



**BACTON STORAGE COMPANY LTD (BSCL) & ENI  
HEWETT LIMITED**

**NOISE ASSESSMENT**

**PROPOSED VEHICLE CHECKING AND  
CONSTRUCTION LAYDOWN AREA ASSOCIATED  
WITH DEVELOPMENTS AT THE BACTON TERMINAL  
COMPLEX, LAND SOUTH OF THE B1159 PASTON  
ROAD AND EAST OF THE NATIONAL GRID GAS  
TERMINAL, BACTON, NORFOLK**

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# 1 INTRODUCTION

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- 1.1 This Noise Assessment has been prepared by RPS Planning & Development Ltd for Bacton Storage Company Ltd (BSCL) (a joint venture company formed by Centrica Storage and Perenco UK) and Eni Hewett Limited (Eni). Both companies have planning permission to develop natural gas storage projects at Bacton utilising, respectively, the offshore Baird and Deborah fields in the southern North Sea.
- 1.2 The Noise Assessment supports a full planning application that has been submitted jointly by BSCL and Eni to North Norfolk District Council (the local planning authority) for a temporary vehicle checking and construction laydown site (the development) on the western half of the large arable field south of the main Bacton Terminal Complex (BTC), across the B1159 Paston Road and immediately to the east of the National Grid and Interconnector Terminals. This area is required to support the construction of the onshore elements of the Baird project and also a number of other projects that are being advanced at the BTC.
- 1.3 The onshore elements of the Baird project include the construction of new gas reception, compression and conditioning facilities within an area of the Perenco UK Terminal (part of the BTC), as well as a new landfall for the sub-sea pipeline that will connect these facilities with the gas field, which is approximately 86 kilometres from the shore. The local planning authority (LPA) granted planning permission (ref. no. PF/10/0141) for these works on 27 July 2010.
- 1.4 The Deborah gas storage project requires the redevelopment of areas of the existing Eni Hewett onshore terminal (part of the BTC). New gas reception, treatment and transfer facilities will be installed as well as the landfall for two new pipelines. Planning permission was granted for this development on 24 November 2010 (ref. no. PF/10/0737).
- 1.5 The Baird and Deborah projects are in the national interest. The UK's own gas reserves are now in decline and the country is becomingly increasing reliant on imported gas to meet its energy needs. Gas will remain an important component of the UK's energy mix over the next two decades, and will have a particularly important role to play in filling the energy gap as ageing energy infrastructure is decommissioned and the new generation of nuclear power stations and major offshore wind farms are delivered. However, at present, the UK has only around 15 days worth of gas storage (France has around 100 days) meaning that it is heavily reliant on pipelines for much of its gas. The provision of gas storage projects, such as Baird and Deborah, therefore provide a much needed buffer for the UK in the event of any disruptions to imported gas supplies and increase the security of the country's energy supplies.
- 1.6 In granting planning permission for the onshore works for the Baird and Deborah projects, the LPA has recognised the national importance of the projects in terms of safeguarding future energy supplies.
- 1.7 The development will be used by BSCL for the Baird project and, as indicated above and also by a number of the other projects being advanced at the gas terminals, including by Eni (Deborah gas storage project) and National Grid (works at its Terminal south of Paston Road to link the Baird and Eni projects with the National Transmission System). The site will also include an expansion/contingency area in the event that further land is required to support the construction of the projects at the terminals.

- 1.8 The need for the vehicle checking area has arisen due to the requirements of the security services. The security services have confirmed that a secure vehicle checking area needs to be provided close to the BTC, as the existing arrangements inside the Terminals will not be sufficient to accommodate the number of construction vehicles associated with the Baird and Deborah projects. The vehicle checking area will provide a secure area where deliveries and consignments associated with the project can be security-cleared before entering the BTC. BSCl, Eni and National Grid (NG) will also make use of the vehicle checking area during the construction of their respective projects.
- 1.9 Furthermore, since planning permission was granted in July 2010 for Baird, additional work has been undertaken on the construction programme for the project. This has identified a requirement for additional land to support the construction phase of the project in addition to that already identified within the Perenco Terminal and adjacent to Seagulls Field. Due to the limited space available within the Perenco Terminal and the BTC generally, it has been necessary to identify land that lies outside of the BTC boundary to provide laydown/construction compounds. These will be used for both the Baird and the NG works.
- 1.10 The large arable field south of Paston Road is an ideal location in which to provide the vehicle checking and construction laydown area due to its proximity to the BTC. The field has previously been the subject of development associated with the terminals, including the installation of the Interconnector and BBL pipeline.
- 1.11 The development will be used for a temporary period of approximately 5 years from spring 2011 until the final quarter of 2015 and will be established on a phased basis. The site will be fully reinstated and returned to agricultural use following the completion of the construction works relating to the various projects at the terminals.
- 1.12 BSCl and Eni are also in the process of identifying park and ride sites to support the construction activities at the BTC. The Baird and Deborah planning permissions (and also the Shell permission – ref no. PF/10/0039) contain conditions that require the provision of park and ride facilities for the duration of the construction works, so as to minimise the impact of construction traffic in the local area. Separate applications will be submitted for the park and ride sites in the near future. The intention is that there would be a park and ride site to the north of the terminals and one to the south.
- 1.13 RPS has been appointed to assess the noise impact of this land use. The closest noise sensitive receptors (NSRs) to the application site are residential properties on Coast Road and Castaways Caravan Park. Increased construction traffic on public roads may also affect residents in Walcott, Bacton and Keswick.
- 1.14 The potential noise effects considered in this assessment are activities within the development site and increases in traffic along the local road network due to construction traffic. Reference has been made to applicable national guidance.
- 1.15 This report provides an assessment based upon the combined vehicle operations including other proposed works within the BTC.

