From:	Geoff Lyon
To:	Hornsea Project Three
Subject:	Deadline 3 - NNDC submission
Date:	14 December 2018 16:35:18
Attachments:	NNDC Deadline 3 draft submissions 14-12-18.pdf

Dear Examining Authority,

Please find attached the Hornsea Project Three Deadline 3 response from North Norfolk District Council (INTERESTED PARTY REF: 20010749).

Please could you confirm receipt of this document.

Kind Regards

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Hornsea Project Three Offshore Wind Farm

REPRESENTATIONS FOLLOWING ISSUE SPECIFIC HEARINGS ON 4-7 DECEMBER 2018

NORTH NORFOLK DISTRICT COUNCIL
(INTERESTED PARTY REF: 20010749)

DEC 2018

Table of Contents

1. Introduction

1.1. These are North Norfolk District Council's written submissions following Issue Specific Hearings 1, 2 and 4. They do not cover in writing all the matters on which oral submissions were made, but expand or elucidate where required.

1.2. As requested by the Examining Authority, the following material is provided with the submissions:

- Material concerning the growth rates in North Norfolk which shows why the period in Requirement 9 of the DCO should be 10 years rather than 5 years, referred to by the Landscape Officer Cathy Batchelor;
- The report by Royal HaskoningDHV entitled *Sheringham Shoal, Cawston, Norfolk Substation Noise Assessment Summary* (2015), referred to by Environmental Health Officer Carol Bye;
- The report by Destination Research entitled *Economic Impacts of Tourism 2017 Results*, referred to by the Head of Economic and Community Development Rob Young.

2. Design Flexibility

2.1. The final chosen method of transmission of electricity to the onshore gird connection location will have a fundamental bearing on the overall impact of the project. Although other off-shore wind farm DCOs have included within the design envelope a choice of HVAC or HVDC transmission (see Table 2 in Appendix 22 to Appellant's Deadline 1 Submission - Transmission System Briefing Note), the Examining Authority has not previously been asked to consider the impacts of the transmission choice in the way that is necessary in this examination.

2.2. The choice of transmission system is crucial to the following impacts in NNDC's area:

- Reduction in number of cables
- Agricultural land take
- Installation time
- Duration of impact on tourism and duration of diversion of the Norfolk Coastal Path
- Booster station within North Norfolk near to Edgefield/Corpusty, which requires significant mitigation

2.3. In each instance, the choice of HVDC will either reduce or remove entirely the relevant impacts. This is why, in its Local Impact Report, NNDC submitted that it would be **positive** for Ørsted to choose a HVDC transmission system, and **negative** to choose a HVAC transmission system.

<u>HVDC Comparator Projects</u>

2.4. In Issue Specific Hearing 1, the Appellant explained Table 2 in Appendix 22 and that none of the HVDC projects which have been consented have yet progressed to construction. It should be noted that both the Dogger Bank A and B developments and the Teeside A and former B projects are progressing, with recent applications made for non-material amendments. Any delay may be attributable to the fact that:

- In relation to the Dogger Bank developments, which were originally one DCO, the development split into two (which was justified on the basis of advancements in technology, not on the basis that HVDC was causing any difficulty); and
- In relation to the Teeside developments, the project consortium split and new owners took over. The recent non-material change application for Sofia Offshore Wind Farm relates improving the turbines.

2.5. In terms of comparator projects, NNDC relies on the Norfolk Vanguard project currently undergoing examination, which has chosen HVDC transmission. The Appellant suggested that this project it is an anomaly in the industry. NNDC disagrees and submits that there is no better comparator than the Norfolk Vangaurd Project:

- The 1,800MW Norfolk Vanguard (and sister 1,800MW Boreas) project would be the largest offshore wind farm in the world; the Applicant's scheme would be the second largest at 2,400MW.
- Vanguard would be approximately 47km offshore whereas Hornsea Project Three would be approximately 121km offshore – a factor which would favour the use of HVDC transmission for Hornsea Project three
- The projects are coming forward for examination at the same time and so are approaching the choice of HVAC or HVDC at the same time, with the same level of technological advancement available to them and with the same supply chain assessment available to them.
- Both projects are promoted by experienced wind farm developers.

<u>Policy Support for Design Flexibility</u>

2.6. Flexibility in policy terms is supported in policy EN-3 paragraph 2.6.24 where "[o]wing to the complex nature of offshore wind farm development…details of a proposed scheme may be unknown to the applicant at the time of the application". The examples given, which are not exhaustive, include the precise location and configuration of the turbines; the foundation type (which is often dependent on seabed conditions and/or turbine type); exact turbine tip height; cable type and cable route; and exact locations of substations. While EN-3 does not provide any gloss on the word "unknown", the use of that word (rather than, for example, "uncertain", combined with the reference to the complex nature of offshore wind farms and the examples suggests paragraph 2.6.24 was contemplating situations of lack of knowledge rather than a wish for a commercial choice.

2.7. Accordingly, the policy support for flexibility is weaker in the case of the commercial HVDC/HVAC flexibility sought by Ørsted than it is for other elements of the proposed development which are genuinely unknown (for example, micro-siting of the turbines). This is particularly so as the HVDC/HVAC choice is directly linked to the extent of onshore impacts of the development.

2.8. In answers to the Examining Authority, it appeared that Ørsted has a preference for HVAC. From the perspective of NNDC, the starting point should be that the best and most efficient way to bring the energy onshore is HVDC, which is also the option with the least impact from noise (in a very tranquil area) and with the least disturbance of the pink-footed geese. If the design flexibility to chose HVDC or HVAC is given within the DCO, it is therefore important to NNDC that HVDC is fully investigated and considered such that it has a realistic prospect of being chosen for the project.

2.9. It is open to the Examining Authority to give NNDC and the other local authorities a role in ensuring that this full consideration takes place, so that HVDC has a realistic prospect of being chosen for the project. To that end, NNDC suggested a Requirement could be imposed, which either gives the local authorities a determinative role in assessing the quality of the choice or ensures local authorities are provided with sufficient detail to assess whether a justified election has been made. Potential wording for such requirements includes:

> Unless there are clear and compelling technological reasons as to why the use of HVDC transmission cannot be provided within the scope of this DCO, then the method of electrical transmission within each phase of the authorised development shall be via HVDC and, only where clear and compelling technological reasons have been provided to the relevant LPAs justifying why the use of HVDC transmission cannot be provided and why the use of HVAC has been selected shall the use of HVAC transmission be permitted.

Or

No phase of the authorised development shall begin until written details justifying why the use of HVDC or HVAC has been selected for that phase of the development.

2.10. Local planning authorities that deal with major projects are well used to being provided with and assessing the type of information that Ørsted identified would be required to comply with such a Requirement, including:

- Technical information concerning the supply chain;
- Commercially sensitive information concerning funding (often provided in viability assessments);
- Pricing information.

2.11. Local authorities are also under a duty to co-operate and neighbouring authorities are often required to work together on major projects. If the first choice of wording were used for the Requirement, then the local planning authorities would be under a duty to work together to ensure they reached an agreed position, taking into account the information provided and having regard to the judgments made by the examining authority in assessing the merits of the scheme as a whole. If a dispute arose (as may potentially arise in other areas on the DCO) then the usual arbitration mechanism would apply.

3. Draft DCO

3.1. Further to the submission made above concerning a requirement relating to the HVDC/HVAC choice, NNDC also made a number of submissions concerning other requirements at Issue Specific Hearing 3.

3.2. In relation to the landscaping requirements, NNDC supports including details and the Landscape Officer will be meeting with officers of South Norfolk District Council and Broadland District Council in order to propose agreed wording by Deadline 4. The wording may be based on the Landscape Scheme requirement in the Hornsea Project Two DCO.

3.3. The other local planning authorities have indicated that they support wording of Requirement 9 being consistent across all authority areas and support the 10-year period requested by NNDC. In respect of growth rates for mitigation planting, NNDC request clarification from Ørsted as to the assumed rates of growth shown in the photomontages and in Table 2.2 (page 16) of Environmental Statement Volume 6 Annex 4.5 – Photograph Panels, Wirelines and Photomontages.

Table 2.2: Planting sizes and growth rates assumed in photomontages.

VP	Height at year 1	Height at year 15	Assumed annual growth rate
Woodland and woodland edge planting	0.4 m	4.9 m	0.3 m
Individual trees in hedgerows	3.5 m	6.5 m	0.2 m

3.4. Having regard to rates of growth, any tree species should be considered in line with recommendations contained on the ecological site classification tool as supplied by Forest Research. This is an online tool only (https://www.forestresearch.gov.uk/tools-and-resources/forest-planning-and-management-services/ecological-site-classification-decision-support-system-esc-dss/). This tool is based of grid reference data and provides climatic data and default coarse resolution soil quality information. If additional detailed soil information and plant indicator species are available, a more precise determination of site quality, and a better estimate of species suitability and yield is provided by the ecological site classification system.

3.5. NNDC consider that The Landscape Management Plan should detail the establishment and management of the woodland and all planting for the first 10

years after implementation. The plan should meet the basic requirements of the UK Forestry Standard including establishment densities and final canopy cover rates.

3.6. In relation to monitoring of operational noise, the report by Royal HaskoningDHV entitled *Sheringham Shoal, Cawston, Norfolk Substation Noise Assessment Summary* (2015), referred to by Environmental Health Officer Carol Bye, is an excellent example of why such monitoring is required. The tonal noise described in the report was not expected to occur, but it was discovered and investigated.

3.7. Finally, the report by Destination Research entitled *Economic Impacts of Tourism 2017 Results*, referred to by the Head of Economic and Community Development Rob Young, shows the value of the tourism economy to NNDC and that seasonality is levelling out. While it is correct that tourism has grown during the course of other significant off-shore development, Mr Young explained the potential for impact, particularly on the Deep History Coast (which begins at Weybourne and which is an important attraction throughout the year).

3.8. Given the time constraints of Issue Specific Hearing 4, NNDC indicated that the submissions to be made by Mr Rob Goodliffe, the Coastal Manager, would be provided in writing.

3.9. Mr Goodliffe, on behalf of NNDC wanted to re-iterate to the Examining Panel the position set out in the Council's Local Impact Report and Statement of Common Ground in relation to bring cables onshore in that alternatives other than trenching are possible and work in this location due to it being used for earlier cable landfalls (Sheringham Shoal).

3.10. NNDC contend that mechanical disturbance of the shingle bank releases the fines in the material and therefore weakens the structure. Likewise cutting through the shore platform and cliff will again weaken the geological make up

directly where the infrastructure is placed. Although it may be argued that it will be backfilled and consolidated, Mr Goodliffe thinks it unlikely that mechanical means will do this to the standards of thousands of years of deposition, compression etc.

3.11. It also appears in the materials provided that the cabling will only be 2-3 metres below the surface using open cut trenching. This would appear shallow on an eroding coastline and there would be a real risk that the cabling would become exposed well within the life of the scheme. As such we conclude that alternative methods such as HDD would overcome NNDC concerns, is feasible for the construction of the infrastructure, has been completed successfully in this location and will ultimately lead to more resilient infrastructure.

3.12. NNDC would expect decommissioning conditions in any consent so that should infrastructure become exposed or reaches the end of its functional life, it would be decommissioned and removed (as far as would be practical) to prevent future issues with beach and marine debris.

3.13. The onshore element of Hornsea Project Three passes through some of the District's most sensitive and valued landscapes and this emphasises the importance of key design considerations which will help to reduce overall impacts, both short, medium and long-term.

Appendix 1 – Report by Royal HaskoningDHV entitled Sheringham Shoal, Cawston, Norfolk Substation Noise Assessment Summary (2015)

Royal HaskoningDHV
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Sheringham Shoal
Cawston, Norfolk

Substation Noise Assessment Summary

Document title: Substation Noise Assessment Summary
Status: Final
Date: 13 March 2015
Project name: Sheringham Shoal, Cawston, Norfolk
Project number: PB2539
Client: Statkraft
Client contact: Fabio Spinato

Reference: Version 2.0
Drafted by: Stephen Wigham
Checked by: Dean Curtis
Date / initials check: 13 March 2015
Approved by: Dean Curtis
Date / initials approval: 13 March 2015

Notice

This document and its content has been prepared and is intended solely for Statkraft for information and use in relation to the Sheringham Shoal substation at Cawston, Norfolk.

Royal HaskoningDHV assumes no responsibility to any other party in respect of, arising out of, or in connection with this document and/or its contents.

