONE'		
Potential Sensitive Receptor	**Range of Noise Levels from Construction Works dB L_{Aeq}**	**Impact Significance (No Mitigation)**
R1	67 - 71	Negligible to Minor Adverse
R2	58 - 63	No Impact
R3	47 - 51	No Impact
R4	48 - 53	No Impact

Under 'Scenario One' the noise impacts are predicted to range between a No Impact to a Minor Adverse impact, however, this is considered to be a worst case scenario and assumes no site screening and equipment operating simultaneously at the edge of the construction area.

8.2.5 *Scenario Two (likely case) Construction Noise Predictions*

The predicted 'likely case' noise levels for each stage of the construction are presented in Table 9.

TABLE 9: CONSTRUCTION NOISE IMPACTS 'SCENARIO TWO'					
Noise Sensitive Receptor	**Distance (metres)**	**Site Preparation (dB LAeq)**	**Piling an Foundation Work (dB LAeq)**	**Building and General Site Work (dB LAeq)**	**Fit Out (dB LAeq)**
R1	180	63	64	63	59
R2	500	54	55	54	50
R3	1950	42	43	42	39
R4	1600	44	45	44	40

A summary of the predicted 'likely' case' range in noise levels during the construction programme is presented in Table 10.

TABLE 10: CONSTRUCTION NOISE IMPACTS 'SCENARIO TWO'		
Potential Sensitive Receptor	**Range of Noise Levels from Construction Works dB L_{Aeq}**	**Impact Significance (No Mitigation)**
R1	59 – 64	No Impact
R2	50 - 55	No Impact
R3	39 - 43	No Impact
R4	40 - 45	No Impact

'Scenario Two' is likely to be more representative of the construction activity expected, particularly if specific noise reduction guideline measures are adhered to on-site (see later section on Mitigations). No noise impacts are predicted for 'Scenario Two'.

8.2.6 *Construction Traffic Noise*

Details are not currently available regarding the amount of construction traffic likely to be associated with the development; however, assumptions have been made in order to assess the likely impact on nearby receptors. The main construction traffic activity is likely to be associated with the delivery of plant and materials, and the removal of site waste.

Construction traffic flows are expected to be very low compared to the observed existing traffic flows within the area. However, an assessment on absolute levels has been undertaken. For indicative purposes URS has calculated the absolute L_{A10} traffic noise values assuming that all of the HGVs pass a particular receptor in a single peak hour.

A scenario consisting of 10 vehicles in a single hour travelling along Albion Street at a theoretical speed of 30 mph with a receptor nominally ten metres from the edge of the roadside has been assumed. Technically this very low rate of traffic flow is below the range normally used in the calculation method advocated in CRTN. Calculations have therefore been based on typical measured L_{Aeq} noise levels of a HGV pass-by which is 76 dBA at 10 metres. Each HGV pass-by would take approximately 30 seconds. The $L_{Aeq, 1hr}$ is therefore calculated to be 65 dB. The measured existing daytime L_{Aeq} noise levels on Albion Street are 69-70 dB. The resultant L_{Aeq} noise levels would therefore be 70 to 71 dB. This represents an increase of 1 dB which corresponds to a minor impact. However, it is considered unlikely that all construction traffic would pass a particular receptor point in a single hour and therefore construction traffic impacts are expected to be negligible.

8.2.7 *Construction Noise Mitigation*

The "worst case" construction noise assessment presented in this report predicts impacts ranging from 'No Impact' to 'Minor Adverse'. However the "likely case" assessment has demonstrated that with basic mitigation, noise impacts at all receptors can be reduced to 'No Impact'. Therefore, in terms of mitigation it is recommended that the good practice standards proposed by BS5228 are considered.