## 2 NOISE UNITS STANDARDS AND GUIDANCE

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### a) Noise

- 2.1 Noise is defined as unwanted sound. The range of audible sound is from 0 dB to 140 dB. The frequency response of the ear is usually taken to be about 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dB(A) weighting. This is an internationally accepted standard for noise measurements.
- 2.2 For variable noise sources such as traffic, a difference of 3 dB(A) is just distinguishable. In addition, a doubling of a noise source would increase the overall noise by 3 dB(A). For example, if one item of machinery results in noise levels of 30 dB(A) at 10 m, then two identical items of machinery adjacent to one another would result in noise levels of 33 dB(A) at 10 m. The 'loudness' of a noise is a purely subjective parameter but it is generally accepted that an increase/decrease of 10 dB(A) corresponds to a doubling/halving in perceived loudness.
- 2.3 External noise levels are rarely steady but rise and fall according to activities within an area. In an attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:
- LAmax noise level: This is the maximum noise level recorded over the measurement period.
  - LAeq noise level: This is the 'equivalent continuous A-weighted sound pressure level, in decibels' and is defined in British Standard 7445 (BS 7445) as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time'. It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise. It is also the unit best suited to assessing community response.
  - LA10 noise level: This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.
  - LA90 noise level: This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

### b) British Standard 5228 'Code of practice for noise and vibration control on construction and open sites', 2009

- 2.4 British Standard 5228 'Code of practice for noise and vibration control on construction and open sites' (BS 5228) & is a two part standard which provides guidance, information and procedures on the control of noise and vibration from construction sites, including piling.
- 2.5 There are no set standards for the definition of the significance of construction noise effects, however, for noise, example criteria are provided in BS 5228 part 1 Annex E and for vibration, example criteria are provided in BS 5228 part 2 Annex B. The assessment of whether changes in noise levels due to construction activity constitute significant effects will be dependent on the

absolute levels of ambient and construction noise, as well as the magnitude, duration, time of occurrence and frequency of the noise change.

- 2.6 Part 1 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels. It includes sections on: community relations; noise and persons on site, neighbourhood nuisance; project supervision; and control of noise. However, annexes include: information on legislative background; noise sources, remedies and their effectiveness (mitigation options); current and historic sound level data on site equipment and site activities; significance of noise effects; calculation procedures estimating noise from sites and noise monitoring; types of piling; and air overpressure.
- 2.7 The following significance criteria are based upon one of three methodologies contained within Annex E of BS 5228-1 and has been used as the basis for the threshold of significance for this assessment. The relative semantic ratings for adverse effects have been adopted based changes in progressive increases in 5 dB.

**Table 2.1: Thresholds of Significance for Construction Noise at Residential Receptors**

Noise Change, $L_{Aeq,T}$ (dB)	Significance
$\leq 5$	Not Significant
$> 5$ and $\leq 10$	Minor Adverse
$> 10$ and $\leq 15$	Moderate Adverse
$> 15$ and $\leq 20$	Major Adverse
$> 20$	Substantial Adverse

Note 1: T is daily working hours of the site

Note 2: Applies to residential receptors

- 2.8 The limits provided in Table 2.1 are subject to lower cut-off values of 65 dB and 45 dB  $L_{Aeq,T}$ , from construction noise alone, for the daytime and night-time periods, respectively, and are areas applicable to residential housing; hotels and hostels; buildings in religious use; buildings in educational use; and buildings in health and/or community use.