This document consists of 34 pages.

Document History

Project number: PB2539			**Document reference: Noise Survey and Modelling Exercise**			
Revision	**Purpose Description**	**Originated**	**Checked**	**Reviewed**	**Authorised**	**Date**
Rev 1.0	Draft for internal review	SW	DC	DC		13 August 2014
Rev 1.1	Draft for client review	SW	DC	DC		14 August 2014
Rev 2.0	Final issue	SW	DC	DC	FS	13 March 2015

Client Signoff

Client	Statkraft
Project	Sheringham Shoal, Cawston. Norfolk
Document title	Noise Assessment Summary
Project No.	PB2539
Copy No.	Final issue

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1 Introduction

Section 1 Introduction

1.1 Introduction

This report is submitted to summarise the findings of recent noise surveys and recommendations for the Sheringham Shoal substation in Cawston, Norfolk.

This work follows a recent noise complaint made regarding the site and provides a review of existing noise levels in proximity to the site and consideration for the consented full build out of the substation to incorporate harmonic filters.

1.2 Site Description and Surrounding Area

The site lies approximately 0.5km to the west of the village of Cawston in north Norfolk. Access to the site is via the B1145 road that links the villages of Cawston and Reepham.

The site primarily consists of two large shunt reactors (approximately 5.5m high and 7m wide) and an office unit (approximately 25m x 17m x 5.5m).

The surrounding area is generally rural and agricultural in character. However, there are small clusters of residential properties approximately 400m to the west at Commonside and approximately 330m to the north-east at Glebe Crescent.

1.3 Noise Complaint

A recent complaint was made regarding noise from the site. The complaint originated from 21 Chapel Street, a property located to the north-east of the site. The complainant alleges that substation noise is audible in a rear bedroom under still meteorological conditions and an Environmental Health Officer (EHO) from Broadlands District Council (BDC) has visited the complainant's property and carried out initial investigations.

Royal HaskoningDHV also attended a joint visit with Tony Garland, EHO at BDC, to 21 Chapel Street on 29 July 2014. The findings of this joint survey are presented in Section 4.

2 Legislation and Guidance

Section 2 Legislation and Guidance

2.1 Legislation

Environmental Protection Act, 1990 (EPA)[1]

Section 79 of the Act defines statutory nuisance with regard to noise and determines that local planning authorities have a duty to detect such nuisances in their area.

Where noise is concerned the Act defines statutory nuisance as:

> *'noise emitted from premises so as to be prejudicial to health or a nuisance…….noise that is prejudicial to health or a nuisance and is emitted from or caused by a vehicle, machinery or equipment in a street'.*

Exemptions include:

> '*noise caused by aircraft other than model aircraft….by traffic, by any naval, military or air force of the Crown or by a visiting force…..or by a political demonstration or a demonstration supporting or opposing a cause or campaign'*

The term 'prejudicial to health' is defined within the Act as:

> '*injurious, or likely to cause injury, to health'*

The term 'health' is defined by the World Health Organisation (WHO) in the preamble to the 1952 Constitution as:

> '*a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*'

With regard to the term 'nuisance', there is no specific definition in the Act. However, in common law, the following definition is often used:

> *'A nuisance is a material interference with a person's use or enjoyment of their land or property'*

Section 80 of the Act provides local planning authorities with powers to serve an abatement notice requiring the abatement of a nuisance or requiring works to be executed to prevent their occurrence.

With regard to the mitigation of noise, the Act also defines the concept of "Best Practicable Means" (BPM):

> *''practicable' means reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications;*
>
> *the means to be employed include the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and structures;*
>
> *the test is to apply only so far as compatible with any duty imposed by law; and*
>
> *the test is to apply only so far as compatible with safety and safe working conditions, and with the exigencies of any emergency or unforeseeable circumstances.'*

1 Environmental Protection Act 1990. HMSO, London.

Section 2 Legislation and Guidance

2.2 Guidance

British Standard (BS) 7445: Parts 1 and 2 - Description and measurement of environmental noise[2].

The Standard provides details of the instrumentation and measurement techniques to be used when assessing environmental noise, and defines the basic noise quantity as the continuous A-weighted sound pressure level (L_{Aeq}). Part 2 of BS 7445 replicates ISO standard 1996-2.

World Health Organisation (WHO) Guidelines for community noise[3]

The World Health Organisation provides the following guidelines on community noise levels with regard to their effects on annoyance, speech intelligibility and sleep disturbance. They are replicated in **Table 1**.

Table 1 WHO Guideline values for community noise in specific environments

Specific environment	Critical health effect(s)	L_{Aeq} (dB)	Time base (hours)	L_{Amax} (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

The document also states that, for sources with low-frequency components:

> '*disturbances may occur even though the sound pressure level during exposure is below 30 dB(A)……when the noise is composed of a large proportion of low-frequency sounds a still lower guideline value is recommended'.*

The WHO guidelines do not expand on the statement above to offer guideline values for noise dominated by low frequencies. However in the British Standard 4142 document there is a section that considers an 'acoustic feature' penalty when assessing industrial noise sources. This is explored further below.

2 British Standards Institution, (2003). BS 7445-1:2003 - Description and measurement of environmental noise. Guide to quantities and procedures. BSI, London
3 Berglund et al. (1999) - Guidelines for Community Noise. Geneva, World Health Organisation (WHO).

Section 2 Legislation and Guidance

British Standard (BS) 4142: 1997 – Method for rating industrial noise affecting mixed residential and industrial areas

BS 4142[4] provides a methodology for assessing industrial and background noise levels outside residential buildings and for assessing whether existing and new industrial noise sources are likely to give rise to complaints from the occupants living in the vicinity.

Assessment of the likelihood of complaints is undertaken by subtracting the measured background noise level from the rating level, the greater this difference the greater the likelihood of complaints.

BS 4142 refers to the following:

> *'A difference of around +10 dB or more indicates that complaints are likely.*
>
> *A difference of around + 5 dB is of marginal significance.*
>
> *If the rating level is more than 10 dB below the measured background noise level then this is a positive indication that complaints are unlikely.'*

In general, the lower the value, the less likelihood those complaints will occur.

When assessing the noise from a source, which is classified as the Rated Noise Level, it is necessary to have regard to the acoustic features that may be present in the noise. In Section 8 of BS 4142 it states:

> *'Certain acoustic features can increase the likelihood of complaint over that expected from a simple comparison between the specific noise level and the background noise level. Where present at the assessment location, such features are taken into account by adding 5 dB to the specific noise level to obtain the rating level.'*
>
> *Apply a 5 dB correction if one or more of the following features occur, or are expected to be present for new or modified noise sources:*
>
> - *The noise contains a distinguishable, discrete, continuous note (whine, hiss, screech, hum, etc.);*
> - *The noise contains distinct impulses (bangs, clicks, clatters, or thumps); and*
> - *The noise is irregular enough to attract attention."*

2.3 Application to the Existing Situation

Typically, a good starting point would be to compare site noise against the WHO guidelines internal night-time noise criterion of 30 dB $L_{Aeq,8hr}$. Assuming that an open window offers 10 – 15 dB attenuation (as stated in the guidance) this would equate to an external free-field noise level of 40 – 45 dB L_{Aeq}. However, as stated above the document recommends that, for sources with low-frequency component a lower guideline value is utilised.

It was not possible to conduct a retrospective BS 4142 assessment as Royal HaskoningDHV does not have noise data characterising the local background noise environment that existed before the commissioning of the new substation. Nevertheless the BS 4142 guidance is useful insofar as it suggests that, when assessing an industrial noise source, 5 dB is an appropriate 'penalty' to apply to noise that contains distinguishable tones (such as the 'hum' emitted by the substation in question).

[4] British Standard Institute (1999). BS4142: Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas. British Standard Institute

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3 Methodology

Section 3 Methodology

3.1 Baseline Noise Survey

3.1.1 Methodology

A noise survey was conducted between 24 June 2014 and 25 June 2014 to characterise the existing noise levels affecting the nearest noise sensitive receptors to the site.

During this time the weather conditions were considered favourable for noise measurements with wind speeds of less than 2 m/s, no rain and temperatures of around 19°C in the daytime and 15°C at night.

Noise measurements were conducted on an attended basis at two locations as illustrated in **Appendix A**.

3.1.2 Procedure

The noise measurements were taken using the instrumentation detailed in **Table 2**.

Table 2 Noise survey instrumentation

Instrument	Serial number	Calibration due date at time of survey
Norsonic 118 Type 1 Sound Level Meter	30545	29 May 2015
Norsonic 1251 Portable Calibrator	23517	10 December 2014

The sound level meter was fully calibrated, traceable to UKAS standards and satisfies the requirements of BS EN 61672: 2003[5] for a 'Type 1' Sound Level Meter (SLM).

The instrument was calibrated before and after the survey using the portable calibrator. No deviation in the calibration levels was noted.

Off-Site Noise Measurements

The noise measurements were conducted with the SLM mounted on a tripod at a height of between 1.2m and 1.5m above ground level, in free field conditions i.e. at least 3.5m from a vertical reflective surface.

The SLM was set to record L_{Aeq}, L_{A90}, L_{A10}, L_{Amax} data with a 'fast' time constant and A-weighting for several 15-minute periods during the day and night. **Appendix C** presents descriptions of these terms.

The measurement positions were selected at locations considered representative of No. 14 Glebe Crescent and No.5 Commonside, as far as was reasonably practicable.

On-Site Noise Measurements

In order to establish source noise levels associated with existing site plant, noise measurements were also conducted at a number of locations within the compound as illustrated in **Appendix A**.

[5] British Standards Institution (2003). BS EN 61672-1:2003 Electroacoustics. Sound level meters. Specifications. BSI, London

Section 3 Methodology

3.2 Noise Survey in 21 Chapel Street

3.2.1 Methodology

A noise survey was conducted on 29 July 2014 to characterise the existing noise levels at the substation site boundary and within the rear bedroom of 21 Chapel Street, Cawston. The survey was also attended by Tony Garland, EHO from BDC.

The weather was clear, warm (19°C) with winds <0.5m/s^{-1}. It was agreed with Tony Garland that under such conditions the noise emissions from the substation would represent an acceptable conservative assessment scenario.

3.2.2 Procedure

The noise measurements were taken using the instrumentation detailed in **Table 3**.

Table 3 Noise survey instrumentation

Instrument	Serial number	Calibration due date at time of survey
Brüel and Kjaer 2250 Type 1 Sound Level Meter	2590499	30 May 2015
Brüel and Kjaer 4231 Portable Calibrator	1850087	07 January 2015

The sound level meter was fully calibrated, traceable to UKAS standards and satisfies the requirements of BS EN 61672: 2003[6] for a 'Type 1' Sound Level Meter (SLM).

The instrument was calibrated before and after the survey using the portable calibrator. No deviation in the calibration levels was noted.

The SLM was set to record L_{Aeq}, L_{A90}, L_{A10}, L_{Amax} data with a 'fast' time constant and A-weighting. Appropriate narrowband (FFT) data was collected from the substation site boundary and in the complainant's bedroom. **Appendix C** presents descriptions of these terms.

[6] British Standards Institution (2003). BS EN 61672-1:2003 Electroacoustics. Sound level meters. Specifications. BSI, London

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4 Survey Results

Section 4 Survey Results

4.1 Baseline Noise Survey

4.1.1 Off-Site Survey - Measurement Summary

A summary of the measured data are presented in **Table 4** along with observations made regarding the character of noise and any specific noise sources audible during the survey.

Table 4 Noise level summary – neighbouring receptors

Location	Time start	dB $L_{Aeq,15min}$	dB $L_{Amax,15min}$	dB $L_{A10,15min}$	dB $L_{A90,15min}$	Comments
Commonside	15:17	50.3	63.7	54.0	40.3	Measurement included car-pass-bys. No site noise audible
	00:25	36.0	61.7	36.3	23.6	Measurement included car-pass-bys. Site noise just audible
	00:41	24.5	42.7	26.4	21.1	No vehicle movements. Site noise just audible
Glebe Crescent	15:52	66.0	81.2	71.3	36.5	Measurement included car-pass-bys. No site noise audible
	00:01	28.6	61.1	28.8	23.9	No vehicle movements. Site noise just audible
	01:07	51.7	80.2	29.3	23.0	Measurement included car-pass-bys. Site noise just audible

During the daytime noise levels were around 50 dB L_{Aeq} at Commonside and around 66 dB L_{Aeq} at Glebe Crescent. Site noise was not audible at the nearest noise sensitive receptors. Noise sources included vehicle movements on the B1145, birdsong and distant road traffic noise.

