Tyrone - Cavan Interconnector

Volume 3 - Part 3 of 5

Consolidated Environmental Statement

Appendices

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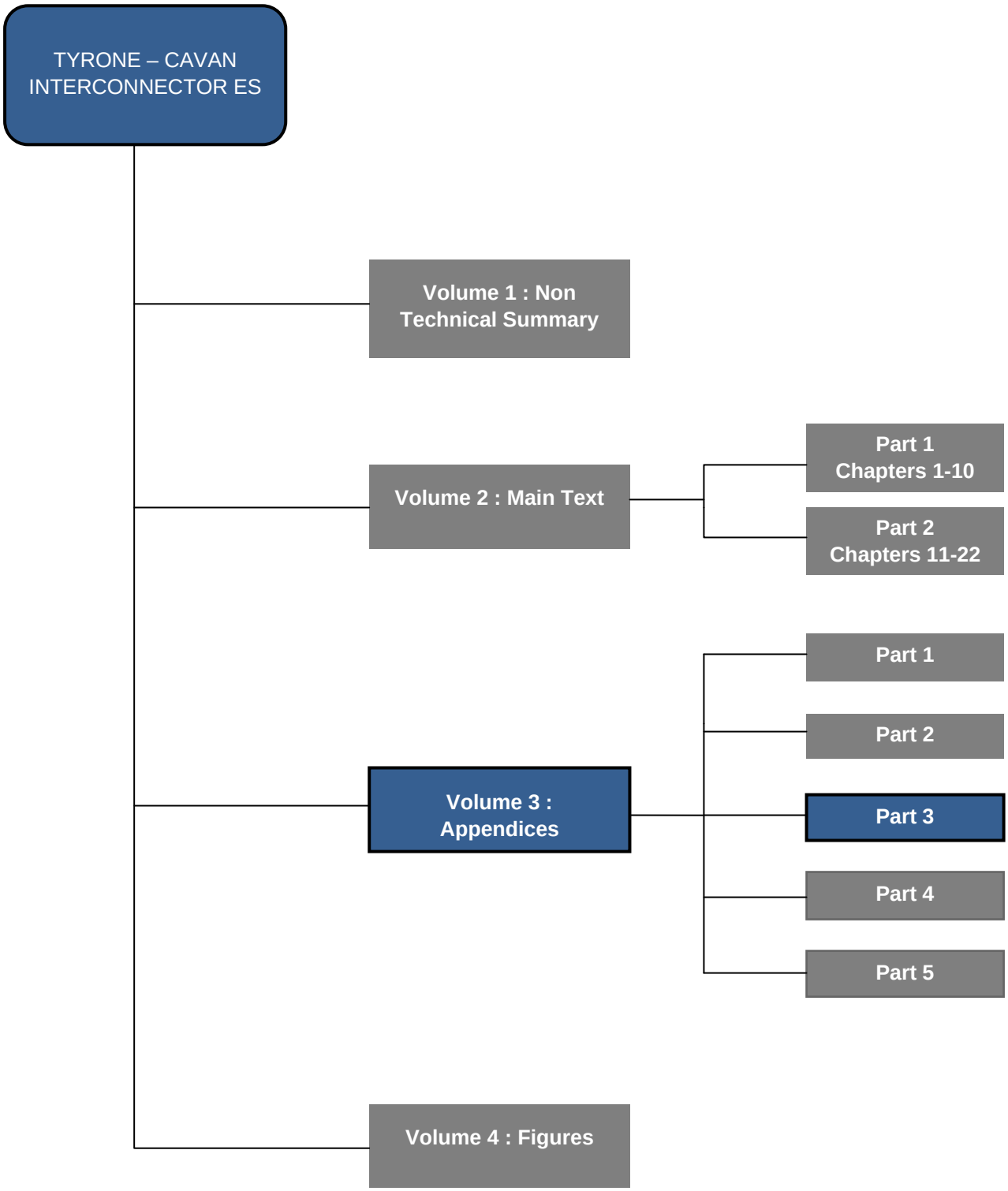
This document is Volume 3 : Appendices Part 3 of the
Tyrone – Cavan Interconnector Environmental Statement (ES).
The whole ES consists of a number of documents printed separately and should be read together.



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For ease of use this document has been printed in A4 format. Should a larger format be required, an electronic version is available at www.nie.co.uk.

Alternatively a printed A3 version may be obtained by contacting NIE at:

NIE Major Projects
120 Malone Road, Belfast, BT9 5HT
Tel: 08457 643 643

Appendix 7A DECC Code of Practice

DEPARTMENT OF ENERGY & CLIMATE CHANGE

Power Lines: Demonstrating compliance with EMF public exposure guidelines

A voluntary Code of Practice

This document replaces “Power Lines: Demonstrating compliance with EMF public exposure guidelines – A voluntary Code of Practice” published by DECC in February 2011

March 2012

About this voluntary Code of Practice

This Voluntary Code of Practice concerns situations where it is necessary to demonstrate compliance with the exposure guidelines that apply to public exposure to power frequency electric and magnetic fields (EMFs) in the UK.

Current Government policy on electric and magnetic fields (EMFs)[1],[2] is that power lines should comply with the 1998 ICNIRP Guidelines[3] on exposure to EMFs in the terms of the 1999 EU Recommendation[4], and this Code of Practice implements this policy. As and when either ICNIRP issue new Guidelines or the EU revise the Recommendation, it will be for Government to consider those changes and to decide whether to adopt them or not. If Government policy changes, this Code of Practice will also be changed accordingly, but until that happens, the present policy as reflected in this Code of Practice remains in force.

This Code of Practice has been developed following publication of the Government response to the Stakeholder Advisory Group on extremely low frequency electric and magnetic fields (ELF EMFs)(SAGE) First Interim Assessment: Power Lines and Property, Wiring in Homes and Electrical Equipment in Homes, published in June 2007[5]. This Code of Practice has been agreed by the Department of Energy and Climate Change with the Department of Health, the Energy Networks Association, the Welsh Assembly, the Scottish Executive, the Northern Ireland Executive and the Health and Safety Executive. It sets out what will be regarded as suitable evidence of compliance with these exposure guidelines as far as the electricity system is concerned.

There are further Government policies relating to EMFs from overhead power lines, specifically that as a precautionary measure they should, where reasonable, have optimum phasing. That is the subject of a companion Code of Practice "Optimum phasing of high voltage double-circuit power lines".

This Code of Practice applies in England, Wales, Scotland and Northern Ireland.

What are the electricity industry and Government agreeing?

The Electricity Industry[6] agrees that whenever evidence is required of compliance with EMF exposure limits, it will provide evidence according to this Code of Practice. *Government* agrees that such evidence will be regarded as sufficient to demonstrate compliance. Situations

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[1] Letter with ten-point annex from Parliamentary Under Secretary of State for Public Health to the Chairman of the National Radiological Protection Board, 22 July 2004

[2] "Government response to the Stakeholder Advisory Group on extremely low frequency electric and magnetic fields (ELF EMFs) (SAGE) recommendations.", Written Ministerial Statement 16 October 2009

[3] ICNIRP (1998). Guidelines for limiting exposure to time-varying electric, magnetic and electromagnetic fields (up to 300 GHz). Health Phys, 74(4), 494-522.

[4] COUNCIL RECOMMENDATION of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC)

[5] SAGE First Interim Assessment http://www.emfs.info/NR/rdonlyres/39CDF32F-E92B-4E2E-AD30-A2B0006B8ED5/0/SAGEfirstinterimassessment.pdf

[6] This Code of Practice is agreed between Government and the Energy Networks Association (ENA). Formally, therefore, it binds only the member companies of ENA. However, Government and ENA hope that all network operators will follow these provisions.

where the need for evidence of compliance with exposure limits may arise include applications for development consent for overhead power lines under the Planning Act 2008 and under Section 37 of the Electricity Act 1989, for compulsory purchase under schedule 3 to that Act, for necessary wayleaves under schedule 4 to that Act, and for planning permission for electricity equipment and equivalent situations under the relevant legislation in Scotland and Northern Ireland.

Direct and Indirect Effects

The Exposure Guidelines deal with both direct effects of fields on the body, primarily the induction of currents in the body, and indirect effects, such as microshocks, contact currents, and surface charge effects, which are all a consequence of charging and discharging of objects by the electric field.

Direct effects are protected against by quantitative exposure limits known as basic restrictions. The remainder of this Code of Practice details these quantitative limits and how they are applied.

While indirect effects are more tangible due to effects such as microshocks, they have historically given rise to less concerns than direct effects. For indirect effects, while the Guidelines give a cautionary reference level of 5 kV m^{-1} for the general public as a trigger to fuller assessment of compliance with the exposure guidelines, using that as a limit is not the most appropriate way of dealing with indirect effects. Rather, there is a suite of measures that may be called upon in particular situations, including provision of information, earthing, and screening, alongside limiting the field which should be used to reduce the risk to the public of indirect effects. In some situations, there may be no reasonable way of eliminating indirect effects, for instance where erecting screening would obstruct the intended use of the land. The approach to addressing indirect effects of electric fields will be the subject of a separate voluntary Code of Practice to be developed between the industry and the Health Protection Agency.

What are the values of the public exposure limits?

The 1998 ICNIRP exposure guidelines specify a basic restriction for the public which is that the induced current density in the central nervous system should not exceed 2 mA m^{-2}. The Health Protection Agency specify[7] that this induced current density equates to uniform unperturbed fields of 360 µT for magnetic fields and 9.0 kV m^{-1} for electric fields. Where the field is not uniform, more detailed investigation is needed. Accordingly, these are the field levels with which overhead power lines (which produce essentially uniform fields near ground level) shall comply where necessary. For other equipment, such as underground cables, which produce non-uniform fields, the equivalent figures will never be lower but may be higher and will need establishing on a case-by-case basis in accordance with the procedures specified by HPA. Further explanation of basic restrictions, reference levels etc is given by the Health Protection Agency[7].

Where do these limits apply?

[7] "Application of ICNIRP Exposure Guidelines for 50 Hz Power Frequency Fields"
http://www.hpa.org.uk/webw/HPAweb&HPAwebStandard/HPAweb_C/1195733805036?p=1158934607693

Government policy is that the 1998 ICNIRP guidelines apply in the terms of the 1999 EU Recommendation. This specifies that Member States should:

> "II. (b) implement measures according to this framework……when the time of exposure is significant….. "
>
> "III (c) may take into account criteria, where appropriate, such as duration of the exposure….."

The preamble states:

> "(9) This recommendation …..applies, in particular, to relevant areas where members of the public spend significant time in relation to the effects covered by this recommendation;"

The Written Ministerial Statement of 16 October 2009 states (paragraph 42):

> *"... In this regard, the UK Government considers that exposure for potentially significant periods of time might reasonably be regarded as referring to residential properties, and to properties where members of the public spend an appreciable proportion of their time. "*

The clear steer from these statements is that there will be certain environments in which the public exposure is potentially for a significant period of time and where compliance with the ICNIRP general public guidelines will be required. In other environments, where exposure can be deemed not to be for a significant period of time, the ICNIRP occupational guidelines, rather that the ICNIRP general public guidelines, shall be deemed to apply.

In order to provide precision for the network companies, local planning officers and the public, in terms of assessing which guidelines apply it is appropriate to look across to any readily available tools in the planning system. All regions of the UK are covered in planning by a "Use Classes" regime which extends development control to changes in use of buildings or land. It would therefore be appropriate to draw on the classification used there to provide clarity.

The thrust of concern where public guidelines should apply is to residential uses. This would embrace use classes variously described as "dwellinghouses", "houses", "houses in multiple occupation" and "residential institutions". It should sensibly be taken more broadly as also embracing other residential properties which may not fall within a particular use class e.g. flats or hostels. A less clear cut case exists for extending it to schools but given the health concern is very much orientated towards childhood sickness it would seem prudent to behave in a precautionary manner and include non-residential uses such as schools, crèches and day nurseries.

In each case, for practical application of the guidelines the definition should also be taken to include the curtilage of the building concerned.

When is specific evidence of compliance required?

The Energy Networks Association will maintain a publicly-available list on its website of types of equipment where the design is such that it is not capable of exceeding the ICNIRP exposure

guidelines, with evidence as to why this is the case. Such types of equipment are likely to include:

- overhead power lines at voltages up to and including 132 kV
- underground cables at voltages up to and including 132 kV
- substations at and beyond the publicly accessible perimeter

Compliance with exposure guidelines for such equipment will be assumed unless evidence is brought to the contrary in specific cases.

For all other equipment (e.g. overhead power lines and underground cables at voltages of 275 kV and 400 kV), when evidence of compliance with exposure guidelines is needed, the following will be provided:

- A calculation or measurement of the maximum fields (ie directly under the line, or directly above the cable)

If this maximum value is less than the ICNIRP guideline levels, it may be assumed that all fields and exposures from that source will be compliant. If this maximum value exceeds the ICNIRP guideline levels, then it is also necessary to provide:

- A calculation or measurement of the field at the location of the closest property at which the public exposure guidelines apply

For overhead lines only, in addition:

- A statement as to compliance with the Code of Practice on phasing, including a justification in the terms of that Code of Practice if the line does not have optimum phasing.

What conditions is compliance assessed for?

Government policy is that the ICNIRP guidelines for the general public will be observed in areas where the land use is such that exposure might be for a significant period of time. Therefore, it is not appropriate to assess compliance for extreme, rare, or unlikely situations. Accordingly, for the purposes of compliance with Government policy, field levels will be assessed:

- For electric fields: for nominal voltage and, for overhead lines, design minimum clearance (excluding reduced clearances that occur only during exceptional ice loading);
- For magnetic fields: for the highest rating that can be applied continuously in an intact system (i.e. including ratings which apply only in cold weather, but not including short-term ratings or ratings which apply only for the duration of a fault elsewhere in the electricity system) and, for overhead lines, design minimum clearance;
- For both electric and magnetic fields: for 1 m above ground level on a plain, level surface;
- For both electric and magnetic fields: for the 50 Hz field only, ignoring harmonics.

Assessments may be offered for other conditions as well, eg abnormal operating conditions, but these are not required, and compliance with Government policy will be assessed for the above conditions.

Should compliance be demonstrated by calculations or measurements?

For sources that have a defined geometry that lends itself to calculations, such as overhead power lines and underground cables, calculations will usually be the preferred method of demonstrating compliance. For sources with a more complex geometry, measurements may be preferred.

Measurements are acceptable if they can be performed for, or scaled to, the above conditions.

Calculations are always acceptable if performed in accordance with the following specification and do not need to be supported by measurements, although measurements may be offered in addition.

Details of acceptable calculations

Calculations performed in accordance with the following will be regarded as acceptable evidence of field levels:

- for linear sources such as overhead lines and underground cables, are based on the infinite-straight-line approximation;
- are of the unperturbed field;
- take account of the correct conductor(s) number, type and size;
- ignore zero-sequence and negative-sequence currents, and voltages and currents induced in the sheath, ground or earth wire;
- for electric fields, treat the ground as a perfect conductor;

and in addition, specifically for overhead lines:

- take account of the basic tower geometry for the design of line in question, but ignore variations in conductor spacing at angle towers etc.

More detailed evidence will also be acceptable if offered but is not required, including:

- Calculations based on the actual conductor geometry rather than the infinite straight line approximation;
- Calculations taking account of perturbations to the electric field from conducting objects.

Committing to Good Practice

This is a voluntary Code of Practice, supplemented by the companion Code “Optimum phasing of high-voltage double-circuit power lines”. Industry and Government are commited in their efforts to demonstrate assessment and compliance with EMF public exposure limits.

Department of Energy & Climate Change
3 Whitehall Place
London SW1A 2AW
www.decc.gov.uk

URN : 12D/035

Appendix 7B Email from St. Jude Medical

RE: ICD 400KV Powerline - CI#64320 1 Hide Details

FROM: Lagstrom, Niklas Tuesday, 27 December 2011, 16:02

TO: Fergal Woods

Dear Fergal,

No, it is not completely correct that the stronger the magnetic field, the higher is the risk of interference. It is completely depending on the frequency of the electro magnetic field.

It does not need 10,000,000 microteslas to raise concerns regarding electro magnetic interferrence problems for an ICD. What I said was that at a frequency of 10 MHz (=10 000 000 Hz), the maximum limit of the magnetic field of 0.092 microtesla. **Please note that there is a great difference between Hz** (which means number of changes per second of the magnetic field) **and the the number of microteslas, that is needed to interupt with the pacemaker.**

If the frequency in the powerline is 50 Hz, the upper limit of the magnetic field is 0.1 µT. With your given values of the typical field 25 meters to the side to be 1-2 µT, this is still 10-20 times to high. However, the strengths of the magnetic field decreases rapidly with the distance from the source, which means that your other given number, the one that indicates that a distance of 37 meters should be kept to avoid interference, sounds reasonable.

I hope this answered your question, otherwise feel free to contact us again.

Med vänliga hälsningar/ Best regards

Niklas

Niklas Lagström
Product Specialist Technical Support
Cardiac Rhythm Management Division

St. Jude Medical AB
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Fax +46 8 760 5126
technical.support@sjm.com

From: Fergal Woods [mailto:fergal.woods@yahoo.co.uk]
Sent: den 22 december 2011 15:55
To: Lagstrom, Niklas
Subject: Re: ICD 400KV Powerline - CI#64320

Dear Niklas,

Apologies for my ignorance and lack of knowledge when it comes to the full understandings of frequencies from transmisson lines. But, my basic understanding was and that the higher the magnetic field the greater the possibly of interference to electronic devices and in this particular case an ICD. But, from your e-mail and feel free to correct me if I'm wrong. I take from it that you are in no way concerned about a 100 microtesla field which is understood, but it would take levels to exceed 10,000,000 microteslas before any concern would be raised.

This has really confused me because, on one hand I've been told that a patient with a ICD implanted standing under a 400kv powerline may experience asynchronous pacing. I assuming that this is based on 50Hz frequency, thus 5,000 microtesla as per frequency of powerlines in the UK. There is a huge gap from 5,000 microtesla to the 10,000,000 that you state before any concern would be raised. Is my understanding of this correct?

I had always been led to believe that patients were advised to avoid EMF frequencies from High voltage power lines, and even taking it a step further other manufacturers of ICD have noted on websites advised that patients with ICD's fitted should not be go any closer than 37metres for fear of electrical interference. But, based on what you are stating it reads that there is absolutely nothing that a patient with a St Judes's ICD implanted device has to be concerned about in relation to EMF exposure from High voltage UK power lines, even to the extend of standing for long periods of time directly underneath a 400kv powerline. Am I correct in stating this? It's just, it goes completely against the advise as to what I've read up on in relation to EMF interaction on ICD's.

I again thank you for your assistance and if this is indeed the situation that my father has absolutely nothing to fear from walking under such power lines it will be of great reassurance to us.

Regards
Fergal Woods

From: "Lagstrom, Niklas" <NLagstrom@sjm.com>
To: Fergal Woods <fergal.woods@yahoo.co.uk>
Sent: Thursday, 22 December 2011, 11:40
Subject: RE: ICD 400KV Powerline - CI#64320

Dear Fergal,

The effect on the ICD is related to the frequencies of the magnetic field, and therefore I can not say anything about the potential effects. For example, if the frequency is below 1 Hz, 100 microtesla is no problem, but if the frequency is 10-440 Megahertz, 0.092 microtesla may be a problem.

So, what I need to know is the frequency of the magnetic fields around the powerline.

Med vänliga hälsningar/ Best regards

Niklas

Niklas Lagström
Product Specialist Technical Support
Cardiac Rhythm Management Division

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Tel +46 8 474 4147
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technical.support@sjm.com

From: Fergal Woods [mailto:fergal.woods@yahoo.co.uk]
Sent: den 22 december 2011 12:02
To: Lagstrom, Niklas
Subject: Re: ICD 400KV Powerline - CI#64320

Dear Niklas,

The typical Magnetic field from a UK 400KV powerline is as follows;

- Maximum field under the line 100 microteslas
- Typical field under the line 5 - 10 microteslas
- Typical field (25m to side) 1 - 2 microteslas

Based on the above figures, could you give me guidance as to possible ICD interference bases on EMF strength.

Could his ICD malfuction/ become disabled under a magnetic field strength of 100 microteslas?
Could his ICD malfunction / become disabled under a magnetic field strength of 5 - 10 microteslas?
Could his ICD malfunction/ become disabled under a magnetic field strength of 1 - 2 microteslas?

I again thank you for your assistance with this matter and I look forward to your response.

[redacted]

From: Lagstrom, Niklas [redacted]
Sent: 23 January 2012 12:06
To: [redacted]
Cc: [redacted]
Subject: Magnetic fields from 400 kV power line - CI#64320 & 64880

Dear [redacted]

I'm sorry to get back to you in order to correct the numbers I have given to you earlier.

Unfortunately, I made a mistake in the given units used in the table 7, "Reference levels for general public exposure to time-varying electric, magnetic and electromagnetic fields" (International Commission on Non-Ionizing Radiation Protection, ICNIRP, http://www.icnirp.de/documents/emfgdl.pdf

Table 7. Reference levels for general public exposure to time-varying electric and magnetic fields (unperturbed values).[a]

Frequency range	E-field strength ($V\ m^{-1}$)	H-field strength ($A\ m^{-1}$)	B-field (μT)	Equivalent plane wave power density S_{eq} ($W\ m^{-2}$)
up to 1 Hz	—	3.2×10^4	4×10^4	—
1–8 Hz	10,000	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8–25 Hz	10,000	$4{,}000/f$	$5{,}000/f$	—
0.025–0.8 kHz	$250/f$	$4/f$	$5/f$	—
0.8–3 kHz	$250/f$	5	6.25	—
3–150 kHz	87	5	6.25	—
0.15–1 MHz	87	$0.73/f$	$0.92/f$	—
1–10 MHz	$87/f^{1/2}$	$0.73/f$	$0.92/f$	—
10–400 MHz	28	0.073	0.092	2
400–2,000 MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	$f/200$
2–300 GHz	61	0.16	0.20	10

[a] Note:
1. f as indicated in the frequency range column.
2. Provided that basic restrictions are met and adverse indirect effects can be excluded, field strength values can be exceeded
3. For frequencies between 100 kHz and 10 GHz, S_{eq}, E^2, H^2, and B^2 are to averaged over any 6-min period.
4. For peak values at frequencies up to 100 kHz see Table 4, note 3.
5. For peak values at frequencies exceeding 100 kHz see Figs. 1 and 2. Between 100 kHz and 10 MHz, peak values for the strengths are obtained by interpolation from the 1.5-fold peak at 100 kHz to the 32-fold peak at 10 MHz. For frequencies exce 10 MHz it is suggested that the peak equivalent plane wave power density, as averaged over the pulse width does not exceed times the S_{eq} restrictions, or that the field strength does not exceed 32 times the field strength exposure levels given in the
6. For frequencies exceeding 10 GHz, S_{eq}, E^2, H^2, and B^2 are to be averaged over any $68/f^{1.05}$-min period (f in GHz).
7. No E-field value is provided for frequencies <1 Hz, which are effectively static electric fields. perception of surface electric cl will not occur at field strengths less than 25 kVm^{-1}. Spark discharges causing stress or annoyance should be avoided.

I used the formula of 5/f, and thought f should be the frequency in Hz. Obviously, it should have been in kHz, which changes the calculations dramatically. Instead of having a limit of vulnerability at 0.1 µT it is 100 µT at the frequency of 50 Hz.

This means that the maximum magnetic field under the line is just around our limit of vulnerability, and the typical filed under the line is well below our level of vulnerability. Please note, that this is based on the information you sent me earlier:

- Maximum field under the line 100 microteslas
- Typical field under the line 5 - 10 microteslas
- Typical field (25m to side) 1 - 2 microteslas

Sorry for the confusion this may have caused.

Best regards

Niklas

Niklas Lagström
Product Specialist Technical Support
Cardiac Rhythm Management Division

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Appendix 8A Legislation and Planning Policy

Appendix 8A Legislation and Planning Policy

Table 8.1.1 - Description of Relevant European and National Legislation

Legislation	Description
Priority Substances Directive (2008/105/EC)	Sets out environmental quality standards for the priority substances and certain other pollutants. This is the result of the requirements set in Article 16(8) of the WFD. In addition, Annex II replaces Annex X of the WFD referring to the list of priority substances. Member States shall take actions to meet those quality standards by 2015 as part of chemical status. For this purpose a programme of measures shall be in place by 2009, and become operational by 2012.
Fish (Consolidated) Directive (2006/44/EC) (replacing 78/659/EC) This Directive will be replaced by the WFD in 2013 once it is fully implemented.	The Fish (Consolidated) Directive (2006/44/EC) was originally adopted in 1978 (Directive 78/659/EC) but consolidated in 2006. It sets outs standards of water quality for the protection of coarse and game fisheries together with monitoring requirements. There are two categories for designated watercourses, '*Salmonid*' (those suitable for salmon and trout), and 'Cyprinid' (those suitable for coarse fish).
Dangerous Substances Directive (2006/11/EC replacing 76/464/EC)	Regulates a large number of chemicals that have the potential to cause aquatic pollution (elimination of List 1 and reduce pollution from List 2). The Directive covered discharges to inland surface waters, territorial waters, inland coastal waters and groundwater. This Directive is due to be repealed by the implementation of WFD daughter directives and is implemented in Northern Ireland by the Surface Waters (Dangerous Substances) (Classification) Regulations (Northern Ireland).
Environmental Liability Directive (2004/35/EC)	This sets out a regime for the prevention and remedying of environmental damage including from land contamination which presents a threat to human health. Strict liability would apply in respect of damage to land, water and biodiversity from activities regulated by specified EU legislation.
Water Framework Directive (2000/60/EC)	The EC Directive 2000/60/EC, otherwise known as the '*Water Framework Directive*' (WFD), has progressively been implemented in Northern Ireland since 2004. The WFD is the main legislation for the protection and enhancement of the water environment and introduces a new catchment scale approach. The primary objective of the WFD is to maintain the 'high status' of waters where it exists, prevent deterioration, and to achieve at least 'good status' in relation to all waters by 2015 (unless there are certain exceptional conditions). This Directive is implemented in Northern Ireland by the Water Environment (Water Framework Directive) Regulations (Northern Ireland).
Nitrates Directive (91/676/EC)	This Directive seeks to reduce or prevent the pollution of water caused by the application and storage (i.e. from leaks and spills etc.) of inorganic fertiliser and manure on farmland. It is intended to safeguard drinking water supplies and prevent wider ecological damage in the form of eutrophication of freshwater and marine waters generally. This Directive is implemented in Northern Ireland by the Protection of Water Against Agricultural Nitrate Pollution Regulations (Northern Ireland) and the Nitrates Action Programme Regulations (Northern Ireland).
Water Framework Directive (Priority Substances and Classification) Regulations 2011	They provide a statutory basis for classification schemes in order to support the implementation of Directive 2000/60/EC, establishing a framework for Community action in the field of water policy (the Water Framework Directive). Further, these Regulations specifically implement Directive 2008/105/EC, on environmental quality standards in the field of water policy (Priority Substances Directive), which aims to protect the water environment from the impacts of dangerous chemicals.
Control of Pollution (Oil Storage) Regulations (Northern Ireland) 2010 (as amended 2011)	Aim to reduce and prevent pollution of the aquatic environment from any inadequate above ground oil storage facilities. They codify existing good practice and set minimum design standards for new and existing above ground oil storage facilities. Provide a legal requirement for the standards to be met.
Nitrates Action Programme Regulations (Northern Ireland) 2010 (as amended)	Protects water against nitrate pollution from agricultural sources.

Environment Liability (Prevention and Remediation) Regulations (Northern Ireland) 2009 (as amended)	The Statutory Rule transposes the provisions of the EC Environmental Liability Directive (2004/35/EC) with regard to the prevention and remedying of environmental damage. The Regulations impose obligations on operators of economic activities to prevent, limit or remediate environmental damage. The Regulations apply only to the more serious cases of environmental damage and are in addition to existing environmental legislation.
Water Abstraction and Impoundment (Licensing) Regulations (Northern Ireland) 2006	Sets out a control regime for regulating the abstraction of water and for construction, altering or operating impounding works.
Protection of Water Against Agricultural Nitrate Pollution Regulations (Northern Ireland) 2004	Establishes that an Action Programme applies in Northern Ireland.
Water Environment (Water Framework Directive) Regulations (Northern Ireland) 2003 (as amended)	Implements the WFD in Northern Ireland. It sets out requirements for managing, protecting and improving the quality of water resources, particularly river basins.
Control of Pollution (Applications and Registers) Regulations (Northern Ireland) 2001 (as amended)	Sets procedures for applying or varying consents under Part 2 of the Water (Northern Ireland) Order 1999, including advertising applications and details required on the water pollution control register.
Environment (Northern Ireland) Order 2002 (including amendments up to 2004)	Covers several environmental issues, including pollution prevention control, assessment and management of air quality, and designation of areas of special scientific interest (ASSIs).
Water (Northern Ireland) Order 1999 (as amended)	The aim of the Order is to make further provisions for discharge consents and allow the Department of the Environment for Northern Ireland (DoE NI) to set water quality objectives and prevent pollution by carrying out anti-pollution works. If the DoE NI believes any poisonous, noxious or polluting matter is likely to enter, or is present in, any waterway or water contained in underground strata, they can carry out any anti-pollution works and operations they feel necessary to address the situation. In addition, works notices can be served on anyone found to be causing or permitting poisonous, noxious or polluting matter into any waterway or water contained in underground strata, which requires anti-pollution works and operations to be carried out.
Drainage (Northern Ireland) Order 1973 (as amended)	Sets out the legislative basis for carrying out watercourse maintenance work and flood defence schemes.
Fisheries Act (Northern Ireland) 1966 (as amended)	Includes provision for the protection of fisheries making it an offence to: Use or possess deleterious matter for the capture, destruction or injury of fish; Pollute a watercourse; Remove any material from the bed of a river without the consent of the Fisheries Conservancy Board; and Obstruct the passage of fish or fail to protect fish where water is abstracted.

Table 8.1.3 - Relevant Planning Policies

Regional Development Strategy 2035	
RG9: Reduce our carbon footprint and facilitate mitigation and adaptation to climate change whilst improving air quality.	As part of a package of carbon reducing measures, this policy encourages the need to protect soils as they have important functions cleansing water used for domestic supplies, and encourages grey water recycling to reduce the need for treatment.
RG11: Conserve, protect and, where possible, enhance our built heritage and our natural environment	This policy requires the protection, enhancement and encourages the restoration of inland water bodies. Rivers and lakes support habitats and species of national and international importance. The quality and the ecological status of the water environment should be improved through fulfilment of statutory obligations.
Dungannon and South Tyrone Area Plan 2010 (Planning Service, Department of the Environment)	
The Dungannon and South Tyrone Plan 2010 sets out local planning policy within the study area. This has been reviewed, and although it provides general environmental protection, there are no specific planning policies with respect to pollution prevention.	
The Armagh Area plan 2004 No. 1 : Armagh Countryside Proposals	
No relevant policies.	
The Armagh Issues Paper 2018	
No relevant information.	

Appendix 8B NIEA WMU Response

Northern Ireland Environment Agency
www.ni-environment.gov.uk

Water Management Unit
17 Antrim Road
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Lisburn
BT28 3AL
Tel: 028 92623093
Fax: 028 92676054

Mary Maguire
AECOM
Clarence West Building
Clarence Street West
Belfast
BT2 7GP

Your Ref: L23600/OT

Our Ref: WQU07960

Date: 20 November 2012

Dear Mary,

Re: Tyrone/Cavan Interconnector

Thank you for your email sent on 30 October 2012 relating to the above.

WMU hold the following information relating to water which may be of use when carrying out your assessment:-

Abstractions

Please see attached - **NIEA – WMU – WQU07960 –Abstraction – Response.xls**

Pollution Incidents

Please see attached - **NIEA – WMU – WQU07960 – Pollution Incidents – Response.xls**

Consented Industrial Discharges

Please see attached - **NIEA – WMU – WQU07960 – Industrial Consents – Response.xls**

Consented Agricultural Discharges

Please see attached – **Data request 1. jpg**

NIW Ltd. Discharges

NIWL operational assets within 1km of the supplied shape file:

NAME	Type	Asset Grid ref	Discharge Grid
Blackwatertown WwPS	ERO	284094-352376	284068-352394
Artasooly WwPS	ERO	281970-349538	281970-349531
Edenderry Artasooly WwPS	None	282035-349829	
Redford WWTW	WWTW	282982-358613	
Lisdown WWTW	WWTW	282960-346798	
Drumhillery WWTW	WWTW	279225-336189	298496-345765

Water Framework Directive – Catchment Management Officer response

Query 1:

Confirmation of the status (i.e. Main River or Ordinary Watercourse) for the watercourses within the study area:

The 2009 classification of river waterbodies positioned within the Study area.

Waterbody Name	2009 Classification
Clontibret Stream (ROI) EuropeanCode UKGBNI1NB030308202 Blackwater/ Monaghan County Council Cross Border Code: XB_03_9	**Poor**
Cor River Trib EuropeanCode UKGBNI1NB030307096	**Moderate**
River Blackwater EuropeanCode UKGBNI1NB030307095	**Poor**
Ballymortrim Water EuropeanCode UKGBNI1NB030307045	**Poor**
River Blackwater EuropeanCode UKGBNI1NB030307040	**Moderate**
River Blackwater Benburb EuropeanCode UKGBNI1NB030307043	**Moderate**
Name River Blackwater EuropeanCode UKGBNI1NB030307027	**Poor**
Name Ballyrath Callan EuropeanCode UKGBNI1NB030307032	**Moderate**
Name River Blackwater EuropeanCode UKGBNI1NB030307027	**Poor**
Name River Rhone EuropeanCode UKGBNI1NB030307036	**Poor**
Name River Blackwater EuropeanCode UKGBNI1NB030307132	**Poor**
Name Drumard Burn Blackwater European Code UKGBNI1NB030307050	**Bad**

River Blackwater Local Management Area 2009 River Status and Objectives:
http://www.doeni.gov.uk/niea/river_blackwater_historical_status.pdf

Query 5

WFD Action Plans for the River Rhone, River Blackwater, Ballymartrin Water, Tynan Water and Clontibret Stream (which are all part of the Neagh Bann International River Basin Management Plan):

Actions for each waterbody can be found in the River Blackwater Local Management Area Action Plan
http://www.doeni.gov.uk/niea/river-blackwater_lma_actionplan.pdf
Clontibret stream (8202) is a cross border waterbody, additional information may be obtained from the Blackwater WMU Action Plan or obtained from Monaghan County Council.

Query 6

Details of any other water attribute or recreational / amenity activity (e.g. commercial fishery, angling, navigation, etc.) that we should be aware of and that would have relevance to the value of the water body and the impact assessment:

For Information:
Contact the Armagh City and District Council for recreational/amenity activities.
Contact DCAL regarding fisheries and angling in the area.
Contact Inland Waterways regarding navigation.

Query 7

Any other environmental reports or studies that may be relevant (e.g. relating to the Hydrology of the study area) that we should be made aware of:

NIEA have not carried out any hydrological surveys in the study area.

If you require any further water related environmental information about this or any other site please email details of your information request to WaterInfo@doeni.gov.uk

Yours sincerely,

Information Management
Water Management Unit

Appendix 9A Details of ASSI designations

DEPARTMENT OF THE ENVIRONMENT

DECLARATION OF AREA OF SPECIAL SCIENTIFIC INTEREST AT BENBURB - MILLTOWN, COUNTIES ARMAGH AND TYRONE. ARTICLE 28 OF THE ENVIRONMENT (NORTHERN IRELAND) ORDER 2002.

The Department of the Environment (the Department), having consulted the Council for Nature Conservation and the Countryside and being satisfied that the area described and delineated on the attached map (the area) is of special scientific interest by reason of its geological features and accordingly needs to be specially protected, hereby declares the area to be an area of special scientific interest to be known as the 'Benburb – Milltown Area of Special Scientific Interest'.

Benburb – Milltown is of special scientific interest because of the exposures present allowing the areas geology to be described and understood. The River Blackwater gorge between Benburb and Milltown hosts a series of disused quarries, together with natural cliff exposures. Collectively these exposures represent over 230m of Lower Carboniferous rock strata belonging to the Tyrone Group that have been classified into four formations and a series of subdivisions known as Members. In addition, exposures within the River Blackwater provide outcrop of the younger Triassic rocks in this area comprising two named geological formations. All the formations and members mentioned in this account have their stratotypes, or reference localities, in this area.

The lowest (and hence oldest) division present is the Maydown Limestone Formation, 126m of dark grey lime-rich shales, siltstones, silty limestones and crinoidal limestones (limestones composed almost entirely of crinoid ossicles, circular skeletal plates). With the exception of the base, the entire thickness can be seen in Maydown Quarry and the nearby exposures to the west. The formation has a rich fossil fauna including corals, lamp shells (brachiopods), bivalve molluscs, moss animals (bryozoa), sea urchins (echinoids) and stone lilies or crinoids (animals related to star fish). The species gathered here, particularly the solitary corals, have restricted time ranges and so indicate an Asbian age for these rocks, around 337 million years ago. There are also remains of land plants in a series of sandstones 8 m thick within the section.

About 12 m below the top of the Maydown Limestone Formation a sequence of conglomerate and sandstone around 5.5m thick has been recognised and named the Crow Hill Conglomerate and Sandstone Member. The conglomerate is at the base of this section and contains frequent cobbles, which are actually rolled fragments of colonial coral colonies of the genera *Lithostrotion* and *Siphonodendron*, set in a variable matrix. A lens of coarse grained sandstone, containing pieces of the giant coral *Siphonophyllia* and fragments of shark teeth, occurs in the middle of the conglomerate. Passing upwards the conglomerate gives way to 2m of pale grey to white coarse-grained sandstones containing plentiful fragments of corals.

The Blackstokes Limestone Formation follows the Maydown and consists of two members estimated to be about 20m thick in total. A grey mudstone with thin

limestones, the Gorestown Mudstone Member, is the lowest member and contains an abundance of fossils including bivalve molluscs, brachiopods, bryozoa, crinoids, sea urchin fragments, ostracods, solitary corals, sponge spicules and trilobites. The section on the northern, Tyrone, side of the river is slightly different with more limestones. The second member, the Rookwood Limestone Member consists of limestones with shale partings. The limestones are dark in colour and fine-grained. Fossils are infrequent and limited in variety. Large brachiopods of the genus *Gigantoproductus* are conspicuous and occur with bivalve molluscs and ostracods. There are trace fossils in the shales in the form of feeding tracks of an unknown animal. The shales have also yielded fish remains (teeth and scales), brachiopods, sea snails and solitary corals.

The Carrickaness Sandstone Formation follows, with approximately 60m of sandstones, siltstones and mudstones almost devoid of fossils. The few found are restricted to plant remains and bivalve molluscs. The outcrop is fragmentary and best seen on the wooded bank of the Ulster Canal between Milltown House and in Blackstokes Bridge Quarry. The sandstones are pale grey to white with ripple marks and cross laminations, suggesting shallow water conditions. Early descriptions mention thin coal seams in this formation. The junction of the Carrickaness Sandstone with the overlying Blackwater Limestone Formation can be seen in the north bank of the river and the south bank of the Ulster Canal.

The Blackwater Limestone Formation is around 26m thick and has been divided into 6 members, all fossiliferous. From the base these are the Tullymore Limestone Member, the Glenview Limestone Member, the Drumflugh Limestone Member, the Benburb Mudstone Member, the Island Sandstone Member and the Outlet Limestone Member. All the fossils up to the Blackwater Limestone Formation in this area indicate an Asbian age, the penultimate stage of the Lower Carboniferous but there is good reason to believe that the final stage, the Brigantian, commences somewhere in the Blackwater Formation. The boundary between the two is poorly marked by fossils. Many Brigantian fossil forms first appear in the late Asbian so are not reliable indicators. The best marker available is the primitive plant genus *Koninckopora* which becomes extinct world-wide at the end of the Asbian. It occurs in the Tullymore and Glenview Limestone members but is absent from then onwards. On this evidence and that of less precise Brigantian indicators, the base of the Brigantian is tentatively placed at the base of the Drumflugh Limestone Member.

The history of palaeontological studies in the area is also notable. It is believed that the giant solitary coral *Siphonophyllia benburbensis*, a spectacular and famous fossil, was first collected in this area in the 1930s by H P Lewis and the species was named by him after Benburb. In addition, in the 19th century Portlock, McCoy and Davis described several species of fossils, notably corals, echinoids, bryozoa and fish, based on specimens from Benburb.

The Benburb – Milltown area hosts the type localities for a series of younger rocks within the site. These outcrop along the River Blackwater upstream of the Milltown area and date from the Early Triassic period, around 245 million years ago. These rocks are known as the Milltown Conglomerate Formation and the Derrycreevy Sandstone Formation and while no fossil remains have been recovered, it is assumed, by analogy with modern environments, that the original sediments were deposited in desert conditions.

The type locality of the Milltown Conglomerate Formation forms the north bank and river bed of the Blackwater opposite the mill factory at Milltown. Here 12 m of conglomerate containing small pebbles can be seen in beds up to 50 cm thick separated by partings of coarse-grained red and purple sandstone. The dominant rock in the pebbles is white vein quartz but fragments of Carboniferous, Ordovician and Silurian rocks have also been recognised. Between the mill factory and the weir on the north bank of the Blackwater, 800 m to the north west, is the type locality of the Derrycreevy Sandstone Formation. It sits on a foundation of Milltown Conglomerate that rapidly gives way to 150 m of brick-red, fine-grained sandstone which forms the base of the Derrycreevy Sandstone. The top of the formation is not seen but rare examples of large scale cross bedding up to 1 m thick occur which probably originated as aeolian deposits in the form of low sand dunes.

The age of these rocks is difficult to determine with the absence of any fossils but the most recent appraisal places them in the Triassic period as part of the Sherwood Sandstone Group. This provides information on the extent of depositional basins and range of palaeo-environments within the Sherwood Group, a geological unit of importance for hydrogeology and potentially for hydrocarbon exploration.

The wider area is of considerable importance for the buildings and other structures associated with past industries. With many of the outcrops associated with these historical industries, the relationship between the areas geology, development of rock outcrop and industrial archaeology is very notable.

SCHEDULE

The following operations and activities appear to the Department to be likely to damage the geological interest of the area:

1. Any activity or operation which involves the damage or disturbance by any means of the surface and subsurface of the land.

2. Extraction of minerals, including rock, sand and gravel.

3. The storage or dumping, spreading or discharge of any material.

4. Changes in tree or woodland management, including afforestation or planting.

5. Construction, removal or disturbance of any permanent or temporary structure including building, engineering or other operations.

6. Alteration of natural or man-made features, the clearance of boulders or stones and grading of rock faces.

7. Operations or activities, which would affect wetlands (include marsh, fen, bog, rivers, streams and open water), e.g.

   i. change in the methods or frequency of routine drainage maintenance;

ii. modification of the structure of any watercourse;

iii. lowering of the water table, permanently or temporarily;

iv. change in the management of bank-side vegetation.

8. The following activities undertaken in a manner likely to damage the interest of the area:

i. educational activities;

ii. research activities;

iii. recreational activities.

9. Sampling of rocks, minerals, fossils or any other material forming a part of the site, undertaken in a manner likely to damage the scientific interest.

10. Use of vehicles or craft likely to damage the interest of the area.

FOOTNOTES

(a) Please note that consent by the Department to any of the operations or activities listed in the Schedule does not constitute planning permission. Where required, planning permission must be applied for in the usual manner to the Department under Part IV of the Planning (Northern Ireland) Order 1991. Operations or activities covered by planning permission are not normally covered in the list of Notifiable Operations.

(b) Also note that many of the operations and activities listed in the Schedule are capable of being carried out either on a large scale or in a very small way. While it is impossible to define exactly what is "large" and what is "small", the Department would intend to approach each case in a common sense and practical way. It is very unlikely that small scale operations would give rise for concern and if this was the case the Department would normally give consent, particularly if there is a long history of the operation being undertaken in that precise location.

BENBURB - MILLTOWN ASSI

Views About Management
The Environment (Northern Ireland) Order 2002 Article 28(2)

A statement of the Departments views about the management of Benburb - Milltown Area of Special Scientific Interest ("the ASSI")

This statement represents the views of the Department about the management of the ASSI for nature conservation. This statement sets out, in principle, our views on how the area's special conservation interest can be conserved and enhanced. Northern Ireland Environment Agency has a duty to notify the owners and occupiers of the ASSI of its views about the management of the land.

Not all of the management principles will be equally appropriate to all parts of the ASSI and there may be other management activities, additional to our current views, which can be beneficial to the conservation and enhancement of the features of interest. It is also very important to recognise that management may need to change with time.

The management views set out below do not constitute consent for any operation or activity. The written consent of the Department is still required before carrying out any operation or activity likely to damage the features of special interest (see the Schedule on pages 3 and 4 for a list of these operations and activities). Northern Ireland Environment Agency welcomes consultation with owners, occupiers and users of the ASSI to ensure that the management of this area maintains and enhances the features of interest, and to ensure that all necessary prior consents are obtained.

MANAGEMENT PRINCIPLES

The earth science interest at Benburb - Milltown occurs as natural outcrop of rock exposures and loose block material. Northern Ireland Environment Agency would encourage the maintenance of the ASSI and its earth science interest.

The geological series

Provided no damaging activities, as set out in the Schedule, are undertaken without consent, the needs of owners, occupiers and the Department can be met. Earth science features such as those at Benburb - Milltown may require occasional management intervention in order to maintain access to, and exposure of, the geology. This could include selective removal of vegetation.

Specific objectives include:

Maintain the geological series in an undamaged state.

Maintain access to the geological series.

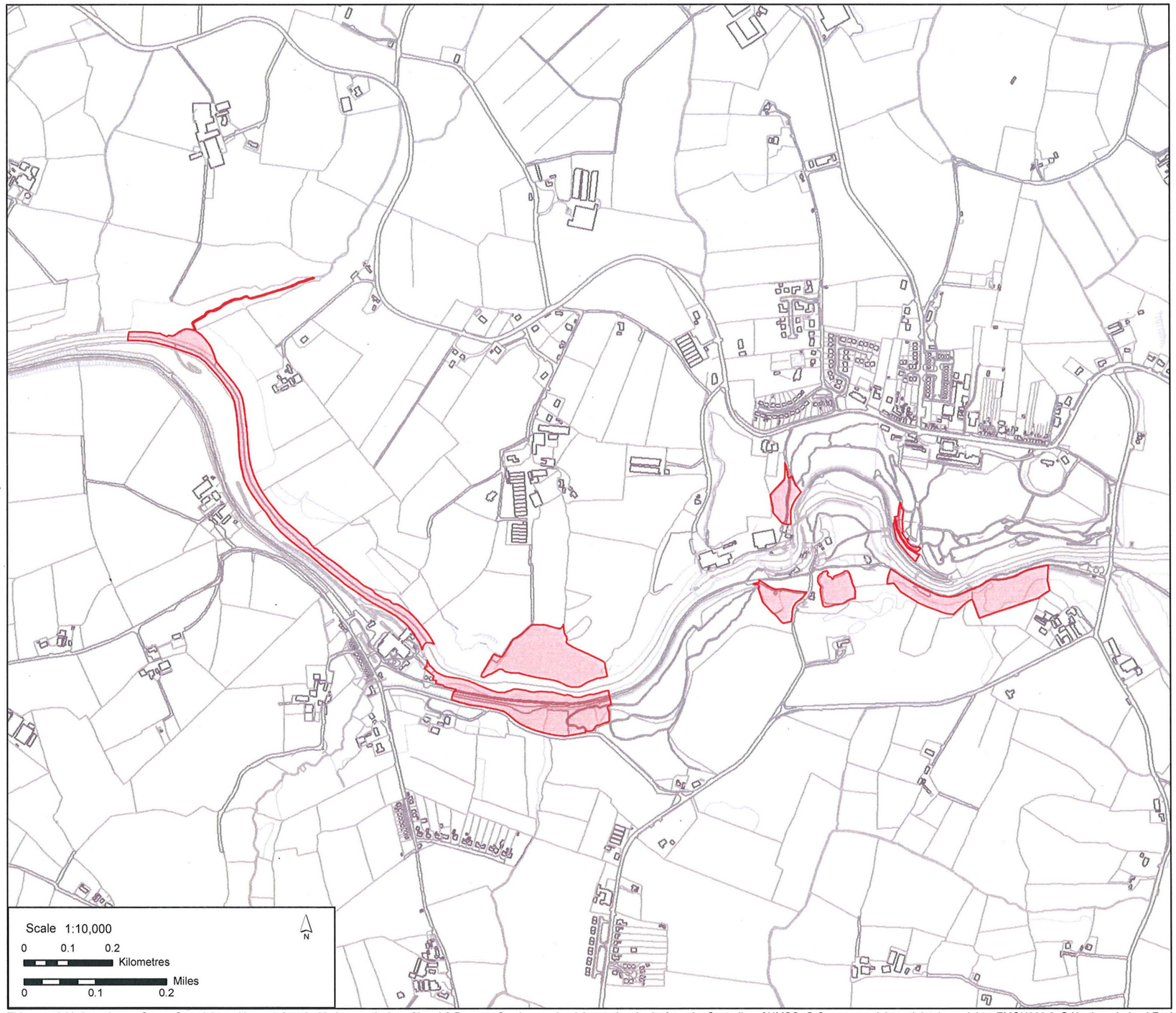
The Official Seal of the
Department of the Environment
hereunto affixed is authenticated
by

G. R. Seymour.

G R SEYMOUR
Senior Officer of the
Department of the Environment

Dated the 8th of FEBRUARY 2012

BENBURB - MILLTOWN ASSI



BENBURB - MILLTOWN
AREA OF SPECIAL SCIENTIFIC INTEREST

Map referred to in the Declaration dated: 8th FEBRUARY 2012

SITE BOUNDARY: The Area of Special Scientific Interest (ASSI) includes all the lands highlighted within the solid coloured lines.

AREA OF SITE: 11.05 hectares

OS MAPS 1:50,000: Sheet Nos. 19
1:10,000: Sheet No. 198

IRISH GRID REFERENCE: H816 518, H814 519, H813 518
H811 518, H811 520, H806 517, H806 515 & H800 520

COUNCIL AREA: ARMAGH CITY AND DISTRICT COUNCIL. DUNGANNON AND SOUTH TYRONE BOROUGH COUNCIL

COUNTY: ARMAGH AND TYRONE

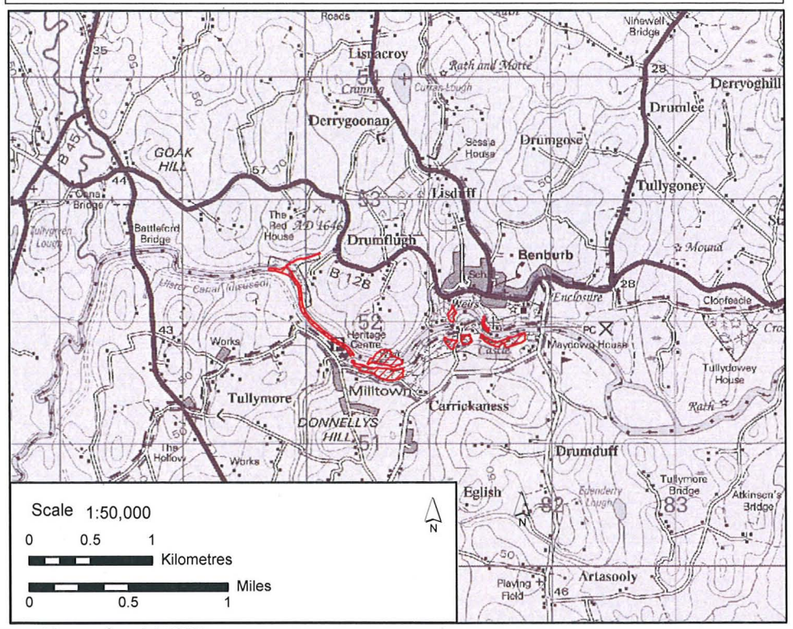
G.R. Seymour.

G R SEYMOUR
SENIOR OFFICER OF THE
DEPARTMENT OF THE ENVIRONMENT

An Agency within the Department of the Environment
www.doeni.gov.uk

INVESTORS IN PEOPLE

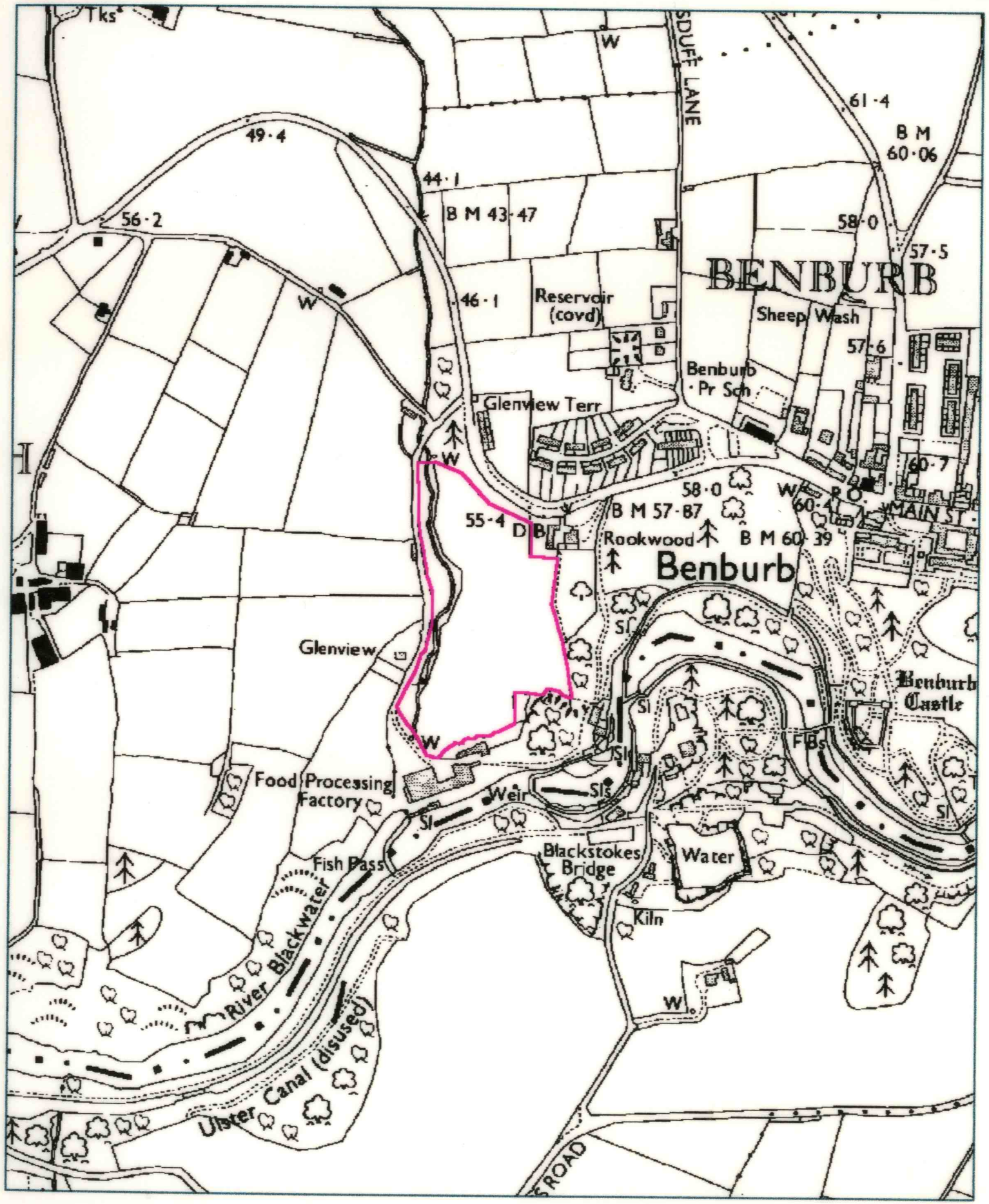
NIEA Northern Ireland Environment Agency
www.doeni.gov.uk/niea

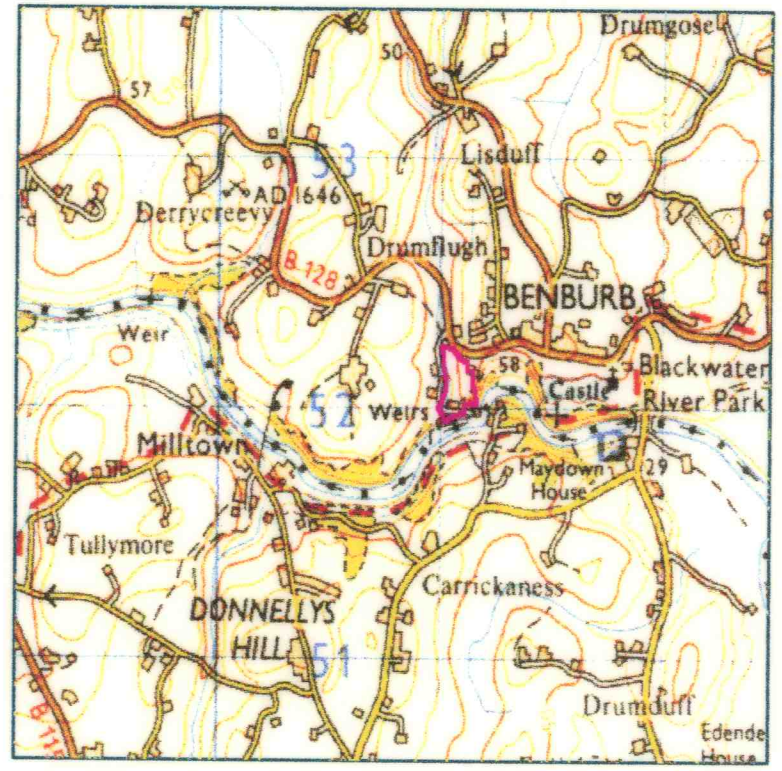


ENVIRONMENT SERVICE

Benburb ASSI

DEPARTMENT OF THE ENVIRONMENT FOR NORTHERN IRELAND
BENBURB AREA OF SPECIAL SCIENTIFIC INTEREST





MAP REFERRED TO IN THE
DECLARATION DATED: 1 August 1995

SITE BOUNDARY: The Area of Special Scientific Interest (ASSI) includes all the lands within the solid coloured line.

AREA OF SITE: 3.0 ha

SCALE: 1 : 5 000

SHEET NO: 198

IRISH GRID REFERENCE: H 810520

DISTRICT COUNCIL AREA: DUNGANNON

COUNTY: TYRONE

John Crowther.