### c) World Health Organisation

- 2.9 The World Health Organisation (WHO) published guidance on the desirable levels of environmental noise in 2000. In this document, Guidelines for Community Noise [ ], the authors consider that sleep disturbance criteria should be taken as an internal noise level of 30 dB  $L_{Aeq,8hr}$  or an external level of 45 dB  $L_{Aeq,8hr}$ , measured at 1 m from the façade. It is also suggested that internal  $L_{Amax}$  levels of 45 dB and external  $L_{Amax}$  levels of 60 dB, should not be exceeded.
- 2.10 For daytime levels, it is considered that:

**‘To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB  $L_{Aeq}$  on balconies, terraces, and outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50 dB  $L_{Aeq}$ . Where it is**

**practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.'**

2.11 However, a review of health effects based noise assessment methods undertaken for the DETR by Porter et al in 1998 [ ], just before the issue of Guidelines for Community Noise, it is noted that:

**'Perhaps the main weakness of both WHO-inspired documents is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values.'**

2.12 The report goes on to state that: "around 56% of the population in England and Wales are exposed to daytime noise levels exceeding 55 dB LAeq and that around 65% are exposed to night-time noise levels exceeding 45 dB LAeq (as measured outside the house in each case). The value of 45 dB LAeq night-time outdoors is equivalent to the 1995 WHO guideline value of 30 dB LAeq night-time indoors allowing 15 dB attenuation from outdoors to indoors for a partially open window (for free air ventilation to the bedroom). The percentages exposed above the WHO guideline values could not be significantly reduced without drastic action to virtually eliminate road traffic noise and other forms of transportation noise (including public transport) from the vicinity of houses. The social and economic consequences of such action would be likely to be far greater than any environmental advantages of reducing the proportion of the population annoyed by noise. In addition, there is no evidence that anything other than a small minority of the population exposed at such noise levels find them to be particularly onerous in the context of their daily lives.'

2.13 Based on the most recent national survey of noise exposure carried out in England and Wales in 2000/2001, the percentage of the population exposed to day and night-time noise levels exceeding the WHO guidelines are 54% and 67%, respectively. The studies indicate that:

2.14 'the percentage of the UK population exposed to daytime levels of 55 dB LAeq,16hr or greater, have decreased since 1990, whilst the percentage of the UK population exposed to night-time levels of 45 dB LAeq,8hr or greater, have increased since 1990, although this change is not considered statistically significant' [ ].

2.15 Therefore, the levels suggested in Guidelines for Community Noise may be considered more aspirational than immediately attainable.

#### **d) Calculation of Road Traffic Noise, 1988**

2.16 The Department of Transport document, Calculation of Road Traffic Noise (CRTN) , describes the procedures for measuring and calculating noise from road traffic. These procedures are necessary to enable entitlement under The Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning. The document can also be used to generate scaling factors for expected increases in road traffic and expected levels of attenuation from barriers.

**e) Noise Change for Non-Permanent Sources and Construction Road Traffic**

- 2.17 A change of 3 dB is the minimum perceptible under normal conditions, and a change of 10 dB corresponds roughly to halving or doubling of a sound. It is generally accepted that an increase of 3 dB(A) or more is the threshold at which a permanent noise effect becomes significant. However, for a temporary change, such as may arise from construction traffic servicing a construction site, as the noise change is not permanent, and in order to allow the project to proceed at a reasonable rate without undue constraint, it is considered justifiable, following accepted precedent, that the threshold of significance can be raised to a 6 dB(A) change.
- 2.18 It is also standard practice to categorise the degree of effect according to the extent of the predicted noise change. This is frequently implemented by the use of semantic descriptors associated with noise change bands. The approach has been used in the UK over the last 10 years in the assessment of road traffic schemes and is based on the premise that subjective response to noise from a new source is proportional to the change in overall noise level. Hence, the semantic scale provided in Table 2.2 has been adopted to describe noise change (given that only increases are likely, there are no decrease bands).

**Table 2.2: Semantic Scale for Rating Noise Impact**

Predicted Change In $L_{Aeq,T}$ or $L_{A10,T}$	Significant Yes/No?	Semantic Scale Rating	Significance Rating	
Increase of less than 6 dB	No	No significant change	Negligible	~
Increase of 6 - 10 dB	Yes	Minor Increase	Minor	Adverse
Increase of 11 - 20 dB	Yes	Moderate Increase	Moderate	Adverse
Increase of more than 20 dB	Yes	Substantial Increase	Major	Adverse

**f) Consultation with North Norfolk District Council**

- 2.19 An Environmental Health Officer from North Norfolk District Council was contacted regarding the assessment. It was agreed that baseline surveys would be carried out at a location representative of the closest noise sensitive receptors to the site and at locations representative of the main HGV routes through Bacton and Walcott. It was agreed that an assessment would be carried out using appropriate guidance including BS 5228, the significance of noise changes and WHO GCN.