At night, during lulls of vehicle movements, external noise levels were in the region of 25 – 29 dB $L_{Aeq,15min}$ and noise from the site was just audible in the form of a continuous low frequency hum. Other noise sources during the night time measurement period included birdsong and distant road traffic noise.

Section 4 Survey Results

4.1.2 Spectral Component of Off-Site Data

The third octave band noise data, acquired at night for the two off-site measurements during the absence of extraneous noise sources, are presented as charts in Figures 1 and 2.

Figure 1 Spectral content of noise measured at Glebe Crescent (third octave band)

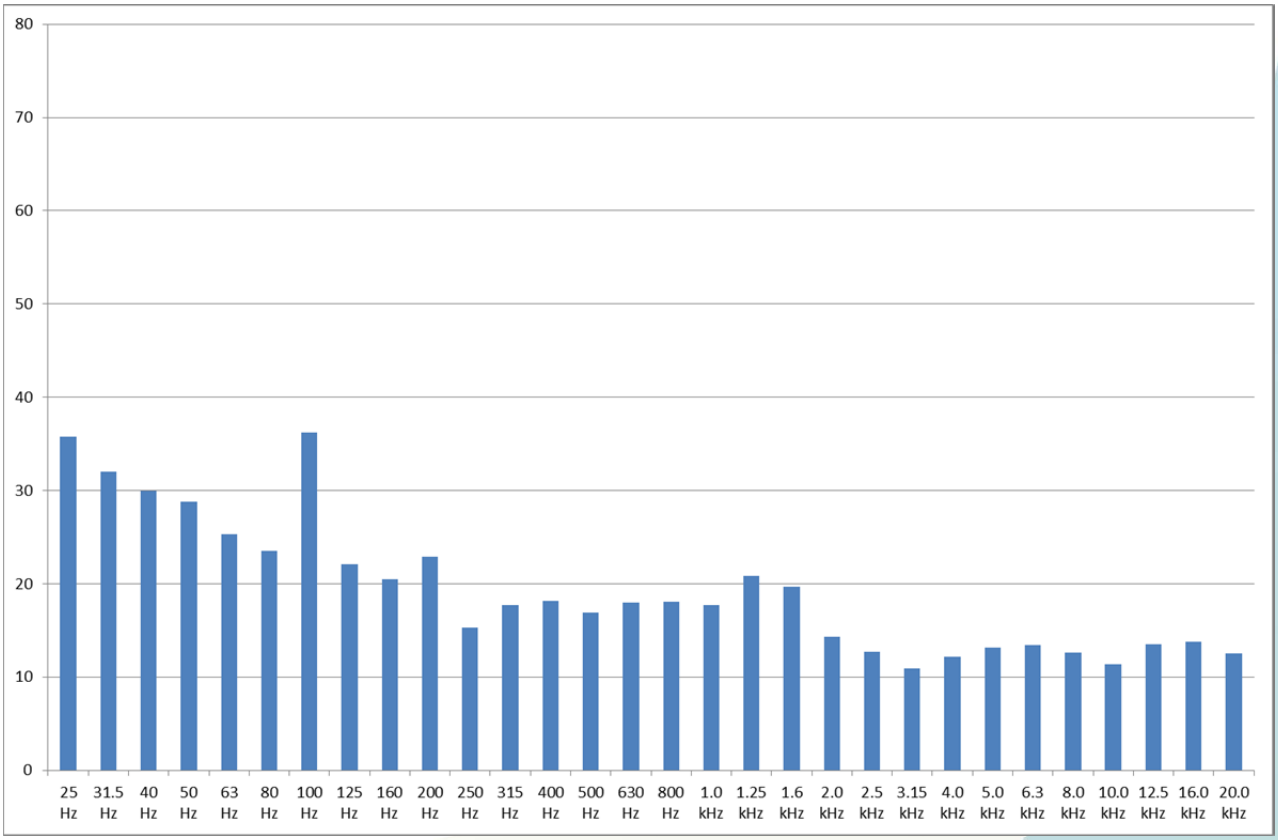


Figure 1 highlights at this location, there was a distinct peak in the noise data at 100 Hz.

Section 4 Survey Results

Figure 2 Spectral content of noise measured at Commonside (third octave band)

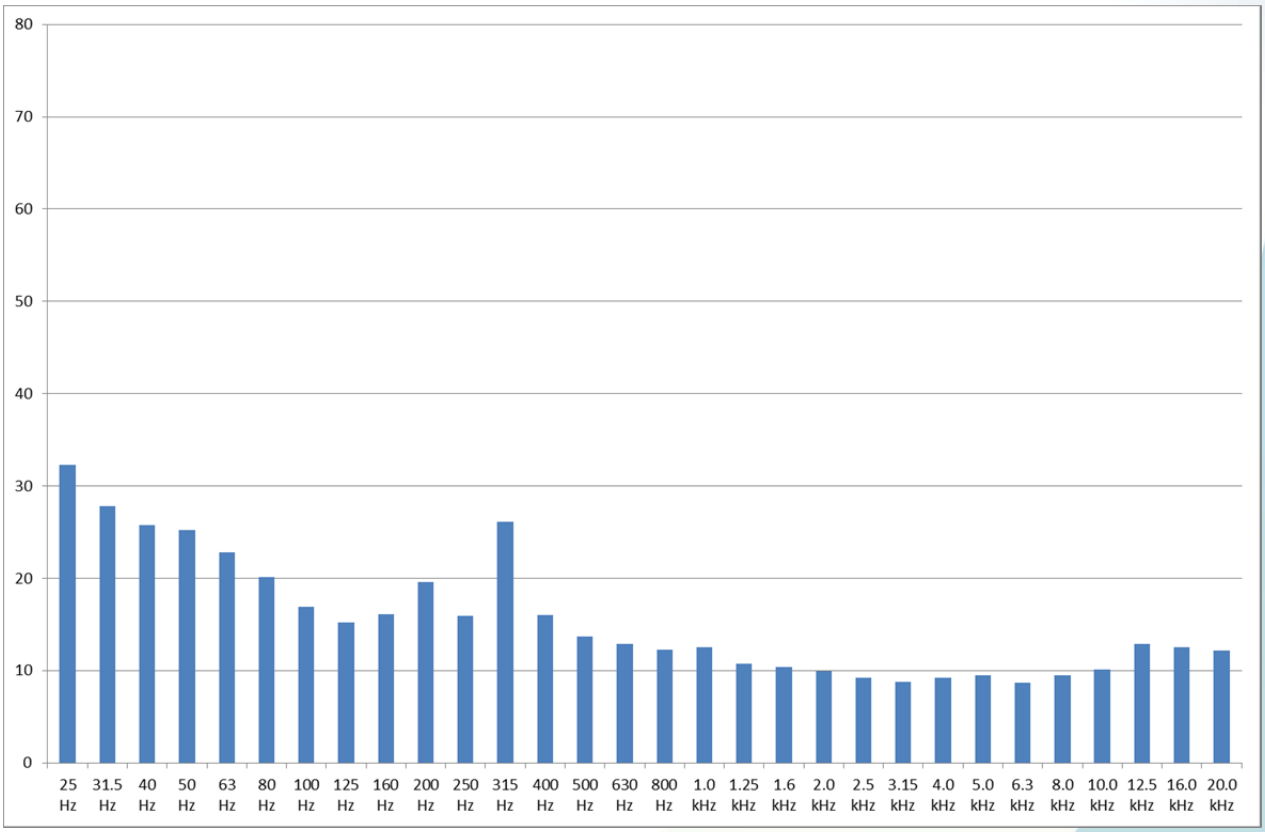


Figure 2 highlights at this location, there was a distinct peak in the noise data at 315 Hz.

Section 4 Survey Results

4.1.3 On-Site Survey - Measurement Summary

Table 5 Summary – substation source noise levels

Location	Description	dB L_{Aeq}
1	5m from Shunt Reactor 1	68.9
		68.2
2	5m from Shunt Reactor 2	70.1
		70.6
3	North-east corner of compound	59.7
4	South-west corner of compound	56.7
5	Western boundary of compound, near office	66.4
6	North-west corner of compound	66.8

The primary noise sources operating at the site were the two-shunt reactors. The measurements show that noise levels associated with the shunt reactors were in the range of 68 – 71 dB L_{Aeq}.at a distance of 5m.

4.1.4 Spectral Component of On-Site Data

The third octave band noise data acquired for the four measurements made close to the shunt reactors have been logarithmically averaged. A chart to show the spectral component of noise associated with the shunt reactors is presented in **Figure 3**.

Section 4 Survey Results

Figure 3 Spectral content of noise source data (third octave band)

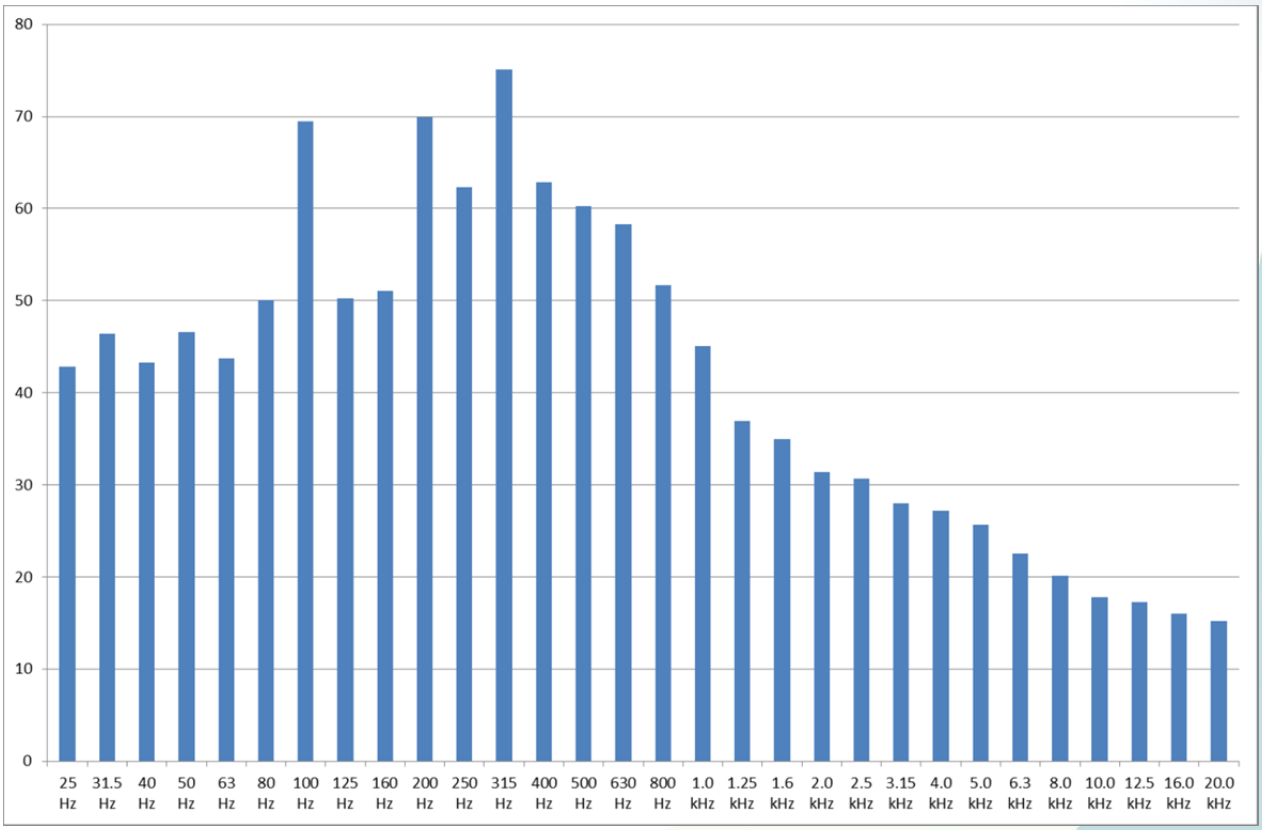


Figure 3 highlights that there were distinct peaks in the source noise data at 100 Hz, 200 Hz and 315 Hz.

4.1.5 Baseline Noise Survey Results Analysis

The results of the noise survey show that, in lulls of extraneous noise sources, site attributed external noise levels were up to 29 dB $L_{Aeq,15min}$ at nearest noise sensitive receptors.