J Crowther
Assistant Secretary

DEPARTMENT OF THE ENVIRONMENT FOR NORTHERN IRELAND

DECLARATION OF AREA OF SPECIAL SCIENTIFIC INTEREST AT BENBURB, COUNTY TYRONE. ARTICLE 24 OF THE NATURE CONSERVATION AND AMENITY LANDS (NORTHERN IRELAND) ORDER 1985.

The Department of the Environment for Northern Ireland (the Department), having consulted the Council for Nature Conservation and the Countryside and being satisfied that the area delineated and described on the attached map (the area) is of special scientific interest by reason of its geological features and accordingly needs to be specially protected, hereby declares the area to be an area of special scientific interest to be known as the 'Benburb area of special scientific interest'.

The interglacial peat deposit at Benburb is sealed by glacigenic diamict. It is the only interglacial peat deposit presently known in Northern Ireland. The peaty sequence at Benburb is sealed by a drumlin forming till and therefore predates the last cold stage. Floristically its pollen content is similar to about ten other interglacial sites in Ireland which are thought to belong to the Gortian temperate stage. The Gortian interglacial dates from some 300-420,000 years before present (B.P.) and is generally assumed to predate the penultimate, Munsterian, glaciation.

The original exposure of the interglacial peat was discovered in the bank of a small tributary of the River Blackwater. Most of the peat is sealed beneath a few metres of glacial till and is only partly exposed along the banks of the tributary stream. The peat is compressed and the lack of firm stratigraphic control and poor exposures does not rule out the possibility that the peat is not *in situ*. The lack of clear bedding planes and the fairly uniform nature of the peat suggests that nonconformities are absent. The apparent setting is of organic materials accumulating in a lake.

The four major pollen assemblage zones contain the colonising, early and late temperate stages of this interglacial cycle, though the final phase has been truncated or is a non-sequence. Floristic studies of the sequence highlight many of the problems involved in the correlations between interglacial sequences in Ireland and those in England. Differences between Benburb and other Gortian sites may well reflect geographic variability in floristic composition within the same interglacial.

Macrofossils from the basal 'pollen assemblage zone' (the pollen-free PAZ 0) series show that Slender Naiad Najas flexilis was the most abundant species. The majority of seeds recovered from this level are from submerged or floating aquatics.

PAZ 1 has Pine Pinus spp. (>80%) and Birch Betula spp. (<10%) as the greatest contributors. Non-arboreal pollen includes Grasses Gramineae (<50%), Sedges Cyperaceae (<10%), aquatics and members of a rich herbaceous flora. The presence of land plants around the pond is indicated by the fruits of Alder Alnus glutinosa, Downy Birch Betula pubescens and Silver Birch Betula pendula.

PAZ 2 comprises only three spectra, Pine Pinus spp. and Yew Taxus spp. pollen are strongly represented. Alder Alnus spp. levels rise to 36% and Grasses Graminae fall to 10%. Levels of Coryloid pollen rise to a peak of 10% and Birch Betula spp. falls to below 5%.

Above this (PAZ 3), Pine Pinus spp. pollen falls from 25% to around 15% and the wetland vegetation is supplemented by mixed deciduous forest comprising Oak Quercus spp., Ash Fraxinus spp. and Elm Ulmus spp.. The presence of Holly Ilex spp. and Ivy Hedera spp., indicates that this zone represents the warmest part of the interglacial cycle.

Finally, in PAZ 4A, Fir Abies spp. pollen is present for the first time and suggests that the vegetation surrounding the area was predominantly forest comprising this species. Rhododendron Rhododendron spp. and species X also are distinctive fossils at this level. Leaves of European Silver-Fir Abies alba are typically present.

Within the uppermost portion of this level (PAZ 4B) Fir Abies spp. declines, as does Alder Alnus spp. and Coryloid pollen, leaving Yew Taxus spp. as the dominant arboreal species. Spruce Picea spp., which is present throughout the diagram in small quantities, rises to a maximum in this zone.

Independent pollen zonation confirms that the Benburb sequence is the first fossiliferous interglacial series to be recorded in the north of Ireland. The basic pollen assemblages are similar to those of Gortian sites elsewhere in Ireland and include the association of Fir Abies spp., Yew Taxus spp., species X and Rhododendron Rhododendron spp. in the late temperate stage. However, certain differences exist between the assemblages at Benburb and other Gortian sites in Ireland. These may be interpreted in several ways. Differences in their floristic composition may reflect a geographic variation within the same interglacial. Alternatively it could be argued, that the presence of only one till above the interglacial peats suggests a last interglacial age (a pre-Midlandian age). However, the critical stratigraphic marker of Hornbeam Carpinus spp. pollen is not present.

SCHEDULE

The following operations and activities appear to the Department to be likely to damage the geological interest of the area:-

1. Any activity or operation which involves the damage or disturbance by any means of the surface and subsurface of the land, including reclamation and extraction of minerals including sand, gravel and peat.

2. The storage or dumping, spreading or discharge of any material.

3. Construction, removal or disturbance of any permanent or temporary structure including building, engineering or other operations.

4. Alteration of natural or man-made features, the clearance of boulders or stones and grading of outcrop.

5. The following activities undertaken in a manner likely to damage the interest of the area:

   (i) Educational activities;

   (ii) Research activities;

   (iii) Recreational activities.

6. Excessive sampling of rocks, minerals, fossils or any other material forming a part of the site.

7. Changes in tree or woodland management, including afforestation, planting, clearing, selective felling and coppicing.

8. Operations or activities which would affect wetlands (including rivers and streams), eg:-

   (i) change in the methods or frequency of routine drainage maintenance;

   (ii) modification to the structure of any watercourse;

   (iii) lowering of the water-table, permanently or temporarily;

   (iv) change in the management of bank-side vegetation;

   (v) changes in field drainage or boundary field drainage.

9. Use of vehicles or craft likely to damage the interest of the area.

10. Burning.

Sealed with the Official Seal of the
Department of the Environment for
Northern Ireland on 1 August 1995

John Crowther

J CROWTHER
Assistant Secretary

CIVIL SERVANT
BOTH CLARENCE COURT
BELFAST

FOOTNOTES

(a) Please note that consent by the Department to any of the above operations or activities does not constitute planning permission. Where required, planning permission must be applied for in the usual manner to the Department under Part IV of the Planning (NI) Order 1991. Operations or activities covered by planning permission are not normally covered in the list of Notifiable Operations.

(b) Also note that many of the operations and activities listed above are capable of being carried out either on a large scale or in a very small way. While it is impossible to define exactly what is "large" and what is "small", the Department would intend to approach each case in a common sense and practical way. It is very unlikely that small scale operations would give rise for concern and if this was the case the Department would give consent, particularly if there is a long history of the operation being undertaken in that precise location.

ASI95046/CWB /JBB

Appendix 9B Historical Ordnance Survey Plans

Site Number 10

Extract from Tyrone County Series 6" map 1833

Meters
0 50 100 150 200 250

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 5000

Land & Property Services.

282500 283000 283500

358500 358000 357500 357000

E G R A

Well

177

187

177

D R U M G O L D

A. R. P.
153 „ 0 „ 39

Well

151

Well

115

Gravel Pit

Gravel Pit

Well

147

K E E R A

A. R. P.
34 „ 1 „ 36

D

C U

C

107

Site Number 10

Extract from Tyrone County Series 6" map 1851-54

Meters
0 50 100 150 200 250

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 5000

Land & Property Services.

282500 283000 283500

358500 358000 357500 357000

Grange Villa

The Grange

B.M.137·7

D R U M G O L

A R P
153 0 39

D U L K E E R A

Culkeeran Ho.

A R P
134 1 36

B.M.115·7

TYRONE (MIDDLE DUNGANNON) SHEET LIV. 16.

Surveyed in 1907. Re-printed in 1921.

CHARACTERISTICS AND SYMBOLS FOR BOUNDARIES, &c.

County	Townland	Antiquities (Site of)	Fort	Braces indicating that the spaces so connected are included in the same area	
Barony	Municipal Wards	Trigonometrical Station	△		
Parish		Area of parcels given in Statute Acres, thus	4·370		

The Representation on this Map of a Road, Track, or Footpath, is no evidence of the existence of a right of way.

Published by the Director General at the Ordnance Survey Office, Phœnix Park, Dublin, 1909.

The Altitudes are given in Feet above the Low Water of Spring Tides in Dublin Bay, which is 21 Feet below a mark on the base of Poolbeg Lighthouse. Altitudes indicated thus (B.M. 54·7) refer to Bench Marks on Buildings, Walls, &c., those marked thus (+52) to surface levels.

Scale 1/2500 being 25·344 Inches to a Statute Mile or 208·33 Feet to One Inch.

Links 100 0 5 10 15 20 25 30 35 40 Chains (½ Mile)

Feet 100 0 500 1000 1500 2000 2500 2600 Feet.

PRICE 6/8 NET.

REVISION OF 1935.

TYRONE SHEET LIV. 16.

MULLYBRANNON Tp. MOYGASHEL Tp. LIV.12. DUNGANNON UNION & R.D. DONNYDEADE Tp. AREAS TO PLAN EDGE ONLY BERNAGH Tp.


LIV.15.
LISMU
LIV.13.
CREW Tp
GRANGE Tp
BERNAGH
ALTNAVANNOG
LISDERMOT
LEVY
MOY
SYERLA
DRUMGOLD
Beetling Mills (Disused)
Bealemount
Broom Hill
Red Ford
Red Ford Bridge
Flax Mill (Disused)
River Rhone
Gravel Pit
Crew House
Cherrymount
Syerla Moat
Fort
E.B.N.I. Transmission Line

LXI.4. DRUMMOND Tp.

Surveyed 1907. Revised 1935. Levelled 1906. Levels partially revised 1937. Vandyked and Printed by the Ordnance Survey, Southampton, 1938.

30/38.

Published by the Ordnance Survey of Northern Ireland, Armagh House, Ormeau Avenue, Belfast, 1938.

The Altitudes are given in feet above the Low Water of Spring Tides in Dublin Bay, which is 21 feet below a mark on the base of Poolbeg Lighthouse. Altitudes indicated thus (B.M. 54·7) refer to Bench Marks on Buildings, Walls, &c., those marked thus (+52) to surface levels. The High Water Mark shown on this Map is the High Water Mark at Medium Tides

CHARACTERISTICS AND SYMBOLS FOR BOUNDARIES, &c.

County	C	Union	U	Change of Boundary indicating the point at which the character of a Boundary changes	
County Borough	B	District Electoral Divisions & Wards	D	Antiquities, (Site of)	Fort
Municipal Borough	M	Townland	A	Trigonometrical Station	△
Urban & Rural Districts	R	Towns with defined Boundary	F	Areas of Parcels given in Statute Acres, thus	1·184
				Braces indicating that the spaces so connected are included in the same area	

The Representation on this Map of a Road, Track, or Footpath, is no evidence of a right of Way.

Scale...1:2500 being 25·344 Inches to a Statute Mile or 208·33 Feet to One Inch.

Links 100 0 5 10 15 20 25 30 35 40 Chains or ½ Mile
Feet 100 0 500 1000 1500 2000 2500 2600 Feet

TYR. LIV. 16. Price 6/8 Net.

REVISION OF 1935.

TYRONE SHEET LXI. 4.

Surveyed 1907. Revised 1935. Levelled 1906. Levels partially revised 1937.
25/39.

CHARACTERISTICS AND SYMBOLS FOR BOUNDARIES, &c.

County	C	Union	U	Change of Boundary indicating the point at which the character of a Boundary changes		Areas of Parcels given in Statute Acres, thus ..... 1·184
County Borough	B	District Electoral Divisions & Wards	D			Braces indicating that the spaces so connected are included in the same area
Municipal Borough	M	Townland	A	Antiquities, (Site of)	Fort	
Urban & Rural Districts	R	Towns with defined Boundary	F	Trigonometrical Station	△	

The Representation on this Map of a Road, Track, or Footpath, is no evidence of a right of Way.

Vandyked and Printed by the Ordnance Survey, Southampton, 1939.
Published by the Ordnance Survey of Northern Ireland, Armagh House, Ormeau Avenue, Belfast, 1939.
The Altitudes are given in feet above the Low Water of Spring Tides in Dublin Bay, which is 21 feet below a mark on the base of Poolbeg Lighthouse.
Altitudes indicated thus (B.M. ^ 54·7) refer to Bench Marks on Buildings, Walls, &c., those marked thus (+52) to surface levels.
The High Water Mark shown on this Map is the High Water Mark at Medium Tides

Scale...1:2500 being 25·344 Inches to a Statute Mile or 208·33 Feet to One Inch.

Links 100 0 5 10 15 20 25 30 35 40 Chains or ½ Mile
Feet 100 0 500 1000 1500 2000 2500 2600 Feet

TYR. LXI. 4.

Price 6/8 Net.

SCALE 1:2500

ORDNANCE SURVEY OF NORTHERN IRELAND

Revised 1973

PROVISIONAL EDITION

PLAN 179-8
(GRID SQUARE H)

MOYGASHEL WARD | DUNGANNON L G D | DONNYDEADE TD | DONNYDEADE TD | 179-4 | BERNAGH TD | CO TYRONE | DREEMORE TD

MOYGASHEL TD | LISDERMOT TD | SYERLA TD | 179-7 | 179-9 | DRUMANUET TD

ALTNAVANNOG

DRUMGOLD

MOY WARD

GRANGE

Broom Hill
Sand Pit
Concrete Products Works
Friends' Burial Ground
Grange Lodge
The Grange
Red Ford Bridge
Bridge Hill
Sewage Works
Violet Hill
Gravel Pit (disused)
River Rhone
GRANGE ROAD
OLD MOY ROAD
STEWA ROAD
RHONE WARD
CULKEERAN ROAD
DRUMGRANNON ROAD

DRUMMOND TD | CULKEERAN TD | 179-12

PLAN 179-8
A (GRID SQUARE H)
Surveyed 1907 Revised 1973
Levelled 1955
Heights are given in metres above Mean Sea Level at Belfast
To convert metres to feet, multiply by 3·281

Metres 20 0 200 400 600 800 Metres
Feet 100 0 1000 2000 2600 Feet
SCALE 1:2500

NOTE
This map is PROVISIONAL in so far as not all minor topographical features have been checked; only ward and district boundaries have been perambulated and, where necessary, rectified; the depiction of vegetation may not be complete; and parcel areas have not been measured or published.

The Ordnance Survey is prepared to supply enclosure areas for a small fee. Inquiries concerning the service should be made to:
The Chief Survey Officer, 83 Ladas Drive, Belfast BT6 9FJ.

The representation on this map of a road, track or path is no evidence of a Right of Way
For explanation of Grid and referencing system see pamphlet issued free of charge
A Reference Card of Conventional Signs is published separately free of charge

Printed by the Director General, Ordnance Survey, Southampton
Published by the Ordnance Survey of Northern Ireland, Ladas Drive, Belfast, 1976

Site Numbers 25 & 26

Extract from Tyrone County Series 6" map 1833-34

Meters
0 60 120 180 240 300

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 6000

Land & Property Services.

282500 283000 283500

354500 354000 353500 353000 352500

M U L L A G H B O Y

A. R. P.
174 " 1 " 4

B E R M E S S O N

G L E B E

A. R. P.
250 " 0 " 15

D E R R

Pond

L.S.Quarry

Gravel Pit

D R U M L E E

A. R. P.
218 " 0 " 1

T U L L Y G O N E Y

A. R. P.
207 " 1 " 34

Gravel Pit

Fort

D R U M D E

A. R. P.
105 " 2 " 27

282500 283000 283500

Site Numbers 25 & 26

Extract from Tyrone County Series 6" map 1906-07

Meters
0 60 120 180 240 300

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 6000

Land & Property Services.

282500 283000 283500

354500 354000 353500 353000 352500

BERMESSON GLEBE
A R P
251 2 37

TULLYGONEY
A R P
207 1 26

LAGHBOY
A R P
173 3 2

DERR
A
348

UMLEE
A R P
219 2 30

DRUMDE
A R P
102 3 20

Ninewell Bridge
Smithy
Lodge
Clonfragile Rectory
Hazel Hill
Tullygoney Houses
Manse
Liable to Floods
F.P.
F.S.
B.M.102·7
B.M.85·8
B.M.106·9
B.M.192·1
B.M.70·1
B.M.100·6

Site Numbers 25 & 26

Extract from Tyrone County Series 6" map 1935

Meters
0 60 120 180 240 300

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 6000

Land & Property Services®

282500 283000 283500

354500 354000 353500 353000 352500

BERMESSON GLEBE

A 251 R 3 P 36

Ninewell Bridge

Holy Well

BM.105-0

BM.107-0

BM.107-2

Lodge

BM.86-4

Fp.

Hazel Hill

BM.103-1

TULLYGONEY

A 207 R 1 P 4

Tullygoney House

138

BM.132-2

Rises

Spring

Manse

Fort

BM.120-6

BM.68-2

LAGHBOY

A 173 R 2 P 36

Liable to Floods

DERA

A 348

Including 6

Liable to Floods

100

DRUMDE

A 219 R 2 P 21

Rises

Spring

DRUMDE

A 102 R 3 P 1

Incl.

BM.90-3

SCALE 1:2500

ORDNANCE SURVEY OF NORTHERN IRELAND

OFFICE RECORD

Revised 1977

PROVISIONAL EDITION

PLAN 198-4
(GRID SQUARE H)

179-16

LISBANLEMNEIGH TD | DUNGANNON L G D | CO TYRONE | MULLAGHBOY TD

TOBERMESSON GLEBE

DERRYOGHILL

DRUMGOSE

DRUMLEE

TULLYGONEY

Hazel Hill

Tullygoney House

TOBERMESSON ROAD

DERRYOGHILL ROAD

DRUMGOSE ROAD

TULLYGONEY ROAD

DRUMLEE ROAD

SESSIAMAGAROLL TD

MOY WARD

BENBURB WARD

STANGMORE TD (Magen)

198-3

198-4

198-8

DRUMDERG TD

Metres 1544000 | Metres 1540000 | Metres 1536000 | Metres 1532000 | Metres 1528000

817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839

543 542 541 540 539 538 537 536 535 534 533 532 531 530 529

BENBURB ROAD

PLAN 198-4

A (GRID SQUARE H)
Surveyed 1907 Revised 1977
Levelled 1973
Heights are given in metres above Mean Sea Level at Belfast
To convert metres to feet, multiply by 3·281

Metres 20 0 200 400 600 800 Metres
Feet 100 0 1000 2000 2600 Feet

SCALE 1:2500

NOTE
This map is PROVISIONAL in so far as not all minor topographical features have been checked; only ward and district boundaries have been perambulated and, where necessary, rectified; the depiction of vegetation may not be complete; and parcel areas have not been measured or published.

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Printed by the Director General, Ordnance Survey, Southampton
Published by the Ordnance Survey of Northern Ireland, Ladas Drive, Belfast, 1978

Site Number 29

Extract from Tyrone County Series 6" map 1833

Meters
0 20 40 60 80 100

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 2500

Land & Property Services.

282500 282600 282700 282800 282900 283000

352700 352600 352500 352400 352300 352200 352100 352000 351900

Fort

R D

P. 25

TULLYLE

Well

A. R. P.
150 „ 2 „ 2

DRUMDER

Rosedale Cottage

Tullydowey Cottage

CONCRETE WORKS

CLONFEACLE ROAD

TULLYDOWEY ROAD

DRUMLEE ROAD

Land & Property Services
CERTIFIED OSNI MAPPING
Reference FIELD TRACE 198-8
Scale 1:2500
Surveyed/Revised 1977
Authenticated C.A.C.
Crown Copyright © 2012

ORDNANCE SURVEY® OF NORTHERN IRELAND
MAPPING

TRACK
ETK
SLOPES AS SHOWN
TRACK
TH (COVD)
TANNING WORKS
mks
1912
SINKS
BM 18·11
17·1H
18·0
RH B(SCAT)
RG
RG B(SCAT)
MARSH
ISSUES
21·3
22·9
RH
22·6
24·1H
TULLYDOWEY ROAD
PRIVATE ROAD
ORCH
MARSH B (G)
POND
CLONFEACLE ROAD
DRUMLEE
Land & Property Services
CERTIFIED OSNI MAPPING
Reference FIELD TRACE 198-8
Scale 1:2500
Surveyed/Revised 1993
Authenticated C. Adair
Crown Copyright © 2012
ORDNANCE SURVEY® OF NORTHERN IRELAND
MAPPING

Tullydowey House

Extract from Tyrone County Series 6" map 1834

Meters
0 20 40 60 80 100

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 2500

Land & Property Services.

283200 283300 283400 283500 283600 283700 283800

352300 352200 352100 352000 351900 351800 351700 351600 351500 351400

T U L L Y D

A. 205 R. 2

Well

Well

Well

Mill Dam

60

Tullydowey House

Extract from Tyrone County Series 6" map 1851

Meters
0 20 40 60 80 100

IRISH GRID CO-ORDINATES

ORDNANCE SURVEY OF NORTHERN IRELAND®

Scale 1: 2500

Land & Property Services.

283200 283300 283400 283500 283600 283700 283800

352300 352200 352100 352000 351900 351800 351700 351600 351500 351400

Gate Lodge

Gate Lodge

T U L L Y D

205

Old Bleach Mill

Tullydowey Ho.


DRUMLEE Td
TULLYLEARN Td
DUNGANNON UNION & R.D
LXI. 16
LXII. 9
STANGMORE (Magee)
DRUMDERG
TULLYDOWEY
TULLY-LEA RN
Clonfeacle
St. Patrick's R.C. Church
Grave Yard
Church (Site of)
Tullydowey House
Mullan Fort
Blackwatertown Bridge
To Blackwatertown
River Blackwater
Liable to Floods
Union & R.D. Bdy.
Rocks Ford
Ford
Well
Lodge
F.P.
Co. ARMAGH
SHEET LXIIA. 1.
LXVII. 4
MINISTRY OF FINANCE ORDNANCE SURVEY 12 APR 1937 OFFICE RECORD COPY

Surveyed in 1907.

CHARACTERISTICS AND SYMBOLS FOR BOUNDARIES, &c.

County	Townland	Antiquities (Site of)	+	Braces indicating that the spaces so connected are included in the same area.	
Barony	Municipal Wards	Trigonometrical Station	△		
Parish		Area of parcels given in Statute Acres, thus	4·370		

The Representation on this Map of a Road, Track, or Footpath, is no evidence of the existence of a right of way.

Published by the Director General at the Ordnance Survey Office, Phoenix Park, Dublin, 1909.

The Altitudes are given in Feet above the Low Water of Spring Tides in Dublin Bay, which is 21 Feet below a mark on the base of Poolbeg Lighthouse. Altitudes indicated thus (B.M. 54·7) refer to Bench Marks on Buildings, Walls, &c., those marked thus (+52) to surface levels.

Scale 1/2500 being 25·344 Inches to a Statute Mile or 208·33 Feet to One Inch.

Links 100 0 5 10 15 20 25 30 35 40 Chains

Feet 100 0 500 1000 1500 2000 2500 2600 Feet

~~Price 3/- Net.~~ Price 6/8 Net.

164 . 2 . 17

Gravel Pit

L I S D O

A. R. P.
131 . 3 . 20

Lisdown

Fort

329

Elm Park House

Tonnagh

343

School Ho.

N A G H

A. R. P.
218 . 1 . 15

School Ho.

Pipe

Pipe

The Flush

Flush Bridges

C U L L E N T R A G H

School House

A. R. P.
243 . 2 . 3

B A L L Y D O O

A. R. P.
191 . 2 . 32

Pipe

L.S. Quarry

to Armagh

Pipe

Pipe

12

Elm Park Ho.

Gate Lodge

Signal Post

Turners Br.

The Flush

Flush Br.

Nursery

Woolseys Br.

Site of Fort

to Belfast

Mill Pond

Ballydoo Br.

Laurel Hill

T O W N A G H

L I S D O O

B A L L Y D O O

C U L L E N T R A G H

A R P
220 3 6

A R P
131 3 20

A R P
191 3 37

A R P
238 2 32

Elm Park House
Waterfall
Reservoir
Lodge
Bracknagh Hill House
B.M.243·0
Tonnagh Hill House
M.P Portadown 14
B.M.231·1
Woolsey's Bridge
B.M.283·3
Turner's Bridge
S.P
M.P 15
The Flush
Flush Bridge
Orange Hall
B.M.267·9
B.M.226·3
Nursery
B.M.225·9
B.M.234·8
Laurel Hill
Ballydoo Bridge
Mill Pond
To Armagh
TAMLAGHT TD (E.D. Ballymartrim)
TULLENTRAGH
BALLYDOO
DOWN
12

Elm Park School
Spring
Spring
Hy Ram Reservoir
Lodge
Spring
222 Including 0
3 1
26 29 water
346
Tonnagh Hill House
Bracknagh Hill House
288
218
BM.281·1 Woolsey's Bridge
BM.283·3
289
298
Spring
Turner's Bridge
S.P
The Flush
Flush Bridge
Orange Hall
241
255
210
BM.234·6
Spring
240
131
1 36
192 1 19
237 0 11
Laurel Hill
Ballydoo Br.
To Armagh
200
300
TAMLAGHT TD
12

G.N.R. (IRELAND)
PORTADOWN & CAVAN BRANCH

BRACKNAGH ROAD

Woolsey's Bridge

BM.231·1

BM.283·3

1:2500
1977

TAMLAGHT

A. 301 R. 0 P.

LISGLYNN

A. 248 R. 3 P. 11

Norton's Cross Roads

Tamlaght 381

Leslie Hill

Fort Lisglynn 455

Quarry

Quarries

Gravel Pit

Pipe

CUP-OUT

OSNI MAPPING
e Co ARMAGH 056-2-15-1
2/16 6" to 1 Mile
/Revised 1832/114

ORDNANCE SURVEY®
OF NORTHERN IRELAND

TAMLAGHTY

303 1 26

LISGLYNN

249 O 6

B.M.250·0

B.M.265·1

B.M.321·6

B.M.334·7

B.M.350·2

B.M.355·4

Norton's Cross Roads

Leslie Hill

Ballymaguy Rc

Raghinn

TARMLAGHT
(E.D. Brootally)

A R P
307 3 5

A R P
243 2 2

LISGLYNN

Norton's Cross Roads

Ballymargy Bridge

Leslie Hill

Lisglynn

B.M.253·1

B.M.288·2

B.M.315·0

B.M.330·3

B.M.322·2

CUP-OUT

ED OSNI MAPPING
ice Co ARMAGH 056-2-15-3.
016 6" TO 1 MILE
d/Revised 1906 rl

ORDNANCE SURVEY®

TAMLAGHT
A 307 R 3 P 1

LISGLYNN
A 243 R 1 P 39

Hall

Gospel Hall

Norton's Cross Roads

Ballymargy Bridge

Leslie Hill

Lisglynn 459

BM.310·6

BM.330·8

BM.263·1

P.P. 331

G.P.

Sp.

239 284 296 249 304 305 307 329 331 459

300 400

E A G H ROAD
DERNALEA ROAD
TAMLAGH
TAMLAGH
ALTS IN PROGRESS
ORCH
Well
Well
Well
YD
SK.
F.F.
C.S.
10·042
8·588
7·717
7·764
2·996
·889
·815
1·039
1·584
4·054
·629
1·497
1·258
1·689
1·843
3·882
·703
2·749
·454
2·191
·306
·269
1·629
1·405
·684
1·409
2·941
·378
2·210
2·221
·039
2·988
·507
2·222
1·609
·739
1·836
1·658
2·339
·119
2·242
·253
·362
1·287
·938
·622
·391
1·470
·774
1·644
3·403
2·477
1·794
2·688
1·350
·999
·683
·323
·430
·967
1·268
·624
·710
·213
1·425
2·898
2·382
·059
1·274
1·696
·501
1·168
·681
·179
1·217
1·329
2·039
·036
·578
1·842
1·241
·330
3·773
3·050
·379
·308
·995
1·461
·115
·049
1·649
1·743
·293
1·217
2·548
1·868
1·409
3·763

Land & Property Services
CERTIFIED OSNI MAPPING
Reference: 16 234-7 NW Foe A" Error
Scale: 1/2500
Surveyed/Revised: 1923
Authenticated:
Crown Copyright © 2010

ORDNANCE SURVEY® OF NORTHERN IRELAND
MAPPING

ARMAGH 15 SE

Summary

This map area appears to be underlain by a thick sequence of L. Palaeozoic (ordovician)? turbidite beds apparently inverted and striking generally with a Caledonoid trend (N.E.S.W.) Dip generally moderate-steep to the S.E. Coarse grained grey/green greywackes with are massively bedded (often 5-10m+) dominate. Grading of these into fine grained dark shales is seen in places along with bottom structures on bedding planes. Outcrop is such that dip + strike are often difficult to ascertain.

Widespread drift deposits overlie solid rock. Thick boulder clay forms steep sided drumlins resting on L.Pal rock pavement exposed in places. In some cases drumlins may have solid rock cores. Boulder clay generally a stiff brown/red clay carrying mainly L.Pal boulders + occasional quartz chip and igneous boulders.

① SMALL DISUSED QUARRY.

upto 1m boulder clay covers the solid rock. However exposure is poor with much soil creep and rubble obscuring the outcrop. massively bedded dark grey/green greywackes. Coarse grained. APPEAR TO DIP GENTLY S.E. AT WESTERN END of quarry greywackes are heavily jointed with prominent vertical shattersiding contrary to the presence of a small normal fault trending N.E.-S.W. Beds probably overturned

② DISUSED QUARRY

Quarry was used by the County Council is now flooded. upto 1m of boulder clay with L.Pal. boulders 3"-6" set in an orangy sandy clay matrix overlies Massively bedded lower Palaeozoic turbidite beds. Coarse grained grey green greywackes. Poorly developed graded Bedding with thin shale developments. 2-3cm occuring. Bottom structures on these turbidite beds indicate along with the graded bedding, that they are inverted. Beds strike N.20°E Dipping around 40° to the S.E.

③ SMALL DISUSED QUARRY

Exposure very poor. Massively bedded turbidites. Very coarse grained grits/greywackes. Lithic fragments upto 2-3cm pale green/grey rock heavily jointed. shaley horizons indicate graded bedding which appears to be inverted. Dip & strike difficult to ascertain. Appears to dip gently N.E.?

ARMAGH 15 SE

GEOLOGICAL SURVEY
OF
NORTHERN IRELAND

Square Miles Surveyed	Miles of Boundary Traced	Reported by	Date
1/4	3	[signature]	3rd June 1964
2		S.J. THOMPSON	APRIL 1976

N.B.—Anyone finding this Map would oblige by sending it at once to the Geological Survey Office, 20 College Gardens, Belfast, or nearest Police Station.

Wt. 150/54 500 5/48 U.G.(A)Ltd. Gp. 113 Wt 787/208 2M 8/48

ALLUVIUM

PEAT

BOULDER CLAY

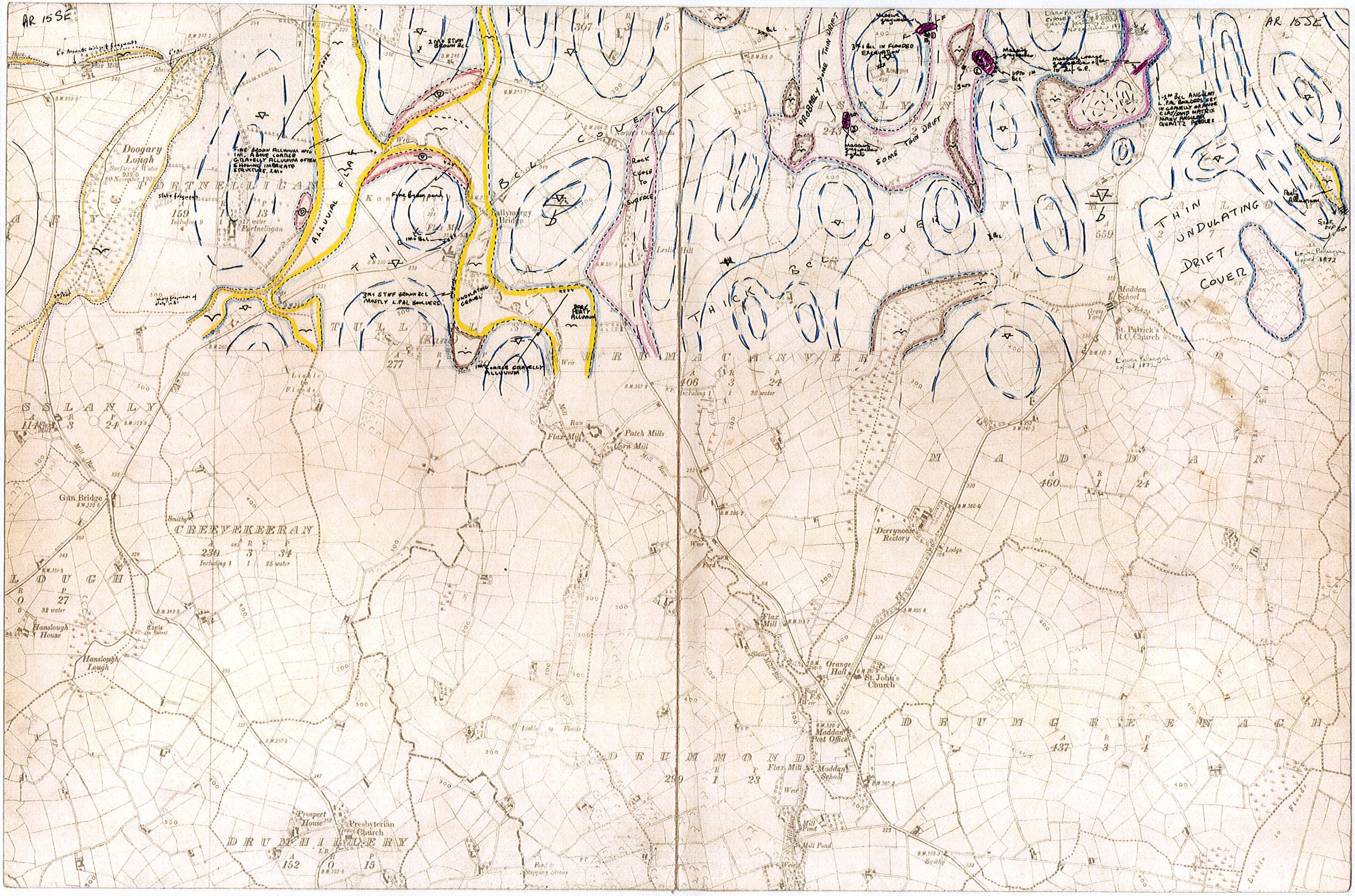
SAND + GRAVEL

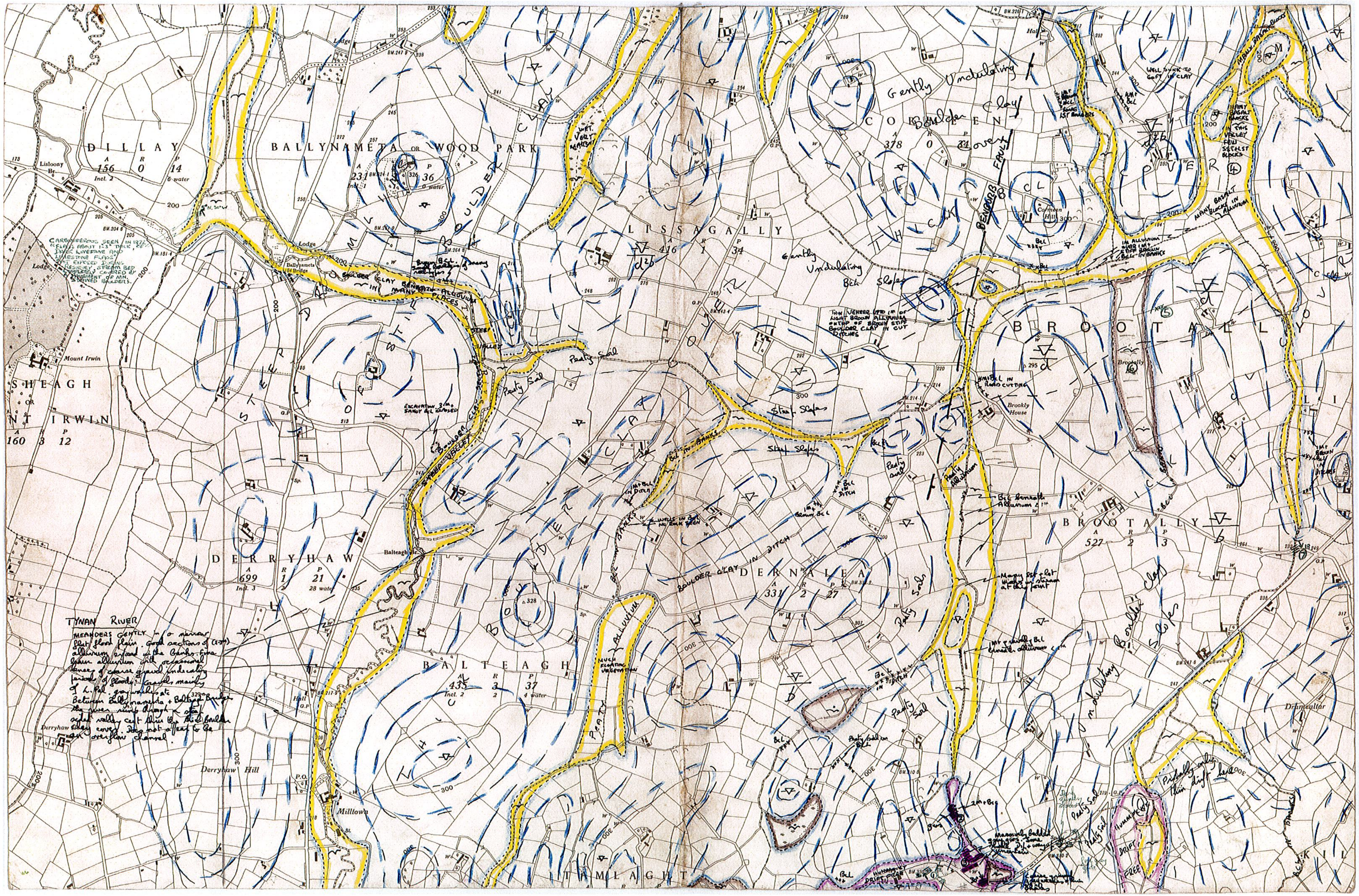
LOWER PALAEOZIC ROCKS ORDOVICIAN??

EXPOSURE SEEN 1872
NOT SEEN IN RESURVEY.

F F

FAULT


AR 15SE
AR 15SE
Doogary Lough
Surface of Water 239·0 8th November 1907
PORTNELLIGAN
159
Including 9
13
17 water
Portnelligan
Flax Mill
Sluice
Race
Slate fragments
FINE BROWN ALLUVIUM UPTO 1M. ABOVE COARSE GRAVELLY ALLUVIUM OFTEN SHOWING IMBRICATE STRUCTURE. 2M+
ALLUVIAL FLAT
2M+ STIFF BROWN BCL
Fine Brown peat
1M+ BCL
THICK BCL COVER
3M+ STIFF BROWN BCL MOSTLY L.PAL BOULDERS
UNDULATING GRAVEL
DARK PEATY ALLUVIUM
1M+ COARSE GRAVELLY ALLUVIUM
TULLY
(Kane)
277
Ballymorgy Bridge
ROCK CLOSE TO SURFACE
Leslie Hill
PROBABLY SOME THIN DRIFT
SOME THIN DRIFT
3M+ BCL IN FLOODED EXCAVATION
Massive greywacke
Lisglynn
243
UPTO 1M BCL
1-2M BCL ANGULAR L.PAL BOULDERS SET IN GRAVELLY ORANGE CLAY/SAND MATRIX MANY ANGULAR QUARTZ PEBBLES
THIN UNDULATING DRIFT COVER
Peaty Alluvium
S20E DIP 50°
Lower Palaeozoic exposed 1872
559
MACANVEER
406
Including 1
3
24
36 water
Maddan School
Grave Yard
St. Patrick's R.C. Church
SSLANLY
114
3
24
Gun Bridge
Mill Race
Smithy
CREEVEKEERAN
230
Including 1
3
1
34
25 water
LOUGH
0
27
32 water
Hanslough House
Castle (in Ruins)
Hanslough Lough
Liable to Floods
Patch Mills
Flax Mill
Corn Mill
MADDAN
460
1
24
Derrynoose Rectory
Lodge
Orange Hall
St. John's Church
Maddan Post Office
Maddan School
Mill Pond
Weir
Ford
DRUMMOND
290
1
23
DRUMGREENAGH
437
3
4
Prospect House
Presbyterian Church
DRUMHILLERY
152
0
15
Ford & Stepping Stones



DILLAY
A 156 R 0 P 14
Incl. 2
6 water
Lisloony Br.
BALLYNAMETA OR WOOD PARK
A 231 P 36
0 water
LISSAGALLY
A 416 R 1 P 34
CORMEEN
A 378 R 0
BROOTALLY
A 527 R 2 P 3
DERRYHAW
A 699 R 1 P 21
Incl. 3
28 water
DERNALEA
A 331 R 2 P 27
BALTEAGH
A 435 R 3 P 37
Incl. 2
4 water
SHEAGH OR MOUNT IRWIN
A 160 R 3 P 12
Mount Irwin
Lodge
Ballynameta Bridge
Balteagh Br.
Derryhaw
Derryhaw Hill
Milltown
Hall
P.O.
Cormeen Hill
Brooklly House
Brootally Bog
Drumcultar
TAMLAGHT
CARBONIFEROUS SEEN IN 1872 "FLAGS ABOUT 1-3" THICK, OF DARK LIMESTONE AND LIMESTONE FLAGS" NOT EXPOSED DURING RESURVEY. STREAM BED COMPLETELY COVERED BY PAVEMENT OF MN. STAINED BOULDERS.
BOULDER CLAY BENEATH ALLUVIUM IN MANY PLACES
STEEP VALLEY
BOULDER CLAY
Peaty Soil
EXCAVATION 3M+ SANDY BCL EXPOSED
WET. VERY MARSHY
Gently Undulating Bcl Slopes
Gently Undulating
Boulder Clay Cover
BENBURB FAULT
THIN VENEER UPTO 1M OF LIGHT BROWN ALLUVIUM ON TOP OF BROWN STIFF BOULDER CLAY IN CUT DITCHES
Steep Slopes
Bcl in Banks
Bcl in Ditch
WELLS IN BCL NO ROCK SEEN
BOULDER CLAY IN DITCH
ALLUVIUM
MUCH FLOATING VEGETATION
Peaty Alluvium
Bcl beneath Alluvium 2 1m
Many sst + lst blocks in stream at this point
Undulating Boulder Clay Slopes
WELL SUNK TO SOFT IN CLAY
MANY BASALT BLOCKS
MANY BASALT BLOCKS IN THIS VALLEY FEW SST + LST BLOCKS
MANY BASALT BLOCKS IN ALLUVIUM
1M ALLUVIUM OVER 1M+ STIFF BROWN BCL IN BANKS
1M+ BCL IN ROAD CUTTING
1M+ BROWN BCL IN DITCHES
Probably only thin drift here
HUMMOCKY DRIFT FREE
DRIFT FREE
TYNAN RIVER
MEANDERS GENTLY in a narrow flat flood plain. Good sections of (2-3m) alluvium exposed in the banks. Fine brown alluvium with occasional lenses of coarse gravel indicating periods of floods. Gravels mainly of L. Pal. greywackes etc. Between Ballynameta + Balteagh Bridges the river runs through a steep sided valley cut thru the thick boulder clay cover. Does not appear to be an overflow channel.

Appendix 10A Consultations

Appendix 10A – All NIEA Natural Heritage Correspondences – 2011 - 2008

2011

Northern Ireland Environment Agency
Natural Heritage
Klondyke Building
Cromac Avenue
Gasworks Business Park
BELFAST
BT7 2JA
Email: planningreminders@doeni.gov.uk

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Date: 5 April 2011
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-7& 8

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon Co Tyrone and overhead electrical transmission line from Trewmount Road Moy to the townlands of Crossreagh and Crossbane Co Armagh

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 19 January 2011. We acknowledge receipt of an Addendum to the Environmental Statement (ES) (Volumes 1-3). We also acknowledge receipt of an objection statement.

Position

Following further consideration of the information contained within the ES and Addendum, NIEA, Natural Heritage has **no objection** to the proposed development **subject to conditions** which would overcome our concerns.

Appraisal of the proposal: Natural Heritage Interest

NIEA, Natural Heritage considers that a newt survey is not required for this proposal as it is unlikely that there are waterbodies which are suitable as breeding ponds for newts within 200 metres of the proposed line route.

Following further consideration of the ES and Addendum we note that the waterbodies adjacent to Towers 32, 43 and 83 are identified as “watercourses” as shown on the legend of Figure 10.1 to 10.10 (Habitat Map) of Volume 4 of the ES. Towers 22 and 23 are located to the east of a pond as shown on the legend of Figure 10.1 to 10.10 (Habitat Map) of Volume 4 of the ES. The attributes of this pond and elements of the surrounding landform are unsuitable for newts – this has been identified in the aerial photography within Volume 4 of the ES, including Figures 1.7, 10.13 and

13.7c.

The results of the badger survey presented in the ES addendum record low incidences of badger evidence and activity within 150 metres of any tower locations. We welcome the intention to undertake a pre-construction badger survey. Should this survey record any new badger setts then a licence will be required for any works to be carried out within 25m of the entrances of any occupied setts.

The bat survey report concludes that the proposal is unlikely to have an adverse impact on the areas local bat population. There will be a loss of some trees which may potentially be used by bats. We consider that once all mature trees to be removed and lopped habve been identified, they shall be inspected for the presence of bats by an experienced bat worker or surveyor on the day of felling.

Recommendations

Should approval be granted, the following Conditions should be attached to the Decision Notice.

Conditions

Once all mature trees to be removed and lopped have been identified, any potential roost sites shall be inspected for the presence of bats by an experienced bat worker or surveyor on the day of felling. If evidence of bats is found during inspection, all work shall cease immediately and advice shall be sought from the Northern Ireland Environment Agency Wildlife Inspector.
Reason: To minimise the impact of the proposal on the local bat population.

Deflectors shall be inserted on lines that cross the Blackwater River Valley.
Reason: To reduce the risk of collision to swans.

Works in the vicinity of watercourses shall avoid contact with the watercourse surface and bed.
Reason: To minimise the impact of the proposal on bats.

All works to take place within 25 metres of existing badger sett entrances on site shall be supervised by an NIEA Protected Species Licence holder.
Reason: To mitigate potential impacts to badgers on the site.

Informatives

The applicant's attention is drawn to The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended), which states that it is an offence to deliberately capture, injure or kill a wild animal of a European protected species included in Schedule II of these Regulations, which includes all species of bat. It is also an offence;
(a) Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
(b) Deliberately to disturb such an animal in such a way as to be likely to;
(i) Affect the local distribution or abundance of the species to which it belongs;
(ii) Impair its ability to survive, breed or reproduce, or rear or care for its young; or
(iii) Impair its ability to hibernate or migrate;

(c) Deliberately to obstruct access to a breeding site or resting place of such an animal; or
(d) To damage or destroy a breeding site or resting place of such an animal.

To avoid any breach of The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended), all mature trees and/or buildings to be removed should be checked on the day of felling for the presence of bats, by an experienced bat worker or surveyor.

If there is evidence of bat activity on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA. Tel. 02890 569623

The applicant's attention is drawn to The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended), which states that it is an offence to deliberately capture, injure or kill a wild animal of a European protected species included in Schedule II of these Regulations, which includes otters (*Lutra lutra*) . It is also an offence;
(a) Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
(b) Deliberately to disturb such an animal in such a way as to be likely to;
(i) affect the local distribution or abundance of the species to which it belongs;
(ii) Impair its ability to survive, breed or reproduce, or rear or care for its young; or
(iii) Impair its ability to hibernate or migrate;
(c) Deliberately to obstruct access to a breeding site or resting place of such an animal; or
(d) To damage or destroy a breeding site or resting place of such an animal.

If there is evidence of otter activity on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA. Tel. 02890 569623

The applicant’s attention is drawn to the Wildlife (Northern Ireland) Order 1985 which indicates that it is an offence to intentionally kill, injure or take any wild animal included in Schedule 5 of this Order which includes the badger (*Meles meles*). It is also an offence to disturb these animals or damage or obstruct access to their place of refuge, or damage or destroy anything which conceals or protects their place of refuge.

If there is evidence of badger on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA. Tel. 02890 569623

The applicant’s attention is drawn to the Wildlife (Northern Ireland) Order 1985 which indicates that it is an offence to intentionally kill, injure or take any wild animal included in Schedule 5 of this Order which includes the smooth newt (*Lissotriton vulgaris*). It is also an offence to disturb these animals or damage or obstruct access to their place of refuge, or damage or destroy anything which conceals or protects their place of refuge. Tel. 02890 569623

If there is evidence of newts on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA. Tel. 02890 569623

The applicant's attention is drawn to the Wildlife (Northern Ireland) Order 1985 which states that it is an offence to intentionally kill, injure or take any wild bird. It is also an offence to take or damage or destroy the nest of any wild bird while that nest is in use or being built; or take or destroy an egg of any wild bird. If any person intentionally disturbs any wild bird while it is building a nest or is in, on or near a nest containing eggs or young; or disturbs dependent young of such a bird they shall be guilty of an offence. **It is therefore advised that tree and hedge loss should be kept to a minimum and removal should not be carried out during the bird-breeding season between 1st March and 31st August.**

Yours sincerely

Development Management Team

Northern Ireland Environment Agency
Natural Heritage
Klondyke Building
Cromac Avenue
Gasworks Business Park
BELFAST
BT7 2JA
Email:
planningreminders@doeni.gov.uk

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Date: 29 March 2011
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-7&8

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon Co Tyrone and overhead electrical transmission line from Trewmount Road Moy to the townlands of Crossreagh and Crossbane Co Armagh

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 19 January 2011. We acknowledge receipt of an Addendum to the Environmental Statement (Volumes 1-3). We also acknowledge receipt of an objection statement.

Position

NIEA, Natural Heritage considers that there is **insufficient information** provided with the application to assess the importance of natural heritage interests. We cannot give a position on this application until further information is received. **In the absence of this, NIEA, Natural Heritage will recommend refusal of the application on the grounds of insufficient information.**

Appraisal of the proposal: Natural Heritage Interest

Addendum B of the ES Addendum contains a bat report, target notes, and a badger report.

Following further consideration of the target notes we note that several of the proposed tower locations are in close proximity to areas of standing water (pond). We consider that these water bodies may have potential as breeding ponds for smooth newt *Lissotriton vulgaris.* The tower locations which are in close proximity to areas recorded as standing water (pond) are as follows: 22, 23, 32, 43 and 83

We therefore consider that a newt survey of these areas is required as they are within 200 metres of areas of standing water (pond).

This survey of these areas must be to NIEA, NH specifications and should be carried out between **Mid March** and **Mid June**. The specification is attached with this response and can be found at http://www.doeni.gov.uk/niea/newt_survey.pdf

Once the survey has been received NIEA, NH will be in a position to give further consideration to this proposal.

Yours sincerely

Development Management Team

NEWT SURVEY - SPECIFIC REQUIREMENTS

The smooth newt *Lissotriton vulgaris* (formerly *Triturus vulgaris*) is the only species of newt in Northern Ireland, and is protected under Schedules 5, 6 & 7 of the Wildlife (Northern Ireland) Order 1985. It is an offence to intentionally kill, injure or take a newt, possess or control any live or dead specimen or anything derived from a common newt, unless acquired lawfully, disturb newts or obstruct access to their place of refuge, or destroy or damage anything that conceals or protects their place of refuge.

Although newts are widespread across Northern Ireland, suitable habitat for the species is in decline. Newts breed in ponds and areas of standing water with vegetation cover close by. Ponds are exceptionally vulnerable, and face many threats, including drainage and infill. To ensure your development proposals comply with the Order, Northern Ireland Environment Agency has asked you to carry out an appropriate Newt survey. You should follow these guidelines:

- The surveyor contracted to undertake this work must have relevant experience which is deemed acceptable to the Department, for example an ecological consultant with experience of, and/or qualifications in amphibian surveying.
- The date and time of the survey and the qualifications of the surveyor should be included in the survey report.
- Newt surveys should be carried out between **Mid March** and **Mid June**.
- Surveys must be carried out within one year of submission to the department.
- The survey should establish whether Newts are active or inactive in the waterbody and surrounding terrestrial area. The survey should include the surrounding 200m of terrestrial habitat associated with the waterbody.
- The information should be presented in a written report and must include large scale maps at 1:500 scale. The methods used for survey must be included within the survey report (bottle

traps are not permitted in Northern Ireland). All evidence of use by Newts found, for example eggs, or sightings, should be included.

- If necessary, the survey should recommend the most appropriate mitigation measures which will protect Newts on site from impacts caused by the development. Mitigation measures should address impacts pre, during and post construction phase. The survey should also stipulate whether the proposed mitigation measures will require a Protected Species Licence.

- In the event that the planning application goes to appeal or public inquiry, persons contracted to carry out surveys may be required to appear at, or give evidence to the appeal or inquiry.

For more information on Newts and development, contact:

Wildlife Officer, Tel: (028) 9065 69602

Northern Ireland Environment Agency
Klondyke Building,
Cromac Avenue,
Gasworks Business Park
Belfast BT7 2JA

2010

Northern Ireland Environment Agency
w.ni-environment.gov.uk

Northern Ireland Environment Agency
Natural Heritage
Klondyke Building
Cromac Avenue
Gasworks Business Park
BELFAST
BT7 2JA
Email:
planningreminders@doeni.gov.uk

Date: 26 May 2010
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-2,4,5 and 6

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon Co Tyrone and overhead electrical transmission line from Trewmount Road Moy to the townlands of Crossreagh and Crossbane Co Armagh

Dear Mr Moore

I refer to your consultation letters for the above planning application which was received in this office on 9, 15 and 20 April 2010 and 13 May 2010. We acknowledge the receipt of objection letters.

We have considered the issues related to ecology which have been raised in the objection letters and request the submission of information which was omitted from the Environmental Statement.

We note that the numbering sequence of target notes in Appendix D1 of Volume 3 of the Environmental Statement does not include the following target notes (TN) : TN 1-5, 9, 10, 16-21, 23-28, 30, 33-37, 40-42 and 48-52. We consider that these TNs should be submitted to NIEA: Natural Heritage for consideration. We do note that the TNs included in the Environmental Statement relate to those areas within the line route study area which are of nature conservation value.

The badger survey does not provide a map outlining the location of recorded setts within the site. A report should be submitted of this survey and presented in the following format:

- The date and time of the survey and the qualifications of the surveyor should be included in the survey report.
- The survey should establish whether or not Badgers have established sett(s) (active or inactive) or use the area for foraging. All evidence of use by Badgers found, for example latrines, hair caught on wire or bedding should be included.

- The information should be presented in a written report and must include large scale maps at 1:500 scale for those areas in the line route study area where badger setts were recorded.

Once this information has been provided NIEA: Natural Heritage can provide further consideration to this proposal.

Andrew McIntosh

Andrew McIntosh
On behalf of NIEA: Natural Heritage

Northern Ireland Environment Agency
www.ni-environment.gov.uk

Northern Ireland Environment Agency
Natural Heritage
Klondyke Building
Cromac Avenue
Gasworks Business Park
BELFAST
BT7 2JA
Email:
planningreminders@doeni.gov.uk

Date: 29 April 2010
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-3

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon Co Tyrone and overhead electrical transmission line from Trewmount Road Moy to the townlands of Crossreagh and Crossbane Co Armagh

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 12 April 2010. We acknowledge receipt of a submission by Michael Burrows Associates on behalf of SEAT dated 19 February 2010.

On page 8 of the submission a formal request has been made under the Environmental Information Regulations (NI) 2004 for details of any formal or informal advice or agreements limiting or forming the scope and methodologies to be employed during ecological surveys carried out by the applicant in relation to this proposal.

Accordingly we submit with this letter the following information:

1. Copy of an e-mail from Cormac Loughran of AECOM dated 21 May 2009 providing a bat survey methodology for the proposal.
2. Draft bat survey methodology (21 May 2009).
3. Letter dated 10 August 2009 detailing the bat survey methodology which was detailed at a meeting held on 10 June 2009.
4. Letter from NIEA: Natural Heritage to Planning Service dated 27 January 2009 (This letter has not been presented in Appendix A of Volume 3 of the Environmental Statement.

Andrew McIntosh
On behalf of NIEA: Natural Heritage

Northern Ireland Environment Agency
Natural Heritage
Klondyke Building
Cromac Avenue
Gasworks Business Park
BELFAST
BT7 2JA
Email: planningreminders@doeni.gov.uk

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Date: 3 February 2010
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-1

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon. Overhead electrical transmission line detailed in Form P1(NIE) application attached

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 6 January 2010. We acknowledge receipt of an Environmental Statement (ES).

Position

NIEA, Natural Heritage has **no objection** to the proposed development **subject to conditions** which would overcome our concerns.

Appraisal of the proposal: Natural Heritage Interest

The Environmental Statement provides a report of ecological assessment of habitats and species present along the interconnector route. We note that bat surveys, as agreed with NIEA: Natural Heritage, are ongoing, and bat roosts, flightlines and feeding areas, and 2010 results will be issued in a separate report to NIEA: Natural Heritage.

We are content with the quality of the ecological reports contained within the ES, and consider that a number of mitigation measures are required to minimise the impact of the proposal on local biodiversity.

Recommendations

Should approval be granted, the following Conditions should be attached to the Decision Notice.

Conditions

Any removal of hedgerow trees, cutting of hedgerows and woodland clearance shall take place outside the bird breeding season which lasts from the 1st of March to the 31st of August.
Reason: To protect breeding birds and protect the biodiversity of the site.

Deflectors shall be inserted on lines that cross the Blackwater River Valley.
Reason: To reduce the risk of collision to swans.

Works in the vicinity of watercourses will avoid contact with the watercourse surface and bed.
Reason: To minimise impacts to riverine habitats.

Once all mature trees to be removed and lopped have been identified, any potential roost sites shall be inspected for the presence of bats by an experienced bat worker or surveyor on the day of felling. If evidence of bats is found during inspection, all work shall cease immediately and advice shall be sought from the Northern Ireland Environment Agency Wildlife Officer.
Reason: To minimise the impact of the proposal on bats

Informatives

The applicant's attention is drawn to The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended), which states that it is an offence to deliberately capture, injure or kill a wild animal of a European protected species included in Schedule II of these Regulations, which includes all species of bat. It is also an offence;
(a) Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
(b) Deliberately to disturb such an animal in such a way as to be likely to;
(i) Affect the local distribution or abundance of the species to which it belongs;
(ii) Impair its ability to survive, breed or reproduce, or rear or care for its young; or
(iii) Impair its ability to hibernate or migrate;
(c) Deliberately to obstruct access to a breeding site or resting place of such an animal; or
(d) To damage or destroy a breeding site or resting place of such an animal.