### 3 BASELINE NOISE SURVEY

- 3.1 A baseline noise survey was undertaken at a location representative of the closest noise sensitive receptors to the site, in the south-east corner of the proposed Laydown field close to residential properties on Coast Road. The survey covered a 24-hour period between 14:00 hrs on Thursday 18th November 2010 and 14:00 hrs on Friday 19th November 2010. The location of the survey is indicated on the plans in Figure 1.
- 3.2 Additional short-term 15-minute surveys were carried out at three locations along the main site access routes in Bacton and Walcott, indicated in the location plans in Figure 1.
- 3.3 All surveys were undertaken using Rion NL-31 sound level meters mounted on a tripod and located at a distance of 1.5 m above local ground level. Data were logged of the sound pressure levels for the noise indices described in Section 2 of this report, using fast A weighted filters. The meters were calibrated prior to and following the measurements using a Rion NC-74 calibrator. There was no significant drift during the survey period. All equipment was within a two year period of calibration. Calibration certificates for the equipment are available on request.
- 3.4 Meteorological conditions were observed during the survey periods. During all of the survey periods conditions were mainly dry with some light rain overnight and wind speeds were below 2 m/s at all measurement locations. Conditions were therefore considered to be acceptable for noise monitoring.
- 3.5 A summary of long-term survey data for the daytime period is provided in Table 3.1. Data have been rounded to the nearest whole number. Full survey data are provided in Appendix A.

**Table 3.1: Summary of Measured Noise Levels**

Location (ref Figure 1)	Time Period	Data Period	Noise Survey Metric (dB)			
			L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>A10</sub>	L <sub>A90</sub>
LT1	Daytime (07:00 – 19:00)	18/11/2010 14:00 – 19:00 and 19/11/2010 07:00 – 14:00	47	76	47	42

- 3.6 A summary of the short-term survey data is provided in Table 3.2. Data have been rounded to the nearest whole number. Full survey data are provided in Appendix A.

**Table 3.2: Summary of Measured Noise Levels**

Location (ref Figure 1)	Start Time	Noise Survey Metric (dB)			
		L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>A10</sub>	L <sub>A90</sub>
ST1	19/11/2010 14:15	62	78	66	39
	19/11/2010 15:26	61	76	66	40
ST2	19/11/2010 14:34	65	74	69	52
	19/11/2010 15:45	61	78	65	43
ST3	19/11/2010 15:02	61	76	66	40
	19/11/2010 16:11	64	83	68	44

- 3.7 The levels in Table 3.2 indicate that houses situated along the main traffic routes to the site are already in excess of those provided within the WHO Guidelines for Community Noise for outdoor

living areas. Therefore, any effects due to traffic have been based solely on an assessment of noise change.

## 4 ASSESSMENT

### a) Application Site

- 4.1 The application site will be in operation between 07:00 and 19:00 hrs Monday to Saturday for a period of approximately five years. Details of activities within the laydown site are included within the Baird Gas storage Offsite Support Areas document ref: C09134-BC00-00-00-365-11062 and also the Planning Statement (prepared by RPS). Potentially noisy activity arising from the operation of the laydown site includes:
- HGV deliveries and movements on site
  - Use of HGV wheel wash
  - Use of road sweeper
  - Operation of standby generator
- 4.2 Other activities that may include the use of noisy machinery will include the flattening of the site, the creation of the topsoil bund and laying of temporary road surfaces. Due to their short duration these activities have not been covered in this assessment.
- 4.3 Noise arising from the laydown site has been modelled using SoundPLAN ray-tracing noise modelling software. Source levels for the activities listed above have been taken from BS 5228 and the RPS source term library, and are provided in Appendix B.
- 4.4 The number of HGV movements has been based upon data for all operators including BSCL, Eni and National Grid (NG). The percentage on-time of other noisy activities have been assumed from typical operations of similar sites.
- 4.5 Noise levels were assessed at ground and first floor level at representative properties within the vicinity of the site. The following properties have been used for the assessment:
- 16 Coast Road
  - 4 St Andrews Close
  - 6 Coast Road
  - Castaways Caravan Park
- 4.6 A noise change assessment has been carried out against the average ambient level measured in the baseline noise survey. The results are provided in Table 4.1 below.