Good standard practices to consider are summarised below:

- Noise and vibration should 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 Part 1: 2008, and EC and UK Noise Legislation, as applicable).
- At all times the best practicable means as defined in the act must be employed to reduce noise.
- The quietest plant or machinery should be used, and all equipment should be maintained in good mechanical order and fitted with appropriate silencers, mufflers or acoustic covers.
- Stationary noise sources should be sited as far away as possible from noise sensitive receptors.
- Acoustic barriers consisting of site materials such as bricks, earth mounds or proprietary types should be constructed when noise cannot be sufficiently reduced by careful siting of noise sources.
- Site hoarding will be used around the boundary of the site.
- All workers on the site including sub-contractors, self employed staff and employees must be made aware of the need to keep noise and disruption to a minimum from building works, equipment, plant and machinery, radios, music, vehicles or any other sources.
- The movement of vehicles to and from the site must be controlled to minimise noise and disturbance to nearby residents, office workers, library users and people using the public open spaces close to the site.

Construction activity will occur during the following times, subject to agreement with Adur District Council:

- Monday - Friday: 07:30 – 18:00.
- Saturday: 08:30 – 14:00.
- Sunday / Bank Holidays: No work.
- Noise will need to be kept to a minimum during the first hour of work.
- The appointed contractor will be a member of the 'Considerate Contractors Scheme'.

The above points will be agreed in consultation with Adur District Council as part of a construction environmental management plan (CEMP).

8.3 Operational Noise Assessment

8.3.1 *Operational Noise Criteria*

BS4142 can be used to assess the likelihood of residential complaints from industrial noise. The likelihood of complaints is based on the difference between the rating level (which is the specific noise level from the plant, plus, if applicable, a correction of +5 dB(A) for tonal or impulsive character) and the background (L_{A90}) level.

The likelihood of complaints is determined according to BS4142 from Table 11.

TABLE 11: BS4142 ASSESSMENT TABLE	
Rating Level minus Background Level	**Assessment**
Rating noise is 10 dB(A) or more below background level	Complaints unlikely
Rating noise is 5 dB(A) above background noise	Marginal significance
Rating noise is 10 dB(A) or more above the background level	Complaints likely

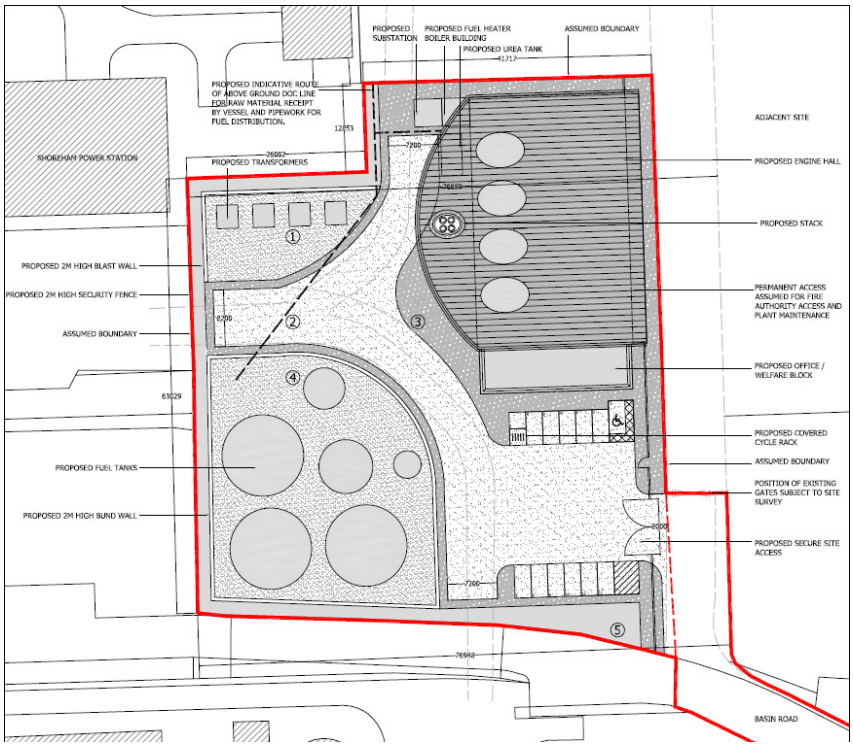
Significance criteria for operational noise have been derived from BS4142. A semantic scale for description of the operational noise impacts is presented in Table 12.