To avoid any breach of The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended), all mature trees and buildings to be removed should be checked on the day of felling for the presence of bats, by an experienced bat worker or surveyor.

If there is any evidence of bats on site, all works must cease immediately and further advice must be sought from the NIEA Wildlife Officer (Tel: 02890 569623), **as a European Protected Species (EPS) License may be required.**

The applicant's attention is drawn to The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended), which states that it is an offence to deliberately capture, injure or kill a wild animal of a European protected species included in Schedule II of these Regulations, which includes otters (*Lutra lutra*) . It is also an offence;

(a) Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;

(b) Deliberately to disturb such an animal in such a way as to be likely to;

(i) affect the local distribution or abundance of the species to which it belongs;

(ii) Impair its ability to survive, breed or reproduce, or rear or care for its young; or

(iii) Impair its ability to hibernate or migrate;

(c) Deliberately to obstruct access to a breeding site or resting place of such an animal; or

(d) To damage or destroy a breeding site or resting place of such an animal.

If there is evidence of otter activity on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA. Tel. 02890 569623

The applicant's attention is drawn to the Wildlife (Northern Ireland) Order 1985 which indicates that it is an offence to intentionally kill, injure or take any wild animal included in Schedule 5 of this Order which includes the badger (*Meles meles*). It is also an offence to disturb these animals or damage or obstruct access to their place of refuge, or damage or destroy anything which conceals or protects their place of refuge.

If there is evidence of badger on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA.

The applicant's attention is drawn to the Wildlife (Northern Ireland) Order 1985 which indicates that it is an offence to intentionally kill, injure or take any wild animal included in Schedule 5 of this Order which includes the smooth newt (*Triturus vulgaris*). It is also an offence to disturb these animals or damage or obstruct access to their place of refuge, or damage or destroy anything which conceals or protects their place of refuge.

If there is evidence of newts on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA.

The applicant's attention is drawn to the Wildlife (Northern Ireland) Order 1985 which states that it is an offence to intentionally kill, injure or take any wild bird. It is also an offence to take or damage or destroy the nest or egg(s) of these birds or to disturb bird(s) while they are building, in or at a nest, or whilst they have dependant young. Where the bird is included in Schedule 1 of the Order any offence is liable to a special penalty.

Andrew McIntosh
On behalf of NIEA: Natural Heritage

2009

Northern Ireland Environment Agency
Natural Heritage
Klondyke Building
Cromac Avenue
Gasworks Business Park
BELFAST
BT7 2JA
Email:
planningreminders@doeni.gov.uk

Date: 2 September 2009
Telephone: 028 905 69615
Your Ref: O/08/0822
Our Ref: 16506-3

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

PAD
RE: PAD for proposed North South Electricity Interconnector
Location: Lands within Armagh District Council and Dungannon Borough Council

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 19 August 2009. We acknowledge receipt of the following chapters of the Draft Environmental Statement: 2, 3, 4, 7 and 13.

Following meetings with the applicant we are aware that Bat surveys, which were requested in our response dated 27 January 2009, are currently on-going. We understand that because of the scale of the proposal, it will only be possible to complete the bat surveys by 2010. However we understand that bat surveys of the most suitable habitat for bats, and potential roosts are nearing completion, and will be submitted in the form of a report in October 2009.

We would like to defer comment at this stage, until we formally receive a report detailing the 2009 bat surveys through Planning Service.

Andrew Mc Intosh
On behalf of NIEA: Natural Heritage

Northern Ireland Environment Agency
www.ni-environment.gov.uk

Northern Ireland Environment Agency
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Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Date: 27 January 2009
Telephone: 028 905 69615
Your Ref: O/08/0822
Our Ref: 16506-1

PAD
RE: PAD for proposed North South Electricity Interconnector
Location: Lands within Armagh District Council and Dungannon Borough Council

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 6 January 2009. We acknowledge receipt of a draft Environmental Statement (ES) submitted in CD-ROM format.

Position

NIEA, Natural Heritage considers that there is **insufficient information** provided at present with the application to fully assess the importance of natural heritage interests. It is unlikely that we will object to this proposal on nature conservation grounds, subject to appropriate conditions. However as some surveys are on-going, and we consider further surveys to be required, we wish to defer full comment until we have all the information which we consider to be relevant.

Appraisal of the proposal: Natural Heritage Interest

The scheme covers a large geographical area and includes a number of habitats present, as highlighted in Appendix H1 of the ES. Some of these habitats may be used by species which are protected under The Wildlife (Northern Ireland) Order 1985 (as amended).

We note that the nearest recorded badger sett is located 40m from the nearest line route. Any works closer than 25m to badger setts will require a licence from the NIEA: Natural Heritage Wildlife Officer. Evidence of otter activity has been provided.

We note the bird surveys presented in the ES. We further note that additional bird surveys are scheduled for 2008-2009 and will provide comment on this upon receipt of this information.

We note that bat surveys have not been undertaken at this stage, rather an assessment of the potential use of habitat features by bats. We consider that there may be mature trees within the line route which support roosting bats, and these should be subject to a bat survey.

We are concerned that there may be potentially suitable habitat for newts within parts of the proposed line route. We note that Target Notes 8, 32 and 39, for example, may be habitat which is suitable for newts, and consider that a newt survey is required.

Additional Information Required

- Bat roost survey of mature trees along the route
- Newt survey of wetland habitats along the route
- Presentation of the additional ornithological survey work currently being undertaken.

Once this additional survey work has been presented in the ES, NIEA, NH will be in a position to give further consideration to this proposal.

Andrew Mc Intosh
On behalf of NIEA: Natural Heritage

2008

Environment & Heritage Service
www.ehsni.gov.uk

Klondyke Building
Cromac Avenue
Gasworks Business Park
Lower Ormeau Road
Belfast BT7 2JA
Email: ehsinfo@doeni.gov.uk

Faber Maunsell
1st Floor
24 Linenhall Street
Belfast
BT2 8BG

29th May 2008

Dear Ms Doyle,

RE: PROPOSED TYRONE TO CAVN INTERCONNECTOR – 400Kv OVERHEAD LINE SUBSTATION

Thank you for your letter on the 1st November 2007 to the Environment and Heritage Service which was received on 5th November 2007.

Environment and Heritage Service, Natural Heritage (EHS), does hold some site specific information at this time (see below). The scheme includes and may have an adverse impact designated Areas of Special Scientific Interest and priority wetland habitats. Please see attached maps. We are concerned that the scheme may impact the hydrology of the area and this will in turn impact on priority fen habitat. These potential impacts should be included in the EIA. The River Black water is also included in the scheme. This River and its tributaries contain Species of Conservation Concern (SOCC) and Priority Species. Potential impacts on the River Blackwater should also be included in the EIA.

I would advise that you carry out a search for additional information on the recommended websites, details attached. These may contain relevant information.

I have also enclosed advice on the scope of work that EHS considers necessary for Environmental Impact Assessment in respect of development sites

It is recommended that you contact EHS to discuss the definition and methodologies of the baseline surveys required. Specifications for surveys can be provided on request.

If you have any queries or would like to discuss any of this advice, please contact me directly. Please quote the EHS reference number with your enquiry.

included with this

Jennifer Firth
On behalf of EHS, Natural Heritage

Results of EHS Search – Ref CB 14478

Date 29th May 2008

Site specific information

The scheme includes area of high nature conservation value and is also near to Areas of Special Scientific Interest (ASSI). Please see maps included with this letter.

Additional sources of information which may be relevant

1. Environment and Heritage Service website www.ehsni.gov.uk includes:

- Details of all regional, national and international designated sites in Northern Ireland
- Northern Ireland Biodiversity Strategy
- Northern Ireland Biodiversity Action Plans
- Areas of Outstanding Natural Beauty
- Landscape Character Areas
- Environmental Legislation

2. Details of important geological and geomorphological features throughout Northern Ireland are available through CEDaR on the Habitas website at: http://www.habitas.org.uk/escr/

3. Details of Recorder sites can be obtained from CEDaR, these can be accessed by contacting the Ulster Museum, 12 Malone Road, Belfast BT9 5BN. Envelopes should be marked '*Info request*' to CEDAR.

General Scoping Guidance

This information is **illustrative** and is not intended to be a definitive statement of the environmental information to be included in the Environmental Statement (ES). It is recommended that the developer remain in contact with EHS throughout the process of Environmental Impact Assessment (EIA) and production of the ES.

General Points:

- The scoping study phase of the EIA should identify the **key topic areas** where the proposed development has the potential to cause either adverse or beneficial effects on the environment.
- The range and extent of direct and indirect impacts on flora and fauna must be considered, both during and post construction, and in the short and long term.
- The EIA should consider direct effects on landscape and public perception of change.
- A combination of landscape assessment and visual assessment should be used.
- Cumulative impacts on flora, fauna and landscape of proposed and existing structures.

Flora and Fauna

The EIA should cover both habitats and species of flora and fauna (especially protected species). It should include both the proposed site and its surroundings.

- The extent of the ecological baseline must be established and the nature of further survey work must be established. A habitat survey (i.e. JNCC phase 1) to permit identification of areas which are likely to be of high nature conservation value or particularly vulnerable to impact from the proposed development. The survey must cover flora and fauna present in all seasons.
- Following from this, the extent and nature of any further survey work that may be needed should be identified. Areas thus identified should be subject to more detailed survey i.e. JNCC Phase 2. In case of flora, this should identify species from all plant groups, which form a significant part of the vegetation, not just higher plants. Survey must cover flora and fauna

in all seasons. Fauna surveys should include a full bird survey. The timing of surveys is critical and must be carried out at appropriate times of year.

- Baseline surveys conducted over a short period may not identify long term trends and reference should be made to previous records.

Landscape

Landscape is a fundamental component of the wider environment and is not just associated with a limited number of designated areas of particular scenic value such as Areas of Outstanding Natural Beauty.

General points:

- Establish the current landscape designation and policies covering the site and its surroundings.
- Details of local landscape character of the site and its surroundings.
- Establish where the potential zone of influence for the development and its associated infrastructure will extend to, including combination effect with established development.
- In combination the information should establish the potential landscape key issues and the areas requiring further investigation during the baseline studies. (See *Guidelines for Landscape and Visual Impact Assessment*, The Landscape Institute and the Institute of Environmental Management and Assessment. Spon Press, London 2002).

Impact on Local Hydrology

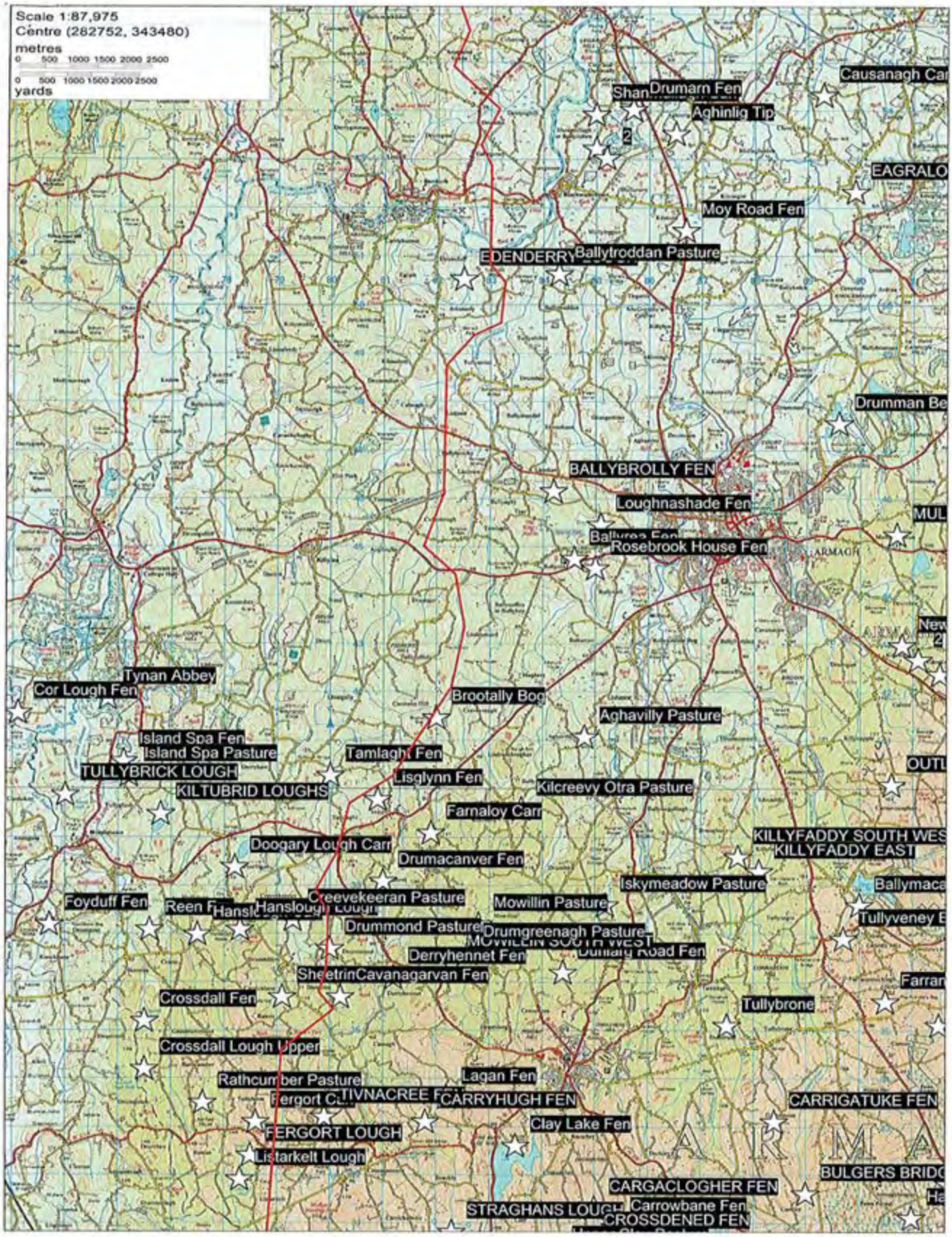
The consequences of changes to the hydrogeological system on peatland, rivers, streams and wetland habitats should be established.

Production of an Environmental Management Plan

An environmental management plan detailing the construction phase should be included. This plan can then be utilized to control the implementation of the development so as to avoid or limit damage to fauna and flora, and should include: a record of pre-construction site conditions, details of how to minimise the environmental impacts of construction activities and the outlining of working practices – see Mitigation Measures below. Method of construction would be specified and provisions for monitoring environmental effects during operation detailed.

Mitigation Measures

Opportunities for reducing identified negative environmental impacts of the proposal by mitigation should be established.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Loughnashade Fen
Rosebrook House Fen
ARMAGH
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Lisglynn Fen
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Doogary Lough Carr
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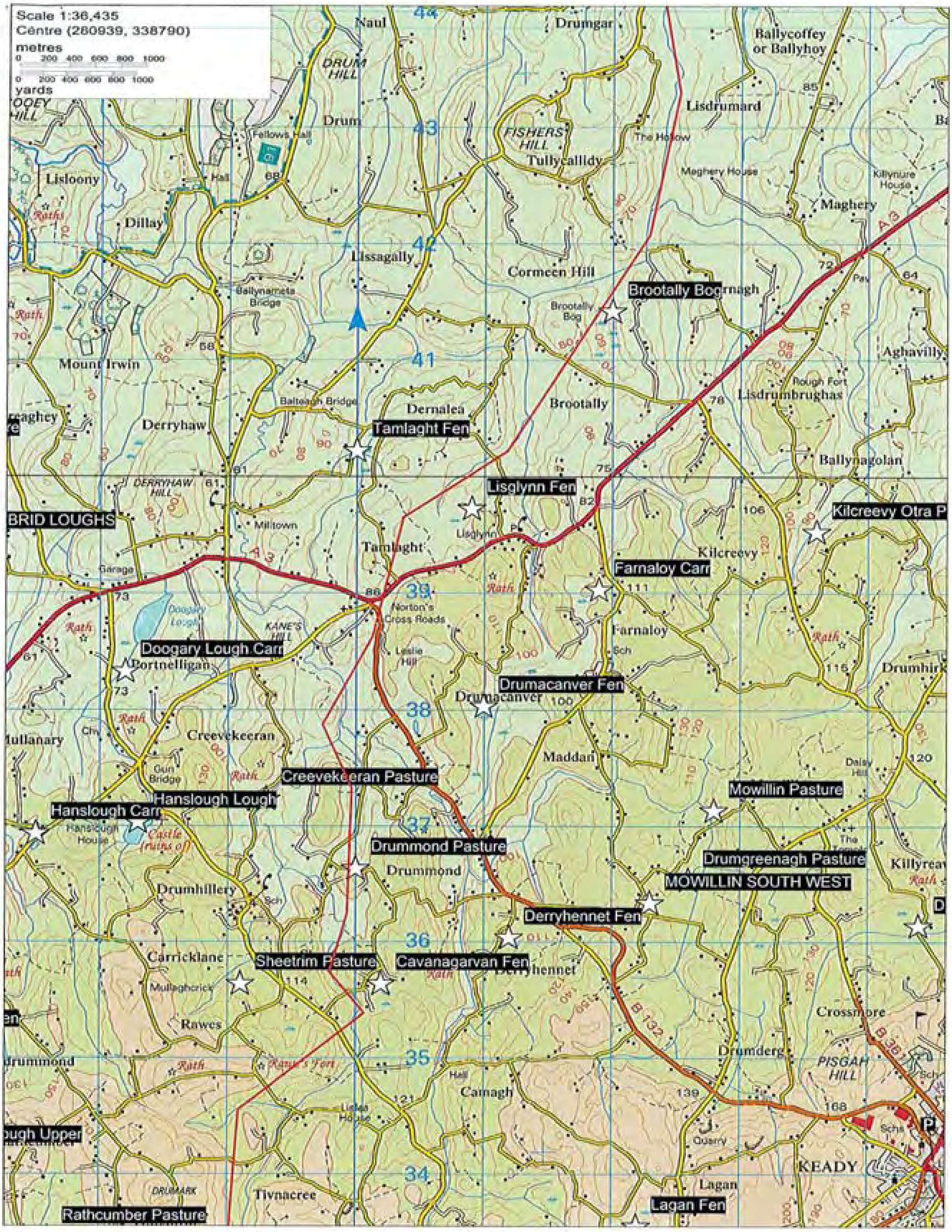
Carrowbane Fen
STRAGHANS LOUGH
CROSSDENED FEN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Hanslough Lough
Hanslough Carr
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Drummond Pasture
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MOWILLIN SOUTH WEST
Derryhennet Fen
Sheetrim Pasture
Cavanagarvan Fen
Rathcumber Pasture
Lagan Fen
Naul
Drumgar
Ballycoffey or Ballyhoy
Lisdrumard
Drum
Fellows Hall
Lisloony
Dillay
FISHERS HILL
Tullycallidy
The Hollow
Maghery House
Killynure House
Maghery
Lissagally
Cormeen Hill
Ballynameta Bridge
Mount Irwin
Aghavilly
Balteagh Bridge
Dernalea
Brootally
Lisdrumbrughas
Rough Fort
Derryhaw
DERRYHAW HILL
Ballynagolan
Milltown
Tamlaght
Lisglynn
Kilcreevy
Garage
Norton's Cross Roads
Doogary Lough
KANE'S HILL
Leslie Hill
Farnaloy
Portnelligan
Drumacanver
Drumhirk
Creevekeeran
Maddan
Mullanary
Gun Bridge
Daisy Hill
Hanslough House
Castle (ruins of)
Drummond
Killyrea
Drumhillery
Carricklane
Derryhennet
Mullaghcrick
Rawes
Crossmore
Rawes Fort
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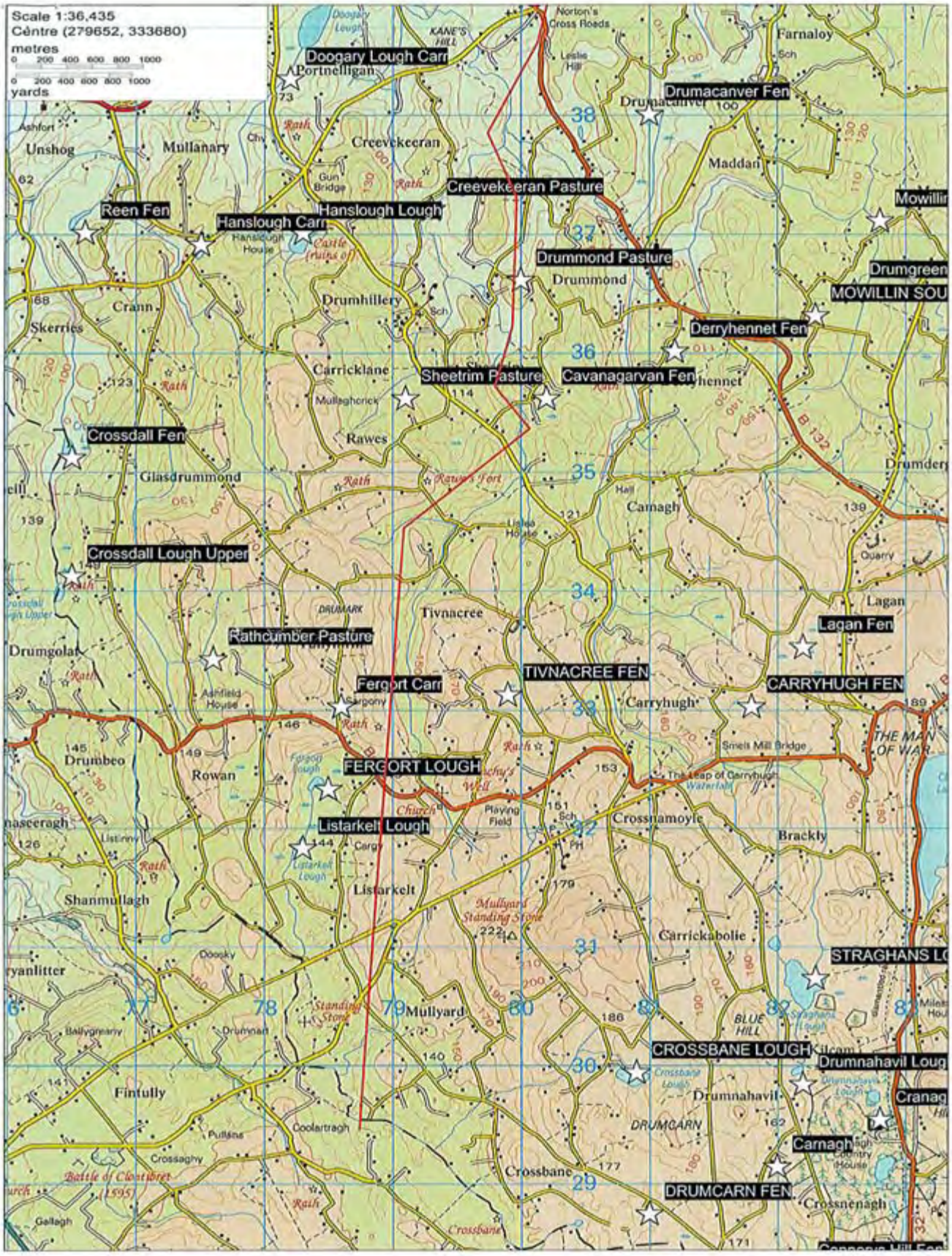
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Cavanagarvan Fen
Crossdall Fen
Crossdall Lough Upper
Rathcumber Pasture
Fergort Carn
TIVNACREE FEN
CARRYHUGH FEN
Lagan Fen
FERGORT LOUGH
Listarkelt Lough
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CROSSBANE LOUGH
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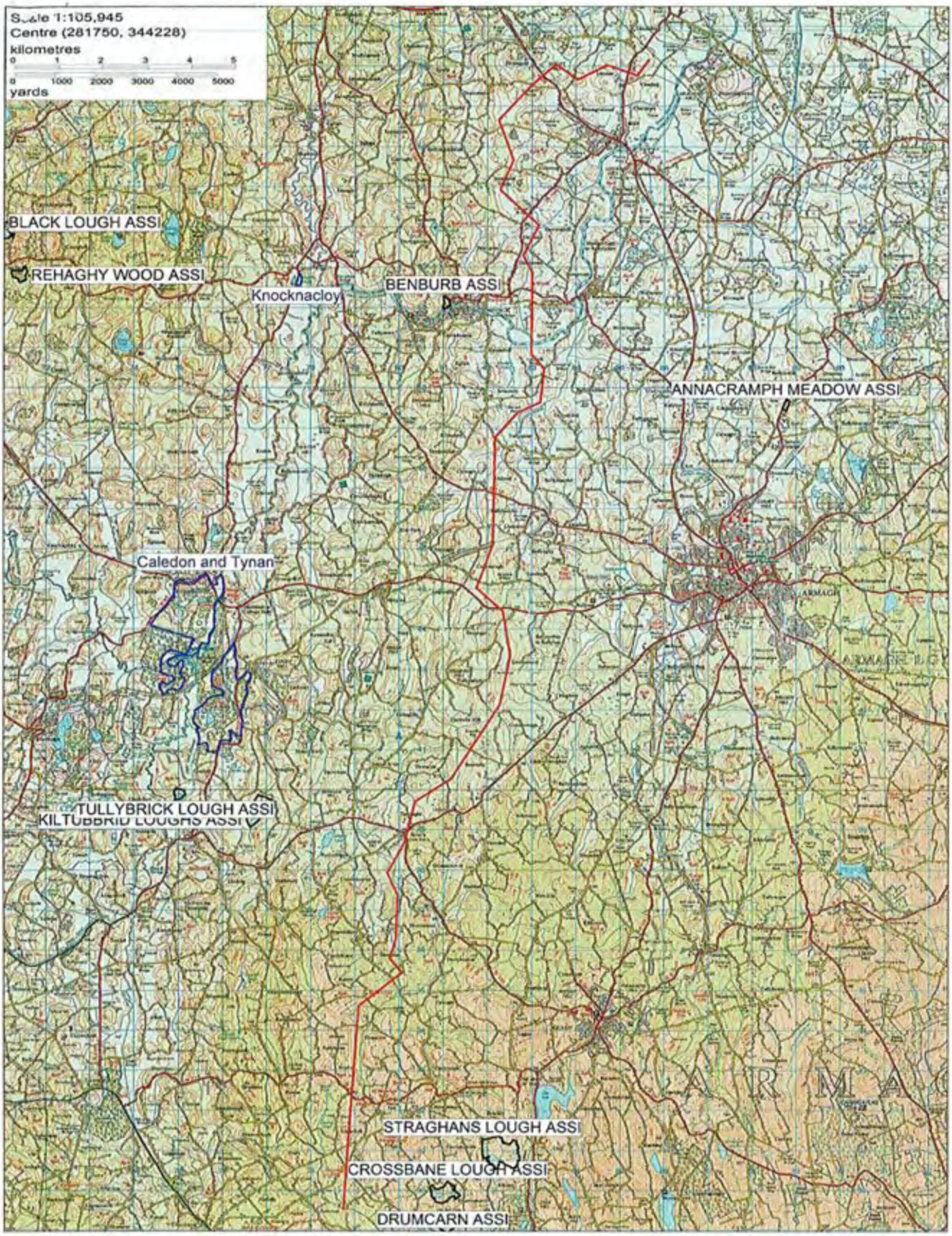
DRUMCARN FEN
Norton's Cross Roads
Farnaloy
Unshog
Mullanary
Creevekeeran
Maddan
Drummond
Drumhillery
Skerries
Carricklane
Rawes
Glasdrummond
Camagh
Tivnacree
Drumgolat
Carryhugh
Drumbeo
Rowan
Crossnamoyle
Brackly
Shanmullagh
Listarkelt
Carrickabolie
Mullyard
Fintully
Coolartragh
Crossbane
Drumnahavil
Carnagh
Crossnenagh
Lagan
Quarry
Smelt Mill Bridge
THE MAN OF WAR
BLUE HILL
DRUMCARN
Battle of Clontibret (1595)

AREAS OF SPECIEAL SCIENTIFIC INTEREST (ASSI)

BENBURB ASSI
CROSSBANE LOUGH
STRAGHANS LOUGH ASSI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ANNACRAMPH MEADOW ASSI
Caledon and Tynan
TULLYBRICK LOUGH ASSI
STRAGHANS LOUGH ASSI
CROSSBANE LOUGH ASSI
DRUMCARN ASSI

Appendix 10B Bat Appendices

Appendix 10B – Bat Survey Reports 2009 - 2012

2012 Bat Survey Report and Figures

Tyrone to Cavan Interconnector Bat Survey

Prepared by:	MM ..... Mary Maguire Senior Environmental Scientist	Checked by:	BS ..... Brian Sutton Principle Ecologist

Approved by: KW.....
Kevin Webb
Associate Director

Tyrone to Cavan Interconnector Bat Survey

Rev No	Comments	Checked by	Approved by	Date
1	First Issue			

9th Floor, The Clarence West Building, 2 Clarence Street West, Belfast, BT2 7GP
Telephone: 028 9060 7200 Website: http://www.aecom.com

Job No 60032220 Reference BATS Date Created 01 Feb 2013

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Table of Contents

Capabilities on project:
Environment

1 Introduction

1.1 Introduction

This report is a continuation of the bat surveys which were undertaken by in 2009/2010 and 2011 along the route of the proposed Tyrone to Cavan Interconnector.

The habitat surveys were re-assessed in 2012 and they indicate that the site contains mature features which may act as flight lines for bats and that the site still comprised of improved or semi-improved grassland of low conservation value. Fields and hedgerows were assessed individually and a species list of plants found during the survey was accumulated.

The aims of the bat survey was to update the surveys which had been undertaken in 2009/2010 and gather more current data about the local bat population in the study area, so potential impacts could be assessed. Due to lands access issues, the bat surveys were under taken in August and September 2012.

This report contains:

- Section 3 – Describes the methodologies used in conducting the study;
- Section 4 – Outlines the results of the bat surveys;
- Section 5 – Provides an assessment of the sites suitability for bats;
- Section 6 – Provides an assessment of the potential impact to bats as a result of the proposed development; and
- Section 7 –Gives the conclusions and recommendations resulting from the surveys and the impact assessment.

1.2 Proposed Development

The scheme to provide a cross-border 400kV electricity interconnection comprises the construction and operation of a substation near Moy, County Tyrone and an overhead electricity line from the substation to the international border, from which point the overhead line would continue into the Republic of Ireland (RoI).

1.3 Legislation

The Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995 and the Conservation (Natural Habitats etc.) (Amendment) Regulations (Northern Ireland) 2007 and 2009 implement the Habitats Directive in Northern Ireland. Bats are protected under Schedule 2 of the Regulations. The Regulations provide protection for any listed animal, including the deliberate damage or destruction of a breeding site or resting place. The Regulations also require that implications for a site of European importance are considered prior to authorisation for any project that is likely to have a significant effect on that site. In particular, actions shall not be undertaken that affect the local distribution or abundance of a European protected species.

Under the Regulations it is an offence to:

- Deliberately capture or kill any wild animal of a European Protected Species.
- Deliberately disturb any such animal.
- Damage or destroy a breeding site or resting place of such a wild animal.
- Keep, transport, sell or exchange, or offer for sale or exchange, any live or dead wild animal (or plant) of a European protected species, or any part of, or anything derived from such a wild animal.

Bat species are also listed in Appendix II of the Bonn Convention (and its Agreement on the Conservation of Bats in Europe) and Appendix II of the Bern Convention (and Recommendation 36 on the Conservation of Underground Habitats), although these are recommendations and not statutory instruments.

1.4 Quality Assurance

This project has been undertaken in line with AECOM's Integrated Management System (IMS). Our IMS places great emphasis on professionalism, technical excellence, quality, environmental and Health and Safety management. All staff members are

Capabilities on project:
Environment

committed to establishing and maintaining our accreditation to the international standards BS EN ISO 9001:2008 and14001:2004 and BS OHSAS 18001:2007. In addition our IMS requires careful selection and monitoring of the performance of all sub consultants and contractors.

2 Methodology

2.1 Desk Study

An ecological desk study was undertaken in July 2012. This was based on the 2009 bat activity surveys and the report which was produced. The methodology associated with this report was updated to include changes to the methodology associated with bat surveys, primarily the BCT Bat Survey Guidelines (2012).

2.2 Review of Previous Bat Survey Works – AECOM 2009/2010

The bat surveys undertaken in 2009/2010 has agreed a bespoke methodology was agreed with NIEA (see Appendix 4). This was based on adapting the NIEA (Jan 09) Bat Survey – Specific Requirements as well as best practice from the Bat Conservation Trust, Bat Surveys – Good Practice Guidelines for the type of development proposed. The existing methodologies were used to develop a methodology which could be used to survey a 35km linear development and provide NIEA with the information it requires to consider the potential impacts of the development on the natural conservation interests of the local area, in this case the local bat population.

It was agreed that the first step would be to identify all sites along the line route potentially useful to bats for commuting, foraging, roosting, hibernating or as advertising posts. This was achieved by reviewing aerial photographs as well as the previously completed phase 1 habitat survey.

This desktop analysis along with local knowledge was used to identify features potentially significant to the local bat population which are likely to be impacted by the proposed line route and substation site. These included:

- Hedgerows with mature trees;
- Riparian corridors;
- Areas of semi-natural habitats (fens, bogs, woodland etc);
- Individual mature standard trees; and,
- Orchards.

Once the desktop review was completed a daytime assessment at each location was conducted to assess the potential for roosting bats to be present in any mature trees. This daytime assessment looked for dead/damaged limbs, scratch marks, urine stains, droppings etc on any mature trees. Surveys were conducted using a variety of electronic bat detectors and associated equipment. The following equipment was utilised during the surveys and analysis:

- Petterson D240x time expansion detector (also with heterodyne output);
- Bat baton detector (frequency division);
- Bat box duet (heterodyne and frequency division);
- Tranquillity time expansion bat detector;
- Olympus VN-6500PC digital voice recorders;
- Yukon Ranger (Kx42) night vision equipment; and a
- Handheld thermo-anemometer (combined windspeed and temperature read out).
- Personal Computer for sound file analysis (using Batscan, Batsound or Wavesufer software)

It was agreed with NIEA that hedges unlikely to harbour bat roosts (i.e. those without mature standard trees, monoculture hedges and those structurally modified by flailing/cutting) did not require a bat roost survey but did require the identification of bat flightlines (commuting routes) between roosts and foraging areas. NIEA agreed that flightline surveys could be carried out during the 2010 survey season to allow the most significant areas to be prioritised for survey during 2009.

2.3 AECOM 2011 Driven Transects

The aim of the 2011 driven transects were to:

- Check the results of the 2009/2010 surveys
- Consider the activity of the local bat population over an additional year to allow for climatic variation across years;
- Use an additional survey methodology which considers bat activity along 70-80% of the study area over a single survey period.

The equipment used included a Petterson D500x full spectrum bat detector (and an external microphone) and a Batbox baton frequency division bat detector. The microphones and detectors were mounted to a car roof by a suction cup and information was relayed to recorders and detectors within the car.

While the method gave overall coverage at a regional level, it did not provide information associated with the exact location of the proposed development.

2.4 Development of the 2012 Methodology

The 2012 surveys were undertaken with cognisance of the BCT Bat Survey-Good Practice Guidelines (2012) and where possible the limitations of the previous 2009/2010 surveys were addressed.

During the 2012 surveys, automated monitoring was utilised from May until September, to capture bat calls in areas which had previously been unavailable because of land access issues.

During the 2012 surveys, land assess was acquired for approximately 97% of the proposed development site and as a result, a walked transect was undertaken for 97% of the proposed development site between August and September 2012.

The weather conditions at the start and end of every survey were recorded, along with the start and end time. Weather conditions for each survey are shown in Appendix B. All survey work was carried out in appropriate weather conditions. Suitable weather conditions are where night time temperatures do not fall below 8^0C and not during periods of heavy rain or strong winds when bats are not likely to be active.

The details of survey personnel are outlined in Appendix A. Surveyors used broadband frequency division and/or time expansion bat detectors. Digital recordings were made to assist with any species identification which could not be confirmed in the field.

2.5 Survey Area

The routes of the walked transects are shown on Figures 1 to 9.

2.6 Assessment of Bat Roost Potential

During the 2012 bat surveys, there was no additional assessment of tree roosting potential other than that completed during 2010.

2.7 Bat Transect Surveys 2012

Due to the length of the route (35km approx) and the associated length of the transects (approx 80km). The transects were designed to coincide with linear features which may be utilised by bats, including all hedgerow and tree line types. Each surveyor was given a transect which was approximately 3km long. The majority of the site was surveyed once, which didn't present the opportunity to rotate the survey direction and limit bias. There were five occasions where two surveys were recorded (in the vicinity of towers 13,41,42,60 and 78) on these occasions the opportunity was taken to rotate the survey direction.

The number of static listening stops in each transect was dependant on the number of linear features and tower bases which were present along each transect. Listening stops were conducted, where the route of the proposed development crossed a linear feature or in locations where the route of the proposed development runs adjacent to a linear feature. In accordance with the BCT Good Practice Bat Survey Guidelines (2012) each static listening point lasted three minutes and the transects were walked at a 'steady' brisk pace, where the terrain permitted it.

Transects commenced 30 minutes prior to sunset and continued for two hours. Where a dawn survey was undertaken, monitoring began 2 hours before sunrise and ended 30 minutes after sunrise.

Surveyors used broadband frequency division (Batbox Duet/Batbox Baton) and/or time expansion (Pettersson D240x) bat detectors in combination with an automated recording device to record bat calls. Digital recordings were made to provide a record of the survey and assist with species identification. Surveyors recorded, where possible, the direction of movement and type of bat activity (e.g. foraging or commuting). Each record was treated as a "bat pass" to build up a picture of activity levels across the site. Bats were identified as far as possible to species or family level using ultrasonic bat detectors and sound analysis software where required.

The survey dates are detailed in Table 2.1 and weather conditions for each survey were recorded and were considered favourable for bats. Surveys were not undertaken when conditions were considered unfavourable. Weather conditions for each survey are given in Appendix B. Where surveys began in favourable conditions and had to end prematurely because of the weather, results were only recorded to the point where the survey had to be abandoned. This point was picked up on the next transect.

The data was analysed in MS Excel and used to give an estimate of relative bat activity displayed as Bat Activity Index (BAI):

- Bat Activity Index = bat passes / unit time

Table 2.1: Survey type and data undertaken

Survey Type	Date of Survey
Dusk Transect Surveys	20.08.2012 21.08.2012 22.08.2012 29.08.2012 30.08.2012 04.09.2012 05.09.2012 10.09.2012 12.09.2012 27.09.2012 05.10.2012
Dawn Transect Survey	15.09.2012

2.8 Static Detector Recording 2012

Four static survey locations were logged initially in May 2012 to develop an understanding of the overall activity. From May until September 2012, 32 static detector locations were selected in areas of close to vegetation and water, which were close to either the route of the proposed development or tower locations proposed as part of the development. Details of the deployment are in Appendix 3.

The static detectors were left to record for five consecutive nights at each point. Locations of the static recorders are shown on Figures 1 to 9. The static detectors deployed were Petterson D500Xs in all cases.

The Petterson D500X records where analysed using Batsound. The resulting data was analysed in MS Excel and used to provide an estimate of relative bat activity displayed as BAI.

2.9 Limitations to survey

Bat surveys offer only 'snapshots' of the location being assessed and do not take account of for potential future changes in abundance or diversity of bats at a given site. However, by completing surveys to best practice, the risks of providing unrepresentative assessments are diminished.

Bat activity transects where undertaken during August and September of 2012 and static monitoring was undertaken from May and September 2012. The results of the bat activity surveys will not give a full seasonal picture of activity within the site but will give an indication of activity levels across the site during late summer / autumn only. Often this period can be one of high activity with mating and feeding activity prior to winter torpor. Surveys were undertaken only in September and October as a confirmation of activity to augment the survey work previously undertaken by AECOM (2011).The static monitoring does provide information across the site but it does not provide information about how bats move across or within the site.

Restricted access to the entire site for the beginning of the surveys has resulted in no assessment of trees with the potential for bat roosts.

No roost emergence or re-entry surveys on trees were undertaken in 2012.

Certain species of bats are harder to detect than others based on the strength (volume) or directionality of their call. Species such as long eared and some Myotis *sp.* bats are particularly difficult to record at range. The use of a range of bat detector models and the use of static detector locations was used to counteract this limitation. However, these species may all have been slightly under recorded.

3 Results

3.1 Desk Study

3.1.1 Statutory Designated Sites

There are no statutory designated sites within 10km of the proposed development.

3.1.2 Non Statutory Designated Sites

There are no local nature conservation designations within 10km of the proposed site.

3.1.3 Species Records

On the occasion of this data search, the Northern Ireland Bat Group did not return any records of either bat roosts or recordings of bat incidents which they had been called to attend.

3.2 Summary of Previous Bat Survey Works – AECOM

AECOM had undertaken walked transect surveys in 2009/2010 and driven transect surveys in 2011. During the 2009/2010 survey period, all the bat species resident in Northern Ireland, were encountered at least once. These are listed as:

- Daubenton's bat
- whiskered bat
- Natterer's bat
- Leisler's bat
- Nathusius' pipistrelle
- common pipistrelle
- soprano pipistrelle
- brown long-eared bat

During the 2011 driven transect surveys, only four of these species were encountered. These were:

- Leisler's bat
- common pipistrelle
- soprano pipistrelle
- Pipistrellus spp.

The 2009/2010 surveys were undertaken to assess the presence or absence of bats within the study area, however because a triage approach was taken relating to the linear features which would be surveyed, the footprint of the study area was approximately 75% of the entire line route.

The 2011 driven transect surveys were undertaken to check the validity of the 2009/2010 results and resulted in 50-70% of the study area in a single study period. However because it concentrated on the minor road network surrounding the proposed development, the bats expected in this type of habitat were only found and it lacked the geographic precision to state bat activity around the tower bases and adjacent linear features.

The results of both surveys indicated that while bat activity was recorded all over the site and within the study area, it recorded fluctuations in bat movements across the site and not continuous important flight lines.

3.3 Activity Transect Survey Results 2012

The survey was undertaken between August and October 2012. No bats were recorded for the survey which was undertaken on the 10.09.2012. The results are shown on Figures 10 to 23. Table 3.1 shows the number species encountered for each survey.

Table 3.1: Numbers of Bats recorded on each survey date.

Date	Species						
	Common Pipistrelle	Leislers Bat	Myotis Spp	Pipistrellus spp.	Soprano Pipistrelle	Unidentified Bat	Survey Total
20.08.12	36	5	-	10	52	-	103
21.08.12	17	4	-	18	9	2	50
22.08.12	6	9	-	8	2	1	26
29.08.12	-	5	-	1	1	9	16
30.08.12	10	1	-	22	20	12	65
04.09.12	20	4	-	7	3	-	34
05.09.12	20	1	3	1	10	-	35
12.09.12	4	-	-	1	1	-	6
15.09.12	2	-	-	-	3	-	5
27.09.12	3	2	-	1	-	2	8
05.10.12	-	2	-	-	22	-	24
Species Total	**118**	**33**	**3**	**69**	**123**	**26**	**372**

The 2012 surveys included one full sweep of the site and as a result, each of the surveys were approximately 2.5 hours long. The category “Undientified bat” was used in cases where there was evidence of bat presence but there was file distortion resulting in non identification. Table 3.2 provides the Bat Activity Index (BAI) for each of the species encountered on each survey.

Table 3.2: Transect Survey BAI (per hour)

Date	Species						
	Common Pipistrelle	Liesler’s Bat	Myotis Spp.	Pipistrellus spp.	Soprano pipistrelle	Unidentified bat	Survey Total
20.08.12	14.4	2	0	4	20.8	0	41.2
21.08.12	6.8	1.6	0	7.2	3.6	0.8	20
22.08.12	2.4	3.6	0	3.2	0.8	0.4	10.4
27.09.12	1.2	0.8	0	0.4	0	0.8	3.2
29.08.12	0	2	0	0.4	0.4	3.6	6.4
30.08.12	4	0.4	0	8.8	8	4.8	26

Date	Species						
	Common Pipistrelle	Liesler's Bat	Myotis Spp.	Pipistrellus spp.	Soprano pipistrelle	Unidentified bat	Survey Total
04.09.12	8	1.6	0	2.8	1.2	0	13.6
05.09.12	8	0.4	1.2	0.4	4	0	14
12.09.12	1.6	0	0	0.4	0.4	0	2.4
15.09.12	0.8	0	0	0	1.2	0	2
05.10.12	0	0.8	0	0	8.8	0	9.6
Species Total	**3.93**	**1.10**	**0.10**	**2.30**	**4.10**	**0.87**	-

The species with the highest BAI across the surveys was Soprano pipistrelle (4.10), the is due to the number encountered on the 20.08.2012 (52).

In an attempt to identify foraging locations, Table 3.3 gives details of the where in relation to the tower locations, foraging and commuting and foraging activity was encountered.

Table 3.3: Foraging in relation to tower locations

Tower Location	Species					
	Common pipistrelle	Leisler's Bat	Pipistrelle Spp.	Soprano pipistrelle	Unidentified Bat	Total
T13	1	-	-	-	-	1
T26	1	-	-	-	-	1
T27	1	-	-	-	-	1
T39	-	-	-	3	-	3
T40	1	-	-	-	-	1
T41	4	2	-	-	-	6
T61	-	1	-	-	-	1
T63	-	-	12	-	-	12
T75	1	-	2	-	-	3
T76	-	-	-	2	-	2
T78	-	-	-	14	-	14
T80	-	-	-	4	-	4
T82	-	-	-	3	-	3
T85	1	-	-	-	-	1
T86	1	-	-	1	-	2
T96	-	-	1	6	-	7
T98	2	-	-	-	-	2
T99	-	-	4	2	-	6

Tower Location	Species					
	Common pipistrelle	Leisler's Bat	Pipistrelle Spp.	Soprano pipistrelle	Unidentified Bat	Total
T128(part of the RoI oversail)	3	1	-	-	2	6
Total	**16**	**4**	**19**	**35**	**2**	**76**

Soprano pipistrelles were recorded foraging the most (35 registrations), however the most number of encounters at a geographic area was in the area surrounding Towers 63 and Towers 78. While 12 encounters were recorded on the 21.08.2012 in the vicinity of Tower 63, the 14 encounters recorded for Tower 78 were recorded on two occasions (20.08.2012 and 05.09.2012). These low levels of activity during the walked transects indicate tower 63 may be of local importance to foraging bats.

Of the 11 social calls which were encountered, all were encountered with foraging registrations. They were recorded in the vicinity of Towers 39, 63, 78, 80 and 128. The vicinity of Tower 39 recorded five social calls on the 05.10.2012.

In total, 372 bat passes were recorded during the transect survey from August to October 2012. Soprano pipistrelle bats made up 33% of the total bat passes recorded (transect and listening points), with Common pipistrelle occupying a further 32% of bat passes. Bat species passes as a percentage of each survey result can be seen on Table 3.4.

Table 3.4: Percentage of Species Encountered during each survey

Survey Dates	Species Encountered (% encountered per survey date)					
	Common Pipistrelle	Leisler's Bat	Myotis Spp	Pipistrellus Spp.	Soprano Pipistrelle	Unidentified Bat
04.09.12	59	12	0	21	9	0
04.10.12	0	8	0	0	92	0
05.09.12	57	3	9	3	29	0
12.09.12	67	0	0	17	17	0
15.09.12	40	0	0	0	60	0
20.08.12	35	5	0	10	50	0
21.08.12	34	8	0	36	18	4
22.08.12	23	35	0	31	8	4
27.09.12	38	25	0	13	0	25
29.08.12	0	31	0	6	6	56
30.08.12	15	2	0	34	31	18
Species Total	32	9	1	19	33	7

3.4 Static Detector Survey Results 2012

The static detectors where placed at thirty one unique survey location points. Static detectors recorded for at least five consecutive nights per month from May until October 2012. Due to an equipment failure, one point in May had to be resurveyed in June. The detectors were left recording for between five and six hours, between the dusk and dawn periods.

Table 3.5 shows the BAI for each species group at each static detector location.

Table 3.5:BAI (per hour) for each species recorded at the static detector location

Detector Location	Species								
	Common pipistrelle	Leislers bat	Myotis spp.	Nathusius pipistrelle	Natterers bat	Pipistrellus spp.	Soprano pipistrelle	Whiskered bat	Total bat BAI (per hour)
1	0.04	0.23	-	-	-	-	-	-	0.27
2	-	0.36	-	-	-	-	-	-	0.36
3	-	9.08	-	-	-	-	-	-	9.25
4	-	0.17	-	-	-	-	0.02	-	0.19
5	0.11	1.09	-	-	-	-	-	-	1.20
6	-	-	-	-	-		-	-	-
7	-	0.19	-	-	0.03	-	0.03	-	0.25
8	-	0.16	-	-	-	-	-	-	0.16
9	0.90	0.84	-	-	-	0.14	0.63	-	2.50
10	0.95	1.06	-	0.73	-	0.05	0.30	-	3.10
11	1.20	13.63	-	-	-	-	0.03	-	14.86
12	0.05	0.87	-	-	-	-	0.27	-	1.20
13	0.21	0.07	-	-	-	-	0.05	-	0.33
14	-	-	-	-	-	-	-	-	-
15	0.08	0.82	-	-	-	2.78	0.73	-	4.41
16	-	0.08	-	-	-	-	-	-	0.08
17	-	0.02	-	-	-	-	-	-	0.02
18	1.83	0.31	0.02	0.10	0.02	0.33	0.19	0.74	3.55
19	-	-	-	-	-	-	-	-	-
20	0.84	0.11	-	-	-	-	0.53	0.11	1.60
21	-	0.08	-	-	-	-	-	-	0.08
22	0.34	0.04	-	-	-	0.08	0.04	-	0.50
23	-	-	-	-	-	-	-	-	-
24	-	-	-	-	-	-	-	-	-
25	-	0.02	-	-	-	-	-	-	0.02
26	-	-	-	-	-	-	-	-	-
27	0.67	0.06	-	-	-	0.04	0.20	-	0.97
28	0.03	0.03	0.03	-	-	0.06	0.03	-	0.19
29	-	0.04	-	-	-	-	-	-	0.04
30	0.19	-	-	-	-	0.03	-	-	0.23
31	-	0.08	-	-	-	-	-	-	0.08
32	-	-	-	-	-	-	0.05	-	0.05

Detector Location	Species								
	Common pipistrelle	Leislers bat	Myotis spp.	Nathusius pipistrelle	Natterers bat	Pipistrellus spp.	Soprano pipistrelle	Whiskered bat	Total bat BAI (per hour)
Species Totals	0.01	0.03	-	-	-	-	-	-	0.05

Location 11 recorded the highest number of total species across its deployment time, with a BAI of 14.86. Across the entire deployment, the highest number of species recorded were Leisler's bats (BAI 0.03). Locations 6, 14, 19, 23, 24 and 26 did not record any activity during the static monitoring.

Table 3.6 shows the number of recorded bat passes recorded at each static detector location as a total species percentage.

Table 3.6:Percentage bat pass recording from each survey location.

Detector Location	Species								
	Common pipistrelle	Leisler's bat	Myotis spp.	Nathusius pipistrelle	Natterer's bat	Pipistrellus spp.	Soprano pipistrelle	Whiskered bat	Survey Total
1	0.06	0.34	0.00	0.00	0.00	0.00	0.00	0.00	0.40
2	0.00	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.23
3	0.00	24.31	0.00	0.00	0.00	0.17	0.28	0.00	24.76
4	0.00	0.45	0.00	0.00	0.00	0.00	0.06	0.00	0.51
5	0.23	2.27	0.00	0.00	0.00	0.00	0.00	0.00	2.49
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.00	0.34	0.00	0.00	0.06	0.00	0.06	0.00	0.45
8	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.28
9	1.87	1.76	0.00	0.00	0.00	0.28	1.30	0.00	5.21
10	1.98	2.21	0.00	1.53	0.00	0.11	0.62	0.00	6.46
11	2.49	28.39	0.00	0.00	0.00	0.00	0.06	0.00	30.93
12	0.11	1.81	0.00	0.00	0.00	0.00	0.57	0.00	2.49
13	0.51	0.17	0.00	0.00	0.00	0.00	0.11	0.00	0.79
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.17	1.70	0.00	0.00	0.00	5.78	1.53	0.00	9.18
16	0.00	0.17	0.00	0.00	0.00	0.00	0.00	0.00	0.17
17	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
18	4.36	0.74	0.06	0.23	0.06	0.79	0.45	1.76	8.44
19	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	1.25	0.17	0.00	0.00	0.00	0.00	0.79	0.17	2.38
21	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.11

Detector Location	Species								
	Common pipistrelle	Leisler's bat	Myotis spp.	Nathusius pipistrelle	Natterer's bat	Pipistrellus spp.	Soprano pipistrelle	Whiskered bat	Survey Total
22	0.51	0.06	0.00	0.00	0.00	0.11	0.06	0.00	0.74
23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
27	1.87	0.17	0.00	0.00	0.00	0.11	0.57	0.00	2.72
28	0.06	0.06	0.06	0.00	0.00	0.11	0.06	0.00	0.34
29	0.00	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.11
30	0.34	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.40
31	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.06
32	0.00	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.23
% Total Species Recorded	**15.81**	**66.01**	**0.11**	**1.76**	**0.11**	**7.54**	**6.74**	**1.93**	**100.00**

In total 1765 calls were identified as bat passes during the static detector surveys. The species with the highest total percentage activity was Leisler's bat (66.01%). Common pipistrelles were the second highest recorded bat species (66.01%). The other pipistrellus species are represented in the recordings, however the Myotis species are a small percentage of the over all (2.25%).

4 Site Assessment

4.1 Site Assessment

4.1.1 Species Present within the Study Area

The activity and remote detector surveys identified the following species within the survey area:

- Common pipistrelle;
- Soprano pipistrelle;
- Nathusius's pipistrelle;
- Leisler's;
- Pipistrellus spp;
- Whiskered bat;
- Natterer's bat; and
- Myotis sp.

In addition to the above, the following species are known to be present in the area based on the 2009/2010 surveys:

- Brown Long-eared, and;
- Daubenton's bat

The 2011 driven transects did not result in any additional species being recorded.

The 2012 activity and static surveys have identified six of the nine bat species resident in Northern Ireland are active on the site. This site supports a high diversity of bat species. All of the species encountered will be impacted in some way by the vegetation disturbance anticipated as a result of the proposed development. However due to the nature of disturbance (hedge/tree cutting and trimming), all bat species encountered will experience some type of impact. Table 4.1 details how species may be impacted.

Table 4.1: Species Impact resulting from habitat loss

Bat Species	Nature of Impact	Temporary / Permanent
Common pipistrelle **Soprano pipistrelle** **Nathusius's pipistrelle** **Natterer's bat** **Whiskered bat**	Loss of commuting routes and foraging areas Loss of roosting opportunities	Temporary Permanent
Leisler's bat	Loss of foraging areas Loss of roosting opportunities Loss of song posts	Temporary Permanent Permanent

4.2 Bat Activity Indices within the Survey Area

The BAI for species detected during the transect surveys is shown in Table 3.2. The species with the highest activity index during the transect surveys was the soprano pipistrelle, followed by the common pipistrelle. Additionally the BAI for species detected during the static surveys is shown in Table 3.5. During the static survey results the species with the highest overall activity index is also the Leisler's bat, followed by the Common pipistrelle.

At this time there is currently no published data on bat activity indices for habitats across the UK, allowing bat activity levels to be compared across sites.

Based on this report the site has been defined a medium risk site as a result of the assessment of habitat potential (based on Table 4.2 of the BCT guidelines) during the AECOM surveys in 2012.

Based on the limitations of the 2012 survey data a worst case approach to the classification has been taken. Further surveys based on the BCT 2012 guidelines should be undertaken to clarify this assessment.

4.3 Bat Foraging and Commuting

Transect surveys carried out by AECOM identified foraging behaviour at 19 locations along the route. From a species perspective, Soprano pipistrelles were recorded most and from a geographical perspective, the areas surrounding Towers 63 and 78 recorded the most activity. However on both occasions, activity was relatively low with 21 and 14 encounters at each site recorded respectively.

Based on the limited months of survey in 2012 it is not possible to make any conclusions on the seasonal use of the site.

5 Potential Impacts

5.1 Potential Impacts

The aim of the surveys was to gather data to assess the potential impact of the proposed Tyrone ./ Cavan Interconnector on the local bat population.

The following impacts are widely considered be the key impacts of development on bats (Altringham 2011; pp 243-265):

- Loss of roost site;
- Loss of habitat (including foraging areas and commuting routes); and;
- Barriers to commuting or seasonal movements and severance of foraging habitat (habitat removal).

5.2 Bat Commuting and Foraging

5.2.1 Loss of habitat

The total permanent land take associated with the proposed development will be approximately 26.19ha. This will result in the direct loss through clearance of trees and hedgerows as part of the safety vegetation clearance and the removal of habitats as a result of tower base locations. This will result in a direct loss of habitat for bats, including foraging and commuting routes.

Transect surveys carried out by AECOM identified that commuting and foraging behaviour was encountered throughout the site of the proposed development.

5.2.2 Barriers to commuting (habitat removal)

Severance and or loss of hedgerows and other liner features through the proposed development, in construction and to a lesser extent operation, will have a negative impact on foraging and commuting bats, particularly those that are low flying and follow landscape features.

Of the populations encountered. severing potential commuting and foraging routes will also have a negative impact on local populations of species such as Natterer's and other *Myotis* bats and *Pipistrellus* bats, which also forage and/or travel along hedgerows.

5.2.3 Impacts of Future Land Use

The area around the study area, is rural in character, however there has been development of agricultural facilities and single dwellings in the countryside. It is not anticipated that the presence of the proposed development will abate this trend. However these other types of development, while discrete have a large cumulative impact and may result in habitat losses as well as the possible loss of known roosts and future potential roost sites, increased severance of commuting routes and increases in light pollution.

6 Recommendations and Mitigation

6.1 Further Surveys

The following further surveys are recommended:

Additional transect surveys from between May and August along the route of the entire interconnector, utilising existing transects. This will address the data gaps associated with walked activity surveys happening only in the later part of the season in 2012. As with the 2012 surveys, all works should be undertaken following the BCT Good Practice Guidelines Survey Guidelines (2012); and

Roost inspections in trees should be undertaken as a check that the 2009/2010 inspection conclusions are still valid and to update the baseline in relation to possible tree roosts along the proposed route.