**Table 4.1: Calculation of Noise Change at Closest NSRs from activities on Laydown and Vehicle Checking Site**

Location	Floor	Predicted Noise Level (dB)	Measured Ambient Noise Level (dB)	Combined Noise Level (dB)	Noise Change (dB)	Significance
16 Coast Road	Ground	32.2	46.6	46.8	0.2	Not Significant
16 Coast Road	First	32.8	46.6	46.8	0.2	Not Significant
4 St Andrews Close	Ground	26.7	46.6	46.7	0.0	Not Significant

Location	Floor	Predicted Noise Level (dB)	Measured Ambient Noise Level (dB)	Combined Noise Level (dB)	Noise Change (dB)	Significance
4 St Andrews Close	First	27.2	46.6	46.7	0.0	Not Significant
6 Coast Road	Ground	28.2	46.6	46.7	0.1	Not Significant
6 Coast Road	First	28.7	46.6	46.7	0.1	Not Significant
Castaways Caravan Park	Ground	28.3	46.6	46.7	0.1	Not Significant

4.7 With reference to Table 2.1, where the total noise level during the daytime is less than 65 dB, an increase in noise level of 5 dB is considered to be significant. The predicted increase in noise levels due to activities on the laydown site are well below this level. It is therefore considered that noise from the site will not cause a significant impact on nearby NSRs.

#### **b) Traffic Assessment**

4.8 Traffic data for the vehicles accessing the laydown site has been provided by the transport consultant, Jacobs. The information available indicates that all construction traffic will be routed along the B1159 through Walcott and Bacton. The traffic data provided indicates that there will be some variation in the number of construction vehicles over the construction phases. Therefore, calculation of both the average number and maximum number of vehicle movements has been made for this assessment.

4.9 Baseline traffic flows have been obtained from baseline traffic data previously provided for the Baird Gas Storage Project, Bacton, Transport Assessment document ref: SRD/RO/JLK0462 01A. With consideration for the HGV routes, data from two of the traffic data count points from this report have been used for the assessment. The locations of these data counts are provided in Figure 2. Further details of the traffic data are provided in the document referenced above.

4.10 A comparison has been made between the baseline noise levels and the noise levels with the construction traffic, and a noise change assessment has been carried out. The results are provided in Tables 4.2 and 4.3. Full calculation data are provided in Appendix C.

**Table 4.2: Calculation of Average Noise Change from Construction Traffic**

Location	Baseline Noise Level $L_{Aeq}$ (dB)	Noise Level with Construction Traffic $L_{Aeq}$ (dB)	Noise Change (dB)
1 (TG 33415 34383)	60.3	60.6	0.3
2 (TG 35977 32300)	64.5	64.7	0.2

**Table 4.3: Calculation of Maximum Noise Change from Construction Traffic**

<b>Location</b>	<b>Baseline Noise Level <math>L_{Aeq}</math> (dB)</b>	<b>Noise Level with Construction Traffic <math>L_{Aeq}</math> (dB)</b>	<b>Noise Change (dB)</b>
1 (TG 33415 34383)	60.3	60.9	0.7
2 (TG 35977 32300)	64.5	64.8	0.3

- 4.11 With reference to Table 2.2, the results in Tables 4.2 and 4.3 indicate that there will be no significant increase in noise due to construction traffic. It is also noted that the predicted noise levels above are lower than the levels measured at ST1, ST2 and ST3 provided in Table 3.2. On this basis it is not likely that residents along the main HGV routes to the site in Walcott, Keswick and Bacton will notice any difference in the noise levels with the construction traffic.