TABLE 12: SEMANTIC SCALE FOR OPERATIONAL NOISE IMPACTS	
Rating Level minus Background Level	**Impact**
Rating Level is 10 dB(A) or more below background level	Negligible
Rating Level is between -10dB(A) and 5dB(A) above background	Minor Adverse
Rating Level is between 5dB(A) and 10dB(A) above background	Moderate Adverse
Rating Level is more than 10 dB(A) above the background level	Major Adverse

8.3.2 *Noise Sources*

The plant proposed for the site will consist of four power generating engines, transformers, boiler and cooling units. Figure 2 presents the proposed site layout.

Figure 2: Proposed Site Layout



The power generating engines will be located within the engine hall. The building will be designed and constructed to control noise break out to acceptable levels. Air intakes and discharges will be fully ducted and provided with silencers. The power generating engines will be fitted with silencers.

The items of plant to be located on the site with the greatest potential to generate high noise levels are the 8No. cooling units which would be located at roof level. The cooling units will be visually screened behind louvres and beneath a standing seam roof. There are however, ventilation slots around the perimeter of the building at roof level and large circular ventilation openings in the roof. There will also be an exhaust stack serving the 4No. power generating engines.

There is no specific plant noise data available at this time and therefore an assessment has been undertaken to consider the viability of the scheme based on typical noise levels from other similar installations. For the purposes of the assessment it the following are assumed:

- each cooling unit has a sound power level of 90 dB(A),
- the stack outlet noise level is 85 dB(A) at 1m,
- the plant will operate continuously over 24 hours, and
- the plant does not exhibit any tonal characteristics.

8.3.3 *Cooling Unit and Stack Assessment*

An assessment has been carried out in accordance with the methodology described in BS4142. The potential noise impacts are presented in Table 13. The assessment is based on night-time background noise levels (night-time being the worst case).

TABLE 13: PREDICTED OPERATIONAL NOISE LEVELS AND BS4142 ANALYSIS

Receptor	Predicted Rating Noise Level (dB L_{Aeq})	Background Level (dB L_{A90})	Difference to Background (dB)	BS4142 Assessment Rating	Impact Significance
R1	47	44	3	Marginal significance	Minor Adverse
R2	38	37	1	Marginal significance	Minor Adverse
R3	26	39	-13	Complaints unlikely	Negligible
R4	28	40	-12	Complaints unlikely	Negligible

The results presented in Table 13 show a Minor Adverse impact at receptors R1 and R2 and a Negligible impact at receptors R3 and R4.

The night-time LAeq noise levels at the marina is predicted to be 41dB(A). As the dominant noise sources at both the marina and R1 are similar (the A259 and the existing PowerStation) the Marina is anticipated to have similar to background noise levels to those measured at R1. Using the background noise levels measured at R1 to assess the marina, it is predicted that the impact significance at the marina will be Minor Adverse.

8.3.4 *Operational Noise Mitigation*

Although the impacts at receptors R1 and R2 are predicted to be Minor Adverse it should be noted that the noise levels due operation of the facility are only 3 dB above background at R1 and 1dB above the background at R2. The noise from the proposed development is therefore not likely to result in a noticeable change to the existing noise environment. In many cases this is considered acceptable by Local Planning Authorities.

It should also be noted that the above assessment is based on the minimum night time background noise level. For the majority of the daytime when background noise levels are higher, noise due to operation of the facility will be below the background at all noise sensitive receptors.

Should Adur District Council require that the noise levels at R1 and R2 are reduced to negligible impact is would be possible to install a silencer within the stack. For the cooling plant, units with a lower sound power level than used in the assessment could be selected. It may also be possible to employ acoustic louvres in lieu of weather louvres, or to provide a full acoustic screen to the north facing roof elevation. Furthermore, silencers could be installed above the fans serving the cooling units. These mitigation measures could result in overall noise reductions of 10dB(A) or more.