6.2 Recommendations

6.2.1 Mitigation – Roosts and Licensing

Based on the current understanding of the proposed Development and the understanding of current roosts, a European Protected Species (EPS) licence for bats is not currently required for the proposed development.

If any of the confirmed roosts, and/or moderate or high potential trees for bats require removal, endoscope surveys should be undertaken under license to establish if the trees to be pollarded as a result of the proposed development require inspection surveys to identify any further bat roosts and mitigation for those particular roosts should be implemented through an EPS license. An EPS licence must be in place before any tree pollarding activities commence, to ensure that the works proceed in line with UK and EU legislation.

The proposed construction period for the proposed development is three years, with ground works beginning a year in advance. This four year time period allows NIE to establish bat roost mitigation where necessary, establish if the mitigation is working and then remove or translocate the tree roosts, if necessary. Removal of trees which may contain bat roost will have to be undertaken under the supervision of a licensed bat ecologist and/or accredited agents.

A minimum of 100 Bat boxes will be erected along the line route, adjacent to those hedgerows where mature trees or trees with a dense covering of ivy have been pollarded. This is precautionary compensation and enhancement as lack of available bat roosts can be a limiting factor in many populations. These boxes will be erected prior to the commencement of vegetation clearance connected with the construction and or operation of the overhead line.

The use of these artificial bat boxes as roosts will be monitored by a licensed bat worker as part of the post-construction monitoring regime. NIE has committed to the maintenance of these boxes for 5 years post construction across the operational phase of the project.

6.2.2 Mitigation - Loss of habitat

Woodland shall be avoided wherever possible and any works in the vicinity of trees will follow best practice guidelines, as outlined in BS 5837:2005 ‘Trees in Relation to Construction – Recommendations.’ In particular, due consideration shall be given to the spread of tree roots where tower foundations are in close proximity to hedgerow trees or woodland edge. Trees that are close to construction works shall be adequately protected from plant and work operations. Excavations or changes in ground levels shall not take place within the protection zone, as even temporary changes can be damaging. During the construction of the substation platform, fill material shall not be allowed to creep towards the roadside trees and hedgerow. The passage of vehicles or storage of materials can compact soil and do significant root damage, and these operations shall not take place within the protected zone. Toxic materials including cement shall not be stored, or discharged, within 10m of a tree. Lines or other materials shall not be fixed to a tree nor shall any tree be used as an anchor point for winching. Where possible, low-growing woodland belts shall be treated as hedgerows, and trimming kept to a minimum.

Due to the nature of the development, the majority of lost habitat will be limited to the location of the substation and at the tower bases. It will also result in a loss of approximately 8039.95m of hedges and hedges with trees and 32 individual trees directly under the spans of the proposed development. A clearance area will also be required approximately 30m from each side of the outer conductor, to minimise incidents of tree falls into the proposed development. While not all the trees and hedges within this 60m buffer will not be cut or pollarded to 2m, as a worst case calculation, approximately 28071.62m of additional hedges and hedges with trees will be affected and 39 additional single trees.

6.3 Mitigation - Barriers to commuting (due to obstruction, lighting or habitat removal)

6.3.1 Loss of Linear features

Wherever possible, hedgerow trees should be pollarded rather than removed, with a height of 2 metres maintained if safety considerations permit. The number of mature trees felled prior to the works shall be kept to a minimum, an ecological clerk of works will be engaged to work alongside to the engineers during construction to facilitate the retention of trees as much as possible. Where mature trees are present these will be crown reduced or pollarded rather than removed. Excavations for tower foundations shall be sited so as to avoid damaging tree roots.

It is acknowledged that the scheme will result in the loss of linear features across the site. It is proposed to maintain connectivity across the proposed tower bases by replacement planting, where possible.

6.3.2 Maintenance, management and replacement of linear features

Where hedgerows are to be lost through the construction of the tower bases, agreement will be sought with the landowner to establish a new hedge of similar length to that which will be lost. If the landowner does not wish to avail of this, NIE will donate an amount to a conservation charity to be used for planting native trees of local provenance in County Armagh. This amount to be donated will be calculated using prevailing rate at the time (figure to be used will be that which is used by DARD (Dept of Agriculture and Rural Development) in its agri-environment schemes.

6.3.3 Mitigation - Future Land Use

Environmental measures should be secured under an environmental strategy for the development, via the implementation of a Construction Environmental Management Plan (CEMP). The environmental strategy should include both environmental measures to avoid or reduce significant effects, and to provide compensation and enhancement where appropriate. Care should be taken to ensure that the strategy compliments existing arrangements at the development site. The details of the strategy are to be approved by the local authority following appropriate consultation.

7 References

Altringham, J.D. (2011). "*Bats: From evolution to Conservation*", 2nd Edition. Oxford University Press.

Bat Conservation Trust (2007a). *Bat Surveys – Good Practice Guidelines*. Bat Conservation Trust, London.

Bat Conservation Trust (2012). *Bat Surveys – Good Practice Guidelines (2nd Edition)*. Bat Conservation Trust, London.

Institute for Ecology and Environmental Management (2006). *Guidelines for Ecological Impact Assessment in the United Kingdom (version 7 July* 2006). IEEM.

Mitchell-Jones, A.J. (2004). *Bat Mitigation Guidelines*. English Nature, Peterborough.

Appendix A: Survey Personnel

Date	Type of Survey	Survey Personnel
20.08.2012	Dusk	Brendan Kemp (AIEMA) Danielle Thompson (GradIEEM) Joe Martin (MIEnSci) Mary Maguire (AIEMA, MIEnvSc, CSci)
21.08.2012	Dusk	Brendan Kemp (AIEMA) Aine O Reilly Joe Martin (MIEnSci) Mary Maguire (AIEMA, MIEnvSc, CSci)
22.08.2012	Dusk	Brendan Kemp (AIEMA) Danielle Thompson (GradIEEM) Aine O Reilly Mary Maguire (AIEMA, MIEnvSc, CSci)
29.08.2012	Dusk	Joe Martin (MIEnSci) Sean Meehan (GradIEEM)
30.08.2012	Dusk	Aine O Reilly Donal Griffin Danielle Thompson (GradIEEM) Alistair Archibald Brendan Kemp (AIEMA) Joe Martin (MIEnSci)
04.09.2012	Dusk	Brendan Kemp (AIEMA) Danielle Thompson (GradIEEM) Sean Meehan (GradIEEM)
05.09.2012	Dusk	Aine O Reilly Brendan Kemp (AIEMA) Sean Meehan (GradIEEM) Donal Griffin
10.09.2012	Dusk	Brendan Kemp (AIEMA) Joe Martin (MIEnSci)
12.09.2012	Dusk	Brendan Kemp (AIEMA) Joe Martin (MIEnSci)

Capabilities on project:
Environment

Date	Type of Survey	Survey Personnel
		Sean Meehan (GradIEEM) Aine O Reilly
15.09.2012	Dawn	Mary Maguire (AIEMA, MIEnvSc, CSci) Danielle Thompson (GradIEEM)
27.09.2012	Dusk	Joe Martin (MIEnSci) Sean Meehan (GradIEEM)
05.10.2012	Dusk	Sean Meehan (GradIEEM) Joe Martin (MIEnSci)

Appendix B: Weather Conditions

Date	Sunset / Sunrise Time	Start Time	Finish Time	Weather Conditions (Start) Temperature (^{o}C) Cloud Cover (%) Average Wind (Beaufort)	Weather Conditions (Finish) Temperature (^{o}C) Cloud Cover (%) Average Wind (Beaufort)
20.08.2012	20:43:00	20:13:00	22:43:00	18^{o}C 70% 1 Beaufort(Avg)	16^{o}C 50% 1 Beaufort(Avg)
21.08.2012	20:40:00	20:10:00	22:40:00	18^{o}C 80% 1 Beaufort(Avg)	16^{o}C 60% 1 Beaufort(Avg)
22.08.2012	20:39:00	20:09:00	22:39:00	17^{o}C 40% 1 Beaufort(Avg)	15^{o}C 50% 1 Beaufort(Avg)
29.08.2012	20:22:00	19:52:00	22:22:00	17^{o}C 40% 1 Beaufort(Avg)	15^{o}C 50% 1 Beaufort(Avg)
30.08.2012	20:19:00	19:49:00	22:19:00	16^{o}C 70% 1 Beaufort(Avg)	15^{o}C 70% 1 Beaufort(Avg)
04.09.2012	20:07:00	19:37:00	22:07:00	15^{o}C 70% 1 Beaufort(Avg)	15^{o}C 70% 1 Beaufort(Avg)
05.09.2012	20:05:00	19:35:00	22:05:00	17^{o}C 60% 0 Beaufort(Avg)	16^{o}C 60% 1 Beaufort(Avg)
10.09.2012	19:52:00	19:22:00	21:52:00	10^{o}C 0% 0 Beaufort(Avg)	8^{o}C 0% 0 Beaufort(Avg)
12.09.2012	19:47:00	19:17:00	21:47:00	12^{o}C 55% 1 Beaufort(Avg)	11^{o}C 65% 1 Beaufort(Avg)
15.09.2012	6:57:00	7:27:00	4:57:00	10^{o}C 70% 1 Beaufort(Avg)	9^{o}C 70% 1 Beaufort(Avg)
27.09.2012	19:09:00	18:39:00	21:09:00	10^{o}C 80% 1 Beaufort(Avg)	10^{o}C 80% 1 Beaufort(Avg)
05.10.2012	18:49:00	18:19:00	20:49:00	12^{o}C 55% 1 Beaufort(Avg)	11^{o}C 65% 1 Beaufort(Avg)

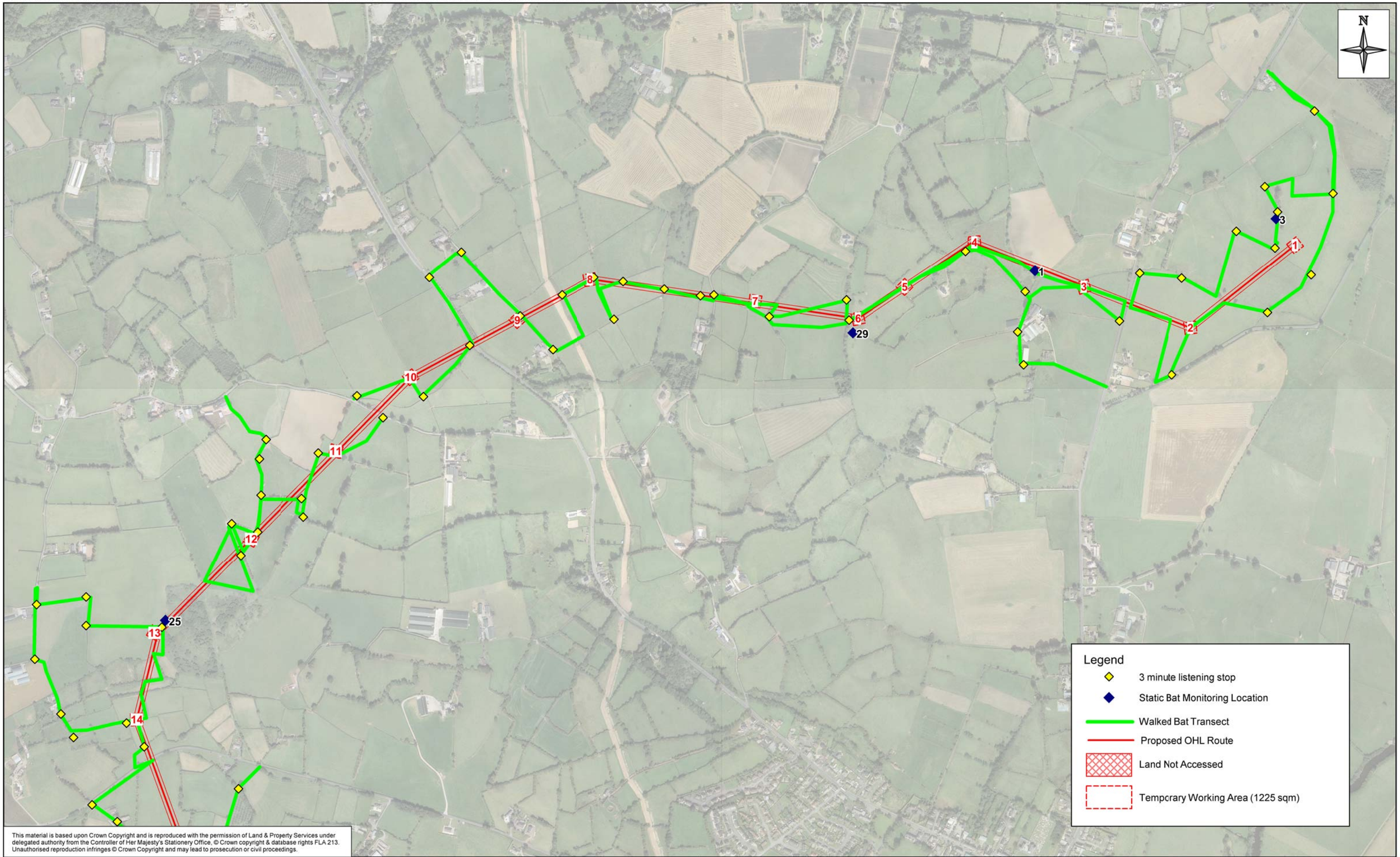
Appendix C: Static Monitoring Conditions

Site No	Location	Date Out	Date In	Dusk Timer on/off	Last recording date	Dawn Timer on/off
1	Hedge line under line between Towers 3 &4	30/05/2012	04/06/2012	21.25 - 00.10	04/06/2012	03.00 - 05.40
2	Corner of field by Tower 15	30/05/2012	04/06/2012	21.25 - 00.10	02/06/2012	03.00 - 05.40
3	Re- monitoring of Ref 1. Hedge line pointing toward small out building on proposed sub-station site near Moy	04/06/2012	13/06/2012	21.30 - 00.15	12/06/2012	02.50 - 05.30
4	Area of Tower 23	04/06/2012	13/06/2012	21.25 - 00.15	13/06/2012	02.50 - 05.30
5	Hedge line by small watercourse between Towers 28 & 29	13/06/2012	20/06/2012	21.25 - 00.10	20/06/2012	02.50 - 05.30
6	Hedge line by river in area of Tower 43	13/06/2012	20/06/2012	21.25 - 00.10	20/06/2012	02.50 - 05.30
7	Hedgeline of grassed field and old railway track	20/06/2012	26/06/2012	21.35 - 00.20	26/06/2012	02.40 - 05.20
8	Treeline east of Tower 54	20/06/2012	26/06/2012	21.35 - 00.20	25/06/2012	02.40 - 05.20
9	Hedge line south of Tower 58	26/06/2012	04/07/2012	21.35 - 00.20	04/07/2012	02.40 - 05.20
10	Facing west, southern of two Hedgelines on old track between T64 & T65	26/06/2012	04/07/2012	21.35 - 00.20	04/07/2012	02.40 - 05.20
11	Hedgeline facing west toward T60	04/07/2012	11/07/2012	21.25 - 00.10	11/07/2012	02.50 - 05.30
12	Hedgeline facing east towards T69	04/07/2012	11/07/2012	21.25 - 00.10	11/07/2012	02.50 - 05.30
13	Hedgeline facing NW toward T74	11/07/2012	19/07/2012	21.15 - 23.59	19/07/2012	03.00 - 05.30
14	Hedgeline facing NE toward T75	11/07/2012	19/07/2012	21.15 - 23.59	18/07/2012	03.00 - 05.30
15	Hedgeline facing north towards converging hedgelines (T77)	19/07/2012	25/07/2012	21.05 - 23.50	25/07/2012	03.10 - 05.40
16	Hedgeline facing south towards T78	19/07/2012	25/07/2012	21.05 - 23.50	25/07/2012	03.10 - 05.40
17	Hedgeline at T79 facing southwest	25/07/2012	02/08/2012	20.55 - 23.40	29/07/2012	03.20 - 05.50
18	Relocated at Hedgeline facing NE toward T75	25/07/2012	02/08/2012	20.55 - 23.40	02/08/2012	03.20 - 05.50
19	Hedgeline 25m from & facing NNW toward T80	02/08/2012	08/08/2012	20.45 - 23.30	06/08/2012	03.30 - 06.00
20	Hedgeline 25m from & facing NE toward T82	02/08/2012	08/08/2012	20.45 - 23.30	08/08/2012	03.30 - 06.00
21	Clump of tall shrubs at T83 facing NNE	08/08/2012	14/08/2012	20.35 - 23.20	14/08/2012	03.40 - 06.10
22	Tree trunk facing SSW toward T88	08/08/2012	14/08/2012	20.35 - 23.20	14/08/2012	03.40 - 06.10
23	Hedgeline facing east at T91	14/08/2012	22/08/2012	20.55 - 23.10	21/08/2012	03.50 - 06.20
24	Fencepost facing south west toward T100	14/08/2012	22/08/2012	20.55 - 23.10	15/08/2012	03.50 - 06.20
25	Tree facing toward T13	22/08/2012	30/08/2012	20.05 - 22.45	25/08/2012	03.00 - 06.00
26	Hedgeline at T102	30/08/2012	07/09/2012	19.30 - 22.30	01/09/2012	03.10 - 06.30
27	Hedgeline at T100	30/08/2012	07/09/2012	19.30 - 22.30	07/09/2012	03.10 - 06.30

Site No	Location	Date Out	Date In	Dusk Timer on/off	Last recording date	Dawn Timer on/off
28	Small clump of trees facing across grass NW toward T56	07/09/2012	12/09/2012	19.20 - 22.20	12/09/2012	03.45 - 07.30
29	Fencepost facing W toward T6	10/09/2012	18/09/2012	19.20 - 22.20	11/09/2012	03.45 - 07.30
30	Tree west of T40 facing N over stream toward woods	12/09/2012	18/09/2012	19.18 - 22.20	18/09/2012	04.25 - 07.45
31	Hedge line briars at T27 facing North	18/09/2012	09/10/2012	19.00 - 22.10	20/09/2012	04.15 - 07.10
32	Hedge line tree by stream between T20 & T21	18/09/2012	09/10/2012	19.00 - 22.10	30/09/2012	04.15 - 07.10

Capabilities on project:
Environment

Figures



Client: Northern Ireland Electricity

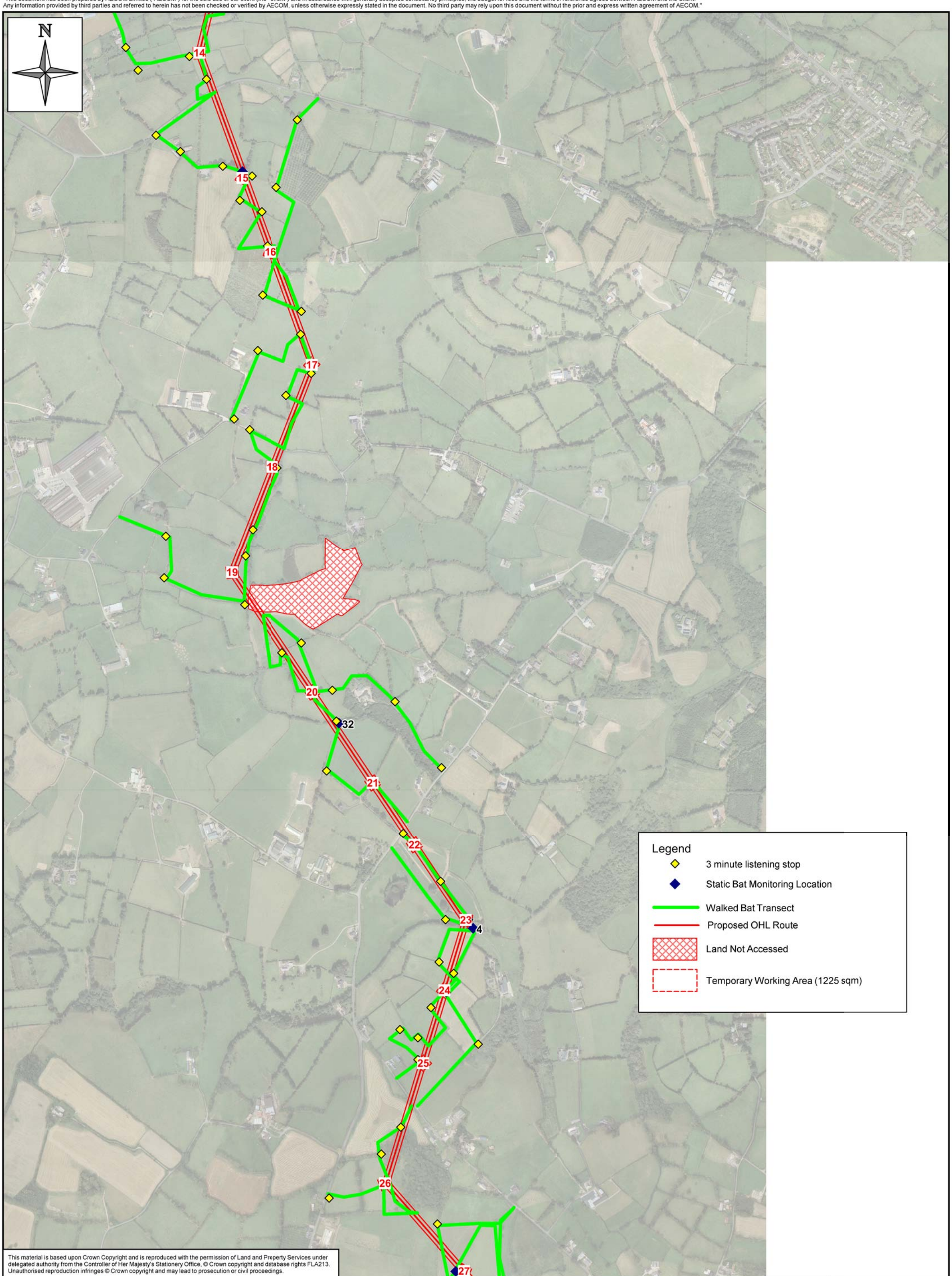
Project: TYRONE-CAVAN INTERCONNECTOR CONSOLIDATED ES

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 1

AECOM
9th Floor
The Clarence West Building
2 Clarence Street West
BELFAST BT2 7GP
Tel: 028 9060 7200
Fax: 028 9060 7399
www.aecom.com

Design:	GB	GIS:	MM
Chk'd:	BS	App'd:	KW
Date:	21/02/2013	Scale:	1:10,000 @ A3

No: 60032220/3528/BTSM/A



Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 2

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: GB	MapInfo: MM
Chk'd: BS	App'd:KW
Date:21/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BTSM/B	

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Legend

- 3 minute listening stop
- Static Bat Monitoring Location
- Walked Bat Transect
- Proposed OHL Route
- Land Not Accessed
- Temporary Working Area (1225 sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 3

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: BS	App'd:KW
Date:21/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BTSM/C	

N

Legend

- 3 minute listening stop
- Static Bat Monitoring Location
- Walked Bat Transect
- Proposed OHL Route
- Land Not Accessed
- Temporary Working Area (1225 sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 4

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: BS	App'd:KW
Date:21/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BTSM/D	

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Legend

- 3 minute listening stop
- Static Bat Monitoring Location
- Walked Bat Transect
- Proposed OHL Route
- Land Not Accessed
- Temporary Working Area (1225 sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 5

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
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Chk'd: BS	App'd:KW
Date:21/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BTSM/E	

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Legend

- 3 minute listening stop
- Static Bat Monitoring Location
- Walked Bat Transect
- Proposed OHL Route
- Land Not Accessed
- Temporary Working Area (1225 sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 6

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
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Chk'd: BS	App'd:KW
Date:22/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BTSM/F	

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Legend

- 3 minute listening stop
- Static Bat Monitoring Location
- Walked Bat Transect
- Proposed OHL Route
- Land Not Accessed
- Temporary Working Area (1225 sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 7

AECOM
9th Floor
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Clarence Street West
BELFAST BT2 7GP
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Chk'd: BS	App'd:KW
Date:22/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BT/G	

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Legend

- 3 minute listening stop
- Static Bat Monitoring Location
- Walked Bat Transect
- Proposed OHL Route
- Land Not Accessed
- Temporary Working Area (1225 sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 8

AECOM
9th Floor
The Clarence West Building
Clarence Street West
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Design: GB	MapInfo: MM
Chk'd: BS	App'd:KW
Date:22/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BTSM/H	

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Legend

- 3 minute listening stop
- Static Bat Monitoring Location
- Walked Bat Transect
- Proposed OHL Route
- Land Not Accessed
- Temporary Working Area (1225 sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT AND STATIC MONITORING LOCATION MAP FIGURE 9

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
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Design: GB	MapInfo: MM
Chk'd: BS	App'd:KW
Date:22/02/2013	Scale: 1:10,000 @ A3
No: 60032220/3528/BTSM/I	

N

GRANGE ROAD

MAYOR LANE

GRANGE ROAD

GRANGE ROAD

TURLEENAN

LISROAN

DRUMGARTH

DRUMGARRON

1 2 3 4 5 6 29

Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 10

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/A	

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CULKEE RAN ROAD

CULKEERAN ROAD

RHONE ROAD

GORESTOWN ROAD

CULKEERAN

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Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 11

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/B	

N

DRUMLEE

DRUMLEE ROAD

DRUMBERG

TULLYDUWEY ROAD

TULLYLEARN

26

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Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 12

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
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Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/C	

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ARTABOLY ROAD

ANNAMOY

TULLYMORE ADDRAHAN

Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 13

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
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Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/D	

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ARTASOOLY ROAD

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Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 14

AECOM
9th Floor
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Clarence Street West
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/E	

N

Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

54 8 55 56 28 57 58 9 59

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 15

AECOM
9th Floor
The Clarence West Building
Clarence Street West
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Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/F	

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Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 16

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/G	

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Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 17

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/H	

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Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 18

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/I	

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Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: TYRONE-CAVAN INTERCONNECTOR

Title: BAT TRANSECT RESULTS FIGURE 19

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/J	

N

Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

80
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Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 20

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/K	

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DERRYNOOSE ROAD

Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 21

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/L	

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101
102
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DERRYHOOSE ROAD

Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 22

AECOM
9th Floor
The Clarence West Building
Clarence Street West
BELFAST BT2 7GP
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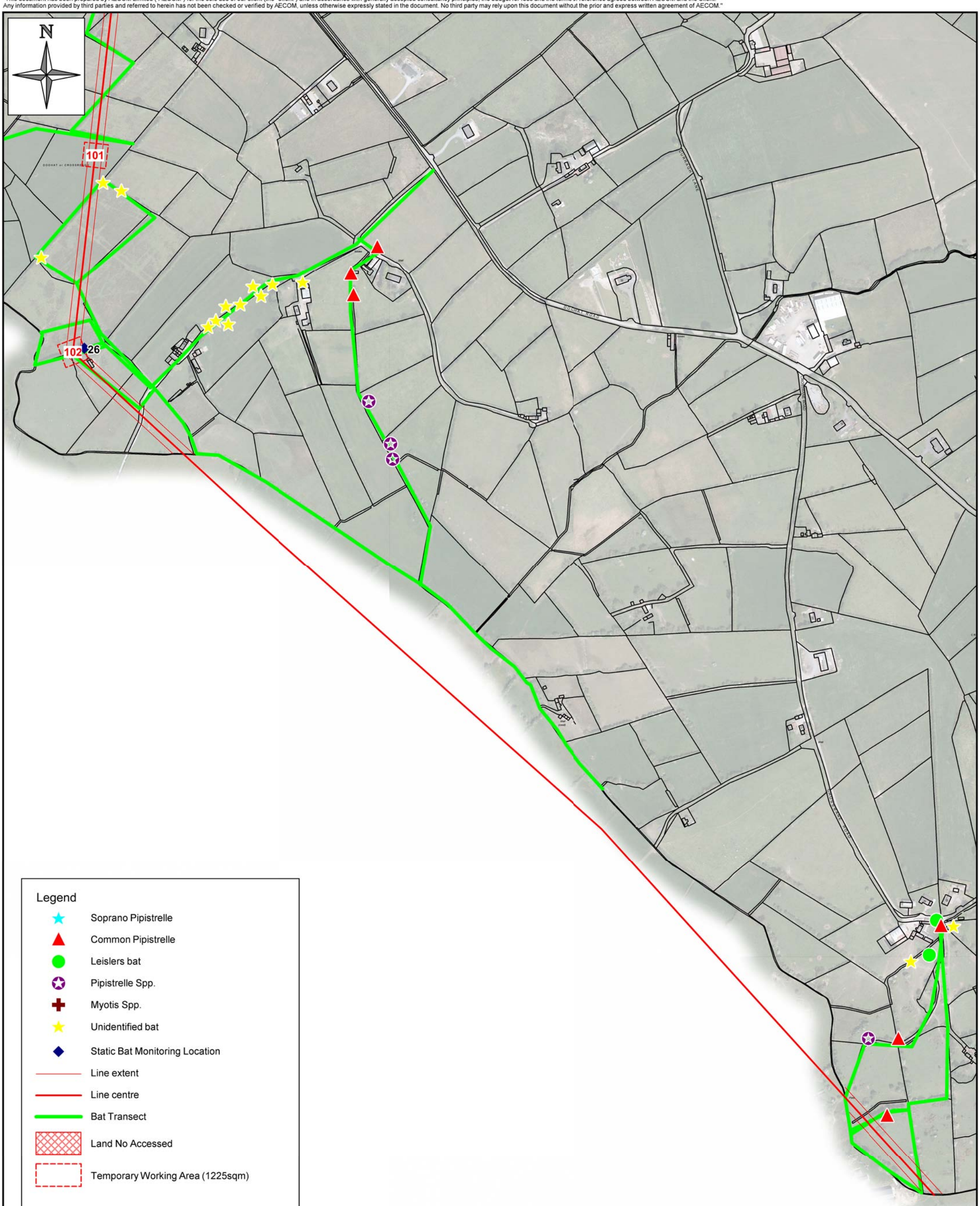
Design: GB	MapInfo: MM
Chk'd: GB	App'd:KW
Date:18/02/2013	Scale: 1:5,000 @ A3
No: 60032220/3528/BT/M	



Legend

- Soprano Pipistrelle
- Common Pipistrelle
- Leislers bat
- Pipistrelle Spp.
- Myotis Spp.
- Unidentified bat
- Static Bat Monitoring Location
- Line extent
- Line centre
- Bat Transect
- Land No Accessed
- Temporary Working Area (1225sqm)

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: BAT TRANSECT RESULTS
FIGURE 23

AECOM
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2011 Driven Transect Report and Figures
(Part of the NIE 2nd Addendum Appendices)

1 Introduction

a. This report describes survey work, additional to that carried out in 2009 and 2010, that was designed to allow the line route and associated study area to be surveyed across 2 nights (repeated each month May to September). The purpose of this work was to further consider the local bat population throughout the study area to verify the results obtained during earlier surveys in 2009 and 2010. Earlier surveys had considered the potential for roosting bats along the line route and identified significant flightlines in the study area. This earlier work indicated that foraging and commuting bats were commonly encountered in the area across which the line route is proposed to travel. But that no significant roosts were present within the study area. The species assemblage within the area under study reflected the commonly encountered species across N. Ireland as a whole with the most frequently recorded species as follows; common pipistrelle *Pipistrellus pipistrellus,* soprano pipistrelle *Pipistrellus pygmaeus* and Leisler's bat *Nyctalus leisleri*. Daubenton's bat *Myotis daubentonii* was also frequently encountered near watercourses in a few locations.

b. The aim of the present study was to survey the route of the proposed development in order to:

   (1) check the results of the earlier surveys (2009/10);

   (2) consider the activity of the local bat population over an additional year to allow for climatic variation across years;

   (3) use an additional survey methodology which considers bat activity along 70-80% of the study area over a single survey period (2-3 hours commencing 30 mins before dusk or 2-1.5 hours before sunrise to sunrise)

2 Background

a. In Northern Ireland there are eight breeding species of bat (Russ & Montgomery, 2002), two of which have only been discovered in the past 15 years (Russ, 1999) and all of them being protected under the Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 as amended. The bat fauna of Northern Ireland, and indeed Ireland as a whole, is unique in that there are relatively high numbers of Leisler's bats *N. leisleri* compared to other European countries (Stebbings, 1988).

b. Bats are protected under the Conservation (Natural Habitats, &c.) (amendment) Regulations 2009. These make it an offence to;

    a. Deliberately capture or intentionally take a bat.

    b. Deliberately or intentionally kill or injure a bat.

    c. To be in possession or control of any live or dead wild bat or any part of, or anything derived from a wild bat.

    d. Damage or destroy a breeding or resting place of such an animal or intentionally or recklessly damage, destroy or obstruct access to any place that a wild bat uses for shelter or protection.

    e. Intentionally or recklessly disturb any wild bat while it is occupying a structure or place that it uses for shelter or protection.

    f. Deliberately disturb any bat in such a way as to be likely to significantly affect;

        i. The ability of any significant group of animals of that species to survive, breed or rear or nurture their young; or

        ii. The local distribution or abundance of that species.

        A bat roost may be any structure a bat uses for breeding, resting, shelter or protection. It is important to note that since bats tend to re-use the same roost sites, legal opinion is that a bat roost is protected whether or not the bats are present at the time.

3 Methodology

Driven transect

a. Driven transects can cover much larger areas than walked ones. They can be one long transect or a series of short ones and can also incorporate listening station stops. A 500m buffer was placed around the route corridor for the overhead line, this constitutes the study area for this survey (see Figure 7.1.1). A route was then selected along minor roads keeping within the study area as much as possible. Then a series of listening stops were added to the route. The 20 selected listening stops are all located on minor roads where the overhead line is proposed to oversail the road (i.e. directly underneath the line route), one exception was listening stop one which is located immediately adjacent to the proposed substation site. The driven transect is approximately 56km in length and incorporates 20 'listening stops' (3 minutes of continual recording at a specific location, as well as continued recording as the vehicle travels along the transect route). Figure 7.1.1 shows the route of the driven transect, the 500m study area and the location of each of the listening stops, relative to the route of the overhead line and the local road network.

Method

b. The transect is driven along the predefined route at a steady speed of 15 mph (24 kph), continually recording bat sounds with a microphone or detector mounted on the roof of the car. The microphone is directed towards the roof of the car at a 45^{o} angle, with the roof acting as a large deflector plate which allows bat calls to be detected for almost 360^{o} around the vehicle. A full spectrum or frequency division detector (across different survey visits) was used to detect bat calls which were simultaneously recorded on to a compact flash card or digital recording device (for later analysis). The location of bat contacts could then be estimated by comparing the time for each bat call with the time record for the relevant transect survey session. During the survey, the ambient air temperature, cloud cover and wind speed were recorded. The transect was driven with dipped headlights and a speed of 15 mph was maintained to allow for recorded sound files to be analysed to species level (higher speeds can distort the recorded calls and wind noise can interfere with recordings). The use of full spectrum and frequency division bat detectors allows for the identification of bats to species level, in all but a few instances. This methodology is adapted from the Bat Conservation Trust, Bat Surveys – Good Practice Guidelines 2007. However the only difference was that the detector was mounted on the roof of the car rather than on the passenger window as described in the BCT guidance. Roof mounting allows for bats to be detected from all directions, rather than a single direction (i.e. passenger side hedge/field) when mounted on the window of the car.

c. Equipment used included a Petterson D500x full spectrum bat detector (and an external microphone) and a Batbox baton frequency division bat detector. A suction mount for a camera was used to secure the microphone or detector to the roof of the vehicle during survey (see photographs 1-3 in the Annex A).

d. The 56km transect was too long to be completed in a single session, therefore 50-70% was surveyed during each visit; and a total of 8 survey visits were completed. This ensured that each transect section and each listening stop (see Figure 7.1.1) was surveyed on four occasions between May and September. The NIEA general guidance on bats surveys states that 'There must be at least 2/3 surveys carried out between May and September. Survey work must be evenly spaced throughout this period'; therefore the number of surveys completed is 1/2 more than normally required by NIEA.

e. Sound files recorded during each survey visit were transferred on to the AECOM servers and analysed at a later date using Batsound software. The results of this analysis are described in Section 4, while the raw data can be viewed in the Annex B.

f. Summary details of the driven transect surveys undertaken are presented in Table 1 below.

Table 1 – Survey details

Date	Sunset or Sunrise	Personnel	D500x/Baton	Times	Weather conditions
27th May 11	2136hrs	Cormac Loughran Mary Maguire	Petterson D500x	2120-0016hrs	Cool, overcast and blustery later in the transect, 11°C
16th June 11	2155hrs	Cormac Loughran Mary Maguire	Petterson D500x	2233-0003hrs	Dry, slight wind and 12°C
21st June 11	2157hrs	Cormac Loughran Mary Maguire	Petterson D500x	2225-0008hrs	Dry and mild with a slight wind, 12°C
20th July 11	0522hrs	Mary Maguire Richard Ayre	Batbox baton	0301-0501hrs	Overcast, fair, 9°C
21st July 11	0524hrs	Mary Maguire Richard Ayre	Batbox baton	0329-0514hrs	Overcast, fair, 12°C
14th Sep 11	1944hrs	Brendan Kemp Joseph Martin	Batbox baton	1939-2249hrs	Dry with a slight wind and 12°C
20th Sep 11	1930hrs	Brendan Kemp Joseph Martin	Batbox baton	1913-2222hrs	Dry with a slight wind and 11°C
27th Sep 11	1912hrs	Brendan Kemp Joseph Martin	Batbox baton	1912-2214hrs	Dry with a slight wind and 15°C

4 Results

Desk study

a. Bat records had previously been obtained from the N. Ireland Bat Group and these were reviewed in relation to the transect route. Two of the records obtained from the bat group fell within the 500m buffer from the line route which was the study area boundary for the line route. Record one referred to a sighting from the 22 Aug 1998 or a single unidentified bat, while record two referred to pipistrelle species 'around a house and yard' but with no recorded abundance. The second record was date may 1997 – Aug 1997. The nearest substantial bat roost identified from a trawl of the bat group records is from a house >500m from Tower number 3. This record is for 100 *M. daubentonii* with an associated comment in the record as follows 'requesting permission to exclude the bats', this is assumed to refer to the fact that the householder was requesting permission to exclude the bats. However no subsequent information is available on the outcome of the request.

b. The N. Ireland Bat Group provided a number of records for the area surrounding the proposed development (Table 4). Five species were identified; common pipistrelle *P. pipistrellus,* soprano pipistrelle *P. pygmaeus,* Leisler's bat *N. leisleri,* Daubenton's bat *M. daubentonii* and brown long-eared bat *Plecotus auritus,* with a few additional records for bat species and *Myotis spp.*

Table 2 – Records of bats within 5km of the overhead line route (as provided by the N. Ireland Bat Group)

Grid Ref	Scientific Name	Location	County	Date	Number	Comments
H7545	*Pipistrellus pipistrellus*	Caledon	Tyrone	02-Aug-06	20	Householder requesting permission to exclude. Medium quantity of droppings seen.
H7688	*Pipistrellus species*	Middletown	Armagh	01-Sep-99	83	
H7945	*bat sp.*	Caledon	Armagh	28-Aug-89		
H8059	*bat sp.*	Dungannon	Tyrone	04-Jan-07		No bats present.
H8059	*Nyctalus leisleri*	Dungannon	Tyrone	11-Jul-97	0	90 bats counted recently. Dead juvenile on ground.
H8060	*Pipistrellus pipistrellus*	Dungannon	Tyrone	17-Aug-98	30	
H8059	*bat sp.*	Dungannon	Tyrone	11-Jul-97	20	Incomplete count. ? Pipistrelle.
H8059	*bat sp.*	Dungannon	Tyrone	11-Jul-97	0	Droppings at gable end. No bats present.
H8059	*Pipistrellus pipistrellus*	Dungannon	Tyrone	20-Jun-05	100	Estimate of 200 bats (100 counted). Householder bat and research-friendly.
H8152	*Pipistrellus pipistrellus*	Benburb	Tyrone	31-Jul-06	5	Probably less than 5 bats present. Householder requesting permission to exclude bats.
H8144	*bat sp.*	Killylea	Armagh	10-Jul-92	50	Estimate by householder. Reported by telephone.
H8143	*bat sp.*		Armagh	14-May-99		
H8259	*bat sp.*	Dungannon	Tyrone	Oct-98	Present	
H8259	*bat sp.*	Dungannon	Tyrone	30-Aug-01	0	Medium quantity of droppings below central ridge beam. No bats seen.
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	27-Jul-91	Present	Bat entered house.
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	Oct-92	Present	Dead bat found.
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	20-Jul-93	130	Bats counted. Bats banded.
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	01-Jun-94	41	Bats counted.
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	30-Jun-95	81	Bats counted.
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	18-Jun-96	53	Bats counted.

Grid Ref	Scientific Name	Location	County	Date	Number	Comments
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	21-Aug-96	77	Bats counted.
H8257	*Pipistrellus species*	Dungannon	Tyrone	17-Oct-05	1	When collected very weak with torn membranes. Still in care in June '06.
H8257	*Nyctalus leisleri*	Dungannon	Tyrone	APR 1997 - SEP 1997		Annually. Nursery inside house in custom built box.
H8257	*Pipistrellus species*	Dungannon	Tyrone	MAY 1997 - AUG 1997		around house, yard, trees.
H8361	*bat sp.*	Dungannon	Tyrone	1989		No other details.
H8361	*Pipistrellus pipistrellus*	Dungannon	Tyrone	08-Jun-99	500	Estimated minimum number. Returned at beginning of April "more than ever".
H8361	*Pipistrellus pygmaeus*	Dungannon	Tyrone	09-Jul-01	500	Estimated number.
H8356	*bat sp.*	Dungannon	Tyrone	21-Jun-99	0	No bats present on this date.
H8356	*bat sp.*	Dungannon	Tyrone	16-Jun-01	1	Bat in ground floor room last week.
H8356	*Pipistrellus pipistrellus*	Dungannon	Tyrone	17-Jun-01	1	Lactating female - died later.
H8356	*Pipistrellus pipistrellus*	Dungannon	Tyrone	01-Jul-01	16	Bat detector identification.
H8355	*Myotis sp.*	Dungannon	Tyrone	01-Nov-97	1	
H8456	*Plecotus auritus*	Dungannon	Tyrone	02-Oct-98	1	
H8456	*Pipistrellus species*	Dungannon	Tyrone	15-Oct-97	1	flying along lane nr. old barn
H8461	*bat sp.*	Dungannon	Tyrone	08-Jul-99	5	Minimum of 5 bats counted
H8456	*bat sp.*	Dungannon	Tyrone	01-Aug-96		Moderate amount of droppings.
H8458	*Myotis daubentonii*	Moy	Tyrone	10-May-07	100	Requesting permission to exclude the bats.
H8558	*bat sp.*	Dungannon	Tyrone	22-Aug-98	1	3 "pairs" reported, one bat seen.
H8552	*bat sp.*	Blackwatertown	Armagh	21-Aug-98	0	Bats gone at time of visit. Droppings reported to be in large granules.
H8540	*bat sp.*	Keady	Armagh	01-Aug-96		Small quantity of droppings.
H8543	*Pipistrellus species*	Armagh	Armagh	Jul-92	Present	Large quantity of droppings.
H8641	*Pipistrellus species*	Armagh	Armagh	03-Oct-06	30	Exclusion permit issued by EHS, Oct 2006.
H8659	*Plecotus auritus*	Dungannon	Tyrone	24-Jul-91	19	Bats counted.
H8648	*bat sp.*	Armagh	Armagh	20-Jun-89	24	Number of bats estimated. Thought to be Pipistrelles.
H8640	*bat sp.*	Armagh	Armagh	1988		
H8758	*Plecotus auritus*	Dungannon	Armagh	1985	Present	No other details.
H8758	*Plecotus auritus*	Dungannon	Armagh	1992		
H8754	*Nyctalus leisleri*	Loughgall	Armagh	12-Aug-91	20	Number of bats estimated. Droppings moderate.
H8754	*Myotis sp.*	Portadown	Armagh	19-Oct-97	1	
H8857	*Myotis sp.*	Dungannon	Armagh	11-Jan-98	1	

c. All of the records in Table 4 arise from the villages and dwellings which lie within a 5km buffer from the proposed development. The bats in the colonies identified will use the surrounding countryside to forage and given that bats are a highly mobile species it is probable that bats from these colonies will use the area which is proposed for the overhead line.

Transect survey

d. The vast majority of land along the transect route is given over to agriculture. The majority of land parcels along either side of the route were under agricultural grassland, mainly improved and semi-improved grassland. Some fields were under arable crops, and these tended to be clustered to some extent, possibly due to soil conditions and/or landowner preferences. The semi-improved grassland in many areas also contained high percentage cover of rushes *Juncus effusus.* Hedgerows varied substantially (and often between landholdings) with many 'box' cut monoculture hedges, but also many overgrown and unkempt hedges present with the study area.

e. Many of the minor roads across which the transect route extended were flanked on either side by tall hedges with trees, these formed a protective canopy over the road in places. With semi-natural woodland infrequent within the study area, these areas are potentially significant for foraging bats, giving protection from the wind and allowing bats to forage relatively protected beneath the canopy. Insect abundance is also likely to be high in these areas given the protection from the wind. In fact Russ & Montgomery (2002) showed that hedgerow avoidance by bats may be related to the common agricultural practice of cutting hedges into low box-shaped forms which are usually species poor and offering little wind protection. It is also suggested that pipistrelle activity was high in areas where tree-lines bordered one side of the road and especially when this habitat bordered both sides of the road. Conversely, bat numbers were significantly lower where a cut hedge bordered both sides of the road.

Table 3: Summary of bat species and number of bat passes recorded during the transect surveys.

Species / Date	27.05.11	16.06.11	21.06.11	20.07.11	21.07.11	14.09.11	20.09.11	27.09.11	Totals
P. pipistrellus	8	9	23	0	4	8	6	21	79
P. pygmaeus	2	0	3	5	19	0	15	1	45
Pipistrellus spp	2	3	3	22	23	11	7	9	80
Nyctalus leisleri	1	12	7	0	0	7	1	2	30
Bat passes	13	24	36	27	46	26	29	33	234

Table 4 - Number of bat passes in relation to each transect section/listening stop, May to September.

Section / Date	27.05.11	16.06.11	21.06.11	20.07.11	21.07.11	14.09.11	20.09.11	27.09.11	Totals
LS 1	__	0	__	0	__	0	10	__	10
Section 1	__	2	__	5	__	0	5	__	12
LS 2	__	1	__	4	__	2	0	__	7
Section 2	__	3	__	2	__	0	1	__	6

Section / Date	27.05.11	16.06.11	21.06.11	20.07.11	21.07.11	14.09.11	20.09.11	27.09.11	Totals
LS 3	__	7	__	0	__	0	1	__	8
Section 3	__	4	__	5	__	0	0	__	9
LS 4	__	0	__	0	__	0	0	__	0
Section 4	__	3	__	6	__	0	0	__	9
LS 5	__	0	__	4	__	4	0	__	8
Section 5	__	0	__	0	__	1	0	__	1
LS 6	__	0	__	0	__	1	1	__	2
Section 6	__	0	__	0	__	1	4	__	5
LS 7	__	0	__	0	__	1	1	__	2
Section 7	__	1	__	1	__	0	1	__	3
LS 8	__	0	__	0	__	2	0	__	2
Section 8	__	1	__	0	__	0	1	__	2
LS 9	__	0	__	0	__	0	__	0	0
Section 9	__	0	__	0	__	2	__	0	2
LS 10	__	0	__	__	0	1	__	1	2
Section 10	0	1	__	__	3	3	__	2	9
LS 11	0	1	__	__	3	1	__	8	13
Section 11	0	0	__	__	4	2	__	2	8
LS 12	0	__	1	__	3	0	__	0	4
Section 12	0	__	1	__	1	3	__	1	6
LS 13	3	__	2	__	4	0	__	0	9
Section 13	0	__	6	__	0	2	__	4	12
LS 14	0	__	0	__	0	0	__	5	5
Section 14	2	__	1	__	0	0	__	5	8
LS 15	2	__	0	__	5	__	0	0	7
Section 15	0	__	1	__	0	__	0	0	1
LS 16	0	__	0	__	2	---	0	0	2
Section 16	0	__	1	__	4	---	0	1	6
LS 17	2	__	0	__	5	__	0	0	7

Section \ Date	27.05.11	16.06.11	21.06.11	20.07.11	21.07.11	14.09.11	20.09.11	27.09.11	Totals
Section 17	0	__	0	__	2	__	0	1	3
LS 18	0	__	3	__	6	__	0	1	10
Section 18	3	__	8	__	0	__	1	1	13
LS 19	0	__	4	__	4	__	0	1	9
Section 19	0	__	8	__	0	__	3	0	11
LS 20	0	__	0	__	0	__	0	0	0
Section 20	1	__	0	__	0	__	0	0	1
Bat passes	13	24	36	27	46	26	29	33	234

5 Recommendations

a. Wherever possible, hedgerow trees should be pollarded rather than removed, with a height of 2 metres maintained if safety considerations permit. The number of mature trees felled prior to the works shall be kept to a minimum, an ecological clerk of works will be engaged to work alongside to the engineers during construction to facilitate the retention of trees as much as possible. Where mature trees are present these will be crown reduced or pollarded rather than removed. Excavations for tower foundations shall be sited so as to avoid damaging tree roots.

b. Woodland shall be avoided wherever possible and any works in the vicinity of trees will follow best practice guidelines, as outlined in BS 5837:2005 'Trees in Relation to Construction – Recommendations.' In particular, due consideration shall be given to the spread of tree roots where tower foundations are in close proximity to hedgerow trees or woodland edge. Trees that are close to construction works shall be adequately protected from plant and work operations. Excavations or changes in ground levels shall not take place within the protection zone, as even temporary changes can be damaging. During the construction of the substation platform, fill material shall not be allowed to creep towards the roadside trees and hedgerow. The passage of vehicles or storage of materials can compact soil and do significant root damage, and these operations shall not take place within the protected zone. Toxic materials including cement shall not be stored, or discharged, within 10m of a tree. Lines or other materials shall not be fixed to a tree nor shall any tree be used as an anchor point for winching. Where possible, low-growing woodland belts shall be treated as hedgerows, and trimming kept to a minimum.

c. A combination of standard and bespoke mitigation measures for bats and bat habitats is proposed:

- Once trees that are to be felled or lopped have been identified, any potential roost sites shall be inspected for the presence of bats immediately prior to felling by an experienced bat worker. If evidence of bats is found during inspection, all work shall cease immediately and advice sought from the NIEA Wildlife Officer.
- Potential tree roosts shall be felled under the supervision of a qualified bat worker. The results of this supervision will be provided to the NIEA Wildlife Officer. Generally this will be carried out in autumn when bats have completed breeding and hibernation has not commenced. Tree felling shall include wedging to prevent cracks closing and trapping bats, and leaving felled limbs in situ for at least 24 hours to enable bats to escape.
- If bats are discovered after felling has commenced, work shall be stopped and NIEA informed and advice sought.
- Known flightlines as identified during the 2009/10 bat surveys will be maintained by pollarding affected trees and hedges at 1.5 - 2 metres high rather than the formerly more usual method of coppicing at ground level, as bats rarely use hedges under 1 metre (Briggs & King 1998).
- A minimum of 100 Bat boxes will be erected along the line route, adjacent to those hedgerows where mature trees or trees with a dense covering of ivy have been pollarded. This is precautionary compensation and enhancement as lack of available bat roosts can be a limiting factor in many populations. These boxes will be erected prior to the commencement of vegetation clearance connected with the construction and or operation of the overhead line.
- The use of these artificial bat boxes as roosts will be monitored by a licensed bat worker as part of the post-construction monitoring regime. NIE has committed to the maintenance of these boxes for 5 years post construction across the operational phase of the project.

d. Where hedgerows are to be lost through the construction of the tower bases, agreement will be sought with the landowner to establish a new hedge of similar length to that which will be lost. If the landowner does not wish to avail of this, NIE will donate an amount to a conservation charity to be used for planting native trees of local provenance in County Armagh. This amount to be donated will be calculated using prevailing rate at the time (figure to be used will be that which is used by DARD (Dept of Agriculture and Rural Development) in its agri-environment schemes (currently £12 per metre, per year for 5 years) for a new hedge which is fenced either side). This compensation measure will also resolve a consultation response dated 9th March 2011 from DARD Countryside Management Branch (see Appendix 6.1). The consultation response had raised the issue of hedgerow reinstatement and these compensation measures will provide that reinstatement.

6 Conclusions

a. Bats as highly mobile species are frequently encountered within 500m of the proposed line route. They appear to forage extensively along the numerous narrow tree-lined minor roads which crisscross the study area. Personal observations during this study mirror those found by Russ & Montgomery 2002; with fewer bats in areas that contained significant proportions of improved grassland and box cut hedge (<0.5m). Russ & Montgomery (2002) also showed that both of these habitats are generally avoided by bats in Northern Ireland and suggest that hedgerow avoidance by bats may be related to the common agricultural practice of cutting hedges into low box-shaped forms which are usually species poor and offering little wind protection. They also showed that pipistrelle activity was high in areas where tree-lines bordered one side of the road and especially when this habitat bordered both sides of the road. Conversely, bat numbers were significantly lower where the cut hedge bordered both sides of the road.

b. This study clearly demonstrates that *P. pipistrellus, P. pygmaeus* and *N. leisleri* are commonly encountered within the study area. This verifies the results of the 2009 & 2010 activity surveys. The species assemblage recorded reflects the wider countryside with the species identified during survey, the same species which are most common across N. Ireland.

c. Observations made during this study would appear to be in line with those revealed by Russ & Montgomery 2002 that high incidence of bat calls coincides with habitats on either site of the transect route. Specifically, that bats appear to forage in areas with tree-lines on either side of the road which form a protective canopy over the road. With substantially fewer bat calls along those sections of transect which have box cut hedges on either side of the road.

d. The driven transect method can be used to rapidly establish the bat assemblage within a given study area and provide a minimum number of bats. It can also provide information with respect to habitat associations, although this was not the main subject under study during this investigation.

7 References

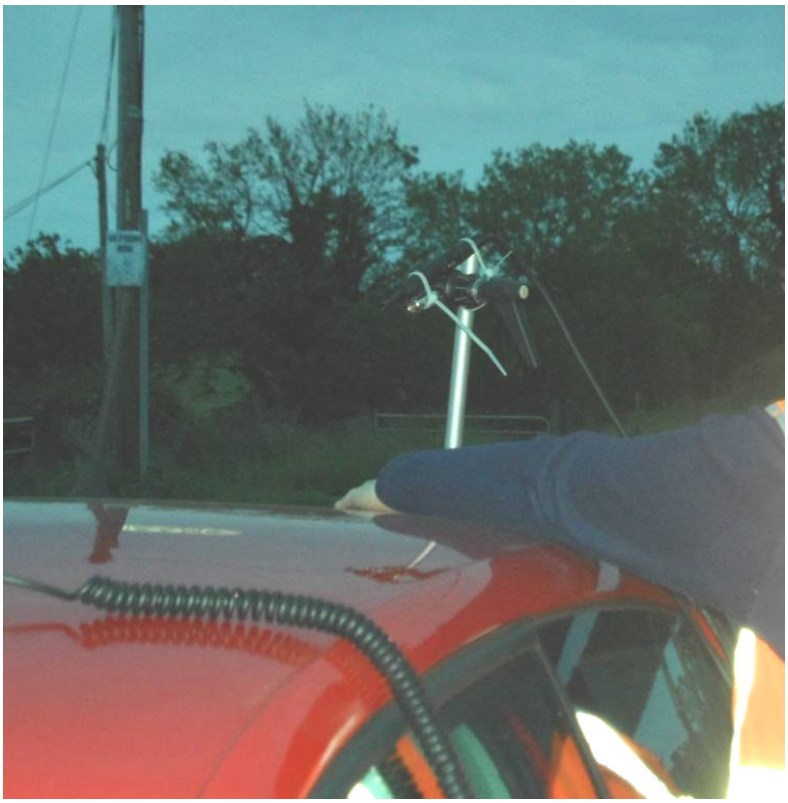
a. Russ, J. M. & Montgomery, W. I. (2002). Habitat associations of bats in Northern Ireland: Implications for conservation. BiolConserv. 108: 49–58.

b. Russ, J. M. (1999). The bats of Britain and Ireland. Echolocation calls, sound analysis and species identification. Powys: Alana Books.

c. Russ, J. M. Briffa, M. & Montgomery, W. I. (2003). Seasonal patterns in activity and habitat use by bats (*Pipistrellus* spp. and *Nyctalus leisleri*) in Northern Ireland, determined using a driven transect. J. Zool., Lond. (2003) 259, 289–299.

Annex A - Photographs

Photograph 1 – shows the external microphone for the Petterson D500x full-spectrum bat detector being secured to the attachment of the suction mounted support on the roof of a vehicle immediately prior to the commencement of a transect survey.



Photograph 2 – shows a more distant view of the same set up as in the close up in photo 1. Note that the external microphone is attached to the Petterson D500x full-spectrum bat detector inside the vehicle allowing the recording to be continually monitored by the passenger during the transect survey. The coiled cable in the foreground is for the flashing beacon to identify a slow moving vehicle (15mph) during survey.

Photograph 3 – Vehicle ready for the commencement of survey. The photographs were taken on the Derrynoose Road near to Tower 100, prior to the commencement of a transect survey.