## 5 SUMMARY AND CONCLUSIONS

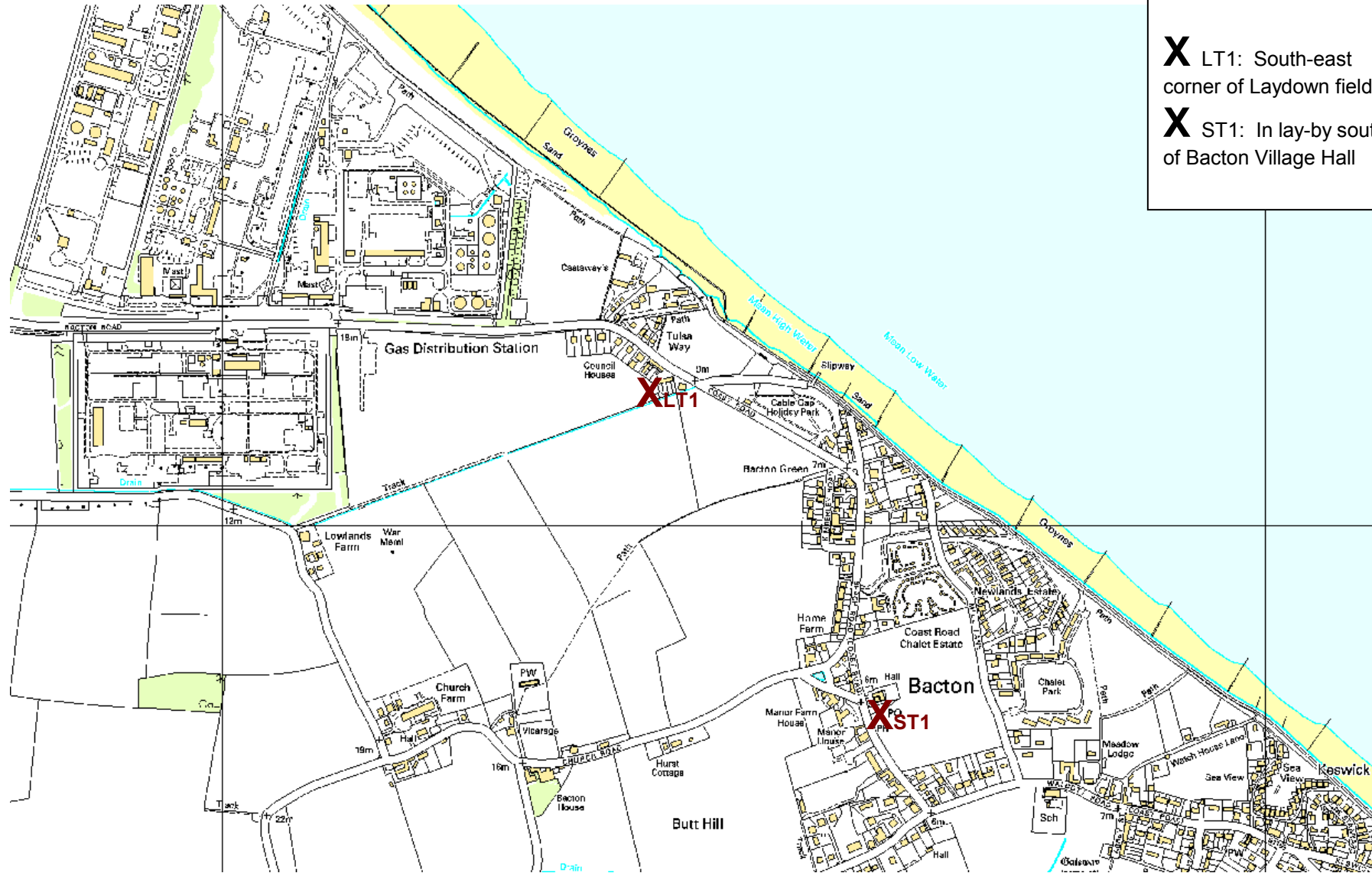
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- 5.1 RPS has carried out an assessment of the noise impact of a proposed construction laydown and vehicle checking site to be used to support the construction of the onshore elements of the Baird project and also a number of other projects that are being advanced at the BTC.
- 5.2 Baseline noise surveys have been undertaken at locations representative of the closest noise sensitive receptors to the application site and along the access routes for construction vehicles. Assessments have been carried out of the noise impact of operations on the proposed laydown site and increases in noise along access routes from construction traffic.
- 5.3 The results of the assessments indicate that there will not be a significant increase in noise levels due to either the operation of the laydown and vehicle checking site or traffic generated by the site. Therefore there is no reason, with respect to noise, that planning permission should not be granted.



# FIGURES

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**Key**

**X** LT1: South-east corner of Laydown field

**X** ST1: In lay-by south of Bacton Village Hall



Noise Monitoring Locations

Figure 1a

Based upon Ordnance Survey maps with the permission of the Controller of Her Majesty's Stationary Office. License No. 100039993. Crown Copyright





# APPENDIX A

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## Long-Term Noise Survey Data