8.3.5 *Operational Traffic Noise*

In terms of road traffic movements, the completed development is not expected to lead to any significant traffic changes on roads around the Proposed Development. The development once completed is expected to employ up to 20 personnel, therefore the typical maximum number of car movements is expected to be no more than 40 during the day. In addition, there will be the occasional maintenance vehicle entering and leaving the site.

Fuel deliveries will be by sea, therefore HGV movements will be minimal. At worst, there will be two HGV deliveries of urea per month. Therefore, based on the likely traffic movements associated with this development, road traffic is expected to have a Negligible impact.

8.3.6 *Operational Noise due to Bio-liquid Deliveries*

The bio-liquids will be delivered by ship. The unloading of bio-liquid will be undertaken using pumps within the vessels bringing the bio-liquid to the site. These pumps are deep within the vessels and will not be a significant source of noise. Also the unloading will only take place once or twice a month, each time lasting around 24 hours. Based on this information the noise impact from deliver and unloading of bio-liquid is considered not significant.

8.3.7 *Operational Vibration*

The plant associated with the development does not give rise to high levels of vibration. Anti-vibration mounts will be fitted to the engines. Given the relatively large distances between the development and the receptors and the mitigation measures proposed it is considered that vibration from the plant will not be perceptible.

9 RESIDUAL IMPACTS

9.1 Construction Impacts

9.1.1 *Construction Noise*

Given basic mitigation, construction noise impacts at all receptors are predicted to have a Negligible impact.

9.1.2 *Construction Traffic Noise*

The worst case construction L_{Aeq} noise level along Albion Street has been calculated to be 65 dB. The daytime measured L_{Aeq} values were found to range between 69 and 70 dB. The resultant L_{Aeq} noise levels would therefore be 70 to 71.5dB. This represents an increase of 1 dB which corresponds to a negligible to minor impact. However, it is considered unlikely that all construction traffic would pass a particular receptor point in a single hour and therefore construction traffic impacts are expected to be Negligible.

9.2 Operational Impacts

9.2.1 *Operational Traffic Noise*

Due to the very low number of staff working at the site, the operational traffic is expected to a have a Negligible impact.

9.2.2 *Operational Noise*

Noise due to the plant items with the potentially highest noise levels is predicted to have a Minor Adverse impact at receptors R1 and R2. At receptors R3 and R4, the predicted impact is Negligible. Following the application of mitigation, operational noise impacts are expected to be Negligible.

9.2.3 *Operational Noise due to Bio-liquid Deliveries*

Due to the methodology employed for unloading bio-liquid and the infrequent occurrence, the noise impact is expected to be Negligible

9.2.4 *Operational Vibration*

All plant at the site will be fitted with suitable vibration isolators. Given the relatively large distance to the nearest receptors and the mitigation employed, operation vibration is expected to be negligible.

9.3 Summary of Residual Impacts

A summary of the residual effects is provided in Table 17.

TABLE 14: RESIDUAL EFFECTS

Description	Duration of Impact	Significance
Construction Noise	Short-Term	Negligible
Construction Traffic Noise	Short-Term	Negligible

TABLE 14: RESIDUAL EFFECTS		
Operational Traffic	Permanent	Negligible
Operational Noise	Permanent	Minor Adverse/Negligible
Operational Vibration	Permanent	Negligible

10 CUMULATIVE SCHEMES

10.1 Parker Steel

In addition to the Proposed Development, other schemes, if close enough, to the Proposed Development can contribute to the overall noise and vibration environment (cumulative impact). Currently, there is one scheme under construction, and that is the expansion of the Parker's Steel site which lies directly east of the proposed bio-liquid power station. An environmental impact assessment was carried out for the steel finishing plant development in 2008 and covered construction, road traffic and operational noise.

For construction noise, a moderate adverse impact was predicted for properties in Albion Street for the Parker Steel development. A moderate adverse impact was also predicted for the same road for the proposed development (Shoreham power station) under a worst case scenario. However, with mitigations a negligible impact has been predicted for the proposed development. Therefore, if both developments were to occur at the same time, the likely noise impact will be no more than Moderate Adverse.