Annex B –
Bat Activity Forms

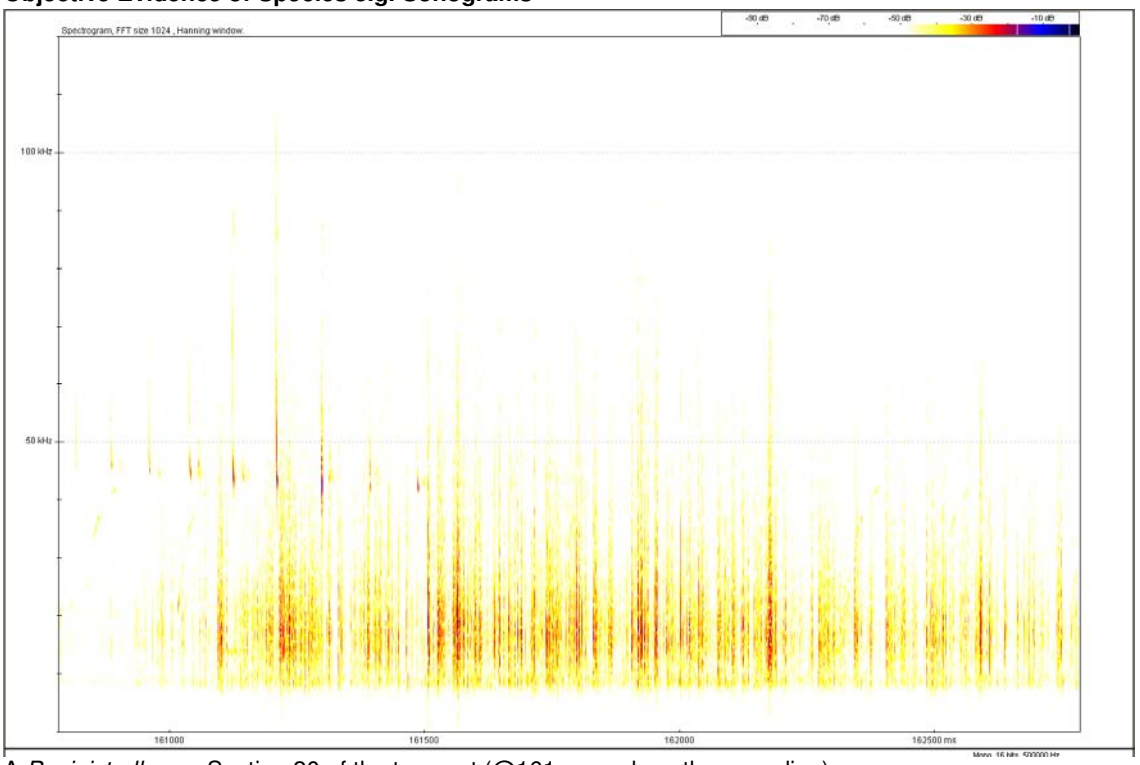
DUSK SURVEY	Recorder(s): Cormac Loughran Mary Maguire		Qualifications, Experience and Relevant Licenses: MSc, MIEEM, CEnv
Date:	27.05.2011		
Arrival time:	2120hrs		Site: N/S Interconnector
Departure time:	0016hrs		Project and Reference: 60032220

Weather conditions			
Sunrise:	-------	Sunset:	2136hrs
Wind speed & direction	4-5mph	Air temperature (C)	11°C
Weather (rain etc):	Cool, overcast and blustery later at the end of the transect survey		
Habitat / corridors / nearby water bodies and general habitat:			

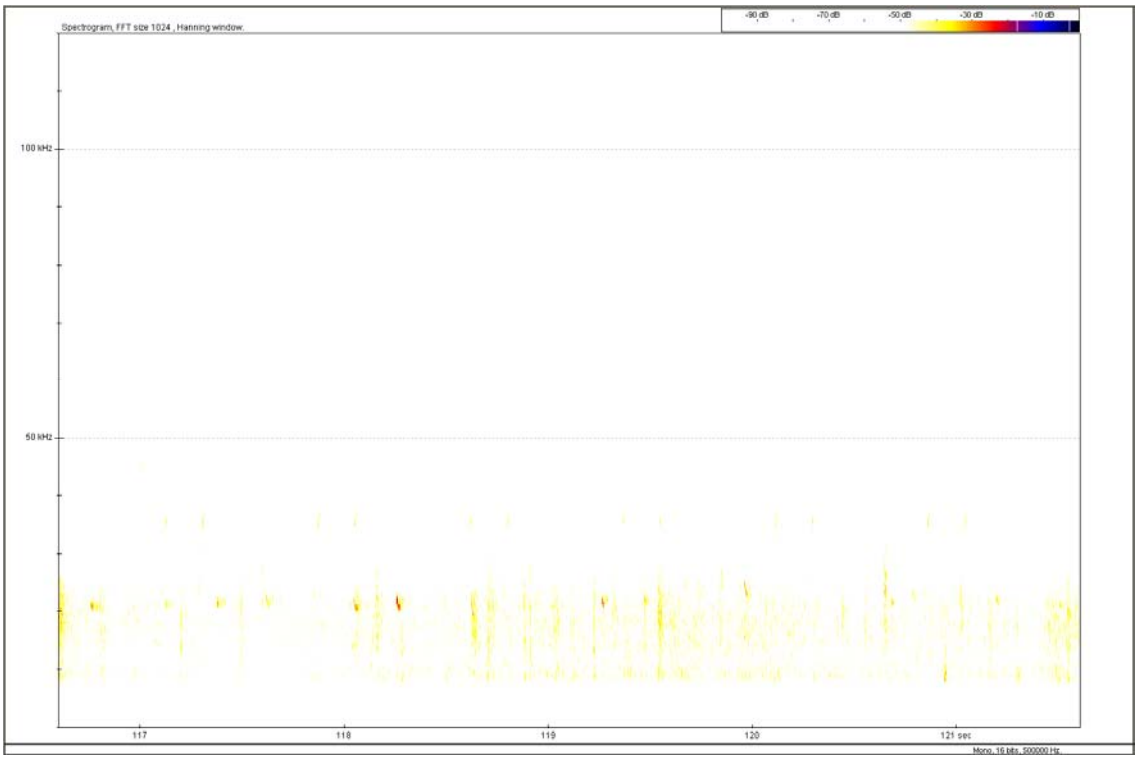
TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species (position on mp3 in secs)	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2210	M00009	Section 20	*P. pipistrellus*	Commuting	1
2	2213	M00010	Listening Stop 20	---	--	-
3	2219	M00011	Section 19	---	--	-
4	2222	M00012	Listening Stop 19	---	--	-
5	2228	M00013	Section 18	*N. leisleri* (115 secs) *P. pipistrellus* (307 secs) *P. pipistrellus* (318 secs)	Commuting	1 1 1
6	2247	M00014	Listening Stop 18	---	--	-
7	2258	M00001	Section 17	---	--	-
8	2302	M00002	Listening Stop 17	*Pipistrellus spp* (81 secs) *P. pygmaeus* (190 secs)	Commuting	1 1
9	2306	M00003	Section 16	---	--	-
10	2309	M00004	Listening Stop 16	---	--	-
11	2314	M00005	Section 15	---	--	-
12	2320	M00006	Listening Stop 15	*P. pipistrellus* (119 secs) *P. pipistrellus* (197 secs)	Commuting	1 1
13	2340	M00007	Section 14	*P. pipistrellus* (34 secs) *P. pygmaeus* (158 secs)	Commuting	1 1
14	2342	M00008	Listening Stop 14	---	--	-
15	2348	M00009	Section 13	---	--	-
16	2355	M00010(2)	Listening Stop 13	*Pipistrellus spp* (165 secs) *P. pipistrellus* (211 secs) *P. pipistrellus* (243 secs)	Commuting	1 1 1
17	2358	M00011(2)	Section 12	---	--	-

18	0002	M00012(2)	Listening Stop 12	---	--	-
19	0007	M00013(2)	Section 11	---	--	-
20	0011	M00014(2)	Listening Stop 11	---	--	-
21	0016	M00015	Section 10	---	--	-

Objective Evidence of Species e.g. Sonograms



A *P. pipistrellus* on Section 20 of the transect (@161 secs along the recording).



A *N. leisleri* commuting at Section 18 at 2229hrs approximately

Additional Comments / Observations

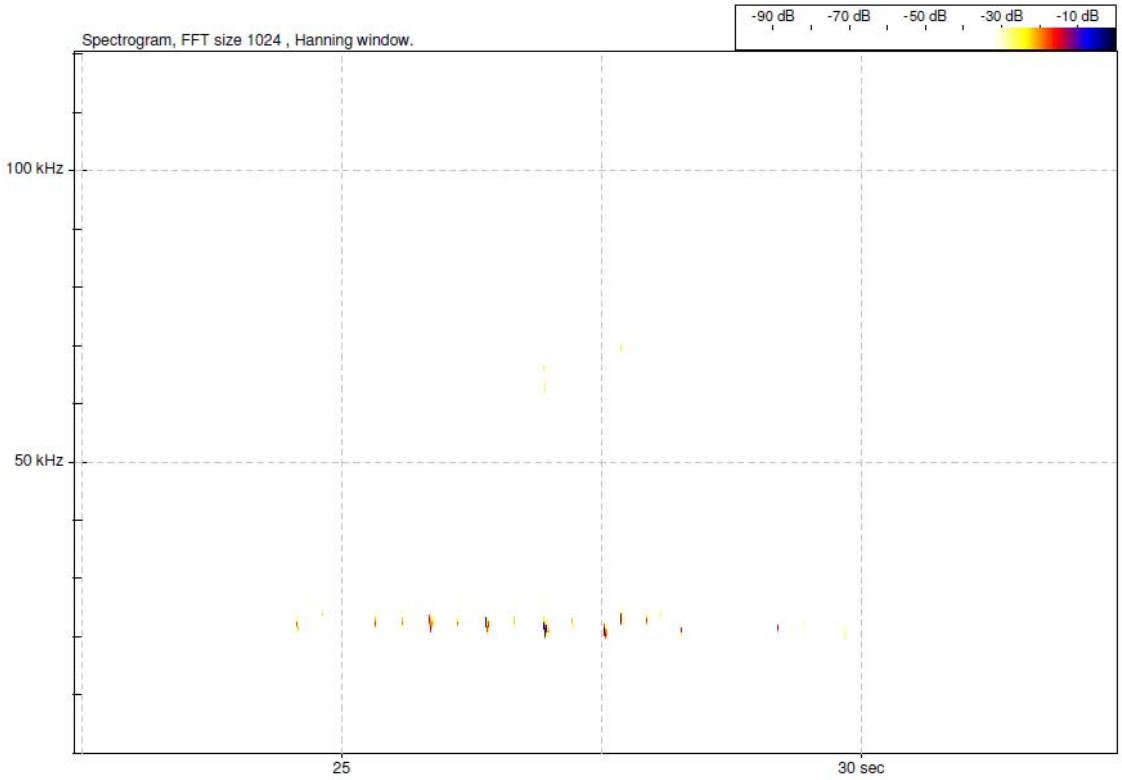
DUSK SURVEY	Recorder(s):	Qualifications, Experience and Relevant Licenses:
Date:	16.06.2011	
Arrival time:	2202	Site: N/S Interconnector
Departure time:	0010	Project and Reference:

Weather conditions			
Sunrise:	n/a	Sunset:	2202
Wind speed & direction	2-3mph	Air temperature (C)	12
Weather (rain etc):	Dry / slight wind		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2221	M0001	Listening Stop 1	No bats recorded.		
2	2230	M0002	Section 1	Leisler's	Commuting	1
	2231			Common pipistrelle	Commuting	1
3	2234	M0003	Listening Stop 2	Leisler's	Commuting	1
4	2239	M0004	Section 2	Common pipistrelle	Commuting	1
	2239			Common pipistrelle	Commuting	1
	2240			Common pipistrelle	Commuting	1
5	2241	M0005	Listening Stop 3	Leisler's	Commuting	1
	2241			Leisler's	Commuting	1
	2242			Leisler's	Commuting	1
	2242			Common pipistrelle	Commuting	1
	2242			Leisler's	Commuting and foraging	2
	2243			Pipistrelle spp.	Commuting	1
6	2250	M0006	Section 3	Common pipistrelle	Commuting	1
	2251			Common pipistrelle	Commuting	1
	2253			Common pipistrelle	Commuting	1
	2253			Leisler's	Commuting	1
7	2254	M0007	Listening Stop 4	No bats recorded.		
8	2303	M0008	Section 4	Leisler's	Commuting and foraging	2
	2306			Leisler's	Commuting	1
9	2307	M0009	Listening Stop 5	No bats recorded.		
10	2310	M0010	Section 5	No bats recorded.		
11	2319	M0011	Listening Stop 6	No bats recorded.		
12	2325	M0012	Section 6	No bats recorded.		
13	2328	M0013	Listening Stop 7	No bats recorded.		

14	2338	M0014	Section 7	Pipistrelle spp.	Commuting	1
15	2339	M0015	Listening Stop 8	No bats recorded.		
16	2346	M0016	Section 8	Leisler's	Commuting	1
17	2349	M0017	Listening Stop 9	No bats recorded.		
18	2352	M0018	Section 9	No bats recorded.		
19	2359	M0019	Listening Stop 10	No bats recorded.		
20	0004	M0020	Section 10	Common pipistrelle	Commuting	1
21	0007	M0021	Listening Stop 11	Pipistrelle spp.	Commuting	1
22	0010	M0022	Section 11	No bats recorded.		

Objective Evidence of Species e.g. Sonograms



Leisler commuting on track no. M00003

Additional Comments / Observations

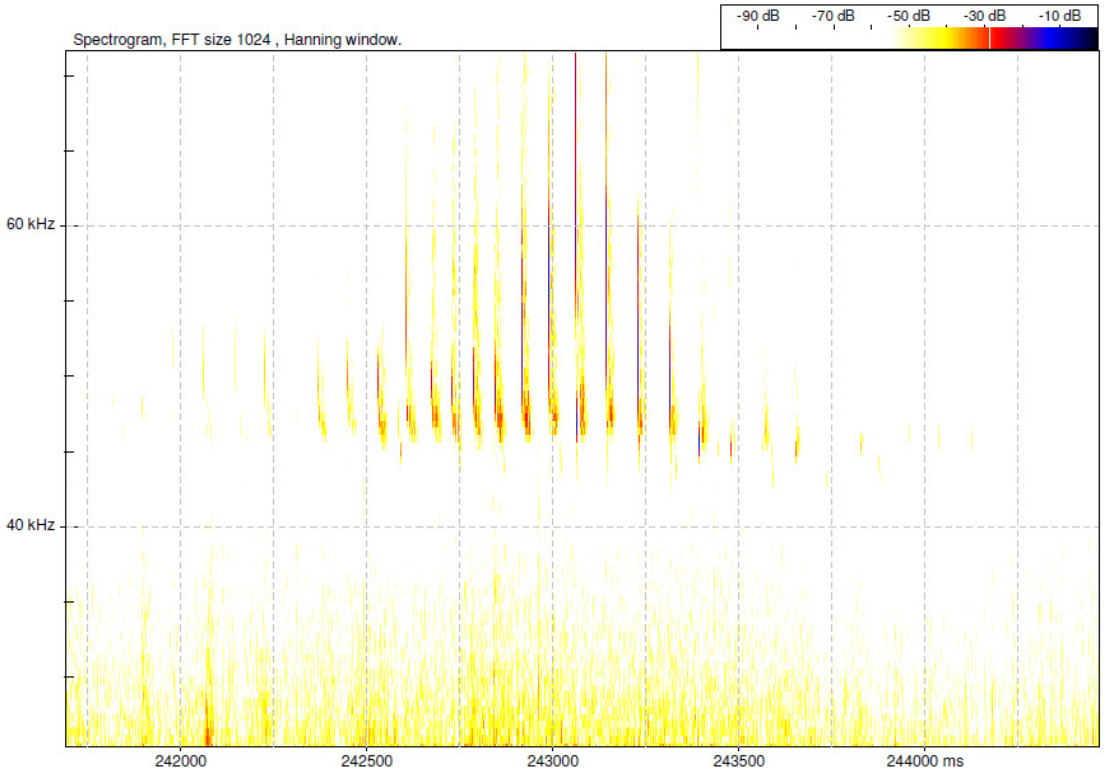
DUSK SURVEY	Recorder(s): Cormac Loughran Mary Maguire	Qualifications, Experience and Relevant Licenses: MSc, MIEEM, CEnv
Date:	21st June 2011	
Arrival time:	2225hrs	Site: N/S Interconnector
Departure time:	0008hrs	Project and Reference: 600032220

Weather conditions			
Sunrise:		Sunset:	2157hrs
Wind speed & direction	2-3mph	Air temperature (C)	12
Weather (rain etc):	Dry / slight wind		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2233	M0001	Section 20	No bats recorded.		
2	2236	M0002	Listening Stop 20	No bats recorded.		
3	2243	M0003	Section 19	Common pipistrelle	Commuting	1
	2243			Common pipistrelle	Commuting	1
	2243			Common pipistrelle	Commuting	1
	2244			Pipistrelle spp.	Commuting	1
	2244			Common pipistrelle	Commuting	1
	2244			Common pipistrelle	Commuting	1
	2244			Pipistrelle spp.	Commuting	1
	2244			Common pipistrelle	Commuting	1
4	2247	M0004	Listening Stop 19	Leisler's	Commuting	1
	2247			Common pipistrelle	Commuting	1
	2248			Common pipistrelle	Commuting	1
	2249			Common pipistrelle	Commuting	1
5	2253	M0005	Section 18	Leisler's	Commuting	1
	2253			Leisler's	Commuting	2
	2254			Common pipistrelle	Commuting	1
	2254			Common pipistrelle	Commuting	1
	2255			Common pipistrelle	Commuting	1
	2256			Common pipistrelle	Commuting	1
	2256			Pipistrelle Spp.	Commuting	1

6	2257	M0006	Listening Stop 18	Soprano pipistrelle	Commuting	1
	2257			Soprano pipistrelle	Commuting	1
	2258			Soprano pipistrelle	Commuting	1
7	2304	M0007	Section 17	No bats recorded.		
8	2308	M0008	Listening Stop 17	No bats recorded.		
9	2318	M0009	Section 16	Common pipistrelle	Commuting	1
10	2331	M0010	Listening Stop 16	No bats recorded.		
11	2328	M0011	Section 15	Common pipistrelle	Commuting	1
12	2331	M0012	Listening Stop 15	No bats recorded.		
13	2336	M0013	Section 14	Leisler's	Commuting	1
14	2340	M0014	Listening Stop 14	No bats recorded.		
15	2349	M0015	Section 13	Common pipistrelle	Commuting	1
	2349			Leisler's	Commuting	1
	2349			Leisler's	Commuting	1
	2349			Common pipistrelle	Commuting	1
	2349			Common pipistrelle	Commuting	1
	2349			Common pipistrelle	Commuting	1
16	2350	M0016	Listening Stop 13	Common pipistrelle	Commuting	1
	2351			Common pipistrelle	Commuting	1
17	0000	M0017	Section 12	Common pipistrelle	Commuting	1
18	0003	M0018	Listening Stop 12	Common pipistrelle	Commuting	1

Objective Evidence of Species e.g. Sonograms



Common pipistrelle commuting on track no M00003.

Additional Comments / Observations

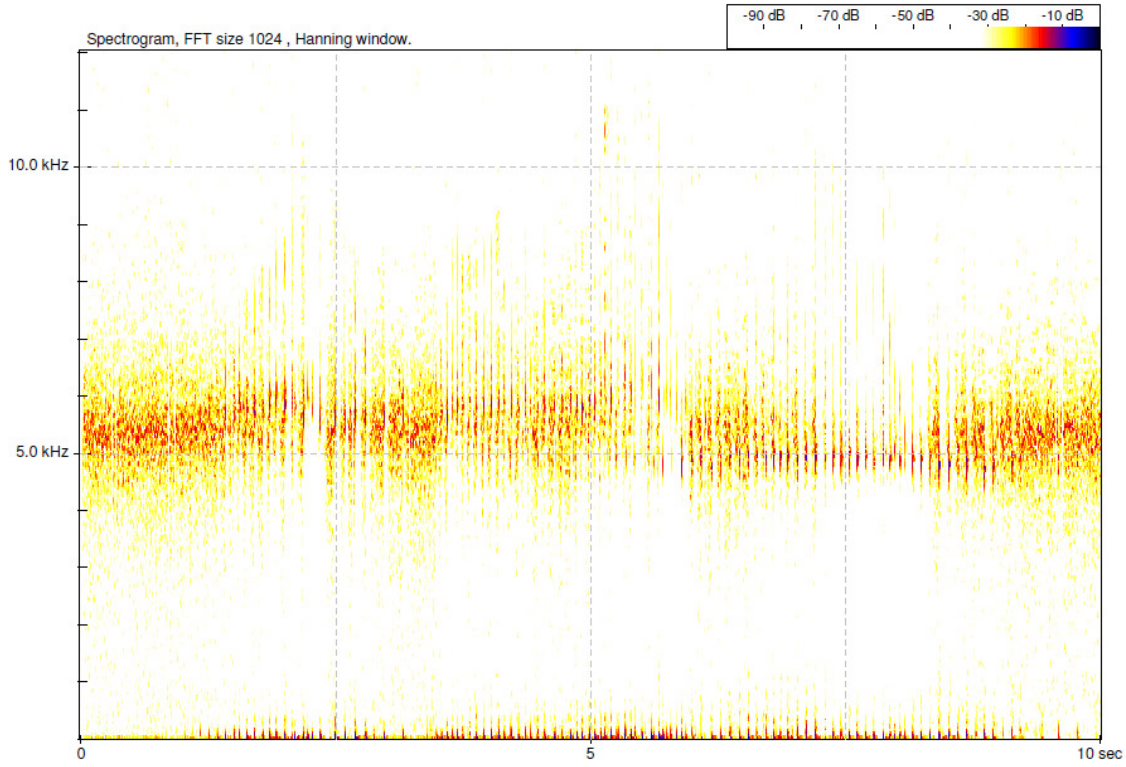
DUSK SURVEY	Recorder(s): Mary Maguire / Richard Ayre	Qualifications, Experience and Relevant Licenses: BSc, MSc, AIEMA
Date:	20/07/11	
Arrival time:	0329	Site: N/S Interconnector
Departure time:	0530	Project and Reference: 60032220

Weather conditions			
Sunrise:	0519	Sunset:	N/A
Wind speed & direction	N/A	Air temperature (C)	9
Weather (rain etc):	Over cast, fair		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0329	VN680199	Listening Stop 1	No bats recorded.		
2	0338	VN680200	Section 1	*Pipistrellus sp.*	Commuting	1
	0338			*Pipistrellus sp.*	Commuting	1
	0339			*Pipistrellus sp.*	Commuting	1
	0339			*Pipistrellus sp.*	Commuting	1
	0340			*Pipistrellus sp.*	Commuting	1
3	0341	VN680201	Listening Stop 2	*Pipistrellus pygmaeus*	Commuting/foraging	1
	0342			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0343			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0344			*Pipistrellus pygmaeus*	Commuting/foraging	1
4	0345	VN680202	Section 2	*Pipistrellus sp.*	Commuting	1
	0347			*Pipistrellus sp.*	Commuting	1
5	0348	VN680203	Listening Stop 3	No bats recorded.		
6	0356	VN680204	Section 3	*Pipistrellus sp.*	Commuting	1
	0356			*Pipistrellus sp.*	Commuting	1
	0357			*Pipistrellus sp.*	Commuting	1
	0357			*Pipistrellus sp.*	Commuting	1
	0358			*Pipistrellus sp.*	Commuting	1
7	0359	VN680205	Listening Stop 4	No bats recorded.		
8	0407	VN680206	Section 4	*Pipistrellus sp*	Commuting/foraging	1
	0407			*Pipistrellus sp*	Commuting/foraging	1
	0407			*Pipistrellus sp*	Commuting/foraging	1
	0408			*Pipistrellus sp*	Commuting/foraging	1
	0408			*Pipistrellus sp*	Commuting/foraging	1
	0409			*Pipistrellus sp*	Commuting/foraging	1
9	0410	VN680207	Listening Stop 5	*Pipistrellus sp*	Commuting/foraging	1
	0412			*Pipistrellus sp*	Commuting/foraging	1
	0413			*Pipistrellus sp*	Commuting/foraging	1
	0414			*Pipistrellus sp*	Commuting/foraging	1
10	0419	VN680208	Section 5	No bats recorded.		

11	0422	VN680209		No bats recorded.		
12	0428	VN680210		No bats recorded.		
13	0431	VN680211		No bats recorded.		
14	0439	VN680212	Listening Stop 6	*Pipistrellus pygmaeus*	Commuting	1
15	0442	VN680213	Section 6	No bats recorded.		
16	0449	VN680214	Listening Stop 7	No bats recorded.		
17	0452	VN680215	Section 7	No bats recorded.		
18	0458	VN680216	Listening Stop 8	No bats recorded.		
19	0501	VN680217	Section 8	No bats recorded.		
20	0508	VN680218	Listening Stop 9	No bats recorded.		
21	0511	VN680219	Section 9	No bats recorded.		

Objective Evidence of Species e.g. Sonograms



Pipistrelle spp. continuous foraging on track no VN680207

Additional Comments / Observations

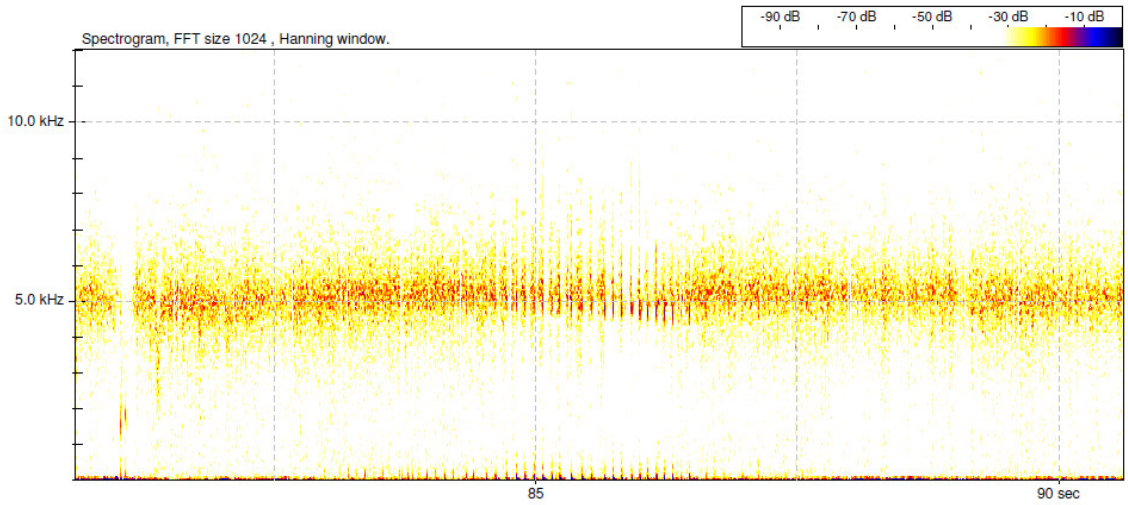
DUSK SURVEY	Recorder(s): Mary Maguire / Richard Ayre	Qualifications, Experience and Relevant Licenses: BSc, MSc, AIEMA
Date:	21/07/11	
Arrival time:	0311	Site: N/S Interconnector
Departure time:	0457	Project and Reference: 60032220

Weather conditions			
Sunrise:	0519	Sunset:	N/A
Wind speed & direction	N/A	Air temperature (C)	12
Weather (rain etc):	Over cast, fair		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0301	VN680220	Listening Stop 10	*No bats recorded.*		
2	0304	VN680221	Section 10	*Pipistrellus pygmaeus*	Commuting/foraging	1
	0306			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0307			*Pipistrellus pygmaeus*	Commuting/foraging	1
3	0310	VN680222	Listening Stop 11	*Pipistrellus pygmaeus*	Commuting/foraging	1
	0311			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0312			*Pipistrellus pygmaeus*	Commuting/foraging	1
4	0313	VN680223	Section 11	*Pipistrellus pygmaeus*	Commuting/foraging	1
	0314			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0320			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0322			*Pipistrellus pygmaeus*	Commuting/foraging	1
5	0326	VN680224	Listening Stop 12	*Pipistrellus sp.*	Commuting/foraging	1
	0327			*Pipistrellus sp.*	Commuting/foraging	1
	0328			*Pipistrellus sp.*	Commuting/foraging	1
6	0329	VN680225	Section 12	*Pipistrellus pygmaeus*	Commuting	1
7	0335	VN680226	Listening Stop 13	*Pipistrellus sp.*	Commuting	1
	0336			*Pipistrellus sp.*	Commuting	1
	0336			*Pipistrellus sp.*	Commuting	1
	0337			*Pipistrellus sp.*	Commuting	1
8	0338	VN680227	Section 13	*No bats recorded.*		
9	0346	VN680228	Listening stop 14	*No bats recorded.*		
10	0349	VN680229	Section 14	*No bats recorded.*		
11	0353	VN680230	Listening Stop 15	*Pipistrellus sp.*	Commuting	1
	0354			*Pipistrellus sp.*	Commuting	1

	0354			*Pipistrellus sp.*	Commuting	1
	0355			*Pipistrellus sp.*	Commuting	1
	0355			*Pipistrellus sp.*	Commuting	1
12	0356	VN680231	Section 15	*No bats recorded.*		
13	0403	VN680232	Listening Stop 16	*Pipistrellus sp*	Commuting	1
	0406			*Pipistrellus sp*	Commuting	1
14	0407	VN680233	Section 16	*Pipistrellus pygmaeus*	Commuting/foraging	1
	0408			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0409			*Pipistrellus pygmaeus*	Commuting/foraging	1
	0410			*Pipistrellus pygmaeus*	Commuting/foraging	1
15	0413	VN680234	Listening Stop 17	*Pipistrellus sp*	Commuting	1
	0414			*Pipistrellus sp*	Commuting	1
	0414			*Pipistrellus sp*	Commuting	1
	0415			*Pipistrellus sp*	Commuting	1
	0415			*Pipistrellus sp*	Commuting	1
16	0416	VN680235	Section 17	*Pipistrellus pygmaeus*	Commuting	1
	0418			*Pipistrellus pygmaeus*	Commuting	1
17	0422	VN680236	Listening Stop 18	*Pipistrellus sp*	Commuting	1
	0423			*Pipistrellus sp*	Commuting	1
	0424			*Pipistrellus pipistrellus*	Commuting	1
	0424			*Pipistrellus pygmaeus*	Commuting	1
	0424			*Pipistrellus pygmaeus*	Commuting	1
	0424			*Pipistrellus sp*	Commuting	1
18	0425	VN680237	Section 18	*No bats recorded.*		
19	0439	VN680238	Listening Stop 19	*Pipistrellus pipistrellus*	Commuting	1
	0439			*Pipistrellus pipistrellus*	Commuting	1
	0439			*Pipistrellus pipistrellus*	Commuting	1
	0440			*Pipistrellus sp*	Commuting	1
20	0440	VN680239	Section 19	*No bats recorded.*		
21	0443	VN680240	Listening Stop 20	*No bats recorded.*		
22	0447	VN680241	Section 20	*No bats recorded.*		

Objective Evidence of Species e.g. Sonograms



Pipistrelle spp. commuting on track no. VN680236.

Additional Comments / Observations

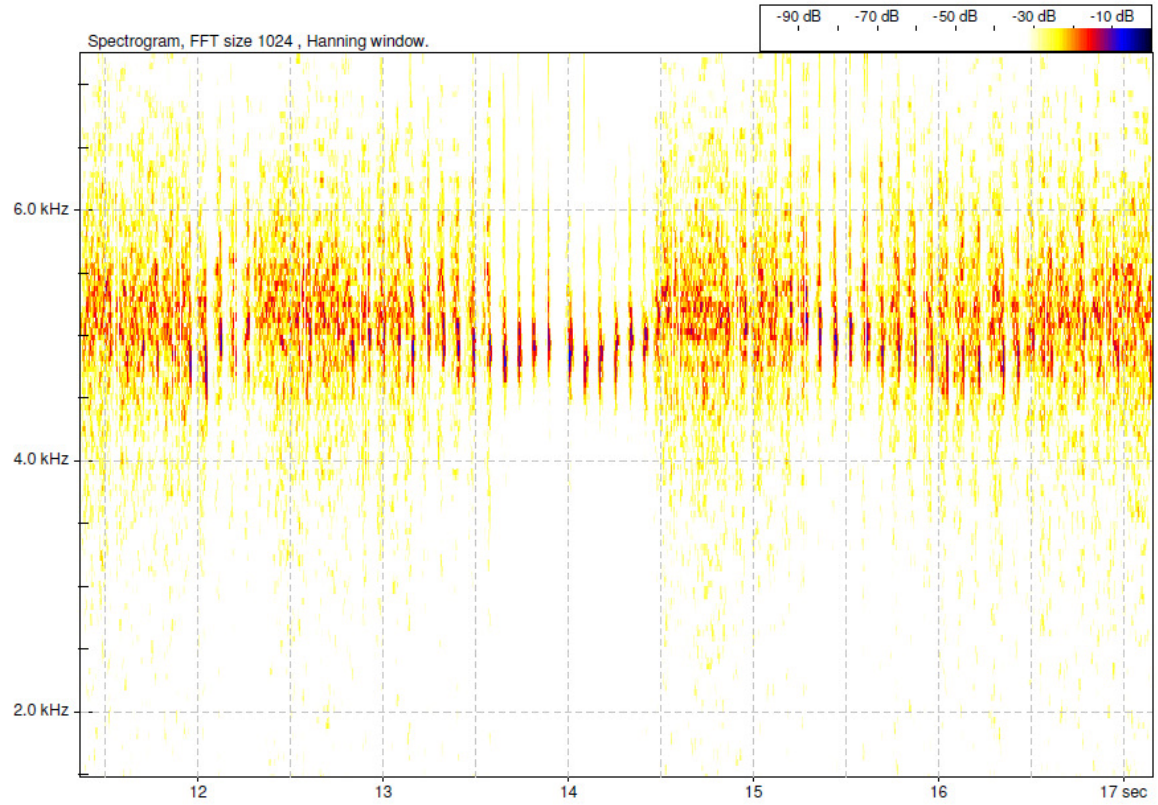
DUSK SURVEY	Recorder(s): Joseph Martin Brendan Kemp	Qualifications, Experience and Relevant Licenses: Joseph Martin BSc MSc Brendan Kemp BSc AIEMA
Date:	14th September 2011	
Arrival time:	1939hrs	Site: N/S Interconnector
Departure time:	2249hrs	Project and Reference: 600032220

Weather conditions			
Sunrise:	N/A	Sunset:	1944hrs
Wind speed & direction	2-3mph	Air temperature (C)	12
Weather (rain etc):	Dry / slight wind		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting	MP3 time and track	Location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	1939	VN680071	Listening Stop 1	No bats recorded.		
2	1943	VN680072	Section 1	No bats recorded.		
3	1954	VN680073	Listening Stop 2	Leisler's	Commuting	2
4	2000	VN680074	Section 2	No bats recorded.		
5	2003	VN680075	Listening Stop 3	No bats recorded.		
6	2007	VN680076	Section 3	No bats recorded.		
7	2015	VN680077	Listening Stop 4	No bats recorded.		
8	2018	VN680078	Section 4	No bats recorded.		
9	2017	VN680079	Listening Stop 5	Pipistrelle spp.	Commuting and foraging	3
	2019			Leisler's	Commuting	1
10	2021	VN680080	Section 5	Leisler's	Commuting	1
11	2026	VN680081	Listening Stop 6	Pipistrelle spp.	Commuting	1
12	2027	VN680082	Section 6	Common pipistrelle	Commuting	1
13	2031	VN680083	Listening Stop 7	Common pipistrelle	Commuting	1
14	2034	VN680084	Section 7	No bats recorded.		
15	2040	VN680085	Listening Stop 8	Leisler's	Commuting	1
	2041			Common pipistrelle	Commuting	1
16	2044	VN680086	Section 8	No bats recorded.		
19	2122	VN680089	Listening Stop 9	No bats recorded.		
20	2126	VN680090	Section 9	Common pipistrelle	Commuting	1
	2127			Common pipistrelle	Commuting	1
21	2131	VN680091	Listening Stop 10	Leisler's	Commuting	1
22	2136	VN680092	Section 10	Common pipistrelle	Commuting	1
	2137			Pipistrelle spp.	Commuting	1
	2137			Pipistrelle spp.	Commuting	1
23	2141	VN680093	Listening Stop 11	Common pipistrelle	Commuting	1
24	2146	VN680094	Section 11	Pipistrelle spp.	Commuting	1

	2150			Pipistrelle spp.	Commuting	1
25	2155	VN680095	Listening Stop 12	No bats recorded.		
26	2157	VN680096	Section 12	Leisler's	Commuting	1
	2159			Pipistrelle spp.	Commuting	1
	2200			Pipistrelle spp.	Commuting	1
27	2202	VN680097	Listening Stop 13	No bats recorded.		
28	2208	VN680098	Section 13	Pipistrelle spp.	Commuting	1
	2209			Common pipistrelle	Commuting	1
29	2215	VN680099	Listening Stop 14	No bats recorded.		
30	2216	VN680100	Section 14	No bats recorded.		

Objective Evidence of Species e.g. Sonograms



Three Soprano pipistrelle encounters with two feeding buzzes and commuting.

Additional Comments / Observations

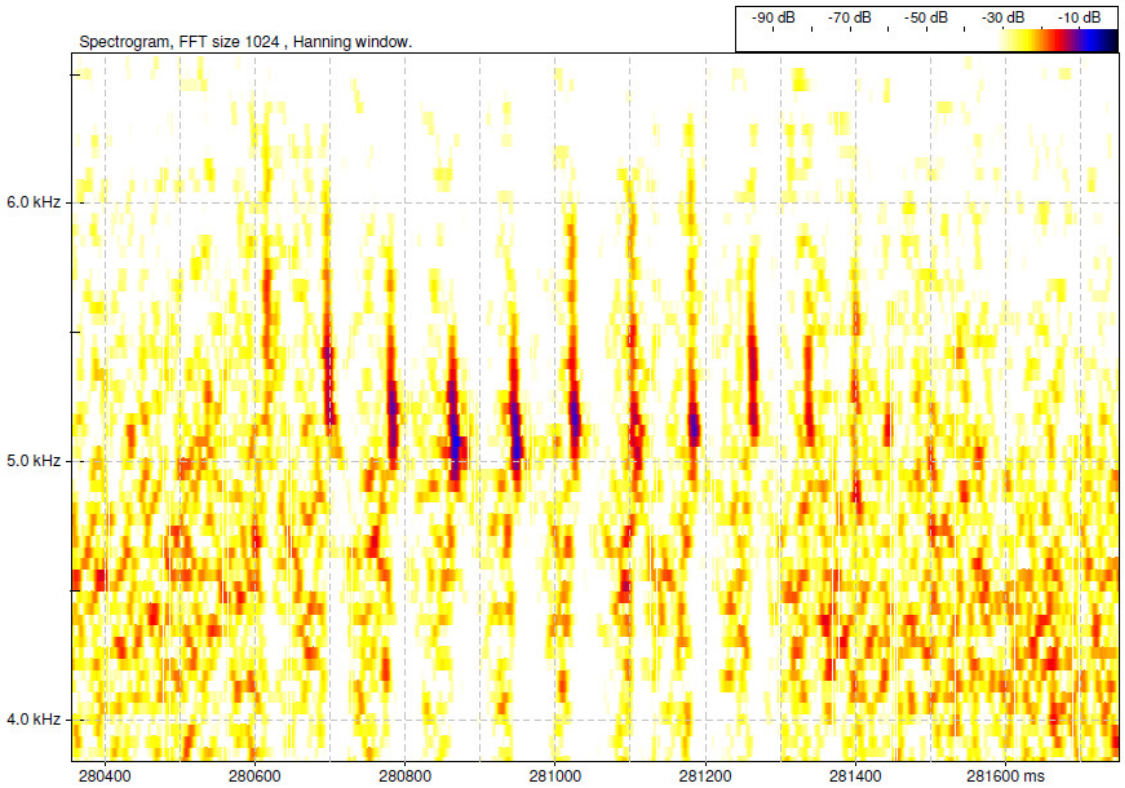
None.

DUSK SURVEY	Recorder(s): Brendan Kemp Joseph Martin	Qualifications, Experience and Relevant Licenses: Joseph Martin BSc MSc Brendan Kemp BSc AIEMA
Date:	20th September 2011	
Arrival time:	1913hrs	Site: N/S Interconnector
Departure time:	2017hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	N/A	Sunset:	1930hrs
Wind speed & direction	3-4mph	Air temperature (C)	11
Weather (rain etc):	Dry / slight wind		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
3	1922	VN680106	Listening Stop 15	No bats recorded.		
4	1925	VN680107	Section 15	No bats recorded.		
5	1929	VN680108	Listening Stop 16	No bats recorded.		
6	1934	VN680109	Section 16	No bats recorded.		
7	1943	VN680110	Listening Stop 17	No bats recorded.		
8	1946	VN680111	Section 17	No bats recorded.		
9	1957	VN680112	Listening Stop 18	No bats recorded.		
10	2004	VN680113	Section 18	Soprano pipistrelle	Commuting	1
11	0206	VN680114	Listening Stop 19	No bats recorded.		
12	2010	VN680115	Section 19	Pipistrelle Spp.	Commuting	1
	2011			Soprano pipistrelle	Commuting	1
	2011			Pipistrelle Spp.	Commuting	1
13	2017	VN680116	Listening Stop 20	No bats recorded.		

Objective Evidence of Species e.g. Sonograms



Soprano pipistrelle recorded on track no VN680113.

Additional Comments / Observations

Southern section of the transect was completed first, before returning to the substation and recommencing from the north of the transect.

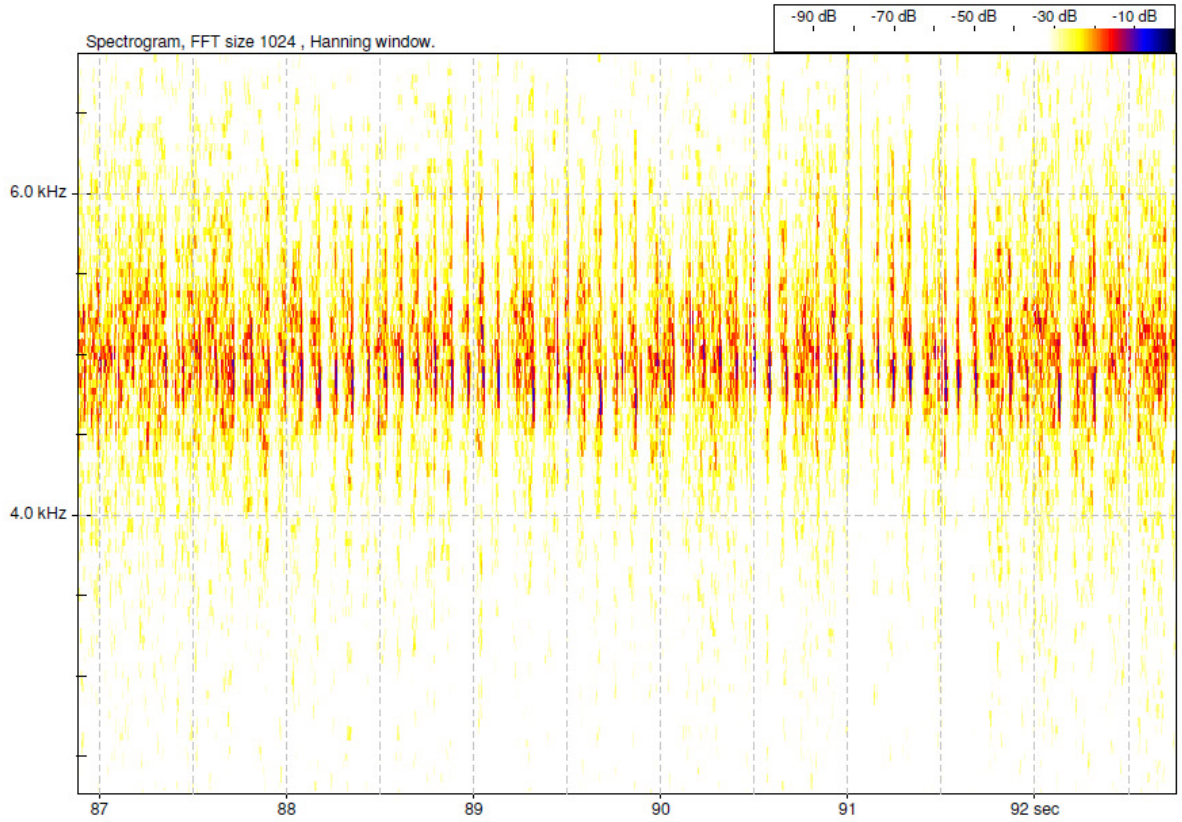
DUSK SURVEY	Recorder(s): Brendan Kemp Joseph Martin	Qualifications, Experience and Relevant Licenses: Joseph Martin BSc MSc Brendan Kemp BSc AIEMA
Date:	20th September 2011	
Arrival time:	2105hrs	Site: N/S Interconnector
Departure time:	2222hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	N/A	Sunset:	1930hrs
Wind speed & direction	3-4mph	Air temperature (C)	11
Weather (rain etc):	Dry / slight wind		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2105	VN680117	Listening Stop 1			
	2105			Common pipistrelle	Commuting and Foraging	2
	2106			Common pipistrelle	Commuting	1
	2106			Soprano pipistrelle	Commuting	1
	2106			Soprano pipistrelle	Commuting and Foraging	1
	2106			Soprano pipistrelle	Commuting	3
	2106					
	2106			Soprano pipstrelle	Commuting and Foraging	2
2	2107	VN680118	Section 1			
	2107			Soprano pipistrelle	Commuting	3
	2107					
	2107			Common pipistrelle	Commuting	1
	2109			Soprano pipistrelle	Commuting	1
3	2116	VN680119	Listening Stop 2	No bats recorded.		
4	2123	VN680120	Section 2	Soprano pipistrelle	Commuting	1
5	2123	VN680121	Listening Stop 3	Leisler's	Commuting	1
6	2126	VN680122	Section 3	No bats recorded.		
7	2136	VN680123	Listening Stop 4	No bats recorded.		
8	2139	VN680124	Section 4	No bats recorded.		
9	2146	VN680125	Listening Stop 5	No bats recorded.		
10	2149	VN680126	Section 5	No bats recorded.		
11	2154	VN680127	Listening Stop 6	No bats recorded.		
12	2159	VN680128	Section 6	Common pipistrelle	Commuting	1

13	2200	VN680129	Listening Stop 7	Pipistrelle Spp.	Commuting	4
14	2202	VN680130	Section 7	Common pipistrelle	Commuting	1
15	2207	VN680131	Listening Stop 8	Pipistrelle Spp.	Commuting	1
16	2213	VN680132	Section 8	No bats recorded.		
17	2217	VN680133	Listening Stop 9	Soprano pipistrelle	Commuting and social calls	1

Objective Evidence of Species e.g. Sonograms



Pipistrelle spp. commuting on track no. VN680129.

Additional Comments / Observations

None.

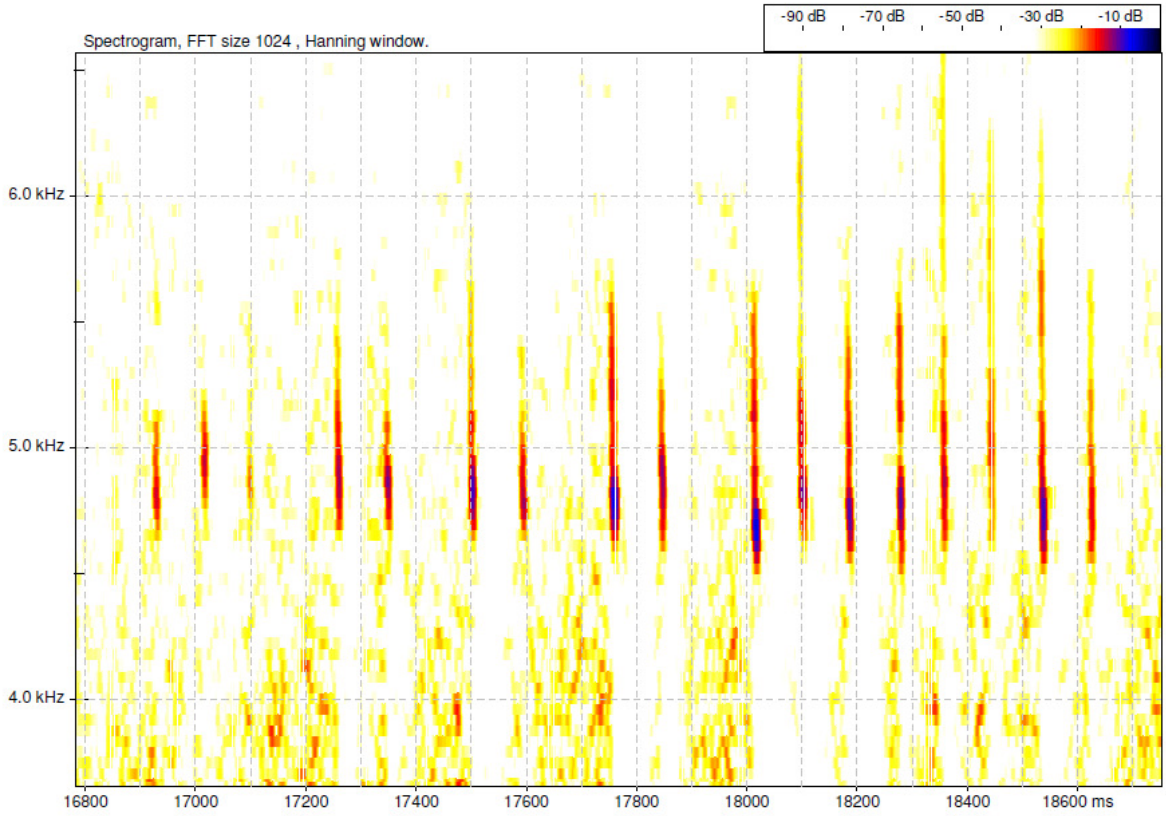
DUSK SURVEY	Recorder(s): Brendan Kemp Joseph Martin	Qualifications, Experience and Relevant Licenses: Joseph Martin BSc MSc Brendan Kemp BSc AIEMA
Date:	27.09.11	
Arrival time:	1912hrs	Site: N/S Interconnector
Departure time:	2214hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	N/A	Sunset:	1912hrs
Wind speed & direction	3-4mph	Air temperature (C)	15°C
Weather (rain etc):	Dry / slight wind		
Habitat / corridors / nearby water bodies and general habitat:			

TN	Time of sighting (24 hr clock)	MP3 track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	1930	VN680136	Listening Stop 9	No bats recorded.		
2	1934	VN680137	Section 9	No bats recorded.		
3	1939	VN680138	Listening Stop 10	Leisler's	Social Call	1
4	1942	VN680139	Section 10	Pipistrelle Spp.	Foraging and Commuting	1
	1946			Pipistrelle Spp.	Commuting	1
5	1948	VN680140	Listening Stop 11	Leisler's	Commuting	1
	1948			Common pipistrelle	Commuting	1
	1949			Common pipistrelle	Commuting	1
	1949			Common pipistrelle	Commuting	1
	1949			Common pipistrelle	Commuting	1
	1950			Common pipistrelle	Commuting	1
	1950			Pipistrelle Spp.	Commuting	1
	1950			Common pipistrelle	Foraging and Commuting	1
6	1951	VN680141	Section 11	Common pipistrelle	Commuting	1
	1954			Common pipistrelle	Foraging and Commuting	1
7	2023	VN680144	Listening Stop 12	No bats recorded.		
8	2026	VN680145	Section 12	Soprano pipistrelle	Commuting	1
9	2034	VN680146	Listening Stop 13	No bats recorded.		
10	2037	VN680147	Section 13	Pipistrelle Spp.	Commuting	2
	2038			Common pipistrelle	Commuting	1
	2038			Pipistrelle Spp.	Commuting and Foraging	1

11	2049	VN680148	Listening Stop 14	Pipistrelle Spp.	Commuting and Foraging	2
	2049			Common pipistrelle	Commuting	1
	2050			Common pipistrelle	Commuting and Foraging	1
	2050			Common pipistrelle	Commuting and Foraging	1
12	2052	VN680149	Section 14	Common pipistrelle	Commuting	1
	2053			Common pipistrelle	Commuting and Foraging	1
	2054			Common pipistrelle	Commuting	1
	2054			Common pipistrelle	Commuting and Foraging	2
13	2058	VN680150	Listening Stop 15	No bats recorded.		
14	2101	VN680151	Section 15	No bats recorded.		
15	2106	VN680152	Listening Stop 16	No bats recorded.		
			Section 16	File corrupted during survey		
16	2119	VN680153	Listening Stop 17	Common pipistrelle	Commuting and Foraging	1
17	2122	VN680154	Section 17	No bats recorded.		
18	2130	VN680155	Listening Stop 18	Common pipistrelle	Commuting	1
	2131			Common pipistrelle	Commuting and Foraging	1
19	2133	VN680156	Section 18	Common pipistrelle	Commuting	1
	2135			Pipistrelle Spp.	Commuting	1
20	2148	VN680157	Listening Stop 19	No bats recorded.		
21	2151	VN680158	Section 19	No bats recorded.		
22	2158	VN680159	Listening Stop 20	No bats recorded.		
23	2201	VN680160	Section 20	No bats recorded.		

Objective Evidence of Species e.g. Sonograms



Two Pipistrelle Spp. Commuting on track no VN680147.

Additional Comments / Observations

None

N

MOY
BENBURB
BLACKWATERTOWN
CALEDON
KILLYLEA
ARMAGH
MILFORD
MIDDLETOWN
KEADY
DERRYNOOSE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

LEGEND

- Proposed NIE Substation
- Proposed NIE 400kV Line
- 500m Buffer
- Listening Stop
- Driven Transect Route
- NI / RoI Border

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE 7.1.1: DRIVEN TRANSECT BAT SURVEY

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: CL	App'd: FL
Date: 03/10/2011	Scale: 1:80,000 @ A3
No: 60032220/7.1.1	

2009 – 2010 Bat Survey Results and Figures
(Part of the NIE 1st Addendum Appendices)

Addendum B1

Bat Report

Table of Contents

List of Figures (contained separately at A3 size in Volume 3)

1 Introduction

a. This report summarises the results of the bat surveys and provides an assessment of the impacts to bats from the proposed development.

b. Habitat surveys for the proposed development were undertaken between 2005 and 2007. These habitat surveys indicated that there were numerous mature hedgerows and other habitats likely to be of significance for bats.

c. During the 2008 Pre-Application Discussion (PAD) process, the Northern Ireland Environment Agency (NIEA) was asked by Planning Service to consider the Draft Environmental Statement. In its response (27/01/09) NIEA, Natural Heritage considered that mature trees along the line route could support roosting bats and these will be subject to a bat survey.

d. The January 2009 amendment of The Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995, which implement the Habitats Directive in Northern Ireland, resulted in more stringent requirements for bat surveys to assist with the assessment of impacts of developments on bat species.

e. Consultation with an NIEA Natural Heritage representative (10th June 2009) was undertaken to further refine the scope, appropriate methodologies and timeframe for the required bat surveys. In particular, bat roosts were to be identified through visual inspection and electronic monitoring of potential roost sites, and the presence of significant flightlines and foraging areas were to be identified.

f. All relevant correspondence relating to the methodology of these surveys is contained in Annex 3. Following agreement of the methodology, bat surveys were completed during both 2009 and 2010.

g. In this report:

- Section 2 – Describes the methodologies used in conducting the study;
- Section 3 – Describes the baseline conditions (bat habitats);
- Section 4 – Provides an overview of Irish Bats;
- Section 5 – Outlines the results of the bat surveys;
- Section 6 – Provides an assessment of the impacts of the development on bats; and
- Section 7 – Gives the conclusions resulting from the surveys and the impact assessment.

2 Methodology

2.1 Introduction

a. The methodology adopted involved both a desktop search and a field survey. The relevant statutory bodies were contacted with regard to appropriate methodologies for a less impactive linear development such as this project. In particular, NIEA was consulted with regard to its response to the PAD application. Detailed consultations were undertaken between NIE, its consultants and NIEA with respect to the development of a methodology for this study. Details of these discussions can be found in Annex 3.

b. In addition, non- governmental organisations such as the Northern Ireland Bat Group (NIBG) were consulted on the provision of local bat records to inform this assessment. The Centre for Environmental Data and Research (CEDaR) was previously approached for records of species of conservation concern (including bats) along the route and at the substation site. The NIBG provided detailed records of known bat roosts for a 5 kilometre (km) wide corridor centred on the proposed line route. In total 33 records were received, these varied from single records of individual bats through to a roost containing 249 pipistrelle bats.

2.2 Details of Methodology

a. A methodology was agreed with NIEA (see Annex 3). This was based on adapting the NIEA (Jan 09) Bat Survey – Specific Requirements as well as best practice from the Bat Conservation Trust, Bat Surveys – Good Practice Guidelines for the type of development proposed. These existing methodologies were used to develop a methodology which could be used to survey a 34km linear development of the nature proposed and provide NIEA with the information it requires to consider the potential impacts of the development on the natural conservation interests of the local area, in this case the local bat population.

b. It was agreed that the first step would be to identify all sites along the line route potentially useful to bats for commuting, foraging, roosting, hibernating or as advertising posts. This was achieved by reviewing aerial photographs as well as the previously completed phase 1 habitat survey.

c. This desktop analysis along with local knowledge derived from previous surveys was used to identify features potentially significant to the local bat population which are likely to be impacted by the proposed line route and substation site. These included:

- Hedgerows with mature trees;
- Riparian corridors;
- Areas of semi-natural habitats (fens, bogs, woodland etc);
- Individual mature standard trees; and,
- Orchards.

d. Once the desktop review was completed a daytime assessment at each location was conducted to assess the potential for roosting bats to be present in any mature trees (see Annex 1). This daytime assessment looked for dead/damaged limbs, scratch marks, urine stains, droppings etc on any mature trees. This also helped to familiarise surveyors with individual sites which would require follow up crepuscular surveys. Surveys were conducted using a variety of electronic bat detectors and associated equipment. The following equipment was utilised during the surveys and analysis:

- Petterson D240x time expansion detector (also with heterodyne output);
- Bat baton detector (frequency division);
- Bat box duet (heterodyne and frequency division);
- Tranquillity time expansion bat detector;
- Olympus VN-6500PC digital voice recorders;
- Yukon Ranger (Kx42) night vision equipment;
- Handheld thermo-anemometer (combined windspeed and temperature read out); and
- Personal Computer for sound file analysis (using Batscan, Batsound or Wavesufer software)

e. It was agreed with NIEA that hedges unlikely to harbour bat roosts (i.e. those without mature standard trees, monoculture hedges and those structurally modified by flailing/cutting) did not require a bat roost survey but did require the identification of bat flightlines (commuting routes) between roosts and foraging areas. NIEA agreed that flightline surveys could be carried out during the 2010 survey season to allow the most significant areas to be prioritised for survey during 2009.

f. The 2009 surveys took place between June and September (inclusive), while the 2010 surveys took place between May and September (inclusive). Dates and times of each survey, including the location (referenced to each proposed tower) can be found in Annex 2. All surveys took place during appropriate weather conditions; and these were recorded on the bat activity record forms in Annex 2. Cold, wet and windy nights when insect prey was likely to be scarce were avoided.

g. A single outbuilding will be removed by the proposed development at the site of the proposed substation; however it was considered unsuitable for roosting bats due to its corrugated roof and the absence of any suitable crevices with the potential to be used by bats. No other buildings will be impacted by the line route and therefore no further inspections of buildings were conducted.

h. Recordings from all surveys were analysed using batsound software (wavesurfer or bat scan) to ascertain the species involved where possible (Russ 1998) and to provide an index of bat activity at each location. The raw data was used to determine “bat passes” per unit time for each recognisable species. A “bat pass” is defined as a sequence of two or more echolocation calls registered as a bat passes within range of the detector. This method permits a comparison of activity levels between the various sites. However, it is not possible to estimate absolute numbers of bats present. This is because detectors cannot differentiate between several passes by the same bat and a single pass by several bats. There is no simple correlation between passes and the number of bats present. Nor is any means currently known for evaluating this relationship to provide population density data.

i. Sites with mature trees with the potential to be used by bats as recorded during the daytime tree assessment (and from aerial photograph review and the results of the phase 1 habitat survey) were subject to a dusk survey visit by an ecologist to identify flightlines and assess roosting potential. Areas with the potential to be used by roosting bats were followed up for a dawn survey visit to look for swarming activity. During all surveys surveyors looked for the presence of roosts, advertising posts, and foraging areas and assessed the presence of any established flight paths. The approximate height of flying bats was estimated, along with the number of ‘bat passes’ recorded and species determined.

j. The information from each survey location is presented in Figures B1.1 – B1.25, in Volume 3 of this Environmental Statement (ES) Addendum, at 1:2500 scale. The location of any roosts, advertising posts, swarming activity and foraging movements is shown for each of the activities/signs recorded during field survey in these Figures. The habitat present, date and time of survey, including a record of the weather conditions at the time of survey, has also been included in Annex 2.

k. Based on the survey data this report evaluates the potential impact of the proposed development on the local bat population and recommends mitigation to protect the local bat population during the construction and operational phase of the proposed development. Residual effects (after the implementation of the mitigation) are described and the long-term impact to the bat population from the line is assessed.