Date / Time	Noise Survey Metric (dB)			
	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>A10</sub>	L <sub>A90</sub>
18/11/2010 14:00	45.2	64.7	46.8	42.0
18/11/2010 14:15	46.7	60.8	48.9	43.2
18/11/2010 14:30	46.7	66.4	49.1	41.7
18/11/2010 14:45	45.3	58.7	48.0	41.6
18/11/2010 15:00	47.5	63.1	50.6	42.3
18/11/2010 15:15	47.7	67.0	47.5	41.9
18/11/2010 15:30	45.9	60.5	48.1	42.3
18/11/2010 15:45	44.9	65.9	46.0	42.0
18/11/2010 16:00	46.2	61.5	48.1	42.6
18/11/2010 16:15	45.8	63.6	47.8	42.3
18/11/2010 16:30	48.8	70.5	50.7	43.2
18/11/2010 16:45	48.2	65.6	49.2	42.1
18/11/2010 17:00	46.0	64.6	47.8	42.0
18/11/2010 17:15	45.6	58.6	47.9	41.3
18/11/2010 17:30	43.4	54.6	45.4	40.4
18/11/2010 17:45	43.5	52.0	45.7	40.3
18/11/2010 18:00	45.4	60.7	46.9	40.9
18/11/2010 18:15	43.4	52.4	45.5	40.9
18/11/2010 18:30	45.4	52.1	47.9	42.1
18/11/2010 18:45	44.5	52.5	47.2	41.0
18/11/2010 19:00	44.2	53.0	46.7	40.7
18/11/2010 19:15	43.7	62.0	45.8	40.8
18/11/2010 19:30	43.8	51.9	45.9	41.0
18/11/2010 19:45	44.1	54.1	46.2	41.1
18/11/2010 20:00	43.0	52.0	44.8	40.6
18/11/2010 20:15	43.5	51.6	45.5	41.0
18/11/2010 20:30	43.7	53.1	46.2	40.3
18/11/2010 20:45	43.3	51.6	45.4	40.7
18/11/2010 21:00	43.0	54.9	45.4	40.4
18/11/2010 21:15	42.9	53.4	45.0	40.1
18/11/2010 21:30	44.2	59.6	46.1	41.4
18/11/2010 21:45	41.7	48.9	43.0	40.2
18/11/2010 22:00	41.3	51.0	43.0	39.4
18/11/2010 22:15	41.0	51.3	42.2	39.3
18/11/2010 22:30	40.5	45.7	41.7	39.1
18/11/2010 22:45	48.0	66.9	48.3	38.6

Date / Time	Noise Survey Metric (dB)			
	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>A10</sub>	L <sub>A90</sub>
18/11/2010 23:00	40.4	47.5	41.8	38.6
18/11/2010 23:15	40.7	48.9	42.1	38.8
18/11/2010 23:30	40.3	44.0	41.6	38.9
18/11/2010 23:45	40.5	47.2	42.1	38.6
19/11/2010 00:00	40.3	46.5	41.8	38.7
19/11/2010 00:15	39.2	45.1	41.0	37.5
19/11/2010 00:30	41.1	48.8	42.9	38.9
19/11/2010 00:45	41.8	49.8	43.4	39.8
19/11/2010 01:00	41.8	48.5	43.8	39.4
19/11/2010 01:15	41.0	47.4	42.4	39.2
19/11/2010 01:30	41.0	47.6	42.6	39.0
19/11/2010 01:45	41.4	47.6	43.0	39.3
19/11/2010 02:00	40.7	49.1	42.3	38.6
19/11/2010 02:15	40.0	53.0	41.7	37.8
19/11/2010 02:30	39.1	45.7	40.5	37.3
19/11/2010 02:45	39.5	46.0	40.9	37.8
19/11/2010 03:00	40.7	49.2	42.2	38.9
19/11/2010 03:15	41.9	52.6	43.5	39.5
19/11/2010 03:30	41.2	51.5	42.9	39.0
19/11/2010 03:45	41.3	52.5	42.9	39.3
19/11/2010 04:00	41.6	49.5	43.5	39.3
19/11/2010 04:15	40.5	48.8	42.4	38.0
19/11/2010 04:30	40.8	48.9	42.7	38.4
19/11/2010 04:45	40.1	47.8	41.8	38.0
19/11/2010 05:00	39.7	49.4	41.7	37.3
19/11/2010 05:15	40.6	52.7	42.2	37.9
19/11/2010 05:30	43.1	54.7	45.4	39.2
19/11/2010 05:45	41.0	51.4	43.4	37.8
19/11/2010 06:00	41.5	51.9	44.1	37.9
19/11/2010 06:15	42.1	50.3	44.6	38.6
19/11/2010 06:30	45.6	61.6	48.1	40.8
19/11/2010 06:45	47.7	69.3	48.0	42.3
19/11/2010 07:00	50.0	75.5	49.3	43.3
19/11/2010 07:15	46.5	62.2	48.7	42.4
19/11/2010 07:30	50.6	74.0	48.6	43.9
19/11/2010 07:45	48.2	67.3	48.9	43.6
19/11/2010 08:00	47.2	63.9	49.4	43.4
19/11/2010 08:15	49.5	66.9	52.2	44.8