A road traffic assessment has been carried out for the Parker's Steel development. The assessment indicated that noise levels due to traffic associated with this development would have no more than a 0.4 dB increase on future traffic levels (along Basin Road, South). For other roads in the area, including Old Shoreham Road and Kingsway, the change in noise level was no more than 0.1 dB. These figures were based on traffic changes of between 18 and 108 vehicles based on baseline flows without the development. The proposed development is expected to see no more than an additional 40 associated vehicle movements per day. At worst, in combination with the Parker's Steel development would lead to a change in noise level of no more than 0.5 dB, which would be imperceptible.

11 CONCLUSION

URS have undertaken a noise assessment for the proposed development of a renewable electricity power generating facility at Fishersgate Terminal, Shoreham.

The assessment has considered noise due to the construction and operation of the facility. Provided basic mitigation measures are introduced noise and vibration impacts are expected to be Negligible.

12 REFERENCES

Ref. 1 National Planning Policy Framework (NPPF)

Ref. 2 The West Sussex County Structure Plan 2001

Ref. 3 Adur Local Development Framework

Ref. 4 Adur District Council Noise Policy

Ref. 5 British Standards Institute (BSi), (1999); BS 8233 – Code of Practice for Sound Insulation and Noise Reduction for Buildings. BSi, London.

Ref. 6 BS 6472-1 – Guide to evaluation of human exposure to vibration in buildings Part 1: Vibration sources other than blasting. BSi, London. British Standards Institution (1993):

Ref. 7 BS 7385 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration.

Ref. 8 British Standards Institution (1997): BS 4142 Method for rating industrial noise affecting mixed residential and industrial areas. British Standards Institution. British Standards Institute (BSi), (2008);

Ref. 9 British Standards Institution (2009): BS5228 Noise and vibration control on construction and open sites.

Ref. 10 International Standards Institute (ISO), (1996): 'ISO9613 Attenuation of Sound During Outdoor Propagation' International Organization for Standardization, Switzerland

Ref. 11 The UK Government (1974): The Control of Pollution Act. Her Majesty's Stationery Office (HMSO).Environmental Advisory Leaflet 72

Ref. 12 Department of Environment Circular Advisory Leaflet 72, 'Noise Control of Building Sites'.

Ref. 13 Department of Transport/Welsh Office Memorandum 'Calculation of Road Traffic Noise (CRTN)' (1998).World Health Organisation

Ref. 14 Design Manual for Road and Bridges Volume 11 Section 3 Part 7-Traffic Noise and Vibration (Highways Agency August 1994).

APPENDIX A – ACOUSTIC TERMINOLOGY

When listening to noise which occurs out in the open, for instance, from road traffic, aircraft, birds, wind in the trees etc., it is common experience that the noise is not constant in loudness, but is changing in amplitude all of the time. Therefore, in order to numerically describe the noise levels it is necessary to use statistical parameters. It has become standard practice to use indices which describe the noise level which has been exceeded for a certain percentage of the measurement period, and also an index which gives a form of average of the sound energy over a particular time interval. The former, termed percentile noise levels, are noted L_{A90}, L_{A10} etc., and the latter is termed the equivalent continuous noise level and are notated by L_{Aeq}. It is worth noting that if the noise level does not vary with time, then all parameters, in theory, normalise to a single value.

All the parameters refer to the noise level measured as an A-weighted sound pressure level. The term A-weighting implies a measurement made using a filter with a standardised frequency response which approximates the frequency response of the human ear at relatively low levels of noise. The resulting level, expressed in A-weighted decibels or dB(A), is widely used in noise standards, regulations and criteria throughout the world.

With regards to percentile levels, the L_{A90} value, is the A-weighted sound pressure level which is exceeded for 90% of the measurement time. It is generally used to measure the background noise in the environment and is recognised in such standards as BS4142. The L_{A10} is the A-weighted sound pressure level which is exceeded for 10% of the measurement time.