3 Baseline Conditions

3.1 Potential Bat Habitat

a. Surveys were undertaken to record and assess the habitat and bat interest of the line route and substation. Records were acquired from CEDaR for all species groups, including bats. The NIBG was also contacted for records.

b. The surveyed area contains suitable bat foraging habitat including improved/semi-improved grassland with numerous hedgerows. There are occasional areas of semi-natural vegetation along the line route and mature trees are common within the hedges, although there are also numerous monoculture hedges structurally modified by annual flailing with a tractor mounted cutter. Woodland is rare although there are a few small copses near to the proposed overhead line route and semi-natural woodland is crossed by the proposed overhead line route at a single location. There are potential roosting opportunities along the 34km route, mostly in the form of mature trees and standing dead trees. No buildings with the potential to contain roosts are impacted upon by the proposed development.

3.2 Habitat Survey

a. An ecological walkover survey of the proposed development was undertaken. The results of this showed that the majority of the study area is comprised of improved or semi-improved grassland of low conservation value. Fields and hedgerows were assessed individually and a species list of plants found during the survey was accumulated.

b. The habitats recorded were mapped and are shown in Figures 10.1 – 10.10 of the Tyrone - Cavan Interconnector Environmental Statement – Volume 4. Significant target notes were recorded and these assisted in informing the bat survey locations (see Appendix D1 in Volume 3 of the ES). These habitat maps were updated in this ES Addendum (Addendum D2).

c. The following text addresses the proposed substation site and then the most frequent habitats present along the overhead line route, highlighting habitats of conservation interest for bats.

3.3 Substation Site

a. The site of the proposed substation is at present under improved grassland or rush-dominated pasture of low conservation value. Fields in the vicinity are separated by barbed-wire fences or hedgerows of low species-diversity and are often in poor condition. A single mature pine species is present in one of these fields. A line of trees along the approximate position of the western edge of the proposed substation site comprises three oak *Quercus petraea*, a horse-chestnut *Aesculus hippocastanum* and two sycamores *Acer pseudoplatanus*.

b. Immediately to the south west of the proposed substation site is a line of mature trees which will be directly impacted upon by the overhead line. The tree-line consists of mature oak, common alder *Alnus glutinosa* and horse chestnut. A single standing dead oak tree lies immediately to the north west of this tree-line and this may be directly impacted upon (ie, removed).

3.4 Proposed Overhead Line Route

3.4.1 Improved agricultural land (grassland & arable)

a. The greatest part (around 90%) of the proposed overhead line route habitats consists of agricultural grassland that has been improved to a variable extent. In addition to this the route also crosses through semi-improved grassland, rush pasture and arable crops. The vast majority of this land is generally of low conservation value and is considered to be of low value for foraging bats. These areas were not specifically surveyed for bat activity except where habitats potentially useful for bats were present. Potentially useful habitats for bats included mature hedges, standard trees, scrub, fens, riparian zones and orchards. Hedges and trees less than 4 metres (m) high and which will not be impacted upon by the proposed overhead line or towers were not surveyed.

3.4.2 Hedgerows and Tree Lines

b. Hedgerows within the study area vary in their conservation value, with species diversity of woody plants, herb diversity and management regime the most important discriminants. Hedgerows dominated by a single species were common in the more intensively managed farms but on the whole over the 34km line route they were relatively scattered. Most functional hedgerows contained four or more woody species, with blackthorn *Prunus spinosa*, hawthorn *Crataegus monogyna,* dog-rose *Rosa canina*, ash *Fraxinus excelsior* and holly Ilex *aquifolium* the most frequently occurring species. Overall 16 woody species were recorded from the hedgerows along the route. Where these were deemed to be potentially significant for commuting/foraging bats an initial dusk survey was conducted to assess their potential further.

c. Management of hedgerows in the surveyed area varies from severe box-cutting, most frequently adjacent to improved grassland fields, to neglect. A small number of hedgerows have been removed in recent years to increase the size of improved grassland fields or have been replaced with fences.

d. Well-grown mature trees are a frequent feature of hedgerows in the surveyed area. The most frequent tree species are ash, sycamore, beech and common alder, but crack willow *Salix fragilis*, white willow *Salix alba*, and oak are also present. Rarely have neglected hedgerows developed into tree lines.

3.4.3 Woodland

e. Woodland is infrequent in the general area of the proposed line and is generally confined to wooded ribbons along stream banks, along old railway cuttings and adjacent to old country houses. The woodland strip at Artasooly (TN31) is notable for its even-aged mature oak, although woodland structure and species diversity are poor in the vicinity of the proposed overhead line route. An area of more extensive wet woodland is present at Clonteevy towards the north of the line but this will not be directly impacted upon by the project. Woodland on the Ancient Woodland Inventory (AWI) is rare along the proposed overhead line route, although the proposed development passes woodlands on the AWI at H823495, H813475, H798381 and at H801385, at distances of around 300m, 500m, 200m and 300m respectively (the AWI inventory information can be found on the Woodland Trust – Back on the Map website). These woodlands are sufficiently remote from the proposed development; no negative impacts are likely on their bat populations.

f. All semi-natural broadleaved woodland is of conservation value, as Northern Ireland probably has the lowest native woodland cover in Western Europe, at 1.7% of the land surface (Cooper et. al. 2002). However, the relative conservation value of a woodland depends on a range of criteria, in particular its size, diversity, naturalness, rarity, relationship to the regional woodland pattern, fragility and representativeness (Ratcliffe 1977). Only a single narrow section of woodland will be impacted upon by the line route, at Artasooly. This was surveyed for bat activity and the results are recorded in Figure B1.6 in Volume 3.

3.4.4 Orchards

g. The overhead line route impacts upon a number of orchards of recent origin towards the northern end. These did not support a diverse bat fauna or significant levels of bat commuting/foraging activity.

3.4.5 Scrub

h. There are occasional areas of scrub along the overhead line route, with examples of willow Salix sp scrub, but gorse *Ulex europaeus* scrub is also frequent. Bramble *Rubus fruticosus agg*. occasionally forms small scrubby stands.

3.4.6 Fen/Swamp/Wet Grassland

i. Four areas of fen, generally grading or deteriorating into wet/marshy grassland and scrub were identified along the overhead line route. They varied from species-poor nutrient-enriched types to relatively species-rich. This includes an area of damp grassland that may once have been a fen, but has now largely dried out, and still retains some herbs and sedges typical of fen habitats.

3.4.7 Watercourses

j. The proposed overhead line route crosses a major regional drain, the River Blackwater. Local terrestrial habitats in the vicinity of the river are of low conservation value, and are dominated by agricultural grassland. Elsewhere, watercourses along the overhead line route consist mainly of minor streams and field drains. These features are generally less than 1m wide, and are often marked by hedgerows or banks of bramble. Occasionally banks support linear woodland. Common wetland species such as floating sweet-grass *Glyceria fluitans* and brooklime *Veronica beccabunga* are locally frequent. Two more substantial streams, up to 4m wide, cross the proposed overhead line route towards the south. The banks of watercourses frequently act as refuges for species that have been eradicated from surrounding agricultural land, although most plant communities are dominated by rank grasses and/or herbs.

4 Irish Bats – A Background

4.1 Overview

a. There are currently known to be eight native species of bat resident in Northern Ireland. An additional species recorded on the island of Ireland (lesser horseshoe *Rhinolophus hipposiderus*) has a south westerly distribution (Cork, Clare, Kerry, Limerick and Galway, amongst others) and has not been recorded in Northern Ireland.

b. Bats roost in a variety of places such as caves, mines, trees and buildings. Woodlands, pasture, ponds and slow flowing rivers or canals provide suitable feeding areas for bats as they support an abundance of suitable insect prey. Bats tend to feed during the first two to three hours after sunset and again before dawn, when insect activity is at its most intense (JNCC 2004).

c. Bat activity changes dramatically from season to season, either due to food availability or mating cycles:

- **January - March** - Insect prey is scarce and bats will hibernate alone or in small groups. Some species occasionally come out of hibernation to feed or warm in sunlight.
- **April - May** - Insects are more plentiful and bats will become active. They may become torpid (cool and inactive) in bad weather. Females will start to form groups and search for suitable maternity roost sites. Bats are nomadic and will use multiple roosts throughout the year.
- **June - July** - Females gather in maternity roosts and give birth to young, which are suckled for several weeks. Males roost alone nearby.
- **August - September** – Mothers leave the roost before the young. Bats mate and build up fat for the winter.
- **October - December** – Bats search for potential hibernacula. They become torpid for longer periods and then hibernate.

d. As habitat requirements for bats change seasonally, different roosts are used at different times of the year. For instance, in summer bats require warm roosts when the females are producing young and in the winter cold roosts are required in order to conserve energy and facilitate hibernation. Summer roosts may be occupied between April and October, with peak activity from May to September. The remaining part of the year is a hibernation period.

e. The several different types of roost which bats occupy throughout the year are:

- Daytime summer roosts are usually cool and secluded and are where bats wait for their next feeding opportunity.
- Nursery/maternity roosts are where young are born and are usually quite warm. Young spend their first few weeks here before they become independent.
- Temporary night roosts are used for shelter nearer to feeding areas if the weather is bad. They are also used for short periods between dusk and dawn to save returning to the main roost.
- Mating roosts are set up by the males, where they attempt to attract females for mating.
- Hibernacula are those roosts in which bats hibernate over winter. These have to be cold and free from any temperature fluctuation. The coldness enables bats to lower their body temperature and become torpid. This saves energy, enabling bats to survive on the fat stores within their bodies that they have built up throughout the summer.

f. The biggest threats to bats include habitat loss (e.g. deforestation), loss of feeding areas as a result of modern forestry and farming practices, use of toxic agrochemicals and remedial timber treatment chemicals and disturbance to bat roosts.

4.2 Legal Framework

a. The Conservation (Natural Habitats etc.) Regulations (Northern Ireland) 1995 and the Conservation (Natural Habitats etc.) (Amendment) Regulations (Northern Ireland) 2007 and 2009 implement the Habitats Directive in Northern Ireland. Bats are protected under Schedule 2 of the Regulations. The Regulations provide protection for any listed animal, including the deliberate damage or destruction of a breeding site or resting place. The Regulations also require that implications for a site of European importance are considered prior to authorisation for any project that is likely to have a significant effect on that site. In particular, actions will not be undertaken that affect the local distribution or abundance of a European protected species.

b. Under the Regulations it is an offence to:

- Deliberately capture or kill any wild animal of a European Protected Species.
- Deliberately disturb any such animal.
- Damage or destroy a breeding site or resting place of such a wild animal.
- Keep, transport, sell or exchange, or offer for sale or exchange, any live or dead wild animal (or plant) of a European protected species, or any part of, or anything derived from such a wild animal.

c. Bat species are also listed in Appendix II of the Bonn Convention (and its Agreement on the Conservation of Bats in Europe) and Appendix II of the Bern Convention (and Recommendation 36 on the Conservation of Underground Habitats), although these are recommendations and not statutory instruments.

5 Survey Results

5.1 Results

5.1.1 Overview

a. Overall bats were encountered frequently along the proposed overhead line route during survey. There were also a number of locations were higher levels of activity were recorded. All eight bat species currently recorded as resident in Northern Ireland were encountered during survey on at least one occasion. These are:

- Daubenton's bat *Myotis daubentonii*
- whiskered bat *Myotis mystacinus*
- Natterer's bat *Myotis nattereri*
- Leisler's bat *Nyctalus leisleri*
- Nathusius' pipistrelle *Pipistrellus nathusii*
- common pipistrelle *Pipistrellus pipistrellus*
- soprano pipistrelle *Pipistrellus pygmaeus*
- brown long-eared bat *Plecotus auritus*

b. The most commonly encountered species was common pipistrelle, followed by soprano pipistrelles and then Leisler's bats. Daubenton's and Natterer's bats were encountered on a number of occasions, while a Myotis sp., possibly a whiskered bat, was recorded at a single location. Nathusius' pipistrelle were also recorded a number of times in at least three locations. However apart from these few records, the remaining records were for common and soprano pipistrelles and Leisler's bats. A detailed breakdown of these records can be found in Table B1.5.1. Maps illustrating these results are in Volume 3 of the ES Addendum. The results are discussed following Table B1.5.1.

Table B1.5.1 – Survey dates, locations and bat species encountered.

Date of Survey	Tower Number	Species encountered & bat passes
07.09.09	1	Pipistrelle spp. (13) Leisler's bat (6) Soprano pipistrelle (2) Common pipistrelle (2) Daubenton's bat (1)
13.06.09	1	Leisler's bat (2)
14.07.10	3 - 4	Pipistrelle spp. (6) Leisler's bat (43) Soprano pipistrelle (42) Common pipistrelle (18)
07.09.10	3 – 4	Pipistrelle spp. (10) Leisler's bat (2) Common pipistrelle (2) Soprano pipistrelle (1)
07.09.09	6	Daubenton's bat (199) Soprano pipistrelle (32) Common pipistrelle (11)

Date of Survey	Tower Number	Species encountered & bat passes
14.09.10	11 - 12	Leisler's bat (12) Soprano pipistrelle (5) Nathusius' pipistrelle (1) Pipistrelle spp. (3)
24.06.10	13	Pipistrelle spp. (11) Leisler's bat (87) Soprano pipistrelle (14) Common pipistrelle (6) Myotis spp. (2)
22.07.09	15	Soprano pipistrelle (12) Leisler's bat (6) Pipistrelle spp. (18) Common pipistrelle (6)
20.05.10	16	Leisler's bat (1) Common pipistrelle (12) Pipistrelle spp. (4) Unknown (12)
03.06.10	18	Common pipistrelle (9) Leisler's bat (13) Soprano pipistrelle (11)
02.06.10	19 - 20	Common pipistrelle (3) Leisler's bat (5) Soprano pipistrelle (1)
22.06.09	23	Common pipistrelle (11) Leisler's bat (2) Soprano pipistrelle (2)
25.05.09	26	Common pipistrelle (15) Leisler's bat (3)
03.06.10	28	Leisler's bat (5)
17.08.09	29	Common pipistrelle (5) Soprano pipistrelle (5) Pipistrelle spp. (3) Nathusius' pipistrelle (1)
17.09.09	32 - beside Blackwater River	Leisler's bat (88) Soprano pipistrelle (28) Daubenton's bat (4)
07.09.10	33 - 34	Soprano pipistrelle (2) Pipistrelle spp. (3) Common pipistrelle (7) Leisler's bat (1)
24.06.09	39	Pipistrelle spp. (30) Common pipistrelle (25) Leisler's bat (26) Soprano pipistrelle (9)

Date of Survey	Tower Number	Species encountered & bat passes
25.05.09	39	Pipistrelle spp. (82) Common pipistrelle (20) Leisler's bat (6) Soprano pipistrelle (20) Myotis spp. (8)
25.05.09	39	Pipistrelle spp. (66) Common pipistrelle (24) Leisler's bat (3) Soprano pipistrelle (14) Myotis spp. (10)
05.07.10	42	Common pipistrelle (37) Soprano pipistrelle (14) Leisler's bat (5) Pipistrelle spp. (2) Unidentified (2)
05.07.10	43	Common pipistrelle (17) Nathusius' pipistrelle (2) Pipistrelle spp. (9) Leisler's bat (1)
07.09.10	46 – 47	Leisler's bat (5) Common pipistrelle (33)
14.09.09	49	Common pipistrelle (3) Leisler's bat (5) Pipistrelle spp. (4)
14.09.09	51	Soprano pipistrelle (6) Common pipistrelle (1) Leisler's bat (27) Pipistrelle spp. (7)
14.09.09	53	Common pipistrelle (2) Leisler's bat (8) Pipistrelle spp. (3)
07.09.09	54	Myotis sp. (1) Soprano pipistrelle (5) Leisler's bat (2) Pipistrelle spp. (2)
18.08.09	55	Leisler's bat (2) Pipistrelle spp. (4)
18.08.09	56	Common pipistrelle (14) Soprano pipistrelle (2) Daubenton's bat (2) Pipistrelle spp. (2)
19.07.10	58 – 60	Common pipistrelle (47) Soprano pipistrelle (10) unidentified (1)

Date of Survey	Tower Number	Species encountered & bat passes
02.08.10	58 – 60	Leisler's bat (21) Soprano pipistrelle (5) Pipistrelle spp. (8) Common pipistrelle (22)
19.07.10	60	Leisler's bat (4) Soprano pipistrelle (4) Pipistrelle spp. (5) Common pipistrelle (51) Nathusius' pipistrelle (8)
02.08.10	60	Leisler's bat (14) Soprano pipistrelle (6) Common pipistrelle (11)
09.06.10	63	Leisler's bat (4)
02.06.10	64	Soprano pipistrelle (1)
09.06.10	64	Common pipistrelle (1)
21.08.09	68	Leisler's bat (5) Pipistrelle spp. (1) Soprano pipistrelle (1) Myotis sp. (1)
21.08.09	72	Common pipistrelle (4) Leisler's bats (1) Pipistrelle spp. (3) Natterer's bat (1)
21.08.09	75	Common pipistrelle (6) Leisler's bat (6) Pipistrelle spp. (3) Soprano pipistrelle (1)
29.07.10	76	Common pipistrelle (2) Leisler's bat (3)
24.08.09	80	Pipistrelle spp. (11) Leisler's bat (1) Common pipistrelle (4) Soprano pipistrelle (2)
20.07.10	80	Leisler's bat (1) Myotis sp. (1)
22.06.10	82	Pipistrelle spp. (2) Common pipistrelle (14) Soprano pipistrelle (6)
29.07.10	82	Pipistrelle spp.(4) Common pipistrelle (33) Soprano pipistrelle (2) Leisler's bat (10) Natterer's bat (4)
24.08.09	83	Daubenton's bat (2) Common pipistrelle (16) Soprano pipistrelle (4) Pipistrelle spp. (6)

Date of Survey	Tower Number	Species encountered & bat passes
22.06.10	87	Pipistrelle spp.(4) Soprano pipistrelle (10) Common pipistrelle (2) Leisler's bat (1)
22.06.10	88 - 89	Common pipistrelle (1) Leisler's bat (1) Soprano pipistrelle (1)
24.08.09	90	Common pipistrelle (2) Soprano pipistrelle (1)
08.09.10	91	Soprano pipistrelle (19) Pipistrelle spp. (15) Common pipistrelle (1)
02.06.10	93	No bats recorded.
15.06.10	93 - 94	No bats recorded.
15.09.10	95 - 96	Pipistrelle spp. (2) Common pipistrelle (7) Leisler's bat (2)
08.09.10	97 – 98	Pipistrelle spp. (5) Leisler's bat(4) Common pipistrelle (11)
15.09.10	100 – 101	Nathusius' pipistrelle (1) Soprano pipistrelle (1) Daubenton's bat (1) Common pipistrelle (2) Natterer's bat (1) Myotis spp. (2)
15.09.10	102 - 103	Pipistrelle spp. (3)

5.1.2 Proposed Substation Site

c. A single Leisler's bat was observed and recorded almost continuously between 2215 hours and 2300 hours on the 13th June 2009 from around the mature trees (Photograph 1, Annex 1) which currently occupy the site of the proposed new substation. It was also seen to chase away another bat (probably another Leisler's bat) on two separate occasions during this time. The weather was fine and mild with a slight breeze. The Leisler's bat flew around the trees at between 7-10 metres on average but was also observed at approximately 20m on occasion.

5.1.3 Proposed Overhead Line

d. Two Leisler's bats were recorded briefly from the tree-line to the south west of the proposed substation site between Towers 1 & 2 (Photograph 1) at 2305 hours and at 2320 hours on the 13th June 2009. This record was followed up with a daytime inspection of the nearby standing dead oak tree and wind damaged common alder. No evidence in the form of scratch and grease marks or droppings or urine stains was found. The advanced state of decay of the dead oak with the associated loss of bark may mean that the tree does not provide sufficient protection for roosting bats. However the tree could still be used as a temporary night roost for bats caught out in inclement weather or as an advertising post for males during the mating season.

e. The proposed overhead line route at Tower 6 crosses a stream/drain, this area is not far from a known bat roost as provided by the Northern Ireland Bat Group during consultation. Surveys here revealed substantial levels of bat foraging along the riparian corridor. Common and soprano pipistrelles and Daubenton's bats were all frequently encountered. However given the position of

the tower and the height of the vegetation fringing the drain it is unlikely that there will be any impediment to foraging activities in this area and vegetation clearance of trees will be limited. No roosting opportunities are present in this area.

f. Approximately 3.35km to the south west of the proposed substation the proposed overhead line crosses over an area of degraded fen between Towers 12 and 13. An initial dusk survey was conducted on the 24th June 2009. On arrival at 2253 hours at least two Leisler's bats were immediately apparent flying overhead and feeding buzzes were recorded via batbox duet detector. The Leisler's bats were an almost constant presence for the first 15 minutes after which they disappeared. A final Leisler's bat registration occurred at 2328 hours but there were none for the remainder of the recording period. Between 2328 hours and 2338 hours there was an occasional registration from a more distant common pipistrelle foraging along the opposite side of the fen. No registrations were recorded (seen or heard) for the final 15 minutes of the visit.

g. Surveys near proposed Tower 18 were concentrated along tall alder/hawthorn hedgerows immediately east of proposed tower location. Bat activity was rather sparse despite ideal weather conditions. Soprano pipistrelles were observed flying from adjacent farm buildings, across fields and along hedgerows where the survey was undertaken. However much of the bat activity recorded was distant from the survey location in the surrounding fields and hedges to the east.

h. An initial survey was carried out at proposed Tower 23. This was due to the fact that two hedges lie within 15 m of the tower, one 6m to the north and one 12m to the south. Both hedges will likely have to be pollarded at between 1-2m during construction of the proposed overhead line and every 5 years thereafter for the operational lifetime of the development. The northern hedge consists primarily of hawthorn and elder *Sambucus nigra,* and is quite dense and overgrown. The southern hedge consists more of a narrow tree-line of common alder growing along a small stream. A survey visit was conducted on the 22nd June 2009. At this time 15 bat passes were recorded and most bats appeared to be commuting although occasional feeding buzzes were recorded. Common pipistrelles were by far the most frequently encountered species with one Leisler's bat also recorded. An unusual silhouette was also noted by one of the observers present and this was thought to indicate the presence of possible whiskered bat during the survey.

i. The area of degraded fen and scrub to the east of Tower 26 was considered to be a potentially substantial area for foraging bats. This was subject to a dusk survey on the 25th June 2009. Immediately on arrival at the survey location several common pipistrelle registrations were noted and over the next seven minutes, ten (peak of four passed over at the same time) common pipistrelles were recorded passing overhead in the same general direction. This led to the conclusion that they were travelling from a nearby roost, passing across the degraded fen during commuting to a foraging area. For the remaining 50 minutes of the survey two distant Leisler's bat registrations were heard and six further common pipistrelles were recorded. There was limited evidence of bat foraging around the fen and most bats appeared to pass overhead en route to other more suitable feeding grounds.

j. Artasooly Wood will be impacted by the proposed overhead line between Towers 39 - 40. At this point the wood consists of a narrow band of even aged possibly planted oaks, one to two trees wide. The trees are perhaps 80 - 100 years old and there are two standing dead trees within the narrow wood. These are Scots pine and not as old as the adjacent oaks. A total of 28 bat passes (estimated 31 bats) were recorded during the initial survey visit. It is difficult to estimate how many of these passes were the same bat foraging along a regular circuit and how many were commuting bats passing by. The other factor to consider is the total species diversity with both common and soprano pipistrelles recorded, Leisler's bat and *Myotis spp,* as well as a possible brown long-eared bat.

k. A wood to the south of Artasooly between the Tullyneagh and Battle Ford Roads was also a 'hot spot' for bat activity. This wood will not be impacted upon by the line route, but the line crosses immediately to the east of the wood and over a stream. Surveys in this location revealed that the corner of the adjacent field which is bounded by tall hedges is a favoured foraging area. The low ground beside the river and protected from the wind by the trees obviously concentrates insect prey.

l. Between proposed Towers 54 – 56 there is a number of taller hedges and tree lines, therefore a number of surveys were carried out in this locations. No behaviour which would indicate the presence of a roost was recorded and the trees appeared to be healthy with limited rot holes and cracks. However foraging common and soprano pipistrelles, Daubenton's bats and Leisler's bats were all recorded in this area. A small stream and tall lime, ash and beech provide some foraging opportunities, however the level of activity would be described as moderate in terms of 'bat passes' recorded. The minor roads in the area appeared to be favoured for foraging with bats observed circling in the protective canopy provided by the overhanging roadside trees.

m. A long section of mature hedge runs parallel with the route of the proposed overhead line between Towers 58 – 60. Surveys in this area revealed moderate to high levels of bat activity and a dawn survey on the 2nd August 2010 identified some possible swarming activity around a mature ivy-covered ash tree close to the location of Tower 60. Common, soprano and possibly Nathusius' pipistrelles were all recorded in this area. The area is low lying with a stream nearby and is provides good foraging

habitat for bats. However a number of trees in this area have been removed by the landowner with an excavator and the tree line could be described as under threat. All mature trees in this area will be checked by a licensed bat worker prior to vegetation clearance.

n. Proposed Tower 80 is located near an area with a number of small wet fields bounded by tall hedges. There is also a dead tree in the hedge to the north of the Tower location and immediately under the proposed overhead line route. Surveys in this area during 2009 revealed a moderate level of activity although repeat surveys during 2010 recorded a much reduced level of activity. However this area has the potential to be good foraging habitat for bats, as it is sheltered, contains tall trees and supports abundant insect prey. All trees in this area will be rechecked by a licensed bat worker immediately prior to vegetation cutting and pollarding is recommended for all mature trees.

o. Immediately to the south of proposed Tower 100 lies a small hazel copse and a tall hedge along a small stream. Although the hazel copse is low enough not to require any tree cutting this area was considered to have a high potential to be used by foraging bats. Access was not permitted to the hazel copse; however surveyors could get within 50m via an adjacent field. This area supported commuting bats with a *Myotis spp* (possibly both Daubenton's and Natterer's bats), Nathusius' and common pipistrelles. Small numbers were present although species diversity was substantial. The vegetation in this area will not be impacted upon by construction of the overhead line.

6 Impact Assessment

6.1 Approach and Methods

a. The impacts, both potential and actual, of the proposed development are assessed according to the following criteria.

(i) The importance of a receiving habitat, defined by its position in a hierarchy of site importance and conservation value. This hierarchy extends from international (highest) importance to negligible (lowest) importance. This range of values is expressed in the protection afforded a site by international and national legislation, and in planning policy at a more local level (Table B1.6.1).

(ii) The biodiversity value of a site, as measured by such factors as:

- animal or plant species, subspecies or varieties that are rare or uncommon, either internationally, nationally or more locally;
- endemic species or locally distinct sub-populations of a species;
- ecosystems and their component parts, which provide the habitats required by the above species, populations and/or assemblages;
- habitat diversity, connectivity and/or synergistic associations (e.g. networks of hedges and areas of species-poor pasture that might provide important feeding habitat for rare species);
- notably large populations of animals or concentrations of animals considered uncommon or threatened in a wider context;
- notably large populations of animals or concentrations of animals considered uncommon or threatened in a wider context;
- plant communities (and their associated animals) that are considered to be typical of valued natural/semi-natural vegetation types, including examples of naturally species-poor communities;
- species on the edge of their range, particularly where their distribution is changing as a result of global trends and climate change;
- species-rich assemblages of plants or animals; and
- typical faunal assemblages that are characteristic of homogenous habitats.

(iii) The secondary value of a site as part of a corridor or a series of stepping stones that facilitate *the migration, dispersal and genetic exchange of wild species, or as a buffer zone that protects a valued site from negative environmental impacts.(iv)* The magnitude of the impacts on the features during both construction and operational phases. The magnitude of ecological impacts considers the size of an impact, and is measured according to the criteria listed in Table B1.6.2. Using these criteria, Table B1.6.3 is used to determine the magnitude of an impact.

(iv) Significance of impacts on sites of conservation interest, badgers, otters, bats and birds, based on their presence as determined by survey. Factors to be considered in significance assessment are outlined in Table B1.6.4. An ecologically significant impact is defined as an impact (negative or positive) on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area (IEEM 2006). The likelihood of the direction of predicted impacts should also be considered, and their significance assessed, taking into account the process described above (Table B1.6.5).

Table B1.6.1 - Criteria for Assessing Ecological Sensitivity

SITE IMPORTANCE	SITE DESCRIPTION
Internationally important sites (very high conservation value)	World Heritage Sites identified under the Convention for the Protection of World Cultural & Natural Heritage, 1972; Biosphere Reserves identified under the UNESCO Man & Biosphere Programme; Wetlands of International Importance designated as Ramsar Sites under the terms of the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention) formulated at Ramsar, Iran, in 1971; Special Protection Areas (SPAs) designated in accordance with the 1979 European Communities Directive on the Conservation of Wild Birds (79/409/EEC): the Birds Directive. This Directive requires member states to take measures to protect birds, particularly rare or endangered species as listed in Annex I of the Directive, and regularly occurring migratory birds; Special Areas of Conservation (SACs and cSACs) designated in accordance with the 1992 European commission Habitats Directive 92/43/EEC (1992): the Habitats Directive. This Directive requires member states to establish a network of sites that will make a significant contribution to conserving habitat types and species identified in Annexes I and II; Other sites maintaining habitats and/or species listed under the Birds and/or Habitats Directives (see above); Sites hosting significant populations of species under the Bonn Convention; Sites hosting significant populations under the Bern Convention; and Biogenetic Reserves (UNESCO Man and the Biosphere Programme).
Nationally important sites (high conservation value)	Areas of Special Scientific Interest are the principal national designation for sites of nature conservation interest. They are notified under Section 28 of the Environment (NI) Order 2002 and are chosen by virtue of any of their flora, fauna or geological, or physiographic features to represent the best national and regional example of natural habitat, physical landscape features or sites of importance for rare or protected species; National Nature Reserves (NNRs) and Marine Nature Reserves (MNRs) are designated under the Environment Order; Sites maintaining UK Red Data Book species that are listed as being either of unfavourable conservation status in Europe, of uncertain conservation status or of global conservation concern; and Sites maintaining species listed in Schedules 1, 5 and 8 of The Wildlife (NI) Order 1985.
Regionally important sites (medium conservation value)	Sites that reach criteria for Local Nature Reserve but do not meet ASSI selection criteria; Sites of Local Importance for Nature Conservation (SLNCIs) are recognised by DOE Planning Service and are intended to complement the network of nationally and regionally important sites. SLNCIs receive special consideration in relation to local planning issues; Sites supporting viable areas or populations of priority habitats/species identified in the UK Biodiversity Action Plan or smaller areas of such habitat that contribute to the maintenance of such habitat networks and /or species populations; Sites maintaining habitats or species identified in Regional Biodiversity Action Plans on the basis of national rarity or local distribution: and Other sites of significant biodiversity importance (e.g. sites relevant to Local Biodiversity Action Plans).

SITE IMPORTANCE	SITE DESCRIPTION
Other sites with local conservation interest (lower conservation value)	Sites not in the above categories but with some biodiversity interest.
Negligible conservation value	Sites with little or no local biodiversity interest.

Table B1.6.2: Factors to be considered when assessing Magnitude of Ecological Impacts

PARAMETER	DESCRIPTION
Extent	The area over which an impact occurs.
Duration	The period required for a feature to recover or be replaced following an impact. Duration of an activity may have a shorter duration than the impact of the activity.
Reversibility	A permanent impact is one from which recovery is unlikely within a reasonable timescale. A temporary impact is reversible either through natural recovery or as a result of mitigation.
Timing and frequency	In some cases, an impact may only occur if it occurs during a critical season or part of a species' life-cycle, and may be avoided by careful scheduling of work activities. Frequency of an activity may also affect the magnitude of its impact by reinforcement of the impact.

Table B1.6.3: Determination of Magnitude of Impacts

MAGNITUDE	DESCRIPTION
High	Major loss or alteration to key features of the baseline condition.
Medium	Loss or alteration to a key feature(s) of the baseline condition, such that the feature(s) will be partially changed.
Low	Minor, but perceptible change to baseline conditions.
Negligible	Very slight or imperceptible change to baseline conditions.

Table B1.6.4: Factors to be Considered when Assessing Ecological Significance of Impacts

PARAMETER	DEFINING CRITERIA
Site integrity	- Extent to which site/ecosystem processes will be removed or changed; - Effect on the nature, extent, structure and function of component habitats; and - Effect on the average population size and viability of component species.
Conservation status	- Habitats: conservation status is determined by the sum of the influences acting on the habitat and its typical species, that may affect its long-term distribution, structure and functions as well as the long-term survival of its typical species within a given geographical area; - Species, conservation status is determined by the sum of influences acting on the species concerned that may affect the long-term distribution and abundance of its populations within a given geographical area; and - Conservation status may be evaluated for any defined study area at any defined level of ecological value. The extent of the area used in the assessment will relate to the geographical level at which the feature is considered important.
Probability of expected outcome	- Known or likely trends and variations in population size/habitat extent; and - Likely level of ecological resilience.

b. Taking the factors in Table B1.6.4 into account the significance of an impact may be broadly categorised according to Table B1.6.5.

Table B1.6.5: Significance (direction) of Impacts

SIGNIFICANCE	DESCRIPTION
Positive	The proposal has a positive impact on the integrity of a defined site or ecosystem and/or the conservation status of habitats or species within a given geographical area.
Major Negative	The proposal (either on its own or with other proposals) is likely to negatively affect the integrity of a European or nationally designated site, in terms of coherence of its ecological structure and function, across its whole area, that enables it to sustain the habitat, complex of habitats and/or the population levels of species of interest, or is likely to negatively affect the numbers, distribution or viability of a species or population of conservation concern. A major change in a site or feature of local importance may also enter this category.
Moderate Negative	The integrity of a European or nationally designated site will not be negatively affected, but the effect on the site is likely to be significant in terms of its ecological objectives. If, in the light of full information, it cannot be clearly illustrated that the proposal will not have a negative effect on integrity, then the impact should be assessed as major negative. The proposal may negatively affect the integrity of a locally important conservation site, or may have some negative effect on the numbers, distribution or viability of a species or population of conservation concern.
Minor Negative	None of the above applies, but some minor negative impact is evident. (In the case of Natura 2000 sites a further appropriate assessment may be necessary if detailed plans are not yet available.
Neutral	No observable impact in either direction.

c. In this section of the report the habitats present within the proposed substation site and line route are considered, followed by a consideration of the likely significant impacts of the proposed development on bats. Impacts due to construction and longer term impacts during the operational phase are identified. The impacts of the proposed development are discussed and are summarised in Table B1.6.6.

6.2 Proposed Substation Site

6.2.1 Impacts Due to Construction

a. The proposed erection of a substation will require land take of grassland habitats of low conservation value. Hedgerows that will be removed during construction of the substation are gappy, species-poor and of poor quality, and therefore likely to be of limited value for bats. The impact of this on bats is considered to be a **minor negative**. A tree line which consists of mature oak, horse-chestnut and sycamore will be removed, and impact of this on bats will be of moderate negative significance as the trees are known to be used by foraging Leisler's bats. A small area of woodland adjacent to the site will be avoided and impact on this habitat will be neutral. Poor quality hedgerows and grassland provide poor foraging conditions for bats, although hedgerows may function as flightlines. The likely impact of substation construction on bat species is therefore considered at this stage to be moderate negative.

6.2.2 Impacts Due to Operation

b. The construction related impacts of the proposed development (above) will continue into the longer term. However, in the longer term, habitat provision measures will replace the ecological value of the foraging area lost during construction of substation; these measures are outlined in the mitigation section of the ES.

6.2.3 Cumulative Impacts

c. The cumulative impacts of the construction of the substation include both negative and positive aspects. The substation will increase the area of land that is no longer available to wildlife as a result of the provision of a built surface, with limited possibilities for colonisation by plant and animal species. The site will add to the existing stock of built structures. While the area of the substation site is relatively small, and occupies land that is currently under agricultural habitats of low conservation value,

the structure will add to the continual removal of land capable of supporting wildlife communities and species that result from the additive development of the countryside.

d. Habitat creation at the substation site as part of landscaping mitigation will play a part in the attempts to increase the area of semi-natural habitats in the wider countryside outside protected sites, as recommended in the Habitats Directive (92/43/EEC).

6.3 Proposed Overhead Line Route

6.3.1 Impacts Due to Construction

a. The proposed erection of new towers will require permanent land take, which will entail direct habitat loss, especially for those 31 towers which are located within a hedgerow. Each tower site will, however, require a footprint that is small in relation to the extensive habitats along the line route. The major impact will be on grassland, which, within the surveyed area, is generally of low conservation value. Tower locations avoid the few areas of semi-improved grassland that support significant diverse herb communities, which may support significant densities of insect prey of importance to bats. Temporary trackways will be used for access (provided that the ground is relatively level and dry), complemented as appropriate by use of helicopters (where this would not cause substantial disturbance).

b. The impact on agricultural grassland is not considered to be significant, as it is generally of low ecological value. Rush-dominated pasture is often more diverse than improved and semi-improved grassland, and supports isolated species-rich pockets. Proposed tower locations avoid those fields that support a relatively rich herb flora, and impact on these grasslands will be neutral. No grassland areas of high conservation value will be directly affected by the proposed development. The impact on these grassland habitats is considered to be minor negative, and will have minimal impact on bat feeding opportunities.

c. The impact on hedgerows is likely to be of moderate conservation significance. However, the siting of some towers in hedgerows in order to reduce the loss of land of agricultural value will require the removal of limited lengths of hedgerow to accommodate the towers. No hedgerows that fulfil the criteria for species-rich hedgerows will be affected in this way. Where required hedgerows over which lines will pass will be protected by a scaffolding cage or the line will be strung over the hedgerow, and there will be no negative impact on these hedgerows. Hedgerows act as wildlife corridors for dispersing and feeding birds and mammals, as well as flightlines for bats, and this function will be unimpaired. The species composition of species-rich hedgerows, a NI Priority Habitat, will not be affected by the proposed development. The impact on the hedgerow network will be insignificant, and overall the impact on this habitat is considered to be minor negative.

d. The construction of the proposed overhead lines will also require some cutting back of hedgerow trees, with potential for removal of bat roost sites. The major impact will be on mature trees, which may require lopping or removal, thus reducing the structural diversity of affected hedgerows and potentially the structure of invertebrate prey populations. In places lines of mature or semi-mature trees will be removed in order to provide clearance for conductors, and to protect towers within falling distance of the trees. Removal of mature hedgerow trees will have a negative impact on local habitat diversity, and in those areas where hedgerows are the only remaining features of significant conservation value, this impact will be major negative. However, because of the length of the proposed overhead line, which dilutes the overall impact, this impact is overall assessed as moderate negative.

e. The proposed development will require the provision of coppiced or pollarded swathes through narrow belts (often less than 8m wide) of native broadleaved woodland along two stream courses. Neither of the woodlands is extensive, although the presence of mature oaks at one of the sites adds conservation value. Nutrient enrichment arising from agricultural inputs into adjacent fields has resulted in low species diversity of the lower vegetation layers. The line route has been directed through a relatively narrow part of the woodland, and the height of the line at this point, determined by the location of the nearest tower on high ground, requires that the upper limbs of trees will need to be lopped. Overall, the small scale of the impacts on the affected woodland habitat indicates that the effect of the proposed development is unlikely to be significant in terms of the ecological value of these woodlands, and its impact is considered to be minor negative.

f. Mature trees may function as bat roosts, and may be of local importance to bat populations. The felling of a tree used by bats will result in their displacement, but individual trees are unlikely to support large roosts. The proposed development will not disrupt bat flightlines, and potential feeding areas over woodland will not be affected. The overall impact on bat populations is assessed to be **minor negative.**

6.3.2 Impacts Due to Operation

g. Permanent habitat loss will be restricted to the footprint of the proposed towers. Removal of haul routes will permit grassland vegetation to recover, although soil compaction may result in a protracted recovery time, and an altered species composition. However, most fields are cultivated to a varying extent, and the cultivation process will reduce this impact. The impact of changes in low diversity agricultural grassland is unlikely to have a significant impact on the availability of insect prey for bats.

h. Line maintenance will require that hedgerow trimming will be of a recurrent nature over a five year cycle, but hedgerow presence will be retained, and the habitat will continue to function as an ecological entity. The major impact in hedgerows will be on lopped or removed mature trees, reducing the structural diversity of affected hedgerows in the longer term. Hedgerows act as wildlife corridors for dispersing and feeding birds and mammals, as well as flightlines for bats, and this function will be unimpaired. The species composition of species-rich hedgerows, a NI Priority Habitat, will not be affected by the proposed development. The impact on the hedgerow network will be insignificant in the longer term and overall the impact on this habitat is considered to be minor negative.

i. Provision and maintenance of corridors through wooded belts will modify woodland structure and may allow penetration of these woodlands by tall herb and scrub species more characteristic of disturbed ground. However, local landform configurations will allow for limited lopping of trees, and it is unlikely that, as already mature trees adjust to this management regime, enhanced light values at ground level will have a significant impact on an already impoverished floristic composition. Overall, the small scale of the affected woodland habitat indicates that the effect of the proposed development is unlikely to be significant in terms of the ecological value of these woodlands, and its impact is considered to be minor negative in the longer term.

j. Removal of mature trees may reduce the potential roost sites available to bats for short term shelter or for longer periods. Hedgerows, where maintenance coppicing is required under the overhead lines, will be retained at a height of 1.5 – 2 metres, and the proposed development will not disrupt bat flightlines. Potential feeding areas over woodland, which may also provide roost sites and mating sites, will not be affected. The overall longer term impact on bat populations is assessed to be minor negative.

k. It should be noted that access to towers and overhead lines may be required to address failures in emergency situations. However, this is unlikely to be a frequent occurrence, and the generally low conservation value of the habitats that the line will cross indicates that the significance of the impacts of these operations on habitats and species will be **neutral**.

6.3.3 Transboundary Impacts

l. There is limited scope during the construction and operation of the proposed development to have an impact on bat populations in the Republic of Ireland. The overhead line will occupy airspace above that which bats will generally use for foraging in the open grassland habitats that characterise the transboundary area. The impact on bats which may use foraging grounds and flightlines on both sides of the border will be **neutral.**

6.3.4 Cumulative Impacts

m. Although individually small in extent, the footprints of the towers will cumulatively increase the area that is no longer available to wildlife to a more significant extent. However, the spread of this loss over a wide area means that it will have little impact on the connectivity of habitats and on the movement of animal species, including bats.

6.4 Summary of Potential Impacts

Table B1.6.6: Impacts on Bats by Associated Habitats

FEATURE	ASSESSMENT OF IMPACT (OVERHEAD LINE)	ASSESSMENT OF IMPACT (SUBSTATION)
Improved/semi-improved grassland	Neutral	Minor negative
Rush pasture	Neutral	Neutral
Wet grassland/fen/swamp	Neutral	Neutral
Semi-natural broadleaved woodland	Minor negative	N/A
Hedgerows	Minor negative	Minor negative
Mature trees and treelines	Moderate negative	Moderate negative
Watercourses	Neutral	N/A

6.5 Mitigation

a. This section deals with mitigation measures identified as means of reducing, avoiding or compensating for impacts on the natural environment. Table B1.6.7 details identified impacts and mitigation.

b. Tower locations will avoid hedgerows of conservation value and no species-rich hedgerows will be affected by the works. Hedgerows will be protected by scaffolding when conductors are drawn between towers. Wherever possible, hedgerow trees will be pollarded rather than removed.

c. New habitats will be provided and maintained around the proposed substation, which will provide replacement habitat for foraging bats. Steep banks incised into the local hillside will be ideally suited to dense native shrub species.

d. The number of environmentally valuable mature trees felled prior to the works will be kept to a minimum, and line routes will avoid hedgerow trees wherever possible. Where mature trees are present these will be crown reduced or pollarded rather than removed. Excavations for tower foundations will be sited so as to avoid damaging tree roots.

e. Woodland will be avoided wherever possible and any works in the vicinity of trees will follow best practice guidelines, as outlined in BS 5837:2005 'Trees in Relation to Construction – Recommendations.' In particular, due consideration will be given to the spread of tree roots where tower foundations are in close proximity to hedgerow trees or woodland edge. Trees that are close to construction works will be adequately protected from plant and work operations. Excavations or changes in ground levels will not take place within the protection zone, as even temporary changes can be damaging. During the construction of the substation platform, fill material will not be allowed to creep towards the roadside trees and hedgerow. The passage of vehicles or storage of materials can compact soil and do significant root damage, and these operations will not take place within the protected zone. Toxic materials including cement will not be stored, or discharged, within 10m of a tree. Lines or other materials will not be fixed to a tree nor will any tree be used as an anchor point for winching. Where possible, low-growing woodland belts will be treated as hedgerows, and trimming kept to a minimum.

f. Riparian habitat will be retained wherever possible to provide cover for faunal species following the works.

g. Wetland areas will be avoided wherever possible. Trampling and the use of machinery on saturated, quaking surfaces will be avoided. The locations of towers have been configured to avoid areas of wet grassland and fen vegetation.

h. A combination of standard and bespoke mitigation measures for bats and bat habitats is proposed:

- Once trees that are to be felled or lopped have been identified, any potential roost sites will be inspected for the presence of bats immediately prior to felling by an experienced bat worker. If evidence of bats is found during inspection, all work will cease immediately and advice sought from the NIEA Wildlife Officer.

- Potential tree roosts will be felled under the supervision of a qualified bat worker. The results of this supervision will be provided to the NIEA Wildlife Officer. Generally this will be carried out in autumn when bats have completed breeding and hibernation has not commenced. Tree felling will include wedging to prevent cracks closing and trapping bats, and leaving felled limbs in situ for at least 24 hours to enable bats to escape.
- If bats are discovered after felling has commenced, work will be stopped and NIEA informed and advice sought.
- Known flightlines as identified during the 2009/10 bat surveys will be maintained by pollarding affected trees and hedges at 1.5 - 2 metres high rather than the formerly more usual method of coppicing at ground level, as bats rarely use hedges under 1 metre (Briggs & King 1998).
- A minimum of 100 bat boxes will be erected along the line route, adjacent to those hedgerows where mature trees or trees with a dense covering of ivy have been pollarded. This is precautionary compensation and enhancement as lack of available bat roosts can be a limiting factor in many populations. These boxes will be erected prior to the commencement of vegetation clearance connected with the construction and or operation of the overhead line.
- The use of these artificial bat boxes as roosts will be monitored by a licensed bat worker as part of the post-construction monitoring regime. NIE has committed to the maintenance of these boxes for 5 years post construction across the operational phase of the project.

Table B1.6.7: Summary Table of Potential Ecological Impacts and Mitigation

SITE/HABITAT	INTEREST	IMPACT	MITIGATION
Improved/semi-improved grassland	Associated invertebrate fauna for foraging bats	Habitat loss	Minimise area of disturbance.
Species-rich grassland	Associated invertebrate fauna for foraging bats	Habitat loss	Avoid species-rich grassland.
Damp/Marshy grassland	Associated invertebrate fauna for foraging bats	Habitat loss	Keep loss of damp grassland to minimum.
Broadleaved woodland	Bat roosts	Disturbance, loss of roost	Provision of new hedgerows and trees/shrubs of native provenance around substation site. Preconstruction inspection surveys to assess use made of trees by bats. Creation of new native woodland of local provenance in wider area.
	Associated invertebrate fauna for foraging bats	Habitat loss Disturbance of foraging bats	Avoid wherever possible. Works impacting on this habitat will take place outside the active season April to October (inclusive).
Hedgerows, hedgerow trees and tree lines	Associated flora and fauna	Habitat loss	Hedgerows and trees will be cut outside active season. Trees will be lopped or pollarded wherever possible, rather than removed.
	Bat roosts	Disturbance, loss of roost	Provision of new hedgerows and trees/shrubs of native provenance around substation site. Preconstruction inspection surveys to assess use made of trees by bats.
Ancient/long-established (AWI) woodland	Habitat	No impact	Avoid sensitive woodland sites.

SITE/HABITAT	INTEREST	IMPACT	MITIGATION
Fen/swamp	Associated invertebrate fauna for foraging bats	Habitat loss/damage and disturbance	Locate towers remotely from wetland areas.

6.6 Residual Effects of the Proposed Development

6.6.1 Overview

a. Residual impacts relate to the effects arising from the proposed development that will persist during the lifetime of the new infrastructure. Overall residual impacts on overhead line route ecology will generally be of minor (negative) significance, and mainly restricted to loss or trimming of vegetation at tower sites and along restricted lengths of hedgerows, treelines and linear woodlands. There will be no loss of significant habitats and impacts on mammal and bird species will largely be indiscernible.

b. The proposed substation will alter site ecology substantially. Grassland and hedgerow habitats of low conservation value will be removed, but new habitats developed around the site will provide compensatory higher quality semi-natural habitats that may increase local foraging opportunities for bats.

6.6.2 Transboundary Impacts

c. Works within Northern Ireland will have no direct impacts on habitats within the Republic of Ireland. There is some potential for impacts on bats, which are a highly mobile species; however none of these is likely to be significant. Bats may have foraging areas that straddle the border, but the nature of the proposed development means that these species are unlikely to be significantly adversely affected. Potential residual impacts on bats which use both jurisdictions will reduce throughout the operational period of the proposed development.

6.6.3 Cumulative Impacts

d. There is a potential for any proposed development to have an enhanced impact on the natural environment resulting from the additive effect of increased development of the countryside. The continuing small-scale disruption of limited areas of land can in total be significant if those areas are of high conservation value. The restricted footprint of individual towers, together with the substation footprint, will add to the area that is no longer available to wildlife. However, towers are selectively sited in widespread habitats of low conservation value, particularly improved and semi-improved grassland and species-poor rush pasture. Tower sites avoid grassland fields of higher conservation value. There will therefore be a low cumulative impact on these habitats in terms of the significance of the impact on their constituent species and on animal species that use the habitats.

e. The habitat of greatest conservation value that will be affected by the works is hedgerow and associated mature trees. Loss of hedgerow sections will be additive to the loss of hedgerows that is ongoing as a result of development. However, the works will not negatively affect any species-rich hedgerows, and the ecological function and overall structure of this habitat will be retained. The cumulative impact of the proposed development on the habitat will be of minor negative significance, and will be offset to some extent by the provision of new habitat around the substation.

6.6.4 Long-term Impacts

f. There are unlikely to be any long-term significant residual effects on bat populations. There will be no impact on sites within Northern Ireland designated under European or local legislation, or on sites recognised through the planning system as being of conservation value. The proposed line will avoid Ancient Woodland Inventory sites, and will have a neutral impact on them.

g. In summary, the proposed development will overall have a **minor long term negative impact** on the bat conservation interest of the study area.

6.6.5 Interrelationship of Impacts

h. The legislative requirements with regard to bats are contained in European instruments (Habitats Directive 92/43/EEC) and are implemented in Northern Ireland in the Conservation (Natural Habitats etc) Regulations 1995, as amended. These requirements, in particular addressing the protection of bat species and the maintenance of the range of bat species, must be considered alongside the impacts of the proposed development as described in the chapters of the Environmental Statement and this ES Addendum. For the majority of topics there will be no interrelated impacts with known impacts on bats or their distribution.

i. Ecological best practice with respect to bats will be incorporated within any mitigation or compensatory measures devised to accommodate impacts on these other disciplines within the environmental assessment process. Moreover, measures designed to mitigate landscape impacts involve new plantings/habitat creation, which may then become part of the habitats used by bats for feeding, breeding or socialising. In order to accommodate the habitat requirements of bats, as shown by their current use of the proposed overhead line route, the existing semi-natural habitats in the surrounding area will be taken into account. Native species of local provenance will be used in planting schemes to ensure compatibility with bat habitat requirements and maintenance of their current range.

j. No further interrelated impacts have been identified.

7 Conclusions

a. The assessment indicates that the proposed development will have a minimal impact on the bat population within the vicinity. The major spatial impact will be the loss of the cumulative area of land required for tower bases; however, since the great majority of tower sites will be in fields devoted to agricultural grassland or in species-poor damp grassland of low conservation value, the ecological significance of this impact will be a minor negative.

b. The provision of the proposed substation will require the removal of existing grassland and hedgerow habitats of low conservation value, together with a treeline which contains mature oaks. The landforming required to accommodate the substation provides opportunities for habitat creation that will increase the biodiversity interest of the site.

c. Over the majority of the length of the overhead line route, the conservation value of existing hedgerows will be unaffected, as most hedges are modified via existing land management regimes with a poor structure and few mature trees.

d. In some instances the siting of towers in or near hedgerows will result in some localised loss of short lengths of hedgerow, but there will be limited negative impacts on the ecological function of the hedgerows at each location.

e. There will inevitably be the loss of some mature hedgerow trees in those hedgerows which are mature and structurally complex. Although at a small scale in relation to the length of the proposed line route, and in terms of ecological function at a landscape scale, this will reduce habitat diversity locally. Areas of significant conservation interest, likely to be used by foraging bats, such as species-rich grassland, woodland, riparian corridors and wetlands have been avoided as tower location sites.

f. The proposed overhead line will have a minor negative impact on the bat populations in the vicinity. Known bat roosts are remote from tower locations, and the siting of towers away from woodland, and the techniques used for stringing lines across hedgerows, will mean that bat populations will not be significantly negatively affected. A number of trees potentially used by bats will be removed, but the impact on bat populations will be imperceptible. Mitigation and compensatory measures will further contribute to minimising the overall impact of the proposed development on bats and bat populations.

References

Bat Conservation Trust (2007). Bat Surveys – Good Practice Guidelines. Bat Conservation Trust, London.

Northern Ireland Environment Agency (January 2009). Bat Survey – Specific Requirements. NIEA, Belfast.

John D. Altringham (2003). British Bats. HarperCollins, London.

Jon Russ (1999). The Bats of Britain & Ireland. Alana Books, UK.

Brian Briggs & David King (1998). Bat Detective: a field guide for bat detection. Stag Electronics, West Sussex.

Annex 1 – Photographs from Daytime Tree Assessment

Photograph 1 – The view northwards across the proposed new substation site. Left to right are 3 oak trees, a horse chestnut and 2 sycamores.

Photograph 2 – The first tree line crossed by the proposed overhead line route. The oak (left), 2 common alder (centre) and a number of horse chestnut (centre right) will be impacted by the overhead line route.

Photograph 3 – This standing dead (oak) tree lies immediately to the north west of the line route and will not be directly impacted by the overhead line route.

Photograph 4 – 2 Leislers were recorded around the tree (2305hrs 13th June 2009). This tree is a potential temporary night roost as well as a potential advertising post for males during the mating season.

Photograph 5 – This area of degraded fen (drained & suffering from the effects of agricultural eutrophication) which will be overtopped by the line route. Potentially useful foraging area for bats.

Photograph 6 – Although the line route will overtop the degraded fen (photo 5) the tower will be located in this agriculturally improved field.

Photograph 7 – The line will impact upon the hedge shown here. It will be coppiced every 5 years down to 1-2 metres. This impact is considered to be minimal at this location.

Photograph 8 – The line route will impact upon this line of semi-mature broadleaved trees. However the trees all appeared to be healthy with limited sign of wind damage, fungal attack or disease. Therefore they have low potential for roosting bats.

Photograph 9 – The line route will impact upon the hedge at the centre of the photograph. It is a potential flightline but has limited potential for use by roosting bats.

Photograph 10 – The elder and blackthorn in this image will be coppiced (every 5 years) to accommodate the overhead line. They have low potential for roosting bats.

Photograph 11 – This area of degraded bog with encroaching willow scrub will be overtopped by the line route. Commuting common and soprano pipistrelles were recorded at dawn from a hedge immediately to the right of this photo.

Photograph 12 – These three mature trees will be impacted upon by the line route. They are healthy and show low potential for roosting bats.

Photograph 13 – This hedge will be impacted upon by the overhead line. There is limited potential for roosting bats within it.

Photograph 14 – The line route crosses the hedge at the centre of this photograph. Limited potential for roosting bats but could be used by commuting bats.

Photograph 15 – The line crosses this image from left to right and will impact upon the taller tree in the left of the image. Low potential for roosting bats.

Photograph 16 – A number of the taller trees in this image (left half) will be directly impacted upon by the proposed line route. They are of low significance for bat roosts but may be used by commuting bats.

Photograph 17 – This mature tree line will be bisected by the proposed line route. These trees (mostly beech) are of low value for roosting bats but maybe used by commuting and foraging individuals.

Photograph 18 – These trees lie within the impact zone of the proposed overhead line and will likely be pollarded down between 1 & 2 metres in height. Limited potential for roosting bats but have the potential to be used by foraging individuals.