WHO guidelines suggest that an open window offers around 10 - 15 dB attenuation. With this in mind it is anticipated that site attributed noise levels would be around 14 – 19 dB(A) inside the properties. This is at least 10 dB below the night noise threshold suggested by WHO.

Nevertheless, a noise complaint regarding a low frequency tone has been submitted and the spectral analysis of noise measured at the two assessed receptors correlates with the frequency content exhibited by the noise sources. Figure 1 and Figure 2 highlight that, , the noise levels measured at the receptor positions were approximately 10 - 15 dB higher at the third octave band centre frequencies of 100 Hz and 315 Hz than adjacent third octave bands.

Section 4 Survey Results

4.2 Noise Survey at 21 Chapel Street

4.2.1 Substation Site Boundary - Measurement Summary

A summary of the measured data are presented in **Table 6.**

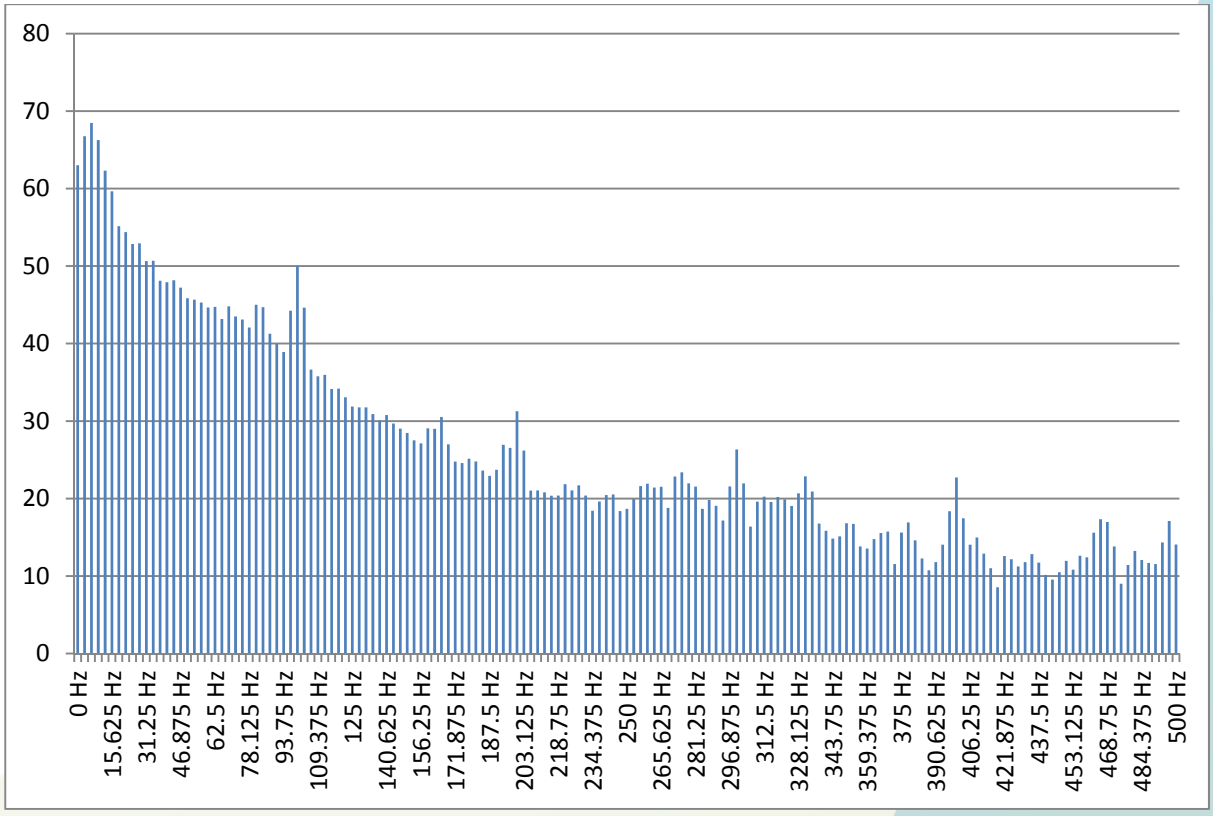
Table 6 Measured noise levels at substation site boundary (roadside)

Name	Start time	dB L_{Aeq}	dB L_{AF10}	dB L_{AF90}	dB L_{AFmax}	dB L_{Zeq} 100Hz	dB L_{Aeq} 100Hz
Total	29/07/2014 22:40	37.0	39.4	34.3	48.1	50.6	31.5

4.2.2 Spectral Component of Substation Site Boundary Data

The third octave band noise data, acquired during the night time period at the substation site boundary in the absence of extraneous noise sources, are presented as charts in **Figure 4** and **Figure 5**.

Figure 4 Narrowband spectrum of substation noise at site boundary (linear)

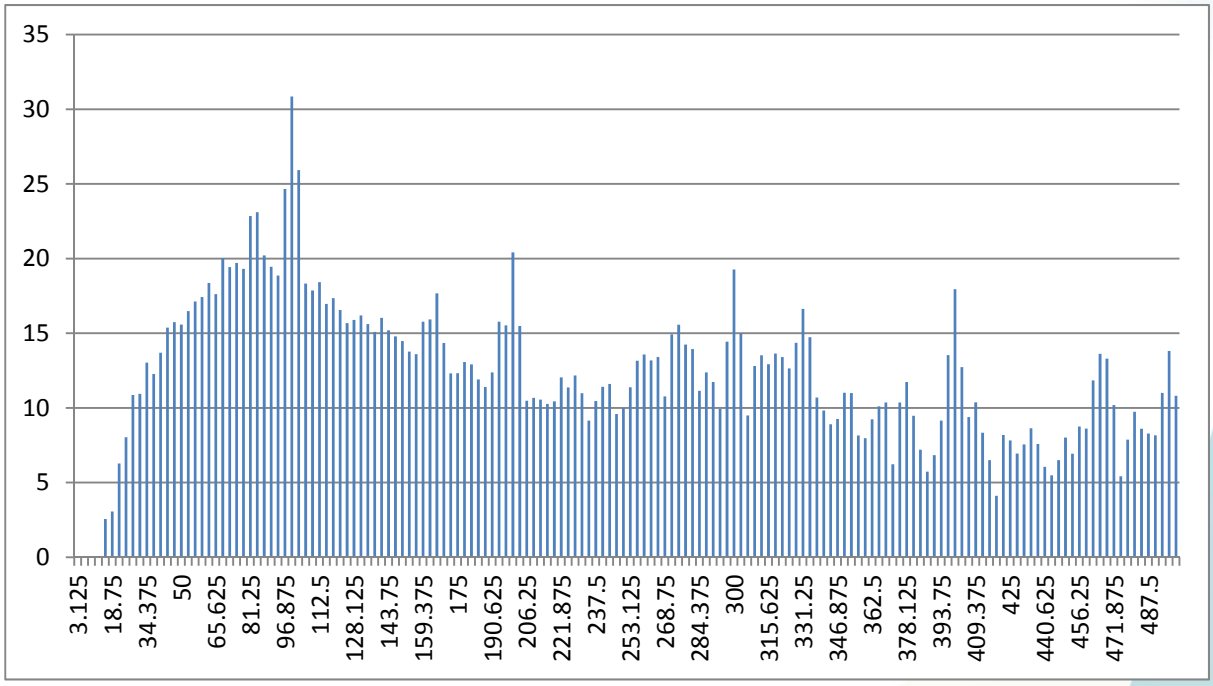


At the site boundary location, adjacent to the B1145, dominant tones were detected at the following frequencies (linear):

- 100Hz 50.0dB
- 200Hz 31.3dB
- 300Hz 26.3dB
- 400Hz 22.7dB

Section 4 Survey Results

Figure 5 Narrowband spectrum of substation noise at site boundary (A-weighted)



At the site boundary location, adjacent to the B1145, dominant tones were detected at the following A-weighted frequencies:

- 100Hz 30.9dB
- 200Hz 20.4dB
- 300Hz 19.3dB
- 400Hz 18.0dB

4.2.3 Background Location (Reepham) - Measurement Summary

A summary of the measured data are presented in **Table 7.**

Table 7 Measured external background noise levels near Reepham

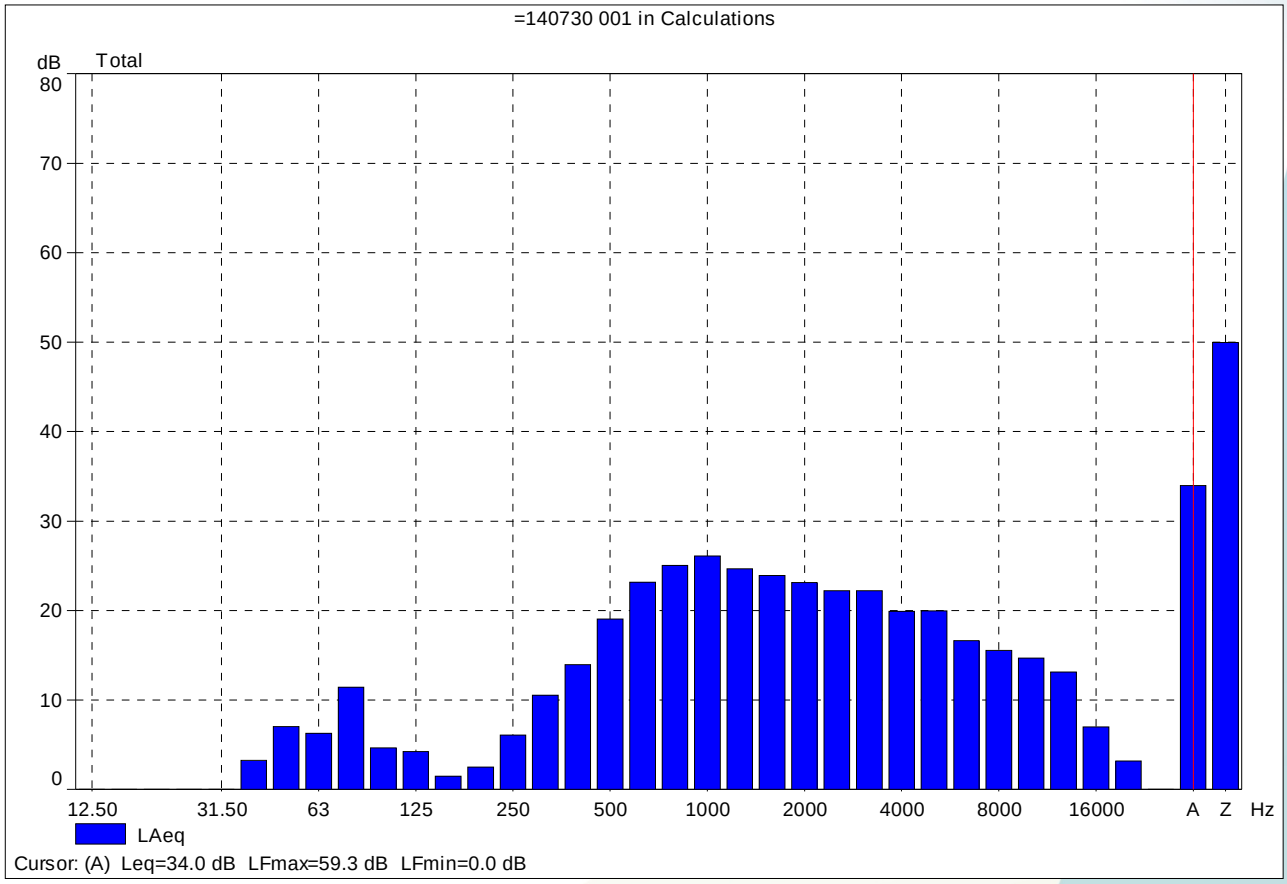
Name	Start time	dB L_{Aeq}	dB L_{AF10}	dB L_{AF90}	dB L_{AFmax}	dB L_{Aeq} 100Hz
Total	30/07/2014 00:13	34.0	34.8	23.2	59.3	4.7

4.2.4 Spectral Component of Background Location (Reepham)

The third octave band noise data, acquired during the night-time period at the background location near Reepham in the absence of extraneous noise sources, are presented as a chart in **Figure 6**.