The L_{Aeq}, the equivalent continuous noise level, is an energy average value of the actual time-varying A-weighted sound pressure level. It is used in the UK as a measure of the noise level of a specific industrial noise when assessing the level of the specific noise against the background noise. It also used as a measure of the general ambient noise environment for noise assessments carried out in accordance to the requirements of certain standards and guidance such as Building Bulletin 93 (BB93) and Planning and Policy Guidance Note 24 (PPG24).

APPENDIX B - BASELINE NOISE AND SURVEY RESULTS

Survey Date

The noise survey was carried out during the day on the 28th April 2010, and during the night on the 28/29th April 2010. Measurements during the day were carried out between the period of 10:00 and 15:30. Night-time measurements were carried out between 23:00 and 03:00 .

The measurements were undertaken by Mark Rogers (MIOA), Lead Acoustics Engineer, URS Corporation.

Survey Weather Conditions

During the survey period, the weather was dry, with a light south-westerly wind. These conditions largely remained the same through both the day and night surveys.

Instrumentation and Calibration

The following instrumentation was used for the survey:

- RION NL-32 Integrating Sound Level Meter, Class1;
- RION NC-74 Calibrator.

The microphone on the meter was fitted with a windshield at all times during the measurements. The equipment was calibrated prior to and after the measurements. No significant drift in calibration signals was noted.

Survey Methodology

Short-term attended noise monitoring was carried out at a number of locations within the vicinity of the proposed power station development at Shoreham Harbour. Measurements were taken on the proposed site at positions representative of the northern and southern boundaries of the site. In addition, measurements were taken at nearby noise sensitive receptors.

Daytime measurements were of 15-minute duration, whilst night-time measurements were of 5-minute duration. Locations were visited on a sequential basis during both the day and night in order to get a representative number of samples.

Various noise parameters were recorded including the L_{Aeq}, L_{A90},and L_{A10} values. The noise meter was set to 'fast' response. The microphone height was 1.2 to 1.5 metres above ground. Except for the ground, the measurements were all taken away from any reflective surfaces, i.e. in a free-field environment.

A note was made of all external noise sources that could potentially effect the development.

The survey results are considered representative of the environmental noise environment in the vicinity of the proposed development under dry weather conditions with a light prevailing wind.

The following table's presents the results of the daytime and night-time noise monitoring carried out by URS during April 2010.

TABLE 15: NORTH BOUNDARY OF PROPOSED SITE				
Time	**L_{Aeq}**	**L_{A10}**	**L_{A90}**	**Description of Noise Source**
11:45	57.1	59.2	53.4	Distant traffic, port activity, power station
14:20	59.6	61.5	55.0	Distant traffic, port activity, power station
23:30	53.5	55.0	52.3	Power station, some distant traffic, boats moving in harbour
23:35	52.7	53.4	52.1	Power station, some distant traffic
23:55	52.8	53.6	52.1	Power station, some distant traffic
00:00	54.0	56.1	52.4	Power station, some distant traffic, boats moving in harbour

TABLE 16: SOUTH BOUNDARY OF PROPOSED SITE				
Time	**L_{Aeq}**	**L_{A10}**	**L_{A90}**	**Description of Noise Source**
12:05	60	60.1	51.3	Distant traffic, port activity, power station
14:35	57.6	59.1	54.7	Distant traffic, port activity, power station, helicopter
23:40	51.5	52.5	50.6	Power station, some distant traffic
23:45	51.3	52	50.5	Power station, some distant traffic
23:50	51.6	52.8	50.4	Power station, some distant traffic
00:05	52.7	53.3	52	Power station, some distant traffic, boats moving in harbour
00:10	54.3	56.7	51.8	Power station, some distant traffic, boats moving in harbour