Date / Time	Noise Survey Metric (dB)			
	L <sub>Aeq</sub>	L <sub>Amax</sub>	L <sub>A10</sub>	L <sub>A90</sub>
19/11/2010 08:30	48.0	73.1	49.3	44.4
19/11/2010 08:45	46.0	61.6	47.7	43.5
19/11/2010 09:00	46.3	54.2	47.9	44.1
19/11/2010 09:15	48.0	65.7	48.3	44.4
19/11/2010 09:30	47.1	66.9	48.2	44.1
19/11/2010 09:45	48.3	63.0	50.4	45.0
19/11/2010 10:00	48.6	64.0	49.4	44.3
19/11/2010 10:15	43.6	60.7	45.2	41.1
19/11/2010 10:30	44.9	59.2	46.0	41.4
19/11/2010 10:45	42.1	57.3	43.7	39.2
19/11/2010 11:00	42.4	56.0	44.9	37.3
19/11/2010 11:15	45.6	61.3	47.7	39.3
19/11/2010 11:30	43.7	66.0	45.3	38.6
19/11/2010 11:45	39.8	48.0	42.1	36.9
19/11/2010 12:00	40.3	60.0	41.8	37.8
19/11/2010 12:15	44.1	59.4	47.1	39.6
19/11/2010 12:30	44.8	55.9	47.2	41.3
19/11/2010 12:45	42.7	58.8	44.4	39.3
19/11/2010 13:00	48.6	68.1	46.9	37.5
19/11/2010 13:15	40.8	58.1	42.4	36.9
19/11/2010 13:30	44.4	70.1	44.6	40.0
19/11/2010 13:45	52.6	73.9	55.3	41.4
<b>Average Daytime (07:00 - 19:00)</b>	<b>47</b>	<b>76</b>	<b>47</b>	<b>42</b>

## APPENDIX B

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### Laydown Site Model Input Data

### Noise Model Input Data

#### Generator

<b>Frequency (Hz)</b>	<b>63</b>	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>4000</b>	<b>8000</b>
<b>L'w (dB)</b>	80	74	57	54	53	48	45	37

from Table C4 of BS 5228

#### Lorry Wash

<b>Frequency (Hz)</b>	<b>3</b>	<b>63</b>	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>4000</b>	<b>8000</b>	<b>16000</b>
<b>L'w (dB)</b>	91	90	90	86	86	85	87	84	82	75

from RPS source term library (measured)

#### Roadsweeper

<b>Frequency (Hz)</b>	<b>63</b>	<b>125</b>	<b>250</b>	<b>500</b>	<b>1000</b>	<b>2000</b>	<b>4000</b>	<b>8000</b>	<b>16000</b>
<b>L'w (dB)</b>	113	107	102	107	104	102	98	98	97

from RPS source term library (measured)

#### Moving HGV

<b>Frequency (Hz)</b>	<b>50</b>	<b>63</b>	<b>80</b>	<b>100</b>	<b>125</b>	<b>160</b>	<b>200</b>	<b>250</b>	<b>315</b>	<b>400</b>	<b>500</b>	<b>630</b>	<b>800</b>	<b>1000</b>	<b>1250</b>	<b>1600</b>	<b>2000</b>	<b>2500</b>	<b>3150</b>	<b>4000</b>	<b>5000</b>	<b>6300</b>	<b>8000</b>	<b>10000</b>
<b>L'w (dB/m)</b>	89	84	77	78	78	78	77	77	80	77	76	76	75	74	73	73	71	69	66	65	62	60	56	53

## APPENDIX C

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### CRTN Calculations for Noise Change

## ROAD TRAFFIC NOISE CALCULATIONS

**Job No:** JAL6097  
**Job Title:** Baird Gas Storage, Offsite Land Requirements  
**Client:** RPS Cottons Centre  
**Traffic Data Supplied By:** Various Sources

**Date:** 09/12/2010  
**Consultant:** SH

### CRTN CALCULATIONS FOR NOISE CHANGE - 18-hour Flows (06:00 - 24:00 hours)

1. Baseline						
No	Grid Reference	Total 18-hr	HGV	Speed (kph)	LA10	LAeq
1	TG 33415 34383	2050	3.8%	45.5	61.3	60.3
2	TG 35977 32300	3375	4.7%	63.9	66.5	64.5

2. Baseline + Average Construction Traffic						
No	Grid Reference	Total 18-hr	HGV	Speed (kph)	LA10	LAeq
1	TG 33415 34383	2075	4.43%	45.5	61.6	60.6
2	TG 35977 32300	3400	5.07%	63.9	66.7	64.7

3. Baseline + Maximum Construction Traffic						
No	Grid Reference	Total 18-hr	HGV	Speed (kph)	LA10	LAeq
1	TG 33415 34383	2102	5.22%	45.5	61.9	60.9
2	TG 35977 32300	3427	5.55%	63.9	66.8	64.8

#### Summary Table - Average Noise Change

No	Baseline Noise level LAeq (dB)	Noise level with Construction Traffic	Noise Change (dB)
1	60.3	60.6	0.3
2	64.5	64.7	0.2

#### Summary Table - Maximum Noise Change

No	Baseline Noise level LAeq (dB)	Noise level with Construction Traffic	Noise Change (dB)
1	60.3	60.9	0.7
2	64.5	64.8	0.3

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