Section 4 Survey Results

Figure 6 Spectral content of measured noise data (third octave band)



4.2.5 Rear Bedroom of 21 Chapel Street - Measurement Summary

A summary of the measured data are presented in **Table 8** along with observations made regarding the character of noise and any specific noise sources audible during the survey.

Table 8 Measured noise levels in rear bedroom

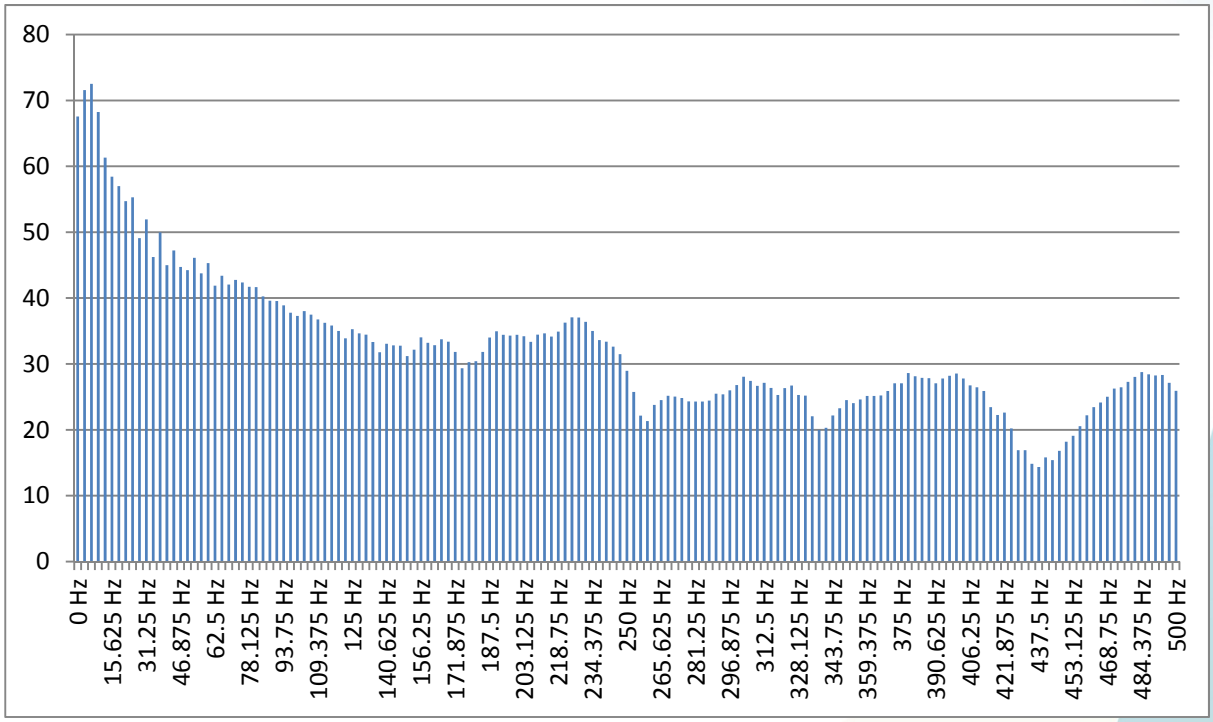
Name	Start time	dB L_{Aeq}	dB L_{AF10}	dB L_{AF90}	dB L_{AFmax}	dB L_{Zeq} 100Hz	dB L_{Aeq} 100Hz
Total	29/07/2014 23:21	37.8	39.7	35.6	43.8	31.9	12.8

4.2.6 Spectral Component of Measured Bedroom Level Data

The third octave band noise data, acquired at night in the first floor rear bedroom of 21 Cawston Street, are presented as charts in **Figure 7** and **Figure 8**.

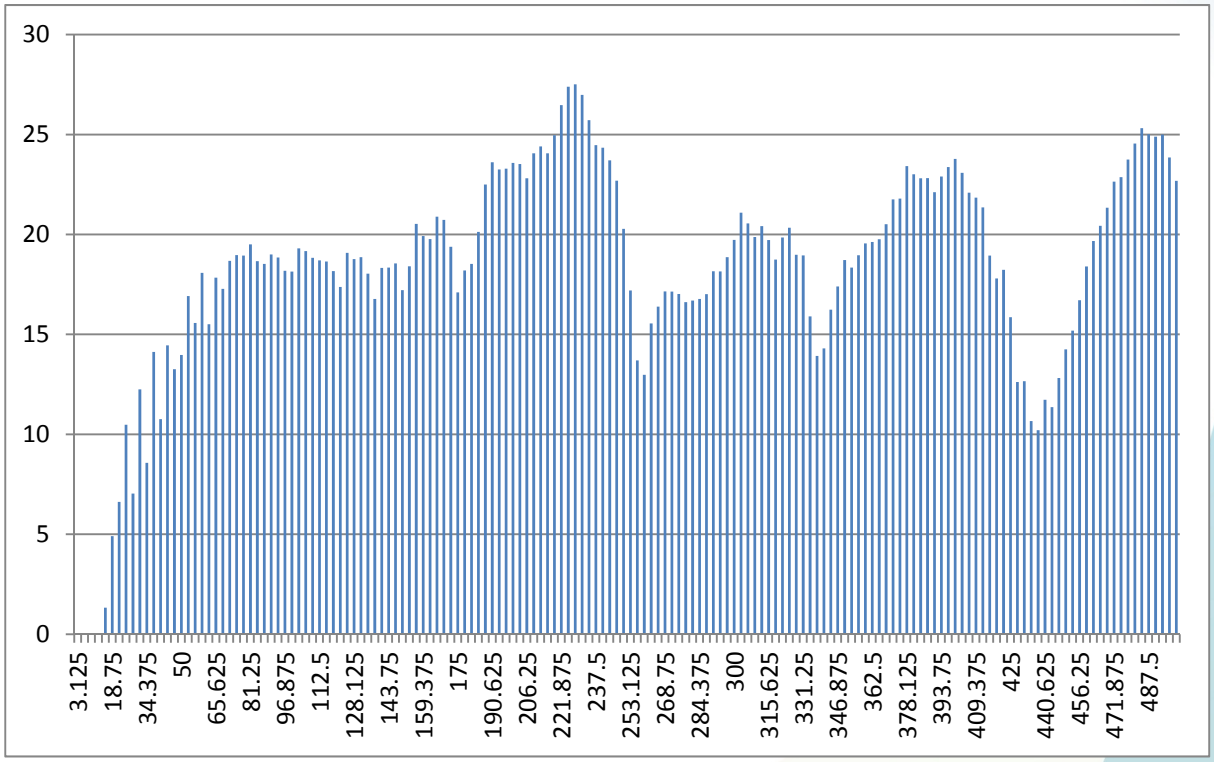
Section 4 Survey Results

Figure 7 Narrowband spectrum in 21 Cawston Street rear bedroom (linear) – Night time



Section 4 Survey Results

Figure 8 Narrowband spectrum in 21 Cawston Street rear bedroom (A-weighted) – Night time



Figures 7 and **8** indicate that the dominant tones identified at the substation site boundary are not present in the bedroom. The above narrowband assessment will include household electrical noise present at the time of the survey.

4.2.7 21 Chapel Street Noise Survey Results Analysis

Figures 7 and **8** indicate that the dominant tones identified at the substation site boundary are not present in the bedroom.

The 100Hz tone from the Cawston substation site was audible when very close to the open bedroom window, although this was at a very low level. The tone was not detectable within the bedroom, as **Figures 7** and **8** indicate, and Tony Garland confirmed that the noise did not constitute a statutory nuisance on this occasion. The conclusions of the joint noise survey were relayed to Mr Sutton and Mr Livingstone immediately following the survey.

Mr Sutton explained that he has written to other residents in the village requesting their opinion on the substation noise and has urged them to pursue a noise complaint through BDC if they believe the noise to be a nuisance. Tony Garland will need to investigate each complaint on its own merit, however it can be concluded that a likely similar conclusion would be drawn if other residents were to lodge a complaint.

The substation tonal noise was also detectable at a very low level at the junction of Chapel Street and High Street. The noise was akin to that emitted from a street light when a bulb requires replacement. As the noise was at such a low level, it can be concluded that it would not likely be detectable inside a dwelling, even with a bedroom window open.

4.3 Historical Survey Work

dB Attenuation Ltd. examined the noise levels in and around the original substation since energisation and their report Ref: dB/SR/23073/JB/002 (February 2012) provides a comparison to the previously completed acoustic report, document

Section 4 Survey Results

dB/SR/2224/JB/001. It was concluded through a predictive assessment that there would be noise content at 100Hz in the region of 34dB outside the Eastern cottages. This conclusion aligns with the monitoring results presented in **Section 4.1**.

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5 Harmonic Filters

Section 5 Harmonic Filters

5.1 Noise from Proposed Harmonic Filters

It is understood that there are proposals to install harmonic filters at the Cawston site, which involves works consented as part of the original Sheringham Shoal substation development. No noise data is currently available for this equipment. In order to avoid the potential for increased noise emission from the site it is recommended that noise from the new equipment is controlled such that the contribution is at least 10dB below existing noise levels. Assuming that the new equipment will be located in close proximity to the existing plant (i.e. no closer to noise sensitive receptors), this should result in no observable cumulative increase from the site and noise from the existing shunt reactors would remain entirely dominant. **Table 9** presents the data from **Figure 3** in tabular format along with recommended maximum noise levels, at 5m distance, for the proposed harmonic filters.

Table 9 Noise spectrum from existing shunt reactors (at 5m distance) and recommended upper limit for noise associated with proposed plant (at 5m distance)

Frequency	Existing Plant Noise Level at 5m distance (dB)	Recommended Upper Limit for Noise Associated with Proposed Plant at 5m distance (dB)
25 Hz	42.8	32.8
31.5 Hz	46.4	36.4
40 Hz	43.2	33.2
50 Hz	46.6	36.6
63 Hz	43.7	33.7
80 Hz	50.1	40.1
100 Hz	69.5	59.5
125 Hz	50.2	40.2
160 Hz	51.1	41.1
200 Hz	69.9	59.9
250 Hz	62.4	52.4
315 Hz	75.1	65.1
400 Hz	62.8	52.8
500 Hz	60.2	50.2
630 Hz	58.3	48.3
800 Hz	51.7	41.7
1.0 kHz	45.1	35.1
1.25 kHz	36.9	26.9
1.6 kHz	35.0	25.0
2.0 kHz	31.4	21.4
2.5 kHz	30.7	20.7
3.15 kHz	28.0	18.0
4.0 kHz	27.2	17.2
5.0 kHz	25.6	15.6
6.3 kHz	22.6	12.6
8.0 kHz	20.1	10.1
10.0 kHz	17.8	7.8
12.5 kHz	17.2	7.2
16.0 kHz	16.1	6.1
20.0 kHz	15.2	5.2

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6 Summary and Conclusions

Section 6 Summary and Conclusions

6.1 Summary and Conclusions

6.1.1 Baseline noise survey

A noise survey was conducted between 24 June 2014 and 25 June 2014 to characterise the existing noise levels affecting the nearest noise sensitive receptors to the site.

The primary noise sources operating at the site were the two shunt reactors. The measurements show that noise levels associated with the shunt reactors were in the range of 68 – 71 dB L_{Aeq} at a distance of 5m.

The results of the off-site noise survey show that, in lulls of extraneous noise sources, site attributed external noise levels were up to 29 dB $L_{Aeq,15min}$ at nearest noise sensitive receptors.

WHO guidelines suggest that an open window offers around 10 - 15 dB attenuation. With this in mind it is anticipated that site attributed noise levels would be around 14 – 19 dB(A) inside the properties. This is at least 10 dB below the night noise threshold suggested by WHO.

The results of the noise survey align with the previous predictive work undertaken by dB Attenuation Ltd.

6.1.2 Noise survey at 21 Chapel Street

A noise survey was conducted on 29 July 2014 to characterise the existing noise levels at the substation site boundary (roadside) and within the rear bedroom of 21 Chapel Street, Cawston The survey concluded that the 100Hz tone attributed to the plant operating at the Cawston substation was audible when very close to the open rear bedroom window, although this was at an extremely low level. The tone was not detectable within the bedroom. Tony Garland, EHO at BDC, confirmed that the noise did not constitute a statutory nuisance on this occasion. Tony Garland also informed Mr Sutton and Mr Livingstone of the conclusions following the survey.