TABLE 17: RECEPTOR R1, ALBION STREET, DIRECTLY OPPOSITE SITE				
Time	**L_{Aeq}**	**L_{A10}**	**L_{A90}**	**Description of Noise Source**
10:30	69.5	73.2	46.8	Road traffic along Albion Street, port activity
13:15	68.5	70.2	48.8	Road traffic along Albion Street, port activity
15:10	69.2	72.9	48.5	Road traffic along Albion Street, port activity
01:05	58.9	60.8	45.3	Occasional traffic in Albion Street, power station audible
01:10	56.5	58.8	44.3	Occasional traffic in Albion Street, power station audible
01:50	45.9	46.7	43.9	Power station audible

TABLE 18: RECEPTOR R3, BLUE LAGOON PUBLIC HOUSE, SHOREHAM PORT				
Time	**L_{Aeq}**	**L_{A10}**	**L_{A90}**	**Description of Noise Source**
12:35	59.5	62.1	45.8	Traffic along Albion Street, port activity audible
00:50	50.7	54.2	38.5	Occasional traffic in Albion Street, port activity just audible
00:55	55.5	57.4	40.8	Occasional traffic in Albion Street, port activity just audible
02:15	44.1	45.5	37	Port activity, distant power station noise
02:20	46.7	47.9	38.1	Port activity, distant power station noise

TABLE 19: RECEPTOR R4, SHOREHAM FORT				
Time	**L_{Aeq}**	**L_{A10}**	**L_{A90}**	**Description of Noise Source**
10:00	58.6	59.4	48.1	Distant traffic, activity from scrap yard, port activity
13:30	57.2	57.8	50.8	Distant traffic, activity from scrap yard, port activity
15:40	58.8	59.6	48.5	Distant traffic, activity from scrap yard, port activity
01:20	42.6	44.2	39.6	Distant traffic, some port activity
01:30	43.4	44.8	41.8	Distant traffic, some port activity
01:35	42.4	44.5	40.4	Distant traffic, some port activity

APPENDIX C – CONSTRUCTION NOISE CALCULATIONS

The details of the Scenario two construction noise calculations are presented below in Tables 23 to 26.