6.1.3 Harmonic filter installation

To avoid the potential for increased noise emission from the substation following the installation of the harmonic filters, the assessment has concluded that noise from the new equipment is controlled such that the contribution is at least 10 dB below existing noise levels. Assuming that the new equipment will be located in close proximity to the existing plant (i.e. no closer to noise sensitive receptors), this should result in no observable cumulative increase from the site and noise from the existing shunt reactors would remain entirely dominant.

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Appendix A

Site Plan

Appendix A

Baseline Site and Off-Site Measurement Locations

Appendix A

21 Chapel Street Survey

Substation and Complainant Monitoring Locations

Background Monitoring Location (Reepham)

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Appendix B

Acoustic Terminology

Appendix B

Term	Description
Decibel (dB)	A unit of noise level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 µPa, the threshold of normal hearing is 0dB, and 140dB is the threshold of pain. A change of 1dB is only perceptible under controlled conditions. Under normal conditions a change in noise level of 3dB(A) is the smallest perceptible change.
dB(A)	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
FFT	Fast Fourier Transfer. A digital signal processing technique that converts a time record into a narrow band constant bandwidth filtered spectrum. Measurements are defined by specifying the frequency span and a number of lines (or filters).
$L_{Aeq,T}$	The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,\,T}$ is used to describe many types of noise and is the conventional descriptor of environmental noise, and this is defined below. $$L_{eq,T} = 10 \times \log\left[\frac{1}{T}\int \frac{\rho^2(t)\,\partial t}{\rho_0^2}\right] \text{dB}$$
$L_{A10,T}$	The A weighted noise level exceeded for 10% of the specified measurement period (T). L_{A10} is the index generally adopted to assess traffic noise.
$L_{A90,\,T}$	The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 1990 it is used to define the 'background' noise level.
L_{Amax}	The maximum A-weighted sound pressure level recorded during a measurement.
L_{Amin}	The minimum A-weighted sound pressure level recorded during a measurement.
R_w	The weighted sound reduction index, R_w, is a single figure description of sound reduction index which is defined in BS EN ISO 717-1: 1997. The R_w is calculated from measurements in an acoustic laboratory to BS EN ISO 140-3:1997 and ratings to BS EN ISO 717-1:1997. Sound insulation ratings derived from site (which are invariably lower than the laboratory figures) are referred to as the R'_w ratings (apparent weighted sound reduction index) and measured to BS EN ISO 140-4:1998

Appendix 2 – Report by Destination Research entitled Economic Impacts of Tourism 2017 Results, referred to by the Head of Economic and Community Development Rob Young.

destinationresearch
delivering results : measuring what matters

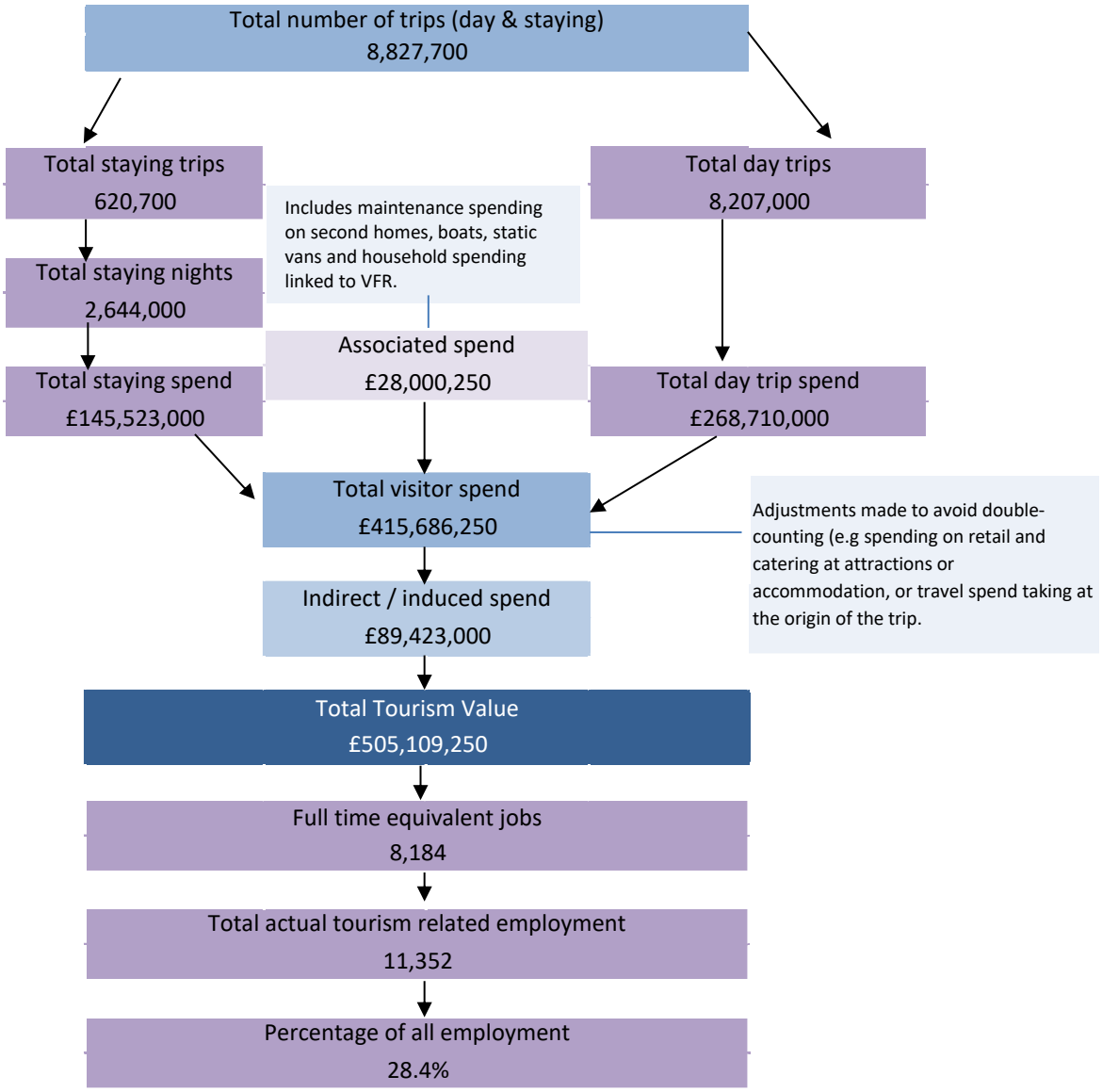
Economic Impact of Tourism

North Norfolk - 2017

Produced by:

Destination Research
Sergi Jarques, Director

Economic Impact of Tourism – Headline Figures North Norfolk - 2017

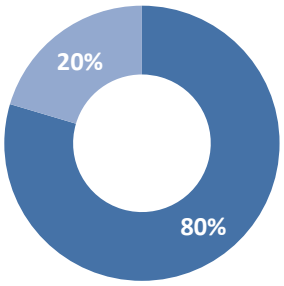


Economic Impact of Tourism – Year on year comparisons

Day Trips	2016	2017	Annual variation
Day trips Volume	7,755,000	8,207,000	5.8%
Day trips Value	£261,055,000	£268,710,000	2.9%
Overnight trips			
Number of trip	553,500	620,700	12.1%
Number of nights	2,415,000	2,644,000	9.5%
Trip value	£141,018,000	£145,523,000	3.2%
Total Value	£490,357,250	£505,109,250	3.0%
Actual Jobs	11,020	11,352	3.0%

	2016	2017	Variation
Average length stay (nights x trip)	4.36	4.26	-2.3%
Spend x overnight trip	£ 254.55	£ 234.34	-7.9%
Spend x night	£ 58.39	£ 55.04	-5.7%
Spend x day trip	£ 33.66	£ 32.74	-2.7%

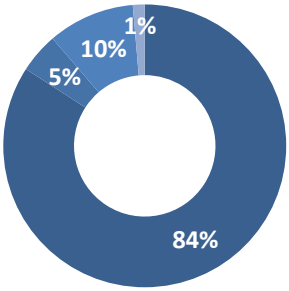
Type of Accommodation



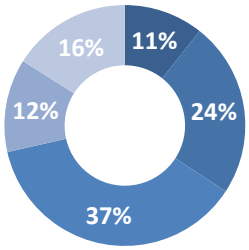
- Paid Accommodation
- Friends / relatives / second homes

Trips by Purpose

- Holiday
- Business
- Friends / relatives
- Other
- Study



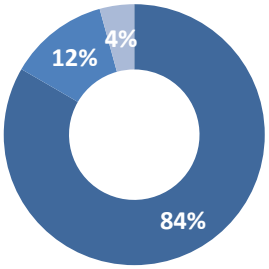
Breakdown of expenditure



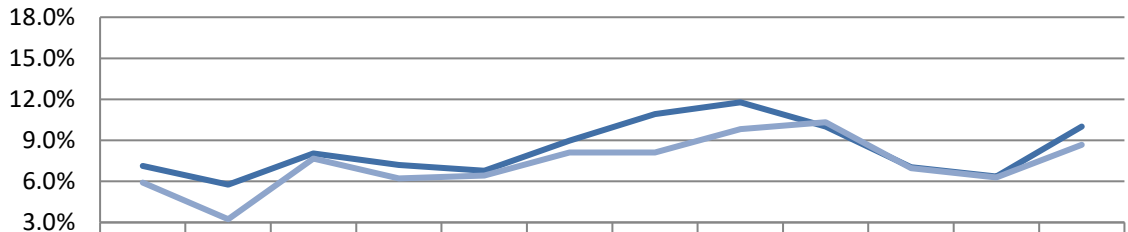
- Accommodation
- Shopping
- Food and drink
- Entertainment
- Travel

Type of employment

- Direct (tourism industries)
- Indirect
- Induced

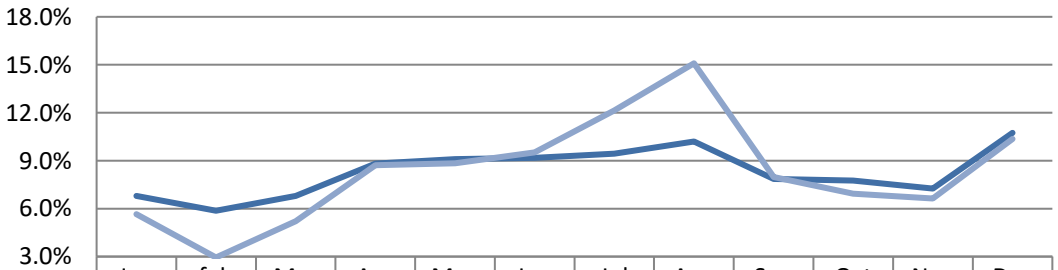


Seasonality - Day visitors



	Jan	feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Day trips	7.1%	5.8%	8.1%	7.2%	6.8%	9.0%	10.9%	11.8%	10.0%	7.0%	6.4%	10.0%
Day spend	5.9%	3.2%	7.7%	6.2%	6.4%	8.1%	8.1%	9.8%	10.3%	7.0%	6.3%	8.7%

Seasonality - Overnight visitors



	Jan	feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Overnight trips	6.8%	5.9%	6.8%	8.8%	9.1%	9.2%	9.4%	10.2%	7.8%	7.8%	7.3%	10.7%
Overnight spend	5.6%	2.9%	5.2%	8.7%	8.8%	9.5%	12.1%	15.1%	8.0%	6.9%	6.6%	10.4%

Contextual analysis

INTRODUCTION

This report examines the volume and value of tourism and the impact of visitor expenditure on the local economy in 2017 and provides comparative data against previously published data. The results are derived using the Cambridge Economic Impact Model under licence by Destination Research Ltd based on the latest data from national tourism surveys and regionally/locally based data.

CONTEXTUAL ANALYSIS

The three key surveys used to measure volume and expenditure from tourism trips are the GB Tourism Survey (for domestic overnight trips), the International Passenger Survey (IPS) for visits from overseas, and the BG Day Visitor Survey (GBDVS), which measures tourism day visits.

Domestic tourism

National Performance

In 2017, British residents took 104.2 million overnight trips in England, totalling 299 million nights away from home. The number of domestic trips was 5% higher than in 2016, and nights were up by 4% compared to the 2016. Holiday Trips in England in 2017 increased by 9% compared to 2016, with 48.9 million trips recorded.

Regional performance

The East of England region experienced a 3% increase in overnight trips during 2017. Bednights were up by 13% on 2016 and expenditure was also up by 13%. This resulted in an increase in the average length of trips (the number of night per trip) from 3 nights per trip in 2016 to 3.3 in 2017.

The average spend per night was unchanged at £52.5 and the spend per trip was up from £159.53 in 2016 to £175.54 in 2017. The region received more visitors in 2017 than in the previous year. But importantly, they stayed for longer, which resulted in an average greater expenditure levels per trip.

The GB Tourism Survey data is a key driver for the Cambridge model. However, it is not specifically designed to produce highly accurate results at regional level. In order to improve the accuracy of results we have applied a 3-year rolling average to this data to help smooth out short term market fluctuations and highlight longer-term trends.

Visits from overseas

National Performance

The number of visits in 2017 grew 4% to a record 39.2 million, after several years of growth since 2010. The number of visitor nights spent in the UK increased by 3% in 2017 to 286 million, with the average number of nights per visit declined slightly from 7.4 in 2016 to 7.3 in 2017. The value of spending increased by 9% to £24.5 billion. Average spend per visit was £7625 in 2017, up from £599 per visit in 2016.

Regional performance

The number of Overseas trips to the East of England in 2017 was unchanged at 2.4 million overnight trips. The total number of nights was down by 2% to 16.1 million. Spend was down by 4.5% to £815 million in 2017.

The International Passenger Survey (IPS) data is a key driver for the Cambridge model. However, as with the GBTS, it is not specifically designed to produce highly accurate results at regional level. In order to improve the accuracy of results we have applied a 3-year rolling average to this data to help smooth out short term market fluctuations and highlight longer-term trends.

Tourism Day Visits

National Performance

During 2017, GB residents took a total of 1,793 million Tourism Day Visits to destinations in England, Scotland or Wales, 2% down on 2016. Around £62.4 billion was spent during these trips, about 2.4% down on 2016.

The largest proportion of visits were taken to destinations in England (1,505 million visits or 84% of the total). The distribution of expenditure during visits broadly reflects this pattern, with a total value of day trips to England totalling £50.9 billion (81.5% of the total for GB).

Regional performance

During 2016, the volume tourism day visits in the East of England decreased by 5% to 133 million. However, spend was up by 10% to £3.85 billion).

Volume of Tourism

Staying Visitors - Accommodation Type

Trips by Accommodation

	UK		Overseas		Total	
Serviced	94,000	16%	1,800	6%	95,800	15%
Self catering	112,000	19%	4,100	14%	116,100	19%
Camping	71,000	12%	1,500	5%	72,500	12%
Static caravans	119,000	20%	600	2%	119,600	19%
Group/campus	34,000	6%	4,500	16%	38,500	6%
Paying guest	0	0%	0	0%	0	0%
Second homes	37,000	6%	1,500	5%	38,500	6%
Boat moorings	17,000	3%	0	0%	17,000	3%
Other	17,000	3%	1,300	4%	18,300	3%
Friends & relatives	92,000	16%	13,500	47%	105,500	17%
Total 2017	**592,000**		**29,000**		**621,000**	
Comparison 2016	**525,000**		**29,000**		**554,000**	
Difference	**13%**		**0%**		**12%**	

Nights by Accommodation

	UK		Overseas		Total	
Serviced	258,000	11%	8,000	3%	266,000	10%
Self catering	386,000	16%	84,000	28%	470,000	18%
Camping	340,000	14%	7,000	2%	347,000	13%
Static caravans	614,000	26%	2,000	1%	616,000	23%
Group/campus	84,000	4%	84,000	28%	168,000	6%
Paying guest	0	0%	0	0%	0	0%
Second homes	140,000	6%	8,000	3%	148,000	6%
Boat moorings	87,000	4%	0	0%	87,000	3%
Other	109,000	5%	3,000	1%	112,000	4%
Friends & relatives	332,000	14%	100,000	34%	432,000	16%
Total 2017	**2,348,000**		**296,000**		**2,644,000**	
Comparison 2016	**2,100,000**		**315,000**		**2,415,000**	
Difference	**12%**		**-6%**		**9%**	

Spend by Accommodation Type

	UK		Overseas		Total	
Serviced	£25,350,000	20%	£710,000	4%	£26,060,000	18%
Self catering	£25,581,000	20%	£5,590,000	33%	£31,171,000	21%
Camping	£19,358,000	15%	£336,000	2%	£19,694,000	14%
Static caravans	£27,416,000	21%	£196,000	1%	£27,612,000	19%
Group/campus	£5,914,000	5%	£4,732,000	28%	£10,646,000	7%
Paying guest	£0	0%	£0	0%	£0	0%
Second homes	£4,081,000	3%	£821,000	5%	£4,902,000	3%
Boat moorings	£6,101,000	5%	£0	0%	£6,101,000	4%
Other	£6,022,000	5%	£183,000	1%	£6,205,000	4%
Friends & relatives	£8,538,000	7%	£4,592,000	27%	£13,130,000	9%
Total 2017	**£128,362,000**		**£17,161,000**		**£145,523,000**	
Comparison 2016	**£123,066,000**		**£17,952,000**		**£141,018,000**	
Difference	**4%**		**-4%**		**3%**	

Serviced accommodation includes hotels, guesthouses, inns, B&B and serviced farmhouse accommodation. Paying guest refers to overseas visitors staying in private houses, primarily language school students. Other trips includes nights spent in transit, in lorry cabs and other temporary accommodation.

Staying Visitors - Purpose of Trip

Trips by Purpose

		UK		Overseas		Total	
Holiday		509,000	86%	13,200	46%	522,200	84%
Business		27,000	5%	1,400	5%	28,400	5%
Friends & relatives		49,000	8%	12,700	44%	61,700	10%
Other		7,000	1%	1,400	5%	8,400	1%
Study		0	0%	0	0%	0	0%
Total	**2017**	**592,000**		**28,700**		**620,700**	
Comparison	**2016**	**525,000**		**28,500**		**553,500**	
Difference		**13%**		**1%**		**12%**	

Nights by Purpose

		UK		Overseas		Total	
Holiday		2,039,000	87%	115,000	39%	2,154,000	81%
Business		77,000	3%	11,000	4%	88,000	3%
Friends & relatives		216,000	9%	157,000	53%	373,000	14%
Other		16,000	1%	13,000	4%	29,000	1%
Study		0	0%	0	0%	0	0%
Total	**2017**	**2,348,000**		**296,000**		**2,644,000**	
Comparison	**2016**	**2,100,000**		**315,000**		**2,415,000**	
Difference		**12%**		**-6%**		**9%**	

Spend by Purpose

		UK		Overseas		Total	
Holiday		£117,351,000	91%	£8,108,000	47%	£125,459,000	86%
Business		£4,749,000	4%	£841,000	5%	£5,590,000	4%
Friends & relatives		£5,049,000	4%	£7,342,000	43%	£12,391,000	9%
Other		£1,214,000	1%	£870,000	5%	£2,084,000	1%
Study		£0	0%	£0	0%	£0	0%
Total	**2017**	**£128,362,000**		**£17,161,000**		**£145,523,000**	
Comparison	**2016**	**£123,066,000**		**£17,952,000**		**£141,018,000**	
Difference		**4%**		**-4%**		**3%**	

Day Visitors

Trips and Spend by Urban, Rural and Coastal Area

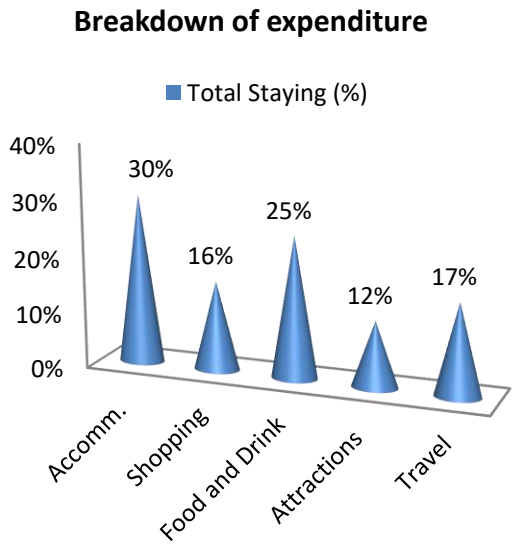
		Trips	Spend
Urban visits		2,979,000	£112,692,000
Countryside visits		3,201,000	£99,707,000
Coastal visits		2,027,000	£56,311,000
Total	**2017**	**8,207,000**	**£268,710,000**
Comparison	**2016**	**7,755,000**	**£261,055,000**
Difference		**6%**	**3%**

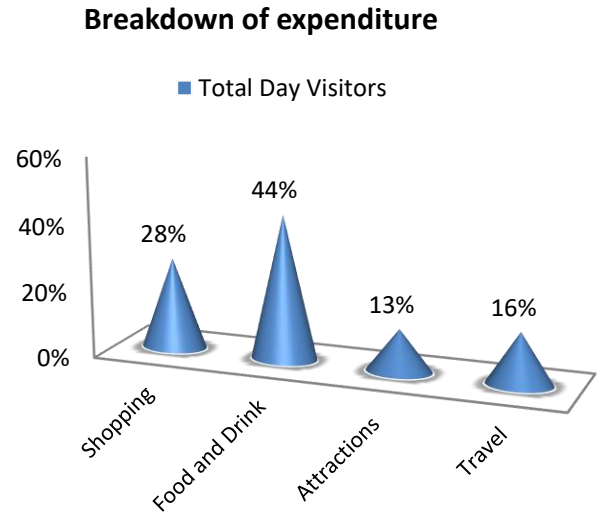
Value of Tourism

Expenditure Associated with Trips:

Direct Expenditure Associated with Trips

		Accomm.	Shopping	Food and Drink	Attractions	Travel	Total
UK Tourists		£39,582,000	£18,204,000	£32,909,000	£15,383,000	£22,284,000	£128,362,000
Overseas tourists		£4,584,000	£5,085,000	£4,011,000	£1,718,000	£1,762,000	£17,160,000
Total Staying		£44,166,000	£23,289,000	£36,920,000	£17,101,000	£24,046,000	£145,522,000
Total Staying (%)		30%	16%	25%	12%	17%	100%
Total Day Visitors		£0	£74,176,000	£117,444,000	£34,768,000	£42,322,000	£268,710,000
Total Day Visitors		0%	28%	44%	13%	16%	100%
Total	**2017**	**£44,166,000**	**£97,465,000**	**£154,364,000**	**£51,869,000**	**£66,368,000**	**£414,232,000**
%		**11%**	**24%**	**37%**	**13%**	**16%**	**100%**
Comparison	**2016**	**£42,765,000**	**£94,627,000**	**£149,908,000**	**£50,322,000**	**£64,451,000**	**£402,073,000**
Difference		**3%**	**3%**	**3%**	**3%**	**3%**	**3%**





Other expenditure associated with tourism activity

Other expenditure associated with tourism activity - Estimated spend				
Second homes	**Boats**	**Static vans**	**Friends & relatives**	**Total**
£10,047,000	£767,125	£4,195,125	£12,991,000	£28,000,250

Spend on second homes is assumed to be an average of £2,100 on rates, maintenance, and replacement of furniture and fittings. Spend on boats assumed to be an average of £2,100 on berthing charges, servicing and maintenance and upgrading of equipment. Static van spend arises in the case of vans purchased by the owner and used as a second home. Expenditure is incurred in site fees, utility charges and other spending and is estimated at £2,100. Additional spending is incurred by friends and relatives as a result of people coming to stay with them. A cost of £185 per visit has been assumed

Direct Turnover Derived From Trip Expenditure

Business turnover arises as a result of tourist spending, from the purchase of supplies and services locally by businesses in receipt of visitor spending and as a result of the spending of wages in businesses by employees whose jobs are directly or indirectly supported by tourism spending.

		Staying Visitor	Day Visitors	Total
Accommodation		£44,904,000	£2,349,000	£47,253,000
Retail		£23,057,000	£73,434,000	£96,491,000
Catering		£35,813,000	£113,921,000	£149,734,000
Attractions		£17,703,000	£36,684,000	£54,387,000
Transport		£14,428,000	£25,393,000	£39,821,000
Non-trip spend		£28,000,250	£0	£28,000,250
Total Direct	**2017**	**£163,905,250**	**£251,781,000**	**£415,686,250**
Comparison	**2016**	**£158,985,250**	**£244,584,000**	**£403,569,250**
Difference		**3%**	**3%**	**3%**

Adjustments have been made to recognise that some spending on retail and food and drink will fall within attractions or accommodation establishments. It is assumed that 40% of travel spend will take place at the origin of the trip rather than at the destination.