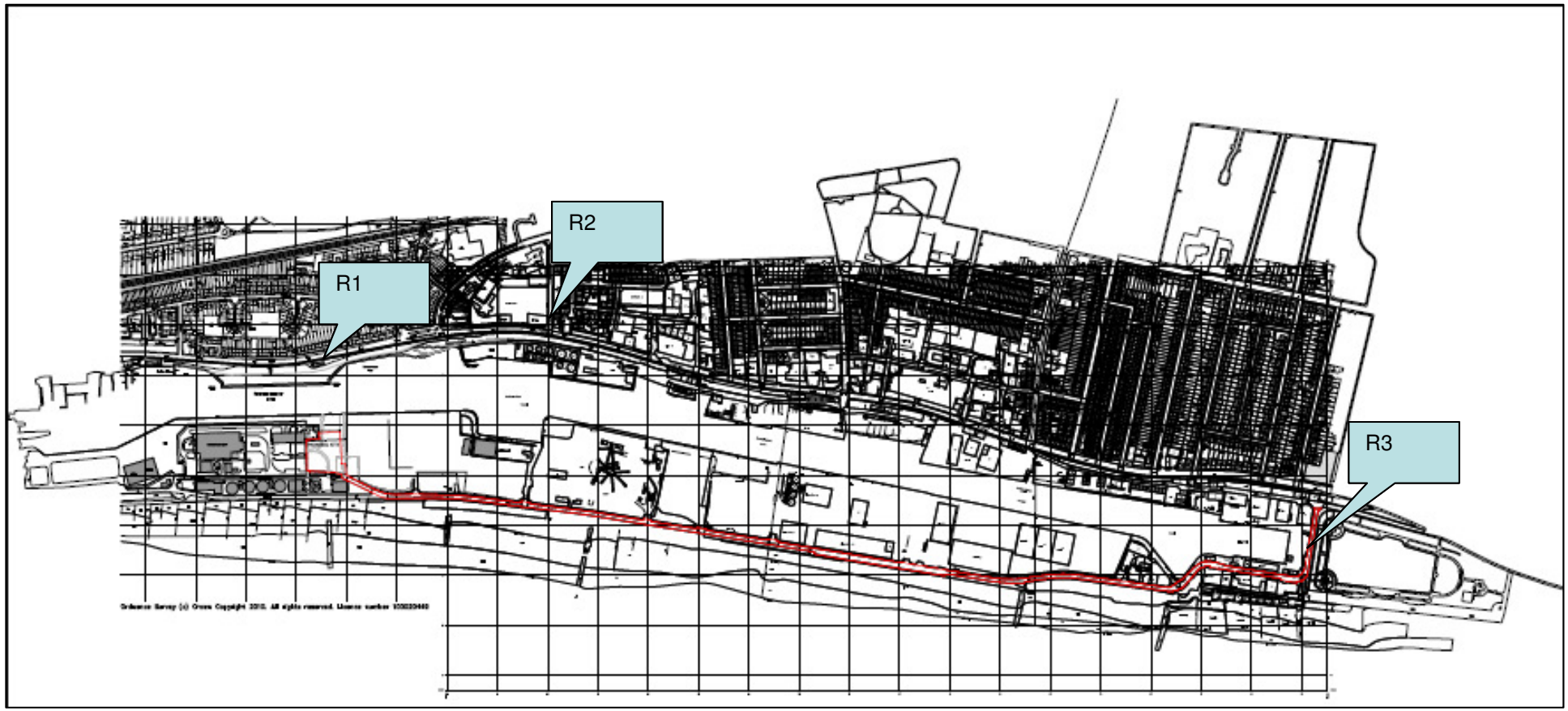
TABLE 20: R1 - SEAVIEW ESTATE, A259				
Construction stage	**Demolition**	**Piling and Foundation Works**	**Building and General Site Activity**	**Fit Out**
Source L_{pA} at 10m (dB)	93	94	93	89
Distance Correction (dB)	-25	-25	-25	-25
Screening Correction (dB)	-5	-5	-5	-5
Façade Correction (dB)	3	3	3	3
On Time % Correction (dB)	-3	-3	-3	-3
Noise level dB(A)	**63**	**64**	**63**	**59**

TABLE 21: R2 - WEST ROAD				
Construction stage	**Demolition**	**Piling and Foundation Works**	**Building and General Site Activity**	**Fit Out**
Source L_{pA} at 10m (dB)	93	94	93	89
Distance Correction (dB)	-34	-34	-34	-34
Screening Correction (dB)	-5	-5	-5	-5
Façade Correction (dB)	3	3	3	3
On Time % Correction (dB)	-3	-3	-3	-3
Noise level dB(A)	**54**	**55**	**54**	**50**

TABLE 22: R3 - BLUE LAGOON PUBLIC HOUSE				
Construction stage	**Demolition**	**Piling and Foundation Works**	**Building and General Site Activity**	**Fit Out**
Source L_{pA} at 10m (dB)	93	94	93	89
Distance Correction (dB)	-46	-46	-46	-46
Screening Correction (dB)	-5	-5	-5	-5
Façade Correction (dB)	3	3	3	3
On Time % Correction (dB)	-3	-3	-3	-3
Noise level dB(A)	**42**	**43**	**42**	**39**

TABLE 23: R4 - SHOREHAM BEACH RESIDENTIAL AREA				
Construction stage	**Demolition**	**Piling and Foundation Works**	**Building and General Site Activity**	**Fit Out**
Source L_{pA} at 10m (dB)	93	94	93	89
Distance Correction (dB)	-44	-44	-44	-44
Screening Correction (dB)	-5	-5	-5	-5
Façade Correction (dB)	3	3	3	3
On Time % Correction (dB)	-3	-3	-3	-3
Noise level dB(A)	**44**	**45**	**44**	**40**

APPENDIX C – NOISE SENSITIVE RECEPTORS



Note: R4 is located 1600m west of the new power station.