Supplier and Income Induced Turnover

		Staying Visitor	Day Visitors	Total
Indirect spend		£25,688,000	£35,132,000	£60,820,000
Non trip spending		£5,600,000	£0	£5,600,000
Income induced		£18,030,000	£4,973,000	£23,003,000
Total	**2017**	**£49,318,000**	**£40,105,000**	**£89,423,000**
Comparison	**2016**	**£47,808,000**	**£38,980,000**	**£86,788,000**
Difference		**3%**	**3%**	**3%**

Income induced spending arises from expenditure by employees whose jobs are supported by tourism spend.

Total Local Business Turnover Supported by Tourism Activity – Value of Tourism

		Staying Visitor	Day Visitors	Total
Direct		£163,905,250	£251,781,000	£415,686,250
Indirect		£49,318,000	£40,105,000	£89,423,000
Total Value	**2017**	**£213,223,250**	**£291,886,000**	**£505,109,250**
Comparison	**2016**	**£206,793,250**	**£283,564,000**	**£490,357,250**
Difference		**3%**	**3%**	**3%**

Employment

Employment

The model generates estimates of full time equivalent jobs based on visitor spending. The total number of 'actual' jobs will be higher when part time and seasonal working is taken into account. Conversion of full time equivalent jobs into actual jobs relies on information from business surveys in the sectors receiving

Direct employment

Full time equivalent (FTE)						
	Staying Visitor		Day Visitor		Total	
Accommodation	904	33%	47	1%	952	15%
Retailing	232	8%	738	20%	969	15%
Catering	656	24%	2,087	55%	2,744	42%
Entertainment	340	12%	704	19%	1,044	16%
Transport	109	4%	192	5%	301	5%
Non-trip spend	519	19%	0	0%	519	8%
Total FTE 2017	**2,759**		**3,768**		**6,528**	
Comparison 2016	**2,676**		**3,661**		**6,337**	
Difference	**3%**		**3%**		**3%**	

Estimated actual jobs						
	Staying Visitor		Day Visitor		Total	
Accommodation	1,339	34%	70	1%	1,409	15%
Retailing	347	9%	1,106	20%	1,454	15%
Catering	984	25%	3,131	56%	4,115	43%
Entertainment	479	12%	993	18%	1,472	16%
Transport	154	4%	270	5%	424	4%
Non-trip spend	591	15%	0	0%	591	6%
Total Actual 2017	**3,894**		**5,571**		**9,465**	
Comparison 2016	**3,775**		**5,413**		**9,188**	
Difference	**3%**		**3%**		**3%**	

Indirect & Induced Employment

Full time equivalent (FTE)			
	Staying Visitor	Day Visitors	Total
Indirect jobs	579	651	1,230
Induced jobs	334	92	426
Total FTE 2017	**913**	**743**	**1,656**
Comparison 2016	**885**	**722**	**1,607**
Difference	**3%**	**3%**	**3%**

Estimated actual jobs			
	Staying Visitor	Day Visitors	Total
Indirect jobs	661	742	1,402
Induced jobs	381	105	486
Total Actual 2017	**1,041**	**847**	**1,888**
Comparison 2016	**1,009**	**823**	**1,832**
Difference	**3%**	**3%**	**3%**

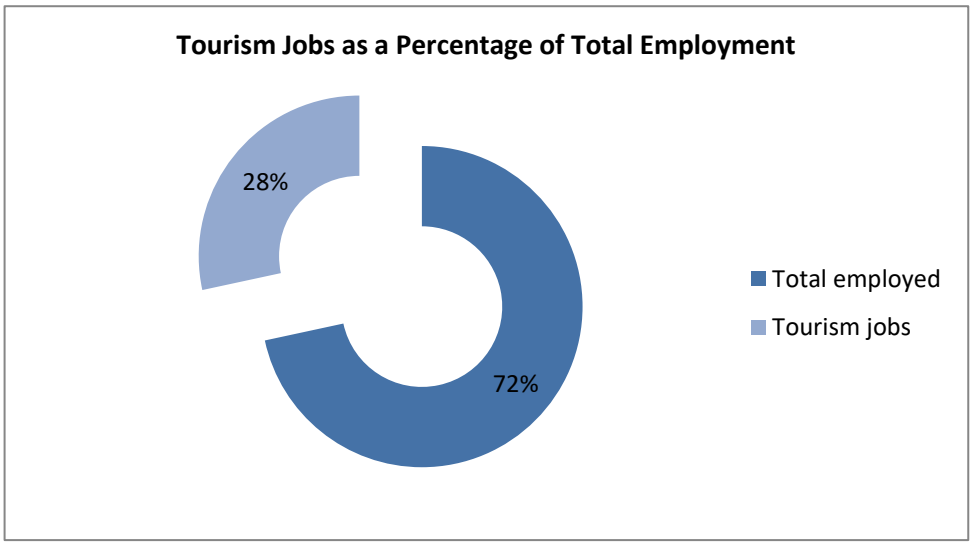
Total Jobs

Actual jobs are estimated from surveys of relevant businesses at locations in England and take account of part time and seasonal working.

Full time equivalent (FTE)							
		Staying Visitor		Day Visitor		Total	
Direct		2,759	75%	3,768	84%	6,528	80%
Indirect		579	16%	651	14%	1,230	15%
Induced		334	9%	92	2%	426	5%
Total FTE	**2017**	**3,673**		**4,511**		**8,184**	
Comparison	**2016**	**3,561**		**4,383**		**7,944**	
Difference		**3%**		**3%**		**3%**	
Estimated actual jobs							
		Staying Visitor		Day Visitor		Total	
Direct		3,894	79%	5,571	87%	9,465	83%
Indirect		661	13%	742	12%	1,402	12%
Induced		381	8%	105	2%	486	4%
Total Actual	**2017**	**4,935**		**6,417**		**11,352**	
Comparison	**2016**	**4,784**		**6,236**		**11,020**	
Difference		**3%**		**3%**		**3%**	

Tourism Jobs as a Percentage of Total Employment

		Staying Visitor	Day visitors	Total
Total employed		40,000	40,000	40,000
Tourism jobs		4,935	6,417	11,352
Proportion all jobs		**12%**	**16%**	**28%**
Comparison	**2016**	**4,784**	**6,236**	**11,020**
Difference		**3%**	**3%**	**3%**



Economic Impact of Tourism – Headline Figures **North Norfolk - 2017**

The key 2017 results of the Economic Impact Assessment are:

8.8 million trips were undertaken in the area
8.2 million day trips
0.6 million overnight visits

2.6 million nights in the area as a result of overnight trips

£414 million spent by tourists during their visit to the area
£35 million spent on average in the local economy each month.

£146 million generated by overnight visits
£269 million generated from irregular day trips.

£505 million spent in the local area as result of tourism, taking into account multiplier effects.

11,352 jobs supported, both for local residents from those living nearby.
9,465 tourism jobs directly supported
1,888 non-tourism related jobs supported linked to multiplier spend from tourism.

Appendix I - Introduction about Cambridge Model

This report examines the volume and value of tourism and the impact of that expenditure on the local economy. The figures were derived using the Cambridge Economic Impact Model and the research was undertaken by Destination Research.

The model utilises information from national tourism surveys and regionally based data held by Destination Research. It distributes regional activity as measured in those surveys to local areas using 'drivers' such as the accommodation stock and occupancy which influence the distribution of tourism activity at local level.

Limitations of the Model

The methodology and accuracy of the above sources varies. The results of the model should therefore be regarded as estimates which are indicative of the scale and importance of visitor activity in the local area. It is important to note that in the national tourism surveys the sample sizes for each area changes year on year. This is as a result of the random probability nature of the methodology. As such, the results of the Cambridge Model are best viewed as a snapshot in time and we would caution against year-on-year comparisons.

It should be noted that the model cannot take into account any leakage of expenditure from tourists taking day trips out of the area in which they are staying. While it is assumed that these may broadly balance each other in many areas, in locations receiving significant numbers of day visitors from London, there is likely to be an underestimate in relation to the number of overseas day visitors staying in holiday accommodation in London.

Whilst it is important to be aware of these issues, we are confident that the estimates we have produced are as reliable as is practically possible within the constraints of the information available.

Rounding

All figures used in this report have been rounded. In some tables there may therefore be a slight discrepancy between totals and sub totals.

Data sources

The main national surveys used as data sources in stage one include:

- Great Britain Tourism Survey (GBTS) - information on tourism activity by GB residents;
- International Passenger Survey (IPS) information on overseas visitors to the United Kingdom;
- Day Visits in the annual Great Britain Day Visitor Survey using information on visits lasting more than 3 hours and taken on an irregular basis

These surveys provide information down to a regional level. In order to disaggregate data to a local level the following information sources are used:

- Records of known local accommodation stock held by Destination Research;
- VisitEngland's surveys of Visits to Attractions, which provide data on the number of visitors to individual tourist attractions ;
- Mid- 2014 estimates of resident population as based on the 2011 Census of Population;
- Selected data from the 2011 Census of Employment;
- Selected data on the countryside and coast including, national designations and length of the coastline.

Staying Visitors

The GBTS provides information on the total number of trips to the region and the relative proportions using different types of accommodation. By matching these figures to the supply of such accommodation, the regional average number of trips per bedspace or unit of accommodation can be derived. The IPS provides information on the total number of trips by overseas visitors to the region. The model uses three year rolling averages to reduce extreme highs and lows which are due to small sample sizes, rather than being a reflection on drastic changes in demand year-on-year.

Day Visitors

Information on day trips at the regional level is available from the Day Visits in Great Britain survey. The survey includes all leisure-related trips from home. It should be noted that a large proportion are local trips made by people resident in the locality. The model uses information from the survey to estimate the number of longer day trips (defined as those lasting at least 3 hours and involving travel of more than 20 miles) and irregular trips lasting more than 3 hours.

Impact of tourism expenditure

This section examines the impact of the tourism expenditure in terms of the direct, indirect and induced expenditure as well as an estimate of the actual jobs (both direct and indirect) supported by tourism expenditure in the district.

The GBTS, IPS and Day Visits to Great Britain survey data on the breakdown of visitor spending. The impact of this initial round of expenditure will be subsequently increased by multiplier effects. These arise from the purchase of supplies and services by the businesses in receipt of visitor expenditure (indirect impacts), and by the income induced-effects arising from the spending of wages by employees in the first round of business and in subsequent expenditure in supplier business (induced impacts).

The New Earnings Survey which provides information on wage levels by industry sector and region; An internal business database which includes data on the structure of business expenditure, local linkages and multiplier ratios drawn from a wide range of business and economic studies carried out by Geoff Broom Associates, PA Cambridge Economic Consultants and others. By applying the breakdown to the estimates of visitor spending, the model generates estimates of total direct spending.

Evidence from national studies suggests that some minor adjustments are required to match visitor spend to business turnover – for example, some expenditure on food and drink actually takes place in inns and hotels that fall in the accommodation sector and within attractions. More significantly, expenditure on travel costs associated with individual trips is equally likely to take place at the origin of the trip as the destination. Therefore the model assumes that only 40% of travel expenditure accrues to the destination area.

Number of full time job equivalents

Having identified the value of turnover generated by visitor spending, it is possible to estimate the employment associated with that spending. Wages for staff and drawings for the proprietors will absorb a proportion of that turnover. By applying these proportions to the overall additional turnover in each sector, the amount of money absorbed by employment costs can be calculated. The New Earnings Survey provides data from which the average costs by business sector, adjusted to take account of regional differences, can be calculated.

After allowing for additional costs such as National Insurance and pension costs, an average employment cost per full time equivalent job can be estimated. The number of such jobs in the local area can then be estimated by dividing the amount of business expenditure on wages and drawings by the average employment cost per job.

Number of Actual Jobs

The model generates estimates of full time equivalent jobs based on visitor spending. However, the total number of actual jobs will be higher when part time and seasonal working is taken into account. The full time equivalent jobs arising directly from visitor spending are converted into actual jobs using information from business surveys in the sectors receiving visitor spending. In general, the conversion factor varies around 1.5 in those sectors.

The indirect and induced jobs arise across a much wider range of employment sectors. Therefore, the average 1.16 for all sectors based on Census of Employment data has been used to convert full time equivalent jobs in this sector to actual jobs.

The employment estimates generated by the model include both self employed and employed

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