Photograph 19 – A row of common alder along a small stream. These will be impacted upon by the line route and pollarded at 1-2m height. They are of low potential for roosting bats but are likely to be used by commuting/foraging individuals. Pollarding the trees every 5 years should significantly reduce the impact of the scheme on this aspect of bat behaviour/ecology.

Photograph 20 – This mature lime tree will be pollarded at 1-2m height. The impact of this on the local bat population is likely to be low.

Photograph 21 – The line route will impact upon the small group of common alders in the centre right of this image. The impact of this upon roosting/foraging bats is likely to be neutral.

Photograph 22 – This small copse of sycamore and ash will be pollarded at 1-2m high. This will have a low – neutral impact upon the local bat population.

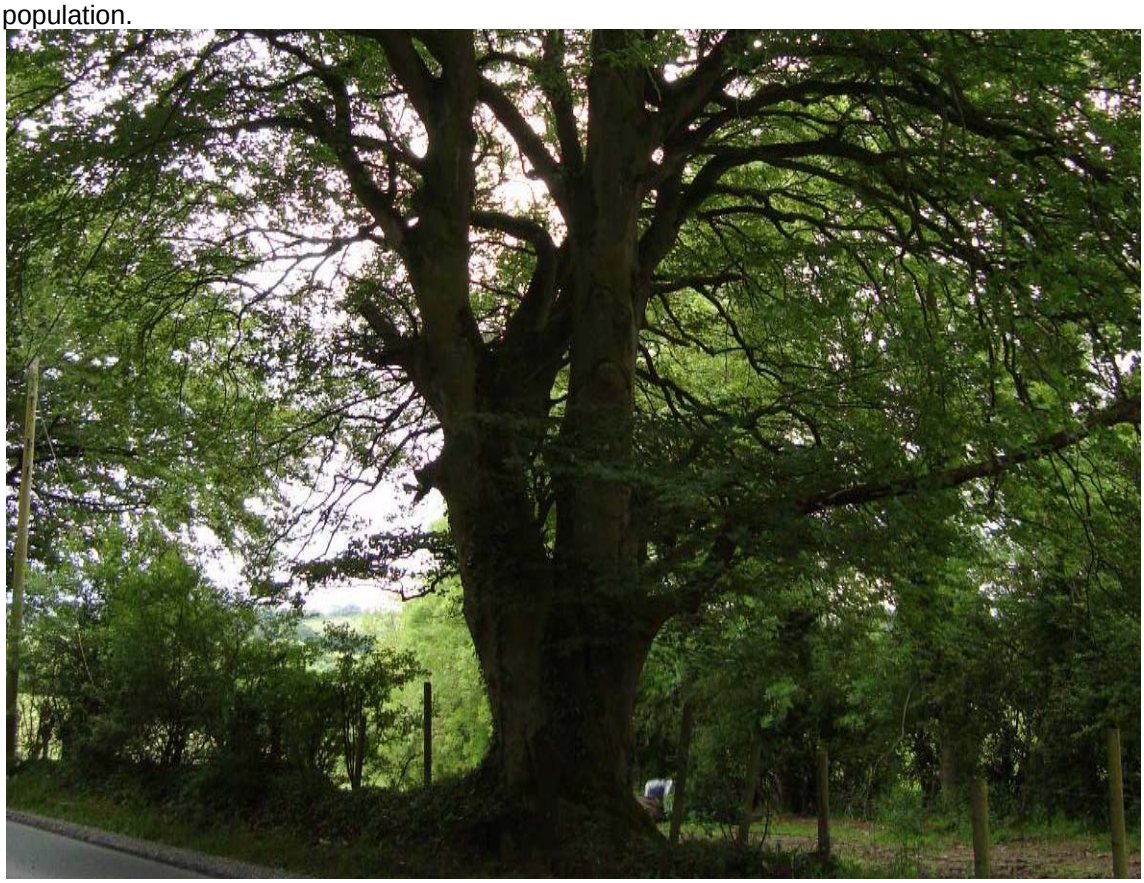
Photograph 23 – The line route will result in the hedge immediately behind the rush dominated area being pollarded at 1-2 height. This will likely result in a low impact upon roosting bats and a moderate impact to foraging individuals.

Photograph 24 - The line route will run across the (bright green) field left to right immediately behind the hedge line. There will be no substantial impact to trees and hedges at this location and therefore no impact upon bats.

Photograph 25 – The tree line in the centre of this image will be substantially reduced during the construction and operation of the proposed overhead line..

Photograph 26 – The line route will over top this area of fen. This should have a neutral impact upon foraging bats as the operation of the line will not reduce the area available for foraging.

Photograph 27 – This hedge will be pollarded at 1-2m high to allow for the construction / operation of the line route. This should result in a neutral to low impact upon the local bat population.



Photograph 28 – This mature beech tree is not directly under the line route but is within the fall zone and will likely need to be pollarded or crown reduced by a specialist tree surgeon. The impact upon roosting bats is deemed to be low as no roosts are present.

Photograph 29 – The hedge in the left half of the photo will need to be pollarded at 1-2 metres to allow for the construction/operation of the overhead line.

Photograph 30 – The hedgerow in the middle distance will be impacted upon by the proposed line route. However no opportunities for roosting bats were identified during a daylight tree assessment of the area. Foraging/commuting bats maybe impacted by pollarding the trees at 1-2 metres, flightlines can be maintained.

Photograph 31 – This tree line will be directly impacted upon by the proposed line route. There is a network of small wet fields with well developed hedges in the immediate vicinity.

Photograph 32 – This hedge will be impacted upon by the line route. Given the age and structure it is unlikely to useful to roosting bats and if pollarded at 1-2m its usefulness as a commuting corridor should be maintained.

Photograph 33 – This hedge will be impacted at the centre of this image.

Photograph 34 –This hedge will be pollarded every 5 years to a height of 1 - 2 metres. There are limited opportunities for roosting bats based on a daytime assessment of mature trees.

Photograph 35 - This hedge will be pollarded every 5 years to a height of 1 - 2 metres. There are limited opportunities for roosting bats based on a daytime assessment of mature trees. Maintenance along the route will ensure that flightlines are retained by the pollarding rather than coppicing of trees under the overhead line.

Photograph 36 – This small copse of blackthorn and hazel will be over topped by the line route, therefore there will be no impact to roosting, foraging or commuting bats at this location.

Photograph 37 – A tower is to be erected in the hedgerow above. The two trees in this image will therefore likely be removed during construction. Daytime assessment of the two trees

revealed no signs of rot, disease or physical damage therefore there is limited opportunity for roosting bats to be present.

Photograph 38 – The hedge in the above image from the photographer into the distance will be pollarded to 1-2m high. So long as the flightline is maintained the effects of this should be of low impact to roosting bats.

Photograph 39 – A section of the wooded stream corridor in the middle distance will coppiced. This hazel scrub which dominates the vegetation is 4-5 m (maximum height) with much of the scrub woodland in a shallow valley with a stream. This has the effect of lowering the overall height of the wood. Therefore only a small amount of the canopy will be lost every 5 years.

Annex 2 – Bat Survey Analysis Forms

DUSK SURVEY	Recorder(s): Cormac Loughran	Qualifications, Experience and Relevant Licenses: MSc, MIEEM
Date:	7th September 2009	
Arrival time:	2005hrs	Site: Substation site, near Moy, County Armagh.
Departure time:	2135hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	NA	Sunset:	20.05
Wind speed & direction	Gusts of ~10-15 mph at times	Air temperature (C)	14.5
Weather (rain etc):	Dry, mild with 80% cloud cover		

Habitat / corridors / nearby water bodies and general habitat: Open fields with hedges and mature trees in boundaries and along nearby minor roads. Occasional mature parkland type trees in places (oak spp).

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2040	VN350057	Along the leeward side of a hedgerow.	Pipistrelle species & Leisler's bat	Commuting	2
2	2042	VN350058	Along the leeward side of a hedgerow.	Soprano pipistrelle	Commuting	1
3	2043	VN350060	Along nearby minor road.	Common Pips	Commuting	2
4	2044	VN350061	Along nearby minor road	Pipistrelle species	Foraging	3
5	2045	VN350062	Along the edges of the trees nearby trees.	Soprano Pip & Leisler's bat	Commuting	2
6	2045	VN350063	Along the edges of the trees nearby trees	Pipistrelle species & Leisler's bat	Commuting and Foraging	5
7	2045	VN350064	Along the edges of the trees nearby trees	Pipistrelle species & Leisler's bat	Commuting and Foraging	2
8	2045	VN350065	Around the tops of nearby hedges	Leisler's bat	Foraging	1
9	2046	VN350066	Around the tops of nearby hedges	Pipistrelle species & Leisler's bat	Commuting	3
10	2046	VN350067	Around the tops of nearby hedges	Pipistrelle species	Commuting	3
An almost continuous stream of bat registrations was recorded between 2040hrs and 2135hrs. At least 100 bat passes were recorded although many of these registrations are likely to include the same bats foraging up and down the nearby hedgerow bordering the road, combined with commuting bats as well. Leisler's bat, common pipisptrelles and soprano pipistrelles were all recorded frequently with a single Daubenton's bat recorded at 2116hrs.						
69	2116	VN350127	Along nearby drains	Daubenton's bat	Commuting	1

Objective Evidence of Species e.g. Sonograms

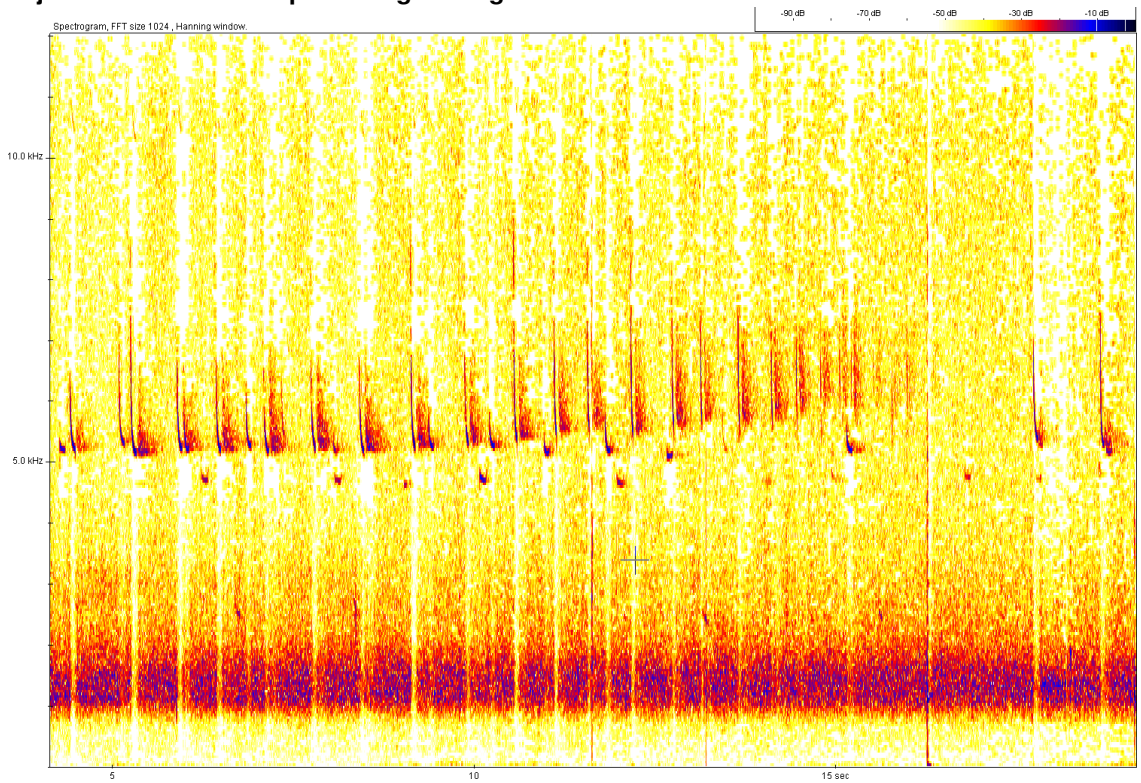


Plate 1: Spectrogram of a Pipistrelle species 'feeding buzz' at 2046hrs 7/09/09.

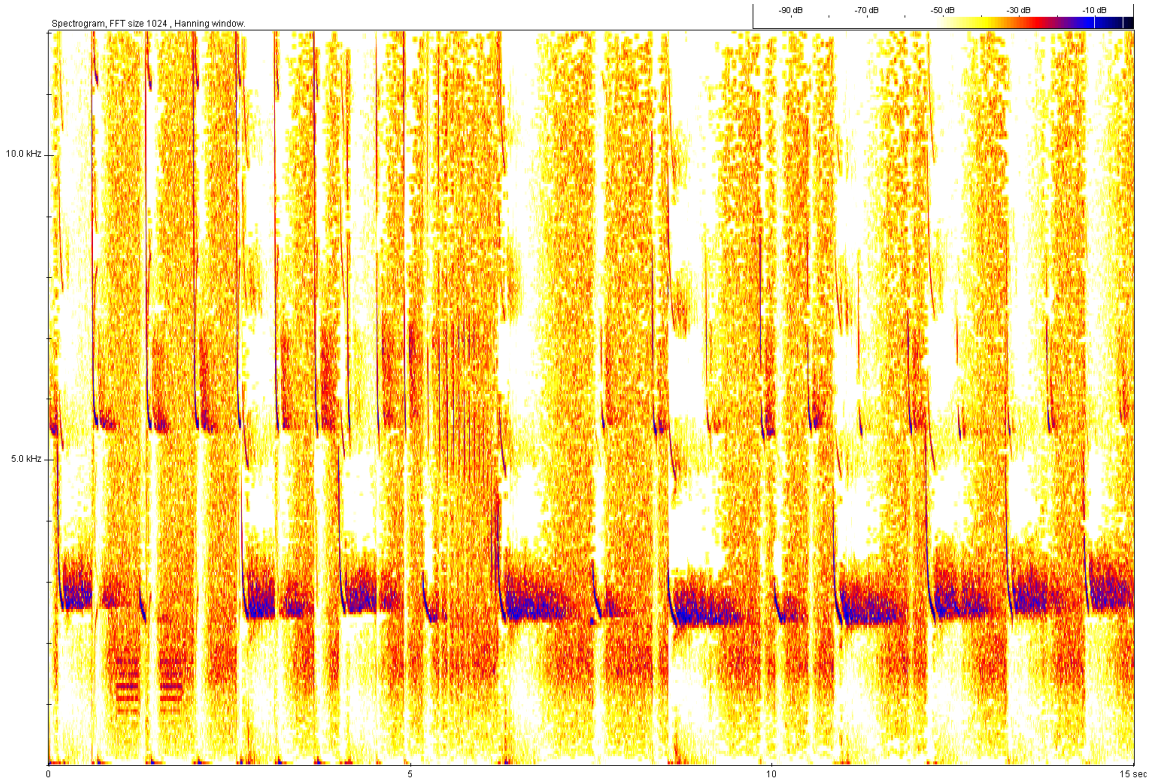


Plate 2: Spectrogram of file VN350064 at 2045hrs 7/09/09 from a minor road near the sub-station site. There appears to be Leisler's bat and Soprano pipistrelles foraging in close proximity to one another.

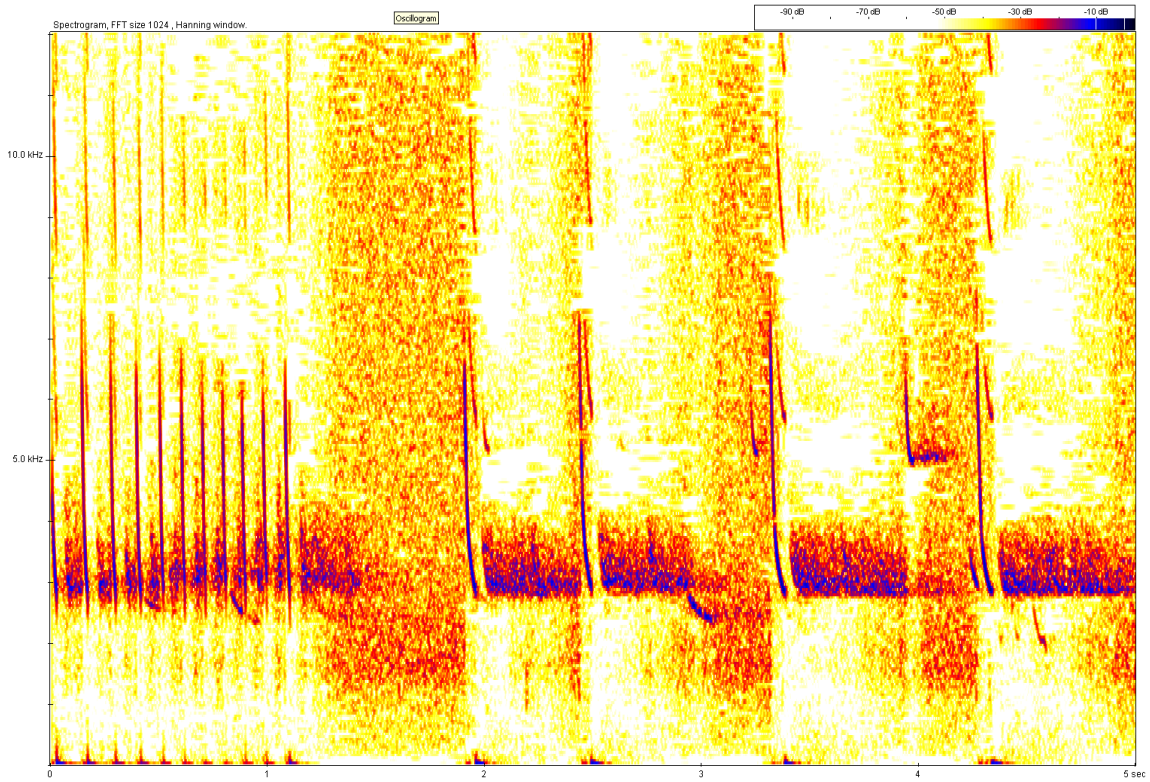


Plate 3: Spectrogram of a 'feeding buzz' from a Leisler's bat recorded at 2046hrs 7/09/09.

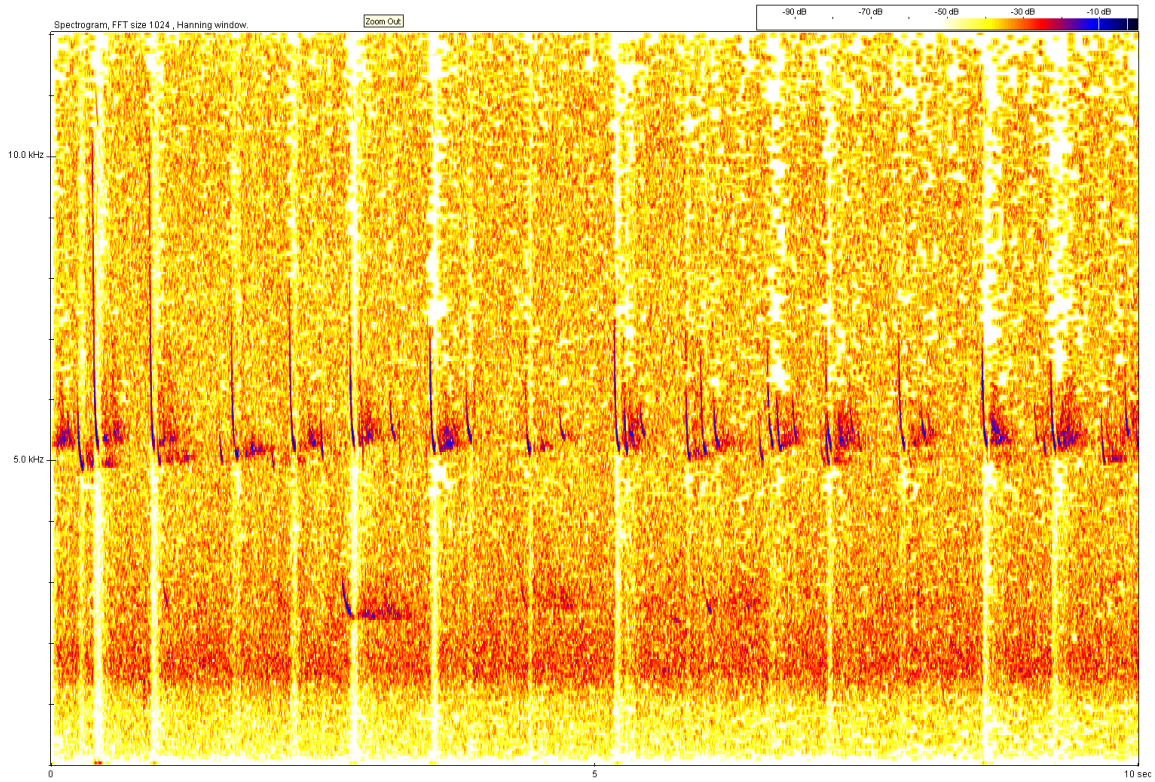


Plate 4: Spectrogram of 3 or more Pipistrelle species flying together with a distant Leisler's bat also evident at a much lower frequency at 2046hrs 7/09/09.

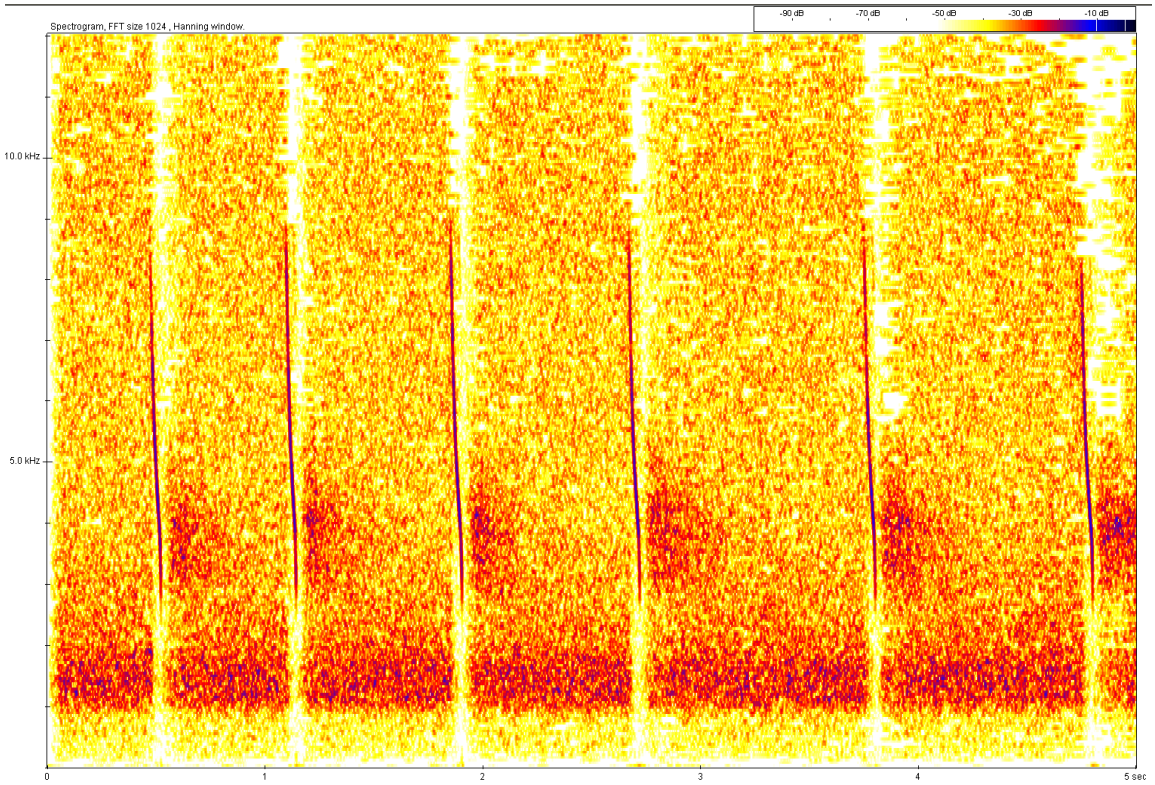


Plate 5: Spectrogram of a Daubenton's bat recorded at 2116hrs 7/09/09.

Additional Comments / Observations

Windy conditions seemed to concentrate several foraging bats along the leeward side of the hedges and along a tree covered nearby minor road. Limited bat activity recorded or observed within the impact zone of the actual substation, however the general area is obviously good for both foraging and commuting bats.

DUSK SURVEY	Recorder(s): Cormac Loughran	Qualifications, Experience and Relevant Licenses: MSc, CEnv, MIEEM
Date:	13th June 2009	
Arrival time:	2135hrs	Site: Substation site, near Moy, County Armagh.
Departure time:	2335hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	NA	Sunset:	2211hrs
Wind speed & direction	Calm with occasional gentle breeze	Air temperature (C)	16
Weather (rain etc):	Dry, mild with 10% cloud cover		

Habitat / corridors / nearby water bodies and general habitat: Open fields with hedges and mature trees in boundaries and along nearby minor roads. Occasional mature parkland type trees in places (oak spp).

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats

Bat detector indicated the presence of bats and a single Leisler's bat was observed foraging around the mature trees almost continuously for 30 minutes. It was also observed to chase away another bat (most probably also a Leisler's bat) and return to the trees. No recordings were made as the recorder cable was malfunctioning.

Objective Evidence of Species e.g. Sonograms

None recorded

Additional Comments / Observations

Trees at the substation are obviously good foraging ground for Leisler's bats during evenings with little or no wind.

DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. 5 years bat survey experience
Date:	14th July 2010	
Arrival time:	0330hrs	Site: Interconnector – area between Towers 3 and 4
Departure time:	0500hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:	0514	Sunset:	
Wind speed & direction	Calm	Air temperature (C)	16°C
Weather (rain etc):	Dry for first 60 minutes of survey. Rain commenced at 0355 and the survey was terminated.		

Habitat / corridors / nearby water bodies and general habitat:

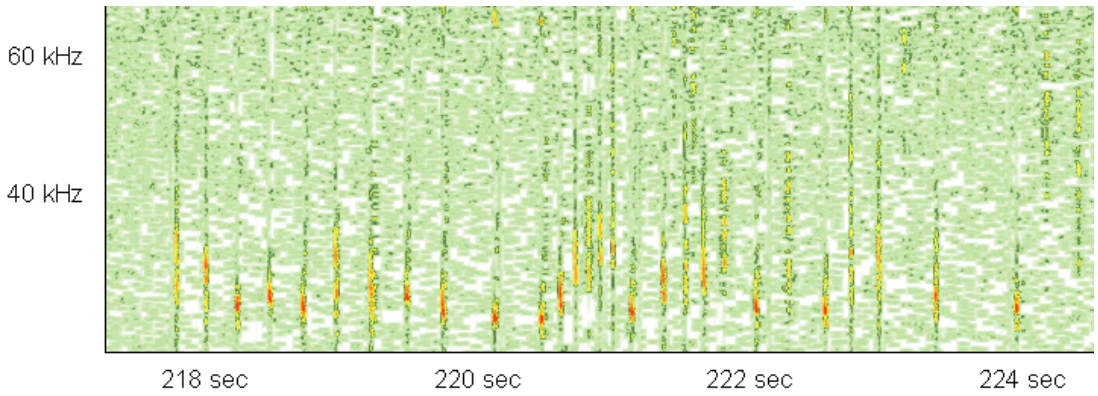
Hedgerow with tall ash trees and an area of rush pasture. This is accessed by a farm lane bounded with tall hedgerows.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0332	Track 1	Along farm lane	Pipistrelle species	Commuting	1
2	0337	Track 2	Over rush pasture	Leisler's bat	Foraging	1
3	0337	Track 2	Along farm lane	Common pipistrelle	Commuting	1
4	0338	Track 2	Over rush pasture	Soprano pipistrelle	Commuting	1
5	0339	Track 2	Along hedgerow	Pipistrelle species	Commuting	3
6	0341	Track 3	Over rush pasture	Common pipistrelle	Commuting	1
7	0341	Track 3	Over rush pasture	Leisler's bat	Foraging	1
8	0341	Track 3	Over rush pasture	Soprano pipistrelle	Foraging	1
9	0342	Track 3	Along farm lane	Leisler's bat	Commuting	1
10	0342	Track 3	Along farm lane	Soprano pipistrelle	Commuting	3
11	0342	Track 3	Over rush pasture	Soprano pipistrelle	Foraging	2
12	0342	Track 3	Along farm lane	Common pipistrelle	Commuting	2
13	0343	Track 3	Over rush pasture	Soprano pipistrelle	Foraging	2
14	0343	Track 3	Over rush pasture	Common pipistrelle	Foraging	2
15	0343	Track 3	Over rush pasture	Soprano pipistrelle	Commuting	1

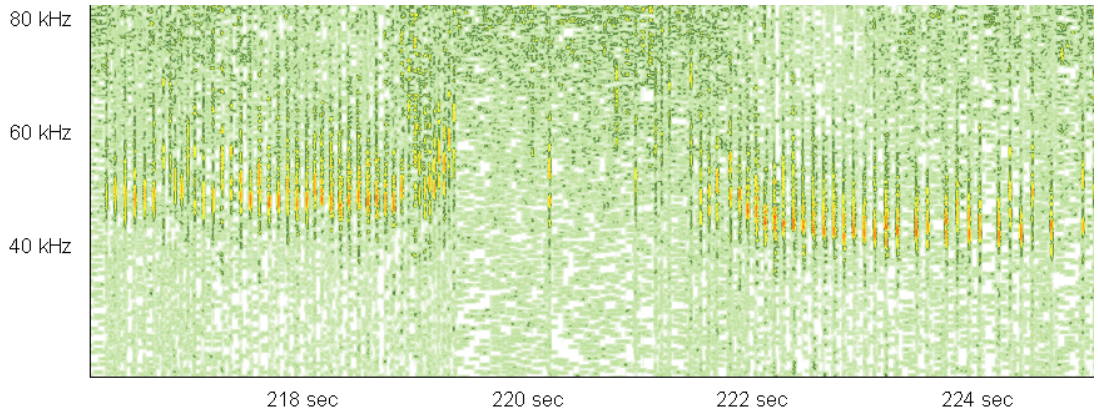
16	0343	Track 3	Along farm lane	Common pipistrelle	Commuting	2
17	0343	Track 3	Over trees	Leisler's bat	Commuting	1
18	0344	Track 3	Over rush pasture	Soprano pipistrelle	Foraging	1
19	0344	Track 3	Over rush pasture	Common pipistrelle	Foraging	2
20	0344	Track 3	Along farm lane	Common pipistrelle	Commuting	2
21	0344	Track 3	Along farm lane	Pipistrelle species	Foraging	1
22	0344	Track 3	Hedgerow	Leisler's bat	Social call	1
23	0345	Track 3	Over rush pasture	Common pipistrelle	Foraging	1
24	0346	Track 3	Over rush pasture	Soprano pipistrelle	Foraging	1
25	0346	Track 4	Along hedgerow	Leisler's bat	Commuting	1
26	0346	Track 4	Over rush pasture	Leisler's bat	Foraging	2
27	0346	Track 4	Over rush pasture	Common pipistrelle	Foraging	1
28	0347	Track 4	Along hedgerow	Leisler's bat	Commuting	3
29	0347	Track 4	Over rush pasture	Leisler's bat	Foraging	2
30	0347	Track 4	Along hedgerow	Pipistrelle species	Commuting	1
31	0347	Track 4	Along hedgerow	Soprano pipistrelle	Commuting	1
32	0347	Track 4	Over rush pasture	Soprano pipistrelle	Foraging	1
33	0348	Track 4	Over rush pasture	Soprano pipistrelle	Foraging	8
34	0348	Track 4	Over rush pasture	Soprano pipistrelle	Commuting	1
35	0350	Track 5	Over rush pasture	Soprano pipistrelle	Commuting	7
36	0350	Track 5	Over rush pasture	Leisler's bat	Foraging	6
37	0350	Track 5	Over rush pasture	Leisler's bat	Commuting	4
38	0350	Track 5	Over rush pasture	Soprano pipistrelle	Foraging	3
39	0352	Track 5	Over rush pasture	Soprano pipistrelle	Commuting	3
40	0352	Track 5	Over rush pasture	Leisler's bat	Commuting	4
41	0352	Track 5	Over rush pasture	Soprano pipistrelle	Foraging	6
42	0352	Track 5	Over rush pasture	Leisler's bat	Foraging	3
43	0352	Track 5	Along farm lane	Common pipistrelle	Commuting	1
44	0358	Track 6	Over trees and rush pasture	Common pipistrelle	Commuting	1
45	0358	Track 6	Over trees and rush pasture	Leisler's bat	Foraging	3
46	0358	Track 6	Over trees and rush pasture	Soprano pipistrelle	Commuting	1
47	0401	Track 6	Over trees and rush pasture	Leisler's bat	Commuting	1
48	0401	Track 6	Over trees and rush pasture	Common pipistrelle	Commuting	1

49	0402	Track 6	Over trees and rush pasture	Leisler's bat	Foraging	3
50	0403	Track 6	Over trees and rush pasture	Common pipistrelle	Commuting	1
51	0403	Track 7	Over trees and rush pasture	Soprano pipistrelle	Commuting	1
52	0403	Track 7	Over trees and rush pasture	Leisler's bat	Foraging	1
53	0404	Track 7	Over trees and rush pasture	Leisler's bat	Foraging	2
54	0405	Track 7	Over trees and rush pasture	Leisler's bat	Commuting	2
55	0406	Track 7	Over trees and rush pasture	Leisler's bat	Commuting	1

Objective Evidence of Species e.g. Sonograms



Sonogram of Leisler's recorded foraging over rush pasture at 0352



Sonogram of common pipistrelle recorded foraging over rush pasture at 0343

Additional Comments / Observations

Bats were not using the hedgerow in the impact zone as a flightline. Most bat activity observed was over the rush pasture and along the adjacent farm lane.

DUSK SURVEY	Recorder(s): Amy Craig	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc.
Date:	07th September 2010	
Arrival time:	1930	Site: Interconnector – area between Towers 3 and 4
Departure time:	2115	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2016hrs
Wind speed & direction	3mph	Air temperature (C)	12
Weather (rain etc):	Dry ~70% cloud cover		

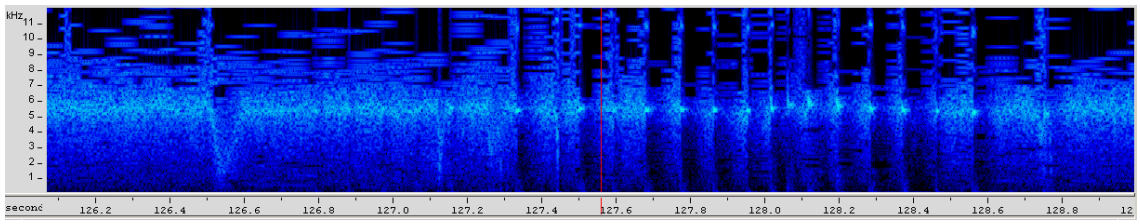
Habitat / corridors / nearby water bodies and general habitat:

Hedgerow with tall ash trees and an area of rush pasture. This is accessed by a farm lane bounded with tall hedgerows.

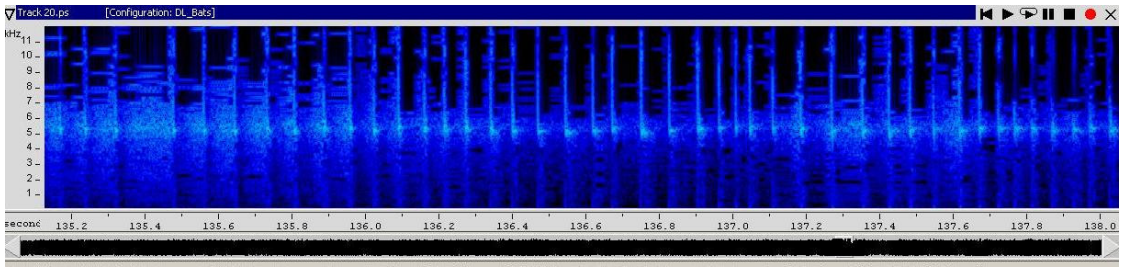
TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	19.43	Track 1	Along hedgerow	Soprano pipistrelle	Commuting	1
2	19.44	Track 1	Along hedgerow	Pipistrelle species	Commuting	1
3	19.47	Track 2	Along hedgerow	Pipistrelle species	Commuting	1
4	19.53	Track 3	Along hedgerow	Pipistrelle species	Commuting	2
5	19.57	Track 4	Along hedgerow	Leisler's bat	Commuting	1
6	20.02	Track 5	Along hedgerow	No bat activity recorded		
7	20.06	Track 6	Along hedgerow			
8	20.10	Track 7	Over trees and rush pasture	Pipistrelle species	Commuting	1
9	20.14	Track 8	Over trees and rush pasture	Leisler's bat	Commuting	1
10	20.19	Track 9	Over trees and rush pasture	Pipistrelle species	Commuting	2
11	20.24	Track 10	Over trees and rush pasture	Pipistrelle species	Commuting	1
12	20.37	Track 11	Along farm lane	Pipistrelle species	Commuting	1

13	20.41	Track 12	Along farm lane	No bat activity recorded		
14	20.45	Track 13	Along farm lane	No bat activity recorded		
15	20.51	Track 14	Along farm lane			
16	20.55	Track 15	Along farm lane			
17	20.59	Track 16	Along farm lane			
18	21.03	Track 17	Along farm lane			
19	21.06	Track 18	Along farm lane			
20	21.10	Track 19	Along farm lane			
21	21.15	Track 20	Along farm lane	Common Pipistrelle	Foraging	1
22	21.17	Track 20	Along farm lane	Pipistrelle sp.	Commuting	1
23	21.18	Track 20	Along farm lane	Common Pipistrelle	Commuting	1

Objective Evidence of Species e.g. Sonograms



Sonogram of Pipistrelle species commuting along tall hedgerow at 1947hrs.



Sonogram of Common Pipistrelle recorded foraging along farm lane at 2115hrs.

Additional Comments / Observations

No bat activity recorded between 2045hrs and 2110hrs

DUSK SURVEY	Recorder(s): Debbie Brown / Mary Maguire	Qualifications, Experience and Relevant Licenses: BSc, MSc BSc, MSc, AIEMA
Date:	07th September 2009	
Arrival time:	2033hrs	Site: Tower 6
Departure time:	2133hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	20.05
Wind speed & direction	Blustery	Air temperature (C)	14.5
Weather (rain etc):	Dry, with light rain beginning towards the end of the survey.		

Habitat / corridors / nearby water bodies and general habitat:
Transect along a slow flowing stream with Alder and Willow fringes and tall herbs and grasses. Beside agricultural farmland and flowing towards a pond to the south which is surrounded by conifers.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	20.33	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	1[1]
2	20.37	Unavailable	Sited commuting from the area of the pond	Soprano Pipistrelle	Commuting	1
3	20.38	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	1
4	20.38	Unavailable	Sited commuting towards the pond	Soprano Pipistrelle	Commuting	1
5	20.39	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	1
6	20.40	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Commuting	1
7	20.41	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	3
8	20.42	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	1
9	20.43	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	2
10	20.44	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	3
11	20.45	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	2
12	20.46	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	1
13	20.47	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	1
14	20.48	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	4
15	20.49	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	8
16	20.50	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	6

[1] Numbers of individuals obtained by counting feeding buzzes.

17	20.51	Unavailable	Along trees fringing stream	Soprano Pipistrelle	Foraging	1
18	20.51	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	1
19	20.52	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	2
20	20.53	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	3
21	20.55	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	5
22	20.56	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	9
23	20.57	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	10
24	20.58	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	11
25	20.59	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	+15
26	21.00	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	+15
27	21.01	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	+15
28	21.03	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	2
29	21.04	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	1
30	21.05	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	3
31	21.06	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	1
32	21.08	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	+15
33	21.09	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	+15
34	21.10	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	+15
35	21.11	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	8
36	21.12	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	12
37	21.13	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	12
38	21.14	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	12
39	21.15	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	7
40	21.16	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	1
41	21.17	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	1
42	21.18	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	2
43	21.19	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	2
44	21.21	Unavailable	Flying along stream towards pond	Daubenton's bat	Foraging	3
45	21.21	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	1
46	21.26	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	1
47	21.28	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	1

48	21.29	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	1
49	21.30	Unavailable	Along trees fringing stream	Common Pipistrelle	Foraging	1

Objective Evidence of Species e.g. Sonograms

Unavailable

Additional Comments / Observations

Two surveyors were present on site during this survey using a Batbox Duet Heterodyne detector. The recorder attached to the bat detector did not work correctly so detailed notes of bat activity detected were taken throughout the survey. Bat species were identified by the surveyors using their knowledge of bat calls and peak frequencies. There was a vast amount of Daubenton's bat activity in this area – numbers noted here are estimates. It was not possible to count every individual due to the constant number of feeding buzzes.

DAWN SURVEY

Site: Towers 11 to 12			
Project and Reference: Tyrone to Cavan Interconnector (60032220)			
Recorder(s):	Mary Maguire	**Arrival time:**	0427hrs
Date:	14th September 2010	**Departure time:**	0530hrs

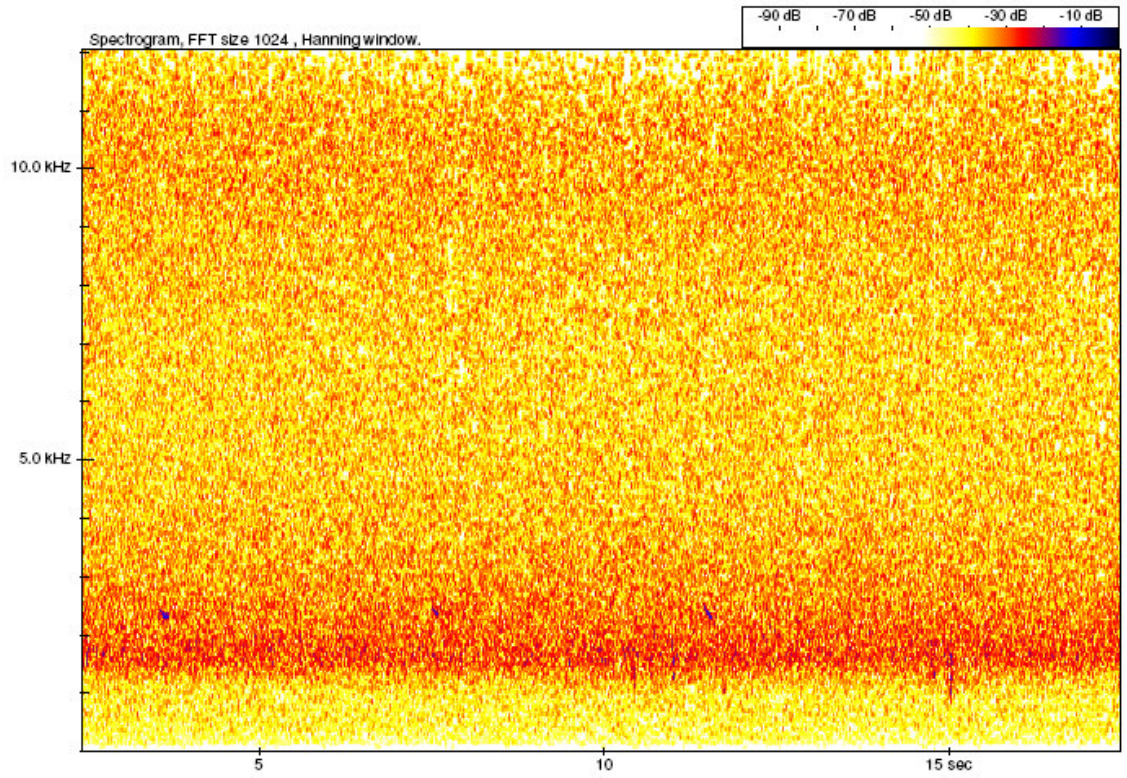
Weather conditions			
Sunrise:	0656hrs	**Sunset:**	
Wind speed & direction:	calm	**Air temperature (C):**	16°C
Weather (rain etc):	Dry until the survey had to be abandoned because of a heavy rain shower.		

Habitat / corridors / nearby water bodies and general habitat:
One agricultural field, which is bounded to the north by a mature hedge line.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bat passes
0427	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350298.*WMA*	*Nyctalus leisleri*	Commuting	1
0428	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350299.WMA	*Nyctalus leisleri*	Commuting	1
0429	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350300.WMA	No bats recorded.		
0429	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350301.WMA	*Nyctalus leisleri*	Commuting	1
0432	Along the mature hedge boundary which separates tower 11 and tower 12.	*VN350302.WMA*	*Nyctalus leisleri*	Commuting	1
0438	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350303.WMA	*Pipistrellus pygmaeus*	Foraging	1
0440	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350304.WMA	*Nyctalus leisleri*	Commuting	2
0442	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350305.WMA	*Nyctalus leisleri*	Commuting	1
0445	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350306.WMA	*Pipistrellus pygmaeus*	Commuting	2
0447	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350307.WMA	*Nyctalus leisleri*	Commuting	2
0447	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350308.WMA	*Pipistrellus pygmaeus*	Commuting	1

0450	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350309.WMA	*Pipistrellus pygmaeus*	Commuting	1
0450	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350310.WMA	*Pipistrellus nathusii*	Commuting	1
0452	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350311.WMA	*Nyctalus leisleri*	Commuting	2
0454	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350312.WMA	*Pipistrellus spp.*	Commuting	3
0455	Along the mature hedge boundary which separates tower 11 and tower 12.	VN350313.WMA	*Nyctalus leisleri*	Commuting	1

Objective Evidence of Species e.g. Sonograms



A *Nyctalus leisleri* commuting on track VN250312.WMA

Additional Comments / Observations

Survey had to be abandoned after 30mins due to the onset of rain.

Qualifications, Experience and Relevant Licenses:

MSc, BSc, AIEMA

DUSK SURVEY	Recorder(s): Mary Maguire	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. AIEMA
Date:	24th June 2009	
Arrival time:	2225hrs	Site: Tower 13
Departure time:	2325hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	NA	Sunset:	2204hrs
Wind speed & direction	Calm	Air temperature (C)	13°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat: Fen bordered by willow scrub and scattered alder

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	22.25	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	16
2	22.26	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	8
3	22.27	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	8
4	22.28	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	9
5	22.28	Track 1 duet	Along wet ditch and site boundary	Soprano pipistrelle	Commuting	1
6	22.30	Track 1 duet	Along wet ditch and site boundary	Soprano pipistrelle	Commuting	3
7	22.30	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting	10
8	22.31	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	7
9	22.32	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	5
10	22.32	Track 1 duet	Along wet ditch and site boundary	Soprano pipistrelle	Commuting	3
11	22.33	Track 1 duet	Along wet ditch and site boundary	Soprano pipistrelle	Commuting and foraging	1
12	22.33	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	6
13	22.35	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	2

14	22.36	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	3
15	22.36	Track 1 duet	Along wet ditch and site boundary	Soprano pipistrelle	Commuting and foraging	1
16	22.38	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	2
17	22.39	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	1
18	22.40	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	1
19	22.40	Track 1 duet	Around trees and scrub at perimeter of site	Common pipistrelle	Commuting	4
20	22.40	Track 1 duet	Around trees and scrub at perimeter of site	Myotis species possibly a Natterer's bat	Commuting	1
21	22.40	Track 1 duet	Around trees and scrub at perimeter of site	Pipistrelle species	Commuting	2
22	22.40	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting	1
23	22.45	Track 1 duet	Along wet ditch and site boundary	Soprano pipistrelle	Commuting and foraging	5
24	22.46	Track 1 duet	Along wet ditch and site boundary	Pipistrelle species	Commuting and foraging	2
25	22.47	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	1
26	22.48	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting and foraging	4
27	22.48	Track 1 duet	Around trees and scrub at perimeter of site	Myotis species	Foraging	1
28	22.54	Track 1 duet	Along wet ditch and site boundary	Leisler's bat	Foraging	2
29	22.57	Track 1 duet	Along wet ditch and site boundary	Pipistrelle species	Commuting	3
30	22.57	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Commuting	1
31	23.02	Track 1 duet	Along wet ditch and site boundary	Pipistrelle species	Commuting	4
32	23.07	Track 1 duet	Along wet ditch and site boundary	Common pipistrelle	Commuting	2

Objective Evidence of Species e.g. Sonograms

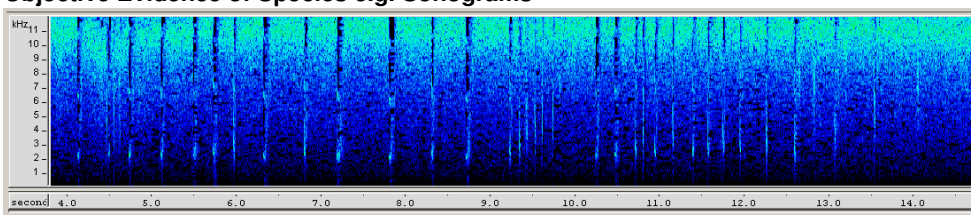


Plate 1: Sonogram of a Leisler's bat 'feeding buzz' at 2225hrs 24/06/09.

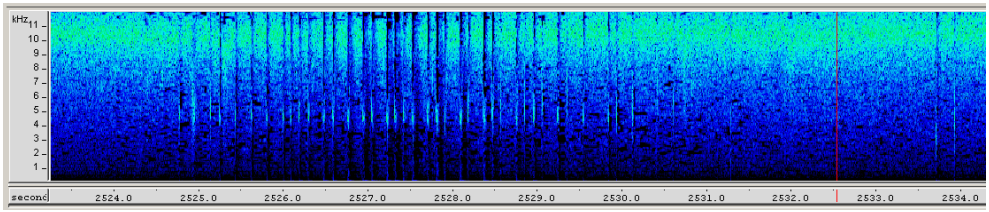


Plate 2: Sonogram of commuting Common pipistrelle at 2307hrs 24/06/09.

Additional Comments / Observations

An almost continuous stream of bat registrations was recorded between 2225 hrs and 2236 hrs. This was a hotspot of Leisler's bat activity, with over 70 registrations recorded in the first 10 minutes of the survey. These were observed flying along the willow scrub and scattered alders along the boundary of the degraded fen.

DUSK SURVEY	Recorder(s): M. Maguire	Qualifications, Experience and Relevant Licenses: B/Sc. M.Sc. AIEMA
Date:	22nd July 2009	
Arrival time:	2240hrs	Site: Tower 15
Departure time:	2341hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2144hrs
Wind speed & direction	Calm	Air temperature (C)	15°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
Small band of trees to the north of an agricultural field with sycamore, hawthorn and brambles.

TN	**Time of sighting (24 hr clock)**	**MP3 time and track**	**Feature of the building/structure and location of sighting**	**Bat species**	**Behaviour (e.g. foraging / commuting)**	**No. of Bats**
1	22.40	22 40 dusk Duet 28.400 – 28.683	Along mature hedgeline	Pipistrellus pygmaeus	Foraging	1
2	22.40	22 40 dusk Duet 33.735 – 34.345	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
3	22.40	22 40 dusk Duet 35.163 – 35.330	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
4	22.41	22 40 dusk Duet 87.772 – 91.142	Along mature hedgeline	*Nyctalus leisleri*	Commuting	1
5	22.41	22 40 dusk Duet 90.295 – 90.810	Along mature hedgeline	*Pipistrellus spp.*	Foraging	1
6	22.41	22 40 dusk Duet 93.400 – 93.647	Along mature hedgeline	Pipistrellus spp.	Commuting	1
7	22.43	22 40 dusk Duet 218.415	Along mature hedgeline	Pipistrellus spp.	Commuting	1
8	22.43	22 40 dusk Duet 230.940 – 232.018	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
9	22.44	22 40 dusk Duet 248.158 – 248.893	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
10	22.44	22 40 dusk Duet 286.108 – 286.950	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
11	22.46	22 40 dusk Duet 365.618 – 366.085	Along mature hedgeline	Pipistrellus pygmaeus	Commuting	1
12	22.46	22 40 dusk Duet 391.392 – 393.365	Along mature hedgeline	Nyctalus leisleri	Commuting	1
13	22.46	22 40 dusk Duet 410.913 – 412.280	Along mature hedgeline	*Nyctalus leisleri*	Commuting	1
14	22.49	22 40 dusk Duet 570.742 – 575.260	Along mature hedgeline	Pipistrellus spp.	Commuting	1
15	22.50	22 40 dusk Duet 635.677 – 641.627	Along mature hedgeline	*Pipistrellus pipistrellus*	Commuting	1
16	22.51	22 40 dusk Duet 699.352 – 704.728	Along mature hedgeline	*Pipistrellus pipistrellus*	Foraging	1

17	22.52	22 40 dusk Duet 763.601 – 772.414	Along mature hedgeline	*Nyctalus leisleri*	Foraging	1
18	22.53	22 40 dusk Duet 824.071 – 825.547	Along mature hedgeline	*Pipistrellus species.*	Foraging	1
19	22.56	22 40 dusk Duet 1014.291-1015.834	Along mature hedgeline	*Pipistrellus pipistrellus*	Commuting	1
20	22.57	22 40 dusk Duet 1065.464-1066.977	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
21	22.57	22 40 dusk Duet 1274.635-1275.649	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
22	22.57	22 40 dusk Duet 1284.163 - 1285.147	Along mature hedgeline	*Pipistrellus species*	Commuting	1
23	22.58	22 40 dusk Duet 1314.338 –1315.250	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
24	22.58	22 40 dusk Duet 1321.138 –1323.325	Along mature hedgeline	*Pipistrellus species.*	Commuting	1
25	22.58	22 40 dusk Duet 1323.757 –1329.418	Along mature hedgeline	*Pipistrellus species.*	Commuting	1
26	22.58	22 40 dusk Duet 1351.108 –1352.730	Along mature hedgeline	*Pipistrellus pipistrellus*	Commuting	1
27	23.05	22 40 dusk Duet 1539.955 –1540.600	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1
28	23.09	22 40 dusk Duet 1758.098 – 760.575	Along mature hedgeline	*Pipistrellus pipistrellus*	Commuting	1
29	23.10	22 40 dusk Duet 1809.573 –1810.803	Along mature hedgeline	*Pipistrellus species*	Commuting	1
30	23.10	22 40 dusk Duet 1811.618 –1812.912	Along mature hedgeline	*Pipistrellus species*	Foraging	1
31	23.10	22 40 dusk Duet 1813.787 – 814.060	Along mature hedgeline	*Pipistrellus pipistrellus*	Commuting	1
32	23.10	22 40 dusk Duet 1817.096 – 817.876	Along mature hedgeline	*Pipistrellus species*	Commuting	1
33	23.13	22 40 dusk Duet 1983.448 – 985.273	Along mature hedgeline	*Pipistrellus species*	Commuting	1
34	23.18	22 40 dusk Duet 2332.965 – 333.491	Along mature hedgeline	*Nyctalus leisleri*	Commuting	1
35	23.19	22 40 dusk Duet 2378.856 –2379.783	Along mature hedgeline	*Pipistrellus species*	Commuting	1
36	23.20	22 40 dusk Duet 2380.120 – 381.783	Along mature hedgeline	*Pipistrellus species*	Commuting	1
37	23.20	22 40 dusk Duet 2382.472 – 383.167	Along mature hedgeline	*Pipistrellus species*	Commuting	1
38	23.24	22 40 dusk Duet 2648.366 – 652.209	Along mature hedgeline	*Nyctalus leisleri*	Commuting	1
39	23.25	22 40 dusk Duet 2718.073 – 719.929	Along mature hedgeline	*Pipistrellus species*	Commuting	1
40	23.26	22 40 dusk Duet 2762.726 – 763.867	Along mature hedgeline	*Pipistrellus species*	Commuting	1
41	23.28	22.40 dusk Duet 2906.335– 2907.180	Along mature hedgeline	*Pipistrellus species*	Foraging	1
42	23.31	22.40 dusk Duet 3352.512– 3355.597	Along mature hedgeline	*Pipistrellus pygmaeus*	Commuting	1

Objective Evidence of Species e.g. Sonograms

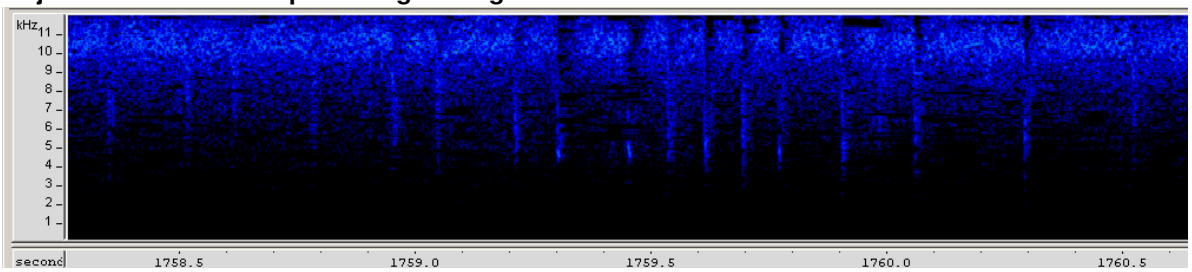


Plate 1: Sonogram of commuting Common pipistrelle recorded at 22.40 hrs on 22/07/09

Additional Comments / Observations

None

DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: BSc, MSc 5 years bat survey experience
Date:	20th May 2010	
Arrival time:	0400hrs	Site: Interconnector Tower 16
Departure time:	0500hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	0517hrs	Sunset:	
Wind speed & direction	Calm	Air temperature (C)	16°C
Weather (rain etc):	Dry		

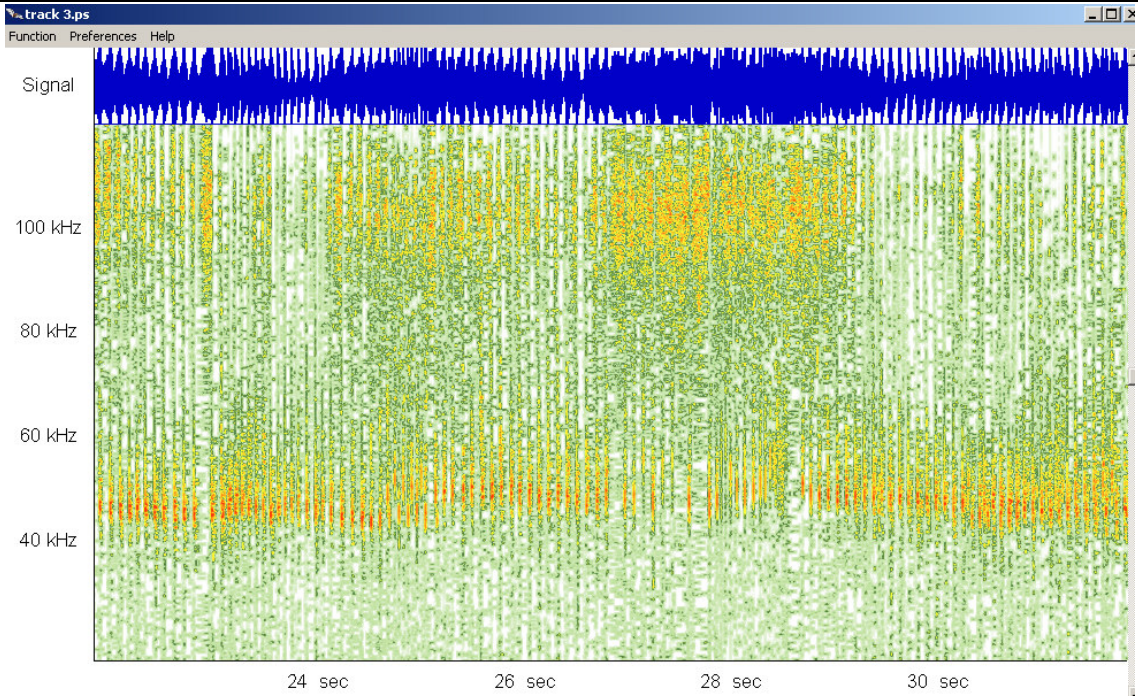
Habitat / corridors / nearby water bodies and general habitat:

Tower location in tall hawthorn hedge between newly planted orchard and pasture. Survey also covered tall hedgerow with mature trees to the east and south of the tower location.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0404	Track 1	In distance – south of tower location towards tower 17	Leisler's bat	Foraging	1
2	0405	Track 1	At location of Tower 16	Unknown	Social call	1
3	0406	Track 1	At location of Tower 16	Unknown	Social call	1
4	0410	Track 2	At location of Tower 16	Unknown	Social call	1
5	0421	Track 3	At tall hedge/tree south east of Tower 16 location	Common pipistrelle	Commuting/Foraging	4
6	0421	Track 3	At tall hedge/tree south east of Tower 16 location	Unknown	Social call	2
7	0422	Track 3	At tall hedge/tree south east of Tower 16 location	Common pipistrelle	Commuting/Foraging	4
8	0423	Track 3	At tall hedge/tree south east of Tower 16 location	Unknown	Social call	1
9	0425	Track 3	At tall hedge/tree south east of Tower 16 location	Common pipistrelle	Commuting/Foraging	4
10	0427	Track 3	At tall hedge/tree south east of Tower 16 location	Unknown	Social call	1
11	0435	Track 4	At boundary NE of Tower 16 location	Unknown	Social call	2
12	0439	Track 5	At location of Tower 16	Pipistrelle species	Commuting in distance	1

13	0440	Track 5	At location of Tower 16	Pipistrelle species	Commuting in distance	1
14	0441	Track 5	At location of Tower 16	Pipistrelle species	Commuting in distance	2
15	0449	Track 6	At boundary NE of Tower 16 location	Unknown	Commuting	3

Objective Evidence of Species e.g. Sonograms



Sonogram of commuting pipistrelles along hedgerow south-east of Tower 16

Additional Comments / Observations

Much pipistrelle activity was recorded along a tall hedgerow with mature trees to the south-east of Tower 16. The line between Tower 16 and Tower 17 crosses this hedgerow and tree inspections are recommended to assess the presence of potential roosts during pre-construction vegetation in this area given the numbers of bats recorded here.

DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: MSc. Environmental Management, 15 years ecology experience, 5 years bat survey experience
Date:	3rd June 2010	
Arrival time:	0325hrs	Site: Tower 18
Departure time:	0500hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:	0502hrs	Sunset:	
Wind speed & direction	Calm	Air temperature (C)	13°C
Weather (rain etc):	Dry with ~ 80% cloud cover		

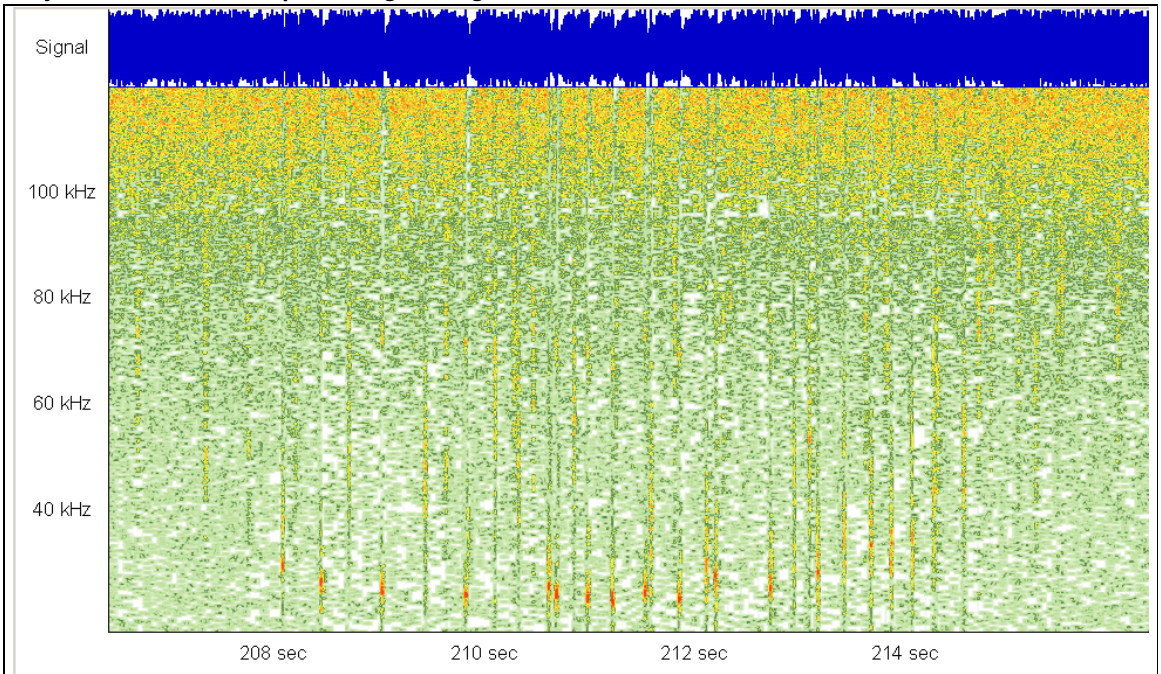
Habitat / corridors / nearby water bodies and general habitat:

Improved grassland bounded by tall alder and hawthorn hedgerows. Low hawthorn hedge fringes road.

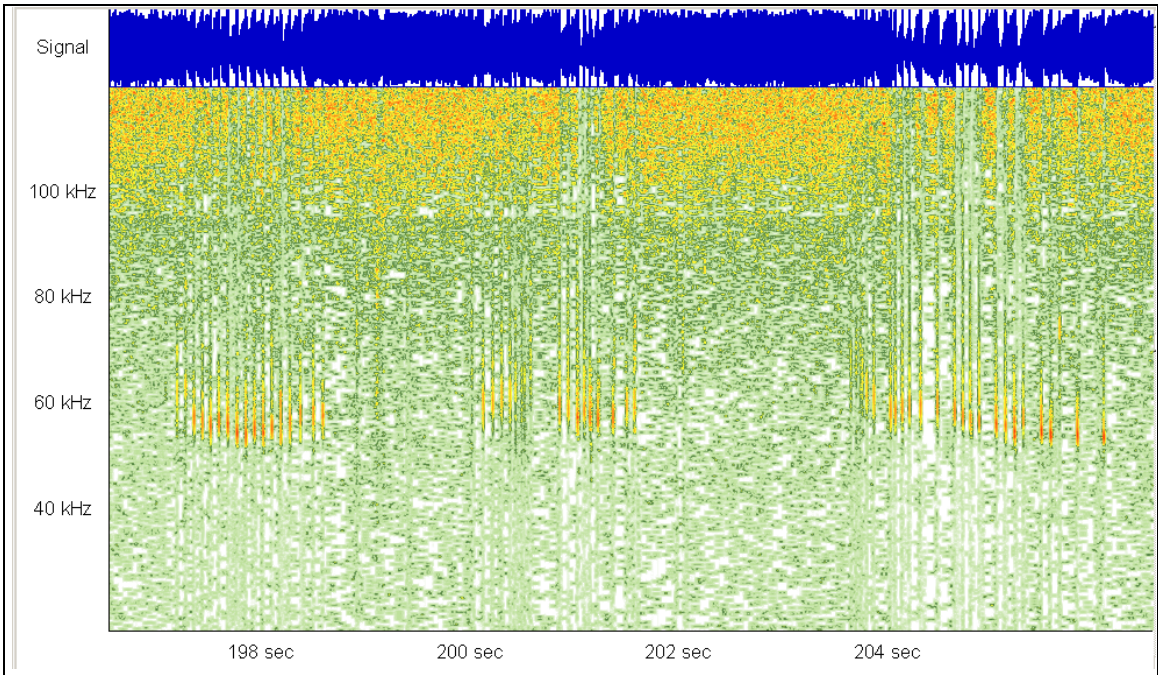
TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0325	Track 1	Tall alder/hawthorn hedge	Leisler's bat	Social call	1
2	0326	Track 1	Tall alder/hawthorn hedge	Leisler's bat	Social call	1
3	0328	Track 1	Tall alder/hawthorn hedge	Leisler's bat	Social call	1
4	0429	Track 1	Tall alder/hawthorn hedge	Leisler's bat	Social call	1
5	0331	Track 2	Large alder in corner of field	Leisler's bat	Commuting	2
6	0331	Track 2	Large alder in corner of field	Soprano pipistrelle	Commuting in distance	2
7	0331	Track 2	Large alder in corner of field	Common pipistrelle	Commuting	1
8	0332	Track 2	Large alder in corner of field	Leisler's bat	Commuting	1
9	0332	Track 2	Large alder in corner of field	Leisler's bat	Foraging	1
10	0333	Track 2	Large alder in corner of field	Soprano pipistrelle	Commuting	1
11	0334	Track 2	Large alder in corner of field	Soprano pipistrelle	Commuting	4
12	0338	Track 3	Tall alder /hawthorn hedge along drain	Soprano pipistrelle	Commuting in distance	1
13	0338	Track 3	Tall alder /hawthorn hedge along drain	Soprano pipistrelle	Commuting	1
14	0346	Track 4	Tall alder /hawthorn hedge along drain	Common pipistrelle	Commuting in distance	2
15	0351	Track 5	Tall alder /hawthorn hedge along drain	Common pipistrelle	Commuting in distance	1

16	0351	Track 5	Tall alder /hawthorn hedge along drain	Leisler's bat	Foraging in distance	1
17	0352	Track 5	Tall alder /hawthorn hedge along drain	Common pipistrelle	Communing in distance	1
18	0354	Track 5	Tall alder /hawthorn hedge along drain	Soprano pipistrelle	Commuting	1
19	0359	Track 6	Tall alder /hawthorn hedge along drain	Common pipistrelle	Commuting in distance	2
20	0406	Track 7	Tall alder /hawthorn hedge along drain	Leisler's bat	Social call	1
21	0406	Track 7	Tall alder /hawthorn hedge along drain	Leisler's bat	Social call / foraging	1
22	0407	Track 7	Tall alder /hawthorn hedge along drain	Soprano pipistrelle	Commuting	1
23	0408	Track 7	Tall alder /hawthorn hedge along drain	Common pipistrelle	Commuting	2
24	0412	Track 8	Tall alder /hawthorn hedge along drain	Leisler's bat	Commuting	1
25	0412	Track 8	Tall alder /hawthorn hedge along drain	Leisler's bat	Social call	1

Objective Evidence of Species e.g. Sonograms



Sonogram of Leisler's bat social call recorded close to Tower 18 recorded at 0329hrs on 3rd June 2010.



Sonogram of commuting Soprano pipistrelles recorded close to Tower 18 recorded at 0334 hrs on 3rd June 2010.

Additional Comments / Observations

The survey was concentrated along tall alder/hawthorn hedgerows immediately east of Tower 18. Bat activity was rather sparse despite ideal weather conditions. Soprano pipistrelles were observed flying from adjacent farm buildings, across field and along hedgerows where the survey was undertaken. Much activity recorded was distant from the survey location.

DUSK SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. 5 years bat survey experience
Date:	2nd June 2010	
Arrival time:	2204hrs	Site: Interconnector – area between Towers 19 and 20
Departure time:	2338hrs	Project and Reference: 60032220 NS Interconnector

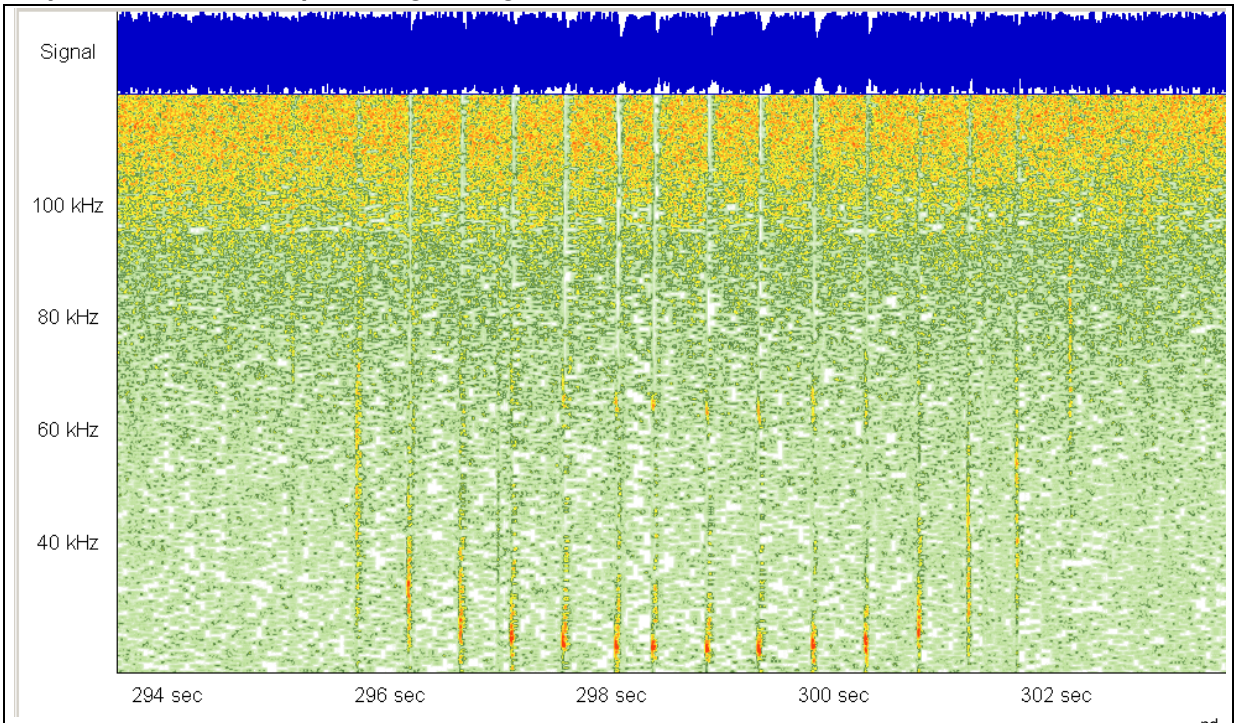
Weather conditions			
Sunrise:		Sunset:	2151hrs
Wind speed & direction	Calm	Air temperature (C)	12
Weather (rain etc):	Dry, ~ 50% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

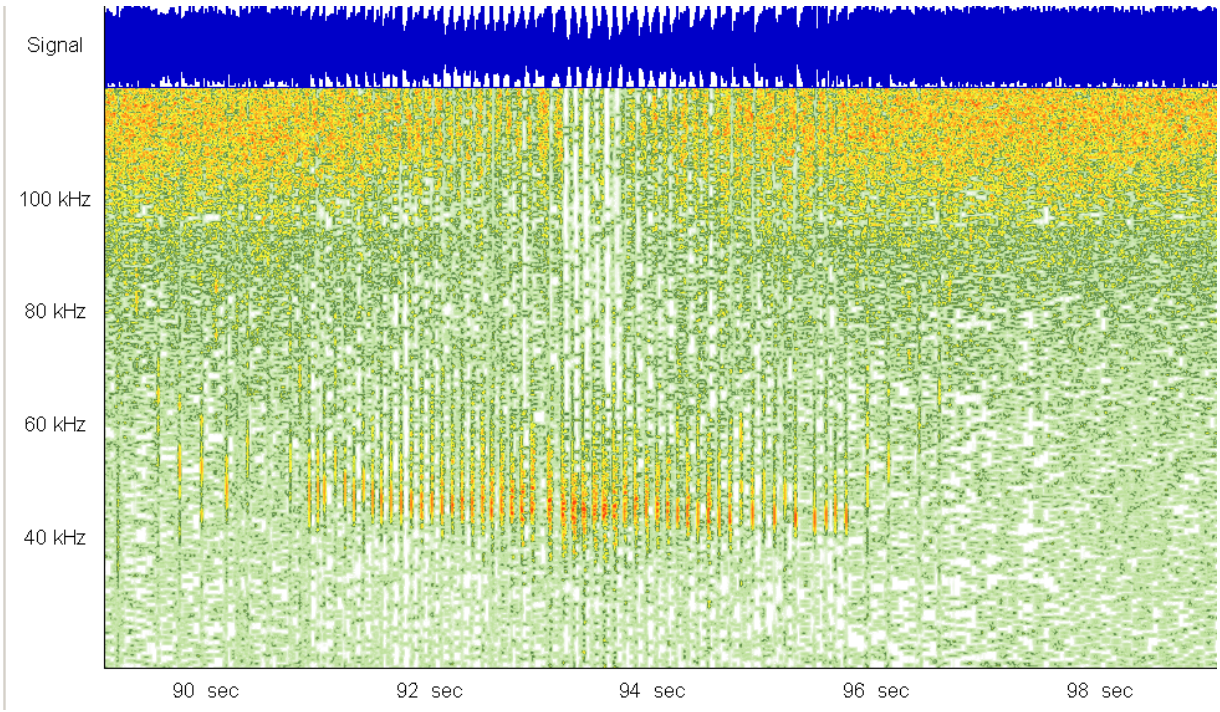
Agricultural grassland bounded by tall hedgerows which have recently been faced.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	22:45	Track 1	Tall hawthorn hedge	Leisler's bat	Social call	1
2	22:46	Track 1	Tall hawthorn hedge	Leisler's bat	Social call	1
3	22:52	Track 2	Tall hawthorn hedge	Leisler's bat	Social call	1
4	22:53	Track 2	Tall hawthorn hedge	Common pipistrelle	Commuting	1
5	22:58	Track 3	Tall hawthorn hedge	Soprano pipistrelle	Commuting	1
6	23:05	Track 4	Tall hawthorn hedge	Leisler's bat	Social call in distance	1
7	23:20	Track 5	Tall hawthorn hedge	Leisler's bat	Social call	1
8	23:21	Track 5	Tall hawthorn hedge	Common pipistrelle	Commuting	2

Objective Evidence of Species e.g. Sonograms



Sonogram of Leisler's bat's bat social call recorded along line route between Towers 19 and 20 at 22:46 on 2nd June 2010.



Sonogram of commuting Common pipistrelle recorded along line route between Towers 19 and 20 at 22:53 on 2nd June 2010.

Additional Comments / Observations

Access constraints prevented survey at locations of Towers 19 and 20 so this survey was undertaken along hedgerows under the line route between these 2 towers. Despite ideal conditions for bat activity, very few bats were recorded.

DUSK SURVEY	Recorder(s): Mary Maguire Cormac Loughran	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. AIEMA MSc, CEnv, MIEEM
Date:	22nd June 2009	
Arrival time:	2225hrs	Site: Tower 23
Departure time:	2345rs	Project and Reference: 60032220

Weather conditions			
Sunrise:	NA	Sunset:	22.35
Wind speed & direction	Calm	Air temperature (°C)	11°C
Weather (rain etc):	Dry, clear and mild		

Habitat / corridors / nearby water bodies and general habitat:

Two dense hedgerows meeting in a field corner. Stream lined with alder along one of the hedgerows, fields generally poor semi-improved grassland. Mature beech and lime nearby but outside impact zone.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2237	Track 1 duet	Along hedgerows/stream side vegetation	Soprano pipistrelles	Foraging and commuting	1
2	2239	Track 1 duet	Across field centre	Soprano pipistrelles	Commuting	1
3	2349	Track 1 duet	Along hedgerows/stream side vegetation	Common pipistrelles	Foraging and commuting	1
4	2257	Track 1 duet	Along hedgerows/stream side vegetation	Common pipistrelles	Commuting	1
5	2259	Track 1 duet	Along hedgerow	Common pipistrelle	Commuting	1
6	2301	Track 1 duet	Along hedgerows/stream side vegetation	Leisler's bat	Commuting	1
7	2308	Track 1 duet	Along hedgerow	Common pipistrelles	Foraging and commuting	1
8	2310	Track 1 duet	Along hedgerows/stream side vegetation	Common pipistrelles	Foraging and commuting	1
9	2311	Track 1 duet	Along hedgerows/stream side vegetation	Common pipistrelles	Commuting	1
10	2313	Track 1 duet	Along hedgerow	Common pipistrelles	Commuting	1
11	2315	Track 1 duet	Along hedgerows/stream side vegetation	Common pipistrelles	Commuting	1
12	2317	Track 1 duet	Along hedgerows/stream side vegetation	Common pipistrelles	Foraging and commuting	2

13	2318	Track 1 duet	Along hedgerow	Common pipistrelles	Foraging and commuting	1
14	2324	Track 1 duet	Along hedgerows/stream side vegetation	Leisler's bat	Commuting	1

Objective Evidence of Species e.g. Sonograms

None

Additional Comments / Observations

15 bat registrations over the course of 100mins is low given the nearby habitats and good weather. Most bats were commuting (and feeding while commuting). The aerial photos in the associated figures for Tower 23 show two blocks of woodland nearby. One to the east, the other to the south. These are likely to be better foraging areas that over an agricultural field and several of the bats appeared to be heading to the woodland to the east.

DUSK SURVEY	Recorder(s): Mary Maguire Cormac Loughran	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. AIEMA MSc, CEnv, MIEEM
Date:	25th May 2009	
Arrival time:	2225hrs	Site: Tower 26
Departure time:	2340hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	NA	Sunset:	2229
Wind speed & direction	Calm	Air temperature (C)	10
Weather (rain etc):	Dry, clear and mild		
Habitat / corridors / nearby water bodies and general habitat: Fen bordered by willow scrub and scattered alder			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2239	Track 1 duet	Along cleared wayleave through the centre of the scrub	Common pipistrelles	Commuting	10
2	2255	Track 1 duet	Other side of scrub bank on opposite side of fen	Leisler's bat	Commuting and foraging	1
3	2301	Track 1 duet	Around trees and scrub at perimeter of site	Leisler's bat	Social call	1
4	2305	Track 1 duet	Around trees and scrub at perimeter of site	Common pipistrelles	Commuting	1
5	2308	Track 1 duet	Along cleared wayleave	Leisler's bat	Commuting	1
6	2310	Track 1 duet	Along site boundary hedge	Common pipistrelle	Commuting	1
7	2318	Track 1 duet	Around trees and scrub at perimeter of site	Common pipistrelles	Commuting	1
8	2329	Track 1 duet	Along cleared wayleave through scrub	Common pipistrelles	Commuting	1
9	2334	Track 1 duet	Along cleared wayleave through scrub	Common pipistrelles	Commuting	1

Objective Evidence of Species e.g. Sonograms
None

Additional Comments / Observations

A stream of 10 bat registrations were not long after arrival on the site (track 1). This was a hotspot of activity, with all 10 bats travelling east to west (3-4m high) underneath a 33kV overhead power line where the scrub has been cleared along an 6m wide swath. These are likely to have been commuting from a roost after dusk to nearby historic foraging areas. Surprisingly the fen and scrub itself did not appear to be used extensively for foraging with only a few distance leislers possibly foraging along the opposite perimeter of the site.

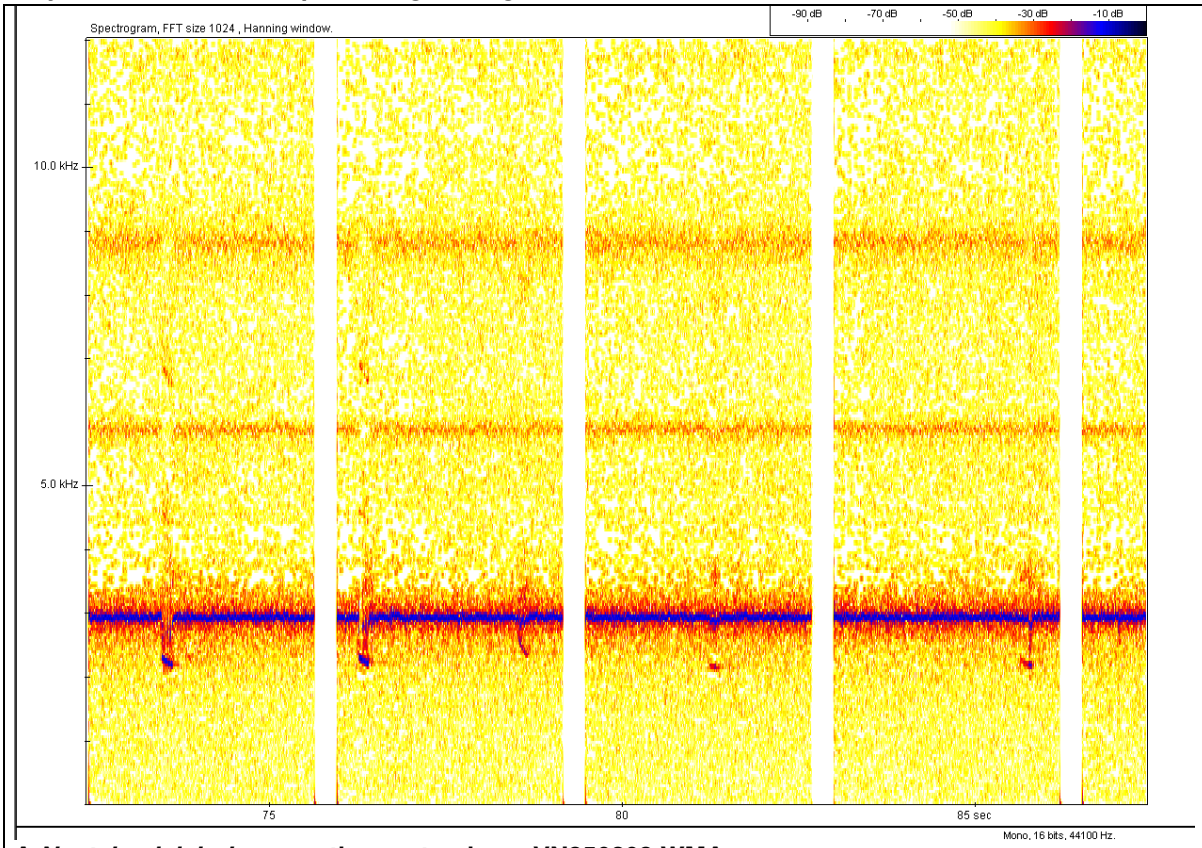
DUSK SURVEY

Site: Tower 28			
Project and Reference: N/S Interconnector (60032220)			
Recorder(s):	Brendan Kemp	**Arrival time:**	2128hrs
Date:	03rd June 2010	**Departure time:**	2249hrs

Weather conditions			
Sunrise:		**Sunset:**	2150hrs
Wind speed & direction:	Calm	**Air temperature (C):**	13
Weather (rain etc):	Dry with ~ 80% cloud cover		
Habitat / corridors / nearby water bodies and general habitat: Mature tree line adjacent to tower location.			

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
21.53	Mature tree line adjacent to tower location.	*VN350199.WMA*	No bats recorded.		
21.59	Mature tree line adjacent to tower location.	VN350200.WMA	*Nyctalus leisleri*	Commuting	1
22.03	Mature tree line adjacent to tower location.	VN350201.WMA	*Nyctalus leisleri*	Commuting	1
22.06	Mature tree line adjacent to tower location.	*VN350202.WMA*	*No bats recorded.*		
22.22	Mature tree line adjacent to tower location.	VN350203.WMA	*Nyctalus leisleri*	Commuting	2
22.28	Mature tree line adjacent to tower location.	VN350204.WMA	*Nyctalus leisleri*	Commuting	1

Objective Evidence of Species e.g. Sonograms



A *Nyctalus leisleri* commuting on track no. VN350203.WMA.

Additional Comments / Observations

Despite almost perfect weather conditions and a multitude of flying insects on the wing during survey, bat activity at the site was quite low.

Qualifications, Experience and Relevant Licenses:

Analysed by Debbie Brown BSc, MSc.

DUSK SURVEY	Recorder(s): Cormac Loughran	Qualifications, Experience and Relevant Licenses: MSc, CEnv, MIEEM
Date:	17th August 2009	
Arrival time:	2100hrs	Site: North of Tower 29
Departure time:	2215hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	20.57
Wind speed & direction	Calm	Air temperature (C)	14°C
Weather (rain etc):	Dry, 98% cloud cover, no wind		

Habitat / corridors / nearby water bodies and general habitat:
Tall hedge in between a number of large arable fields. A tall tree line containing a mature oak was also close by.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2130	VN350027	Along hedgerow	Soprano pipistrelles	Commuting	1
2	2132	VN350028	Along hedgerow	Common pipistrelles	Commuting	1
3	2137	VN350029	Along hedgerow	Soprano pipistrelles	Commuting	1
4	2138	VN350030	Along hedgerow	Soprano pipistrelles	Commuting	1
5	2143	VN350031	Along hedgerow	Pipistrelle species	Commuting	1
6	2144	VN350032	Along hedgerow	Common pipistrelles	Commuting	1
7	2145	VN350033	Along hedgerow	Common pipistrelles	Commuting	1
8	2145	VN350034	Along hedgerow	Pipistrelle species	Commuting	1
9	2146	VN350035	Along hedgerow	Soprano pipistrelle	Commuting	1
10	2147	VN350036	Along hedgerow	Soprano pipistrelle	Commuting	1
11	2148	VN350037	Along hedgerow	Pipistrelle species	Commuting	1
12	2149	VN350038	Along hedgerow	Common pipistrelle & Nathusius pipistrelle	Commuting	2
13	2151	VN350039	Along hedgerow	Common pipistrelles	Commuting	1

Additional Comments / Observations

TN12 recorded a low peak frequency for a pipistrelle. Could be the result of the bats altering their frequency while flying in close proximity to one another, or a possible record of a Nathusius' pipistrelle.

Objective Evidence of Species e.g. Sonograms

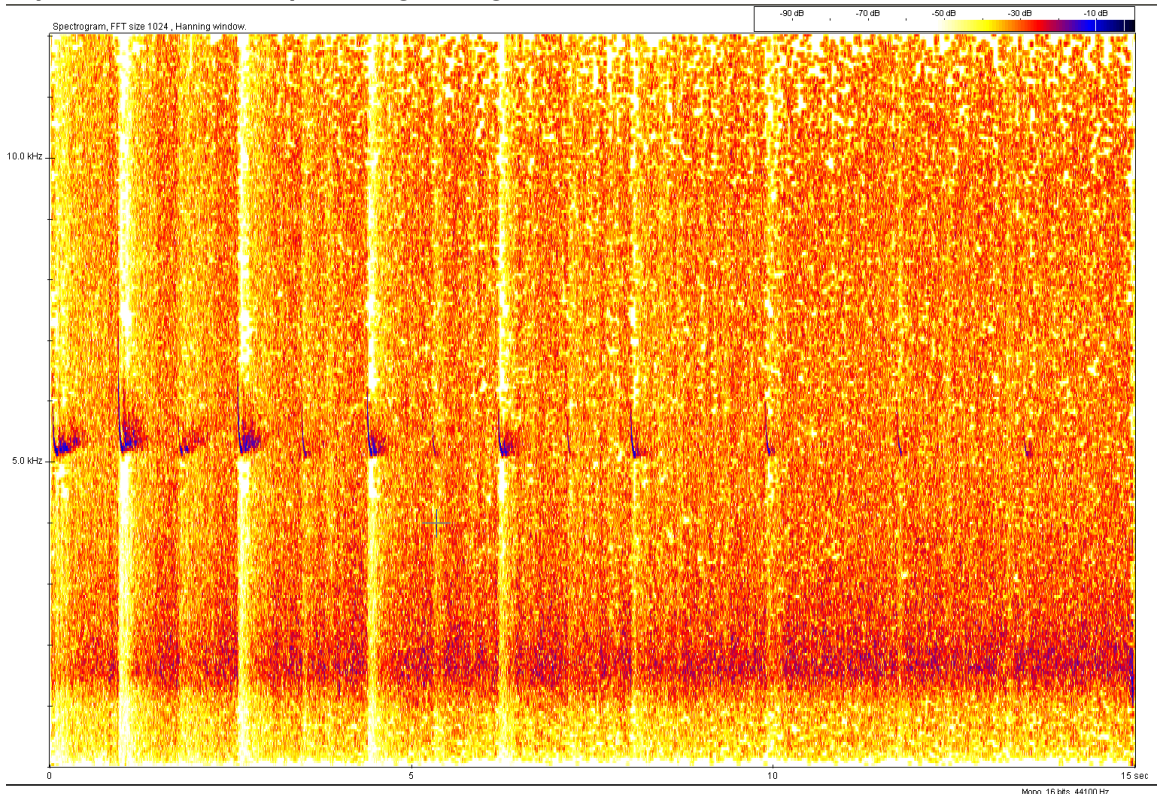


Plate 1 – A spectrogram of TN1 showing a probable soprano pip recorded while commuting along hedge.

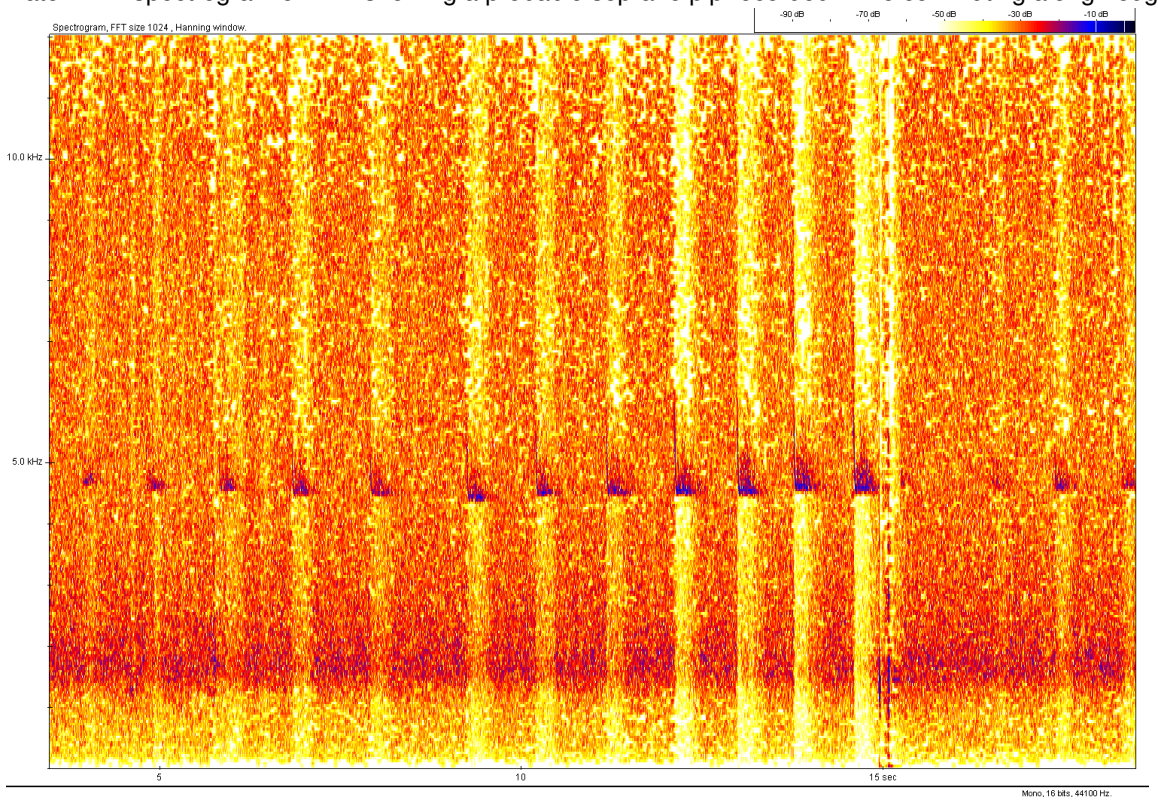


Plate 2 – Showing a common pip travelling along the same hedge 2 mins later.

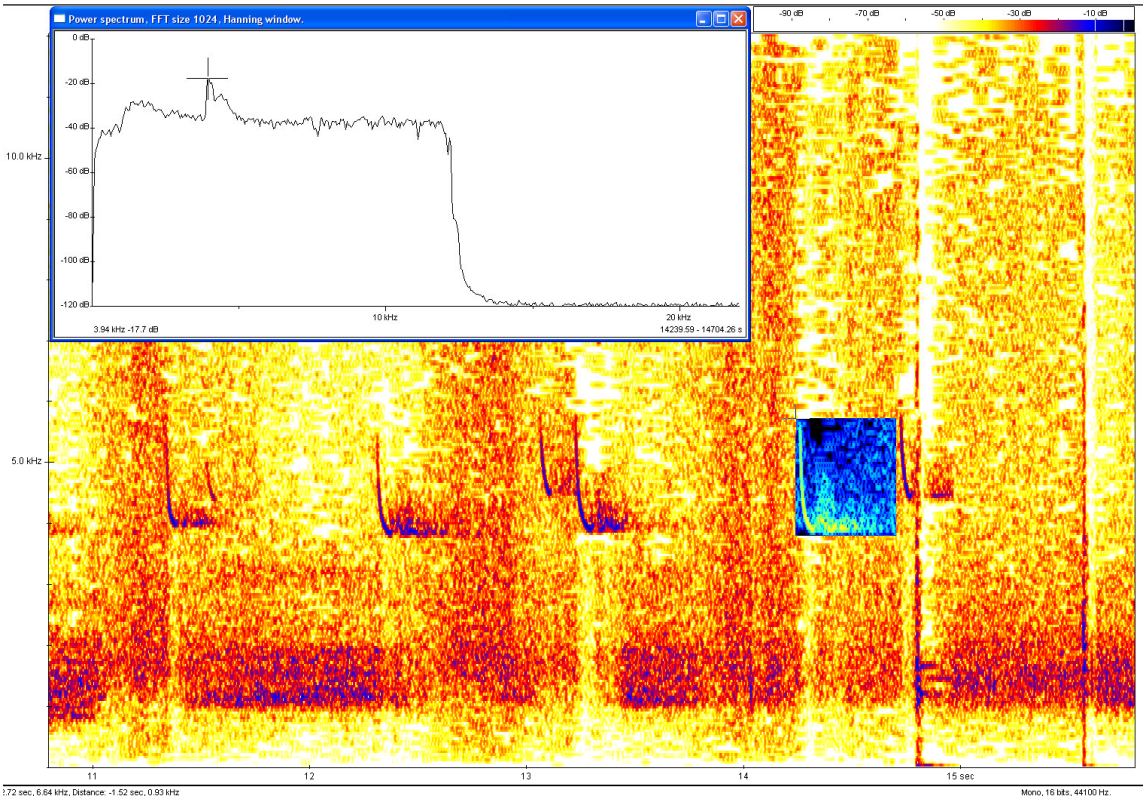


Plate 3 – The analysis of VN350038 showing 2 pipistrelles flying near together. Notice the power spectrum analysis showing the peak frequency as 39.4khz.

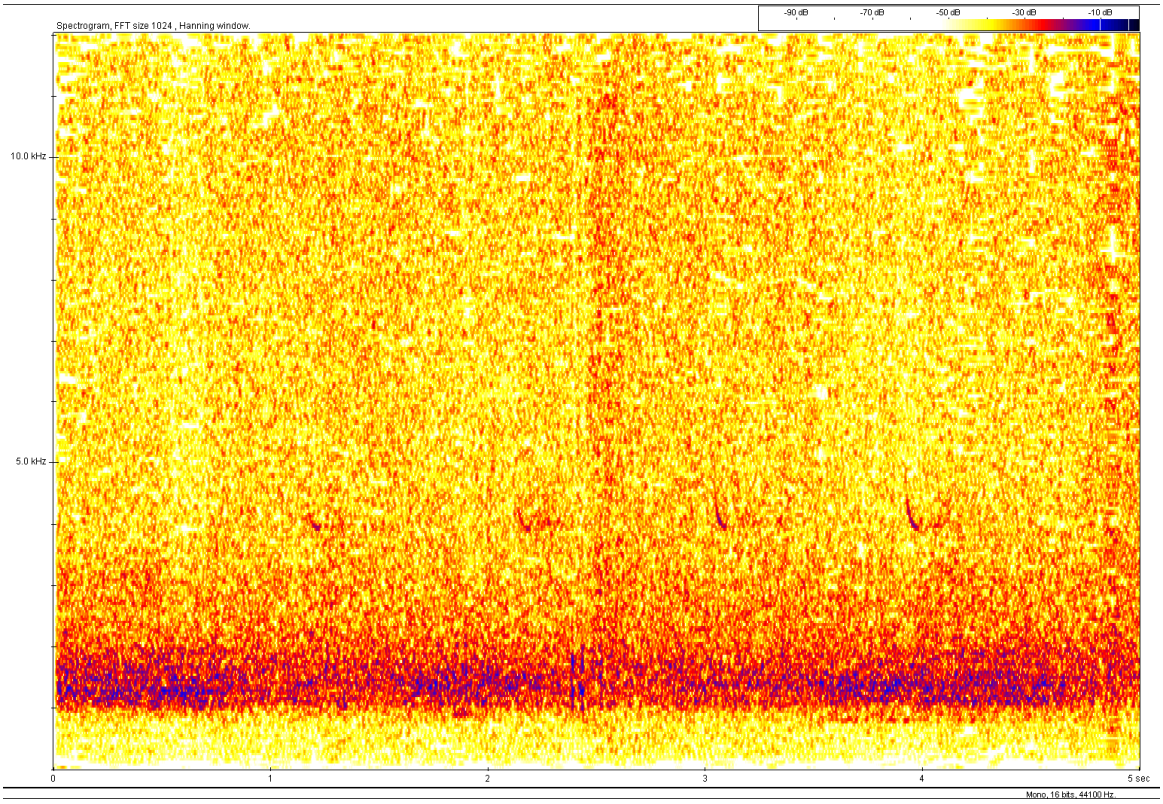


Plate 4 – The analysis of VN350038 showing a pipistrelles with peak frequency as 39.8khz, possibly a Nathusius pipistrelle.

DUSK SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: BSc, MSc
Date:	17th September 2009	
Arrival time:	2100hrs	Site: River Blackwater between Towers 32 & 33
Departure time:	2215hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	20.57
Wind speed & direction	Calm	Air temperature (C)	14°C
Weather (rain etc):	Dry, 98% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:
Tall strip of alder, hawthorn and poplar between large field of improved pasture and River Blackwater - ~ 20m wide with fast-flowing water

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	21.12	Track 1 duet	Along trees fringing river	Leisler's bat	Commuting west to east	6
2	21.15	Track 2 duet	Along trees fringing river	Leisler's bat	Commuting west to east and foraging	19
3	21.16	Track 3 duet	Along trees fringing river	Leisler's bat	Commuting east to west and some foraging	18
4a	21.19	Track 4 duet	Along trees fringing river	Leisler's bat	Commuting and foraging	9
4b	21.19	Track 4 duet	Fields in distance	Soprano pipistrelle	Commuting	1
5a	21.22	Track 5 duet	Along trees fringing river	Leisler's bat	Commuting	16
5b	21.22	Track 5 duet	Fields in distance	Soprano pipistrelle	Social call	2
6	21.24	Track 6 duet	Along trees fringing river	Leisler's bat	Commuting	2
7	21.25	Track 7 duet	Along trees fringing river	Leisler's bat	Commuting/social call	2
8	21.26	Track 8 duet	Over grassland adjacent to trees	Soprano pipistrelle	Commuting	1
9	21.27	Track 9 duet	Along trees fringing river	Leisler's bat	Foraging	2
10a	21.30	Track 10 duet	Along trees fringing river	Soprano pipistrelle	Commuting west to east	1
10b	21.30	Track 10 duet	In distance	Leisler's bat	Social call	1
11a	21.31	Track 11 duet	Along trees fringing river	Soprano pipistrelle	Commuting	2
11b	21.31	Track 11 duet	In distance	Leisler's bat	Social call	1

12a	21.35	Track 12 duet	Along trees fringing river	Soprano pipistrelle	Foraging	4
12b	21.35	Track 12 duet	Along trees fringing river	Leisler's bat	Foraging and social call	2
13	21.37	Track 13 duet	In distance	Soprano pipistrelle	Commuting	2
14	21.39	Track 14 duet	Over grassland close to treeline along river	Soprano pipistrelle	Foraging	3
15	21.40	Track 15 duet	Over grassland close to treeline along river	Soprano pipistrelle	Commuting	1
16	21.42	Track 16 duet	In distance	Soprano pipistrelle	Social call	1
17	21.46	Track 18 duet	On opposite side of the river	Soprano pipistrelle	Commuting	3
18a	21.47	Track 19 duet	Along trees fringing river	Soprano pipistrelle	Foraging	2
18b	21.47	Track 19 duet	In distance	Leisler's bat	Social call	1
19	21.50	Track 21 duet	In distance	Leisler's bat	Foraging	2
20	21.52	Track 22 duet	Along trees fringing river	Leisler's bat	Foraging	3
21a	21.55	Track 23 duet	In distance	Leisler's bat	Social call	1
21b	21.55	Track 23 duet	In distance	Soprano pipistrelle	Commuting	1
22	21.56	Track 24 duet	Over grassland close to treeline along river	Soprano pipistrelle	Foraging	3
23a	21.56	Track 25 duet	In distance	Soprano pipistrelle	Social call	1
24b	21.56	Track 25 duet	In distance	Leisler's bat	Social call	1
25	21.58	Track 26 duet	On opposite side of river	Leisler's bat	Foraging	2
26	22.00	Track 27 duet	Along river	Daubenton's bat	Foraging	4

Objective Evidence of Species e.g. Sonograms

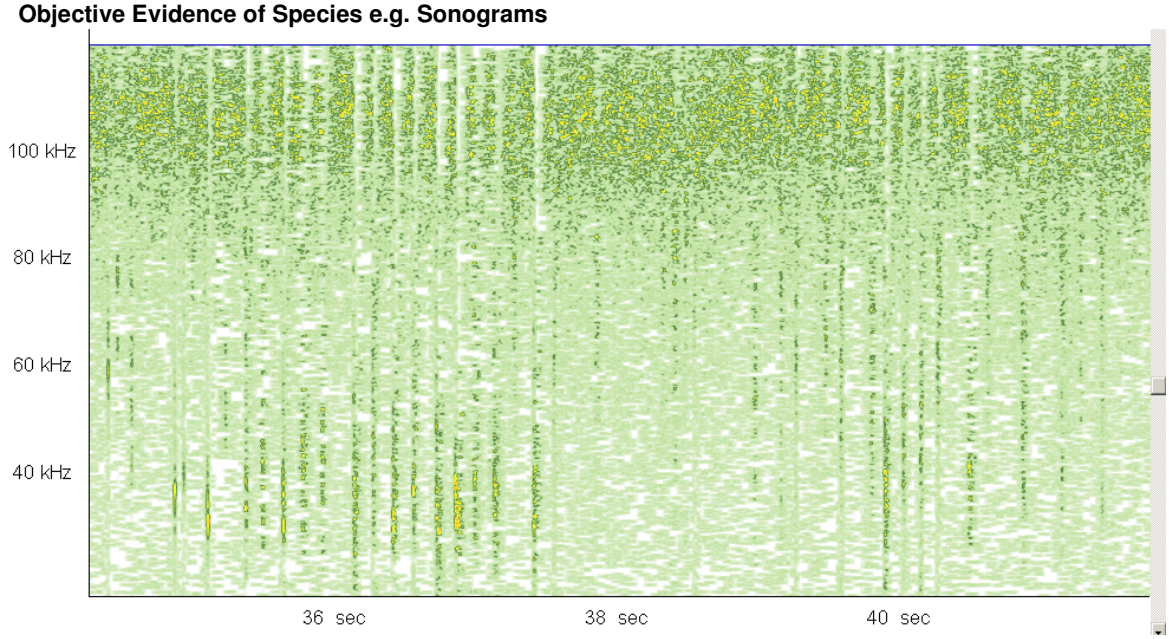


Plate 1: Sonogram of commuting Leisler's bat at 2119 hrs along trees fringing River Blackwater

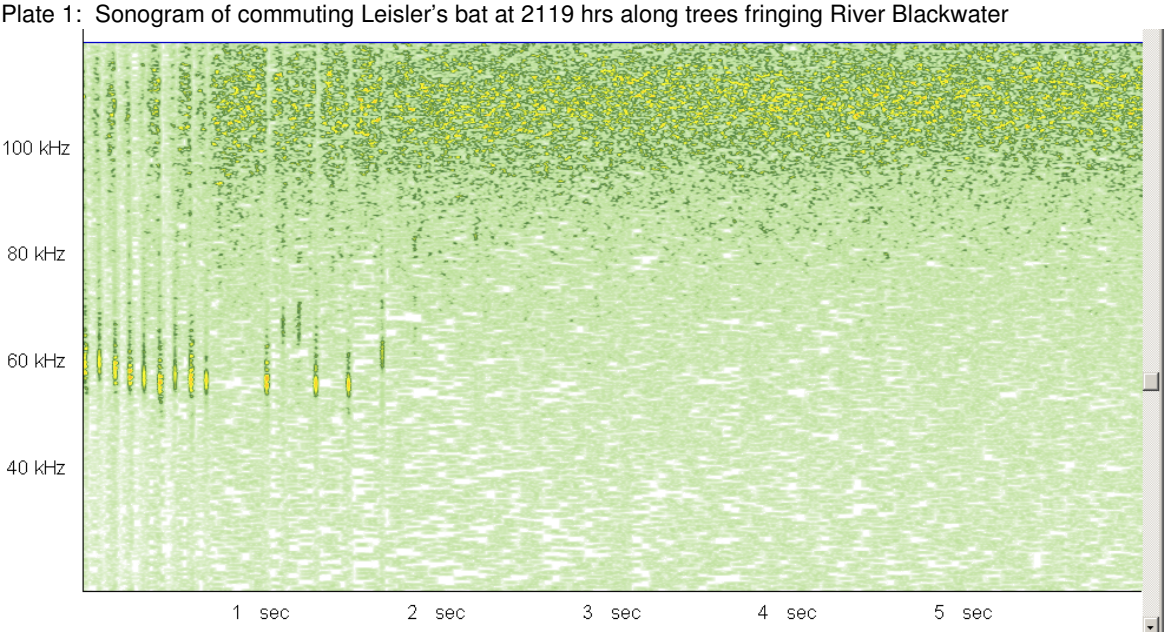


Plate 2: Sonogram of Soprano pipistrelle at 2130 hrs commuting along trees fringing River Blackwater

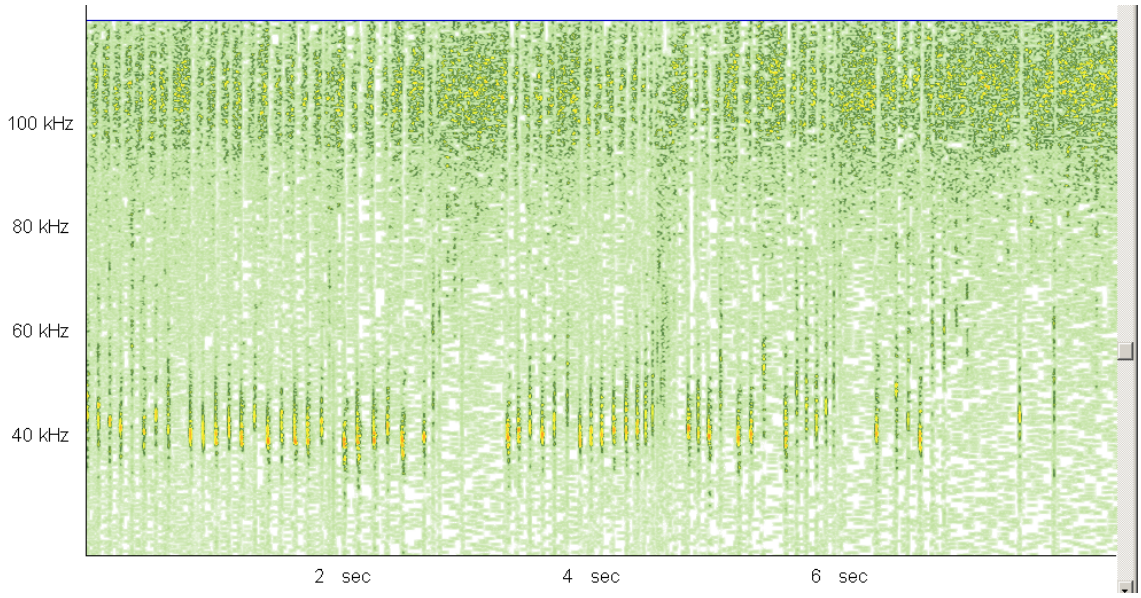


Plate 3: Sonogram of Daubenton's bat foraging activity along the River Blackwater at 2200 hrs

Additional Comments / Observations

This was a hotspot of bat activity throughout the survey.

DUSK SURVEY

Site: Towers 33 to 34			
Project and Reference: N/S Interconnector			
Recorder(s):	Cormac Loughran	**Arrival time:**	1940hrs
Date:	07th September 2010	**Departure time:**	2101hrs

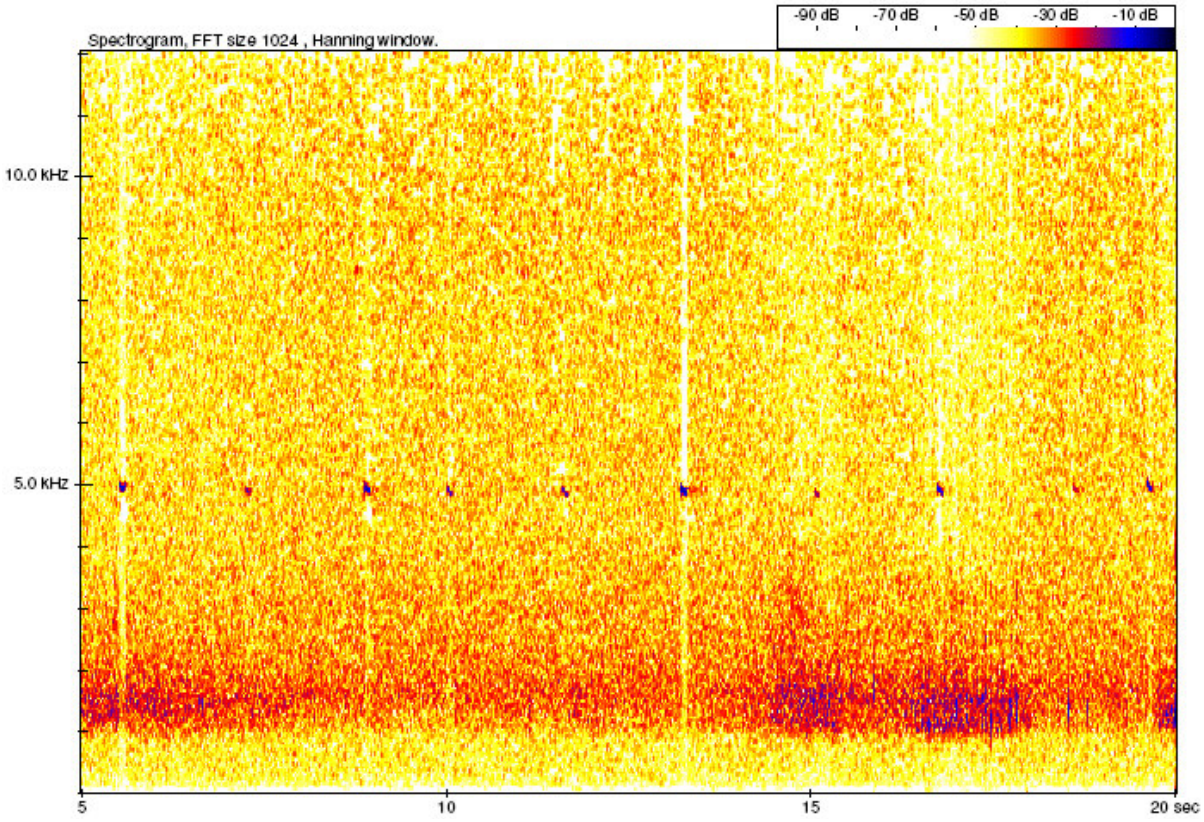
Weather conditions			
Sunrise:		**Sunset:**	2016hrs
Wind speed & direction:	3 mph	**Air temperature (C):**	12°C
Weather (rain etc):	None with 70% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

Hedge line adjacent to a significant block of willow scrub, between Towers 33 & 34.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
19.46	Hedge line bounded by an area of scrub.	*VN35167.WMA*	*Pipistrellus pygmaeus*	Commuting	2
19.53	Hedge line bounded by an area of scrub.	*VN35168.WMA*	*Pipistrellus spp.*	Commuting	1
19.54	Hedge line bounded by an area of scrub.	*VN35169.WMA*	*Pipistrellus pipistrellus*	Commuting	1
19.58	Hedge line bounded by an area of scrub.	*VN35170.WMA*	*Pipistrellus spp.*	Commuting	1
20.00	Hedge line bounded by an area of scrub.	*VN35171.WMA*	*Pipistrellus pipistrellus*	Commuting	1
20.18	Hedge line bounded by an area of scrub.	*VN35172.WMA*	*Pipistrellus pipistrellus*	Commuting	1
20.19	Hedge line bounded by an area of scrub.	*VN35173.WMA*	*Nyctalus leisleri*	Commuting	1
20.29	Hedge line bounded by an area of scrub.	*VN35174.WMA*	*Pipistrellus pipistrellus*	Commuting	1
20.31	Hedge line bounded by an area of scrub.	*VN35175.WMA*	*Pipistrellus pipistrellus*	Commuting	2
20.33	Hedge line bounded by an area of scrub.	*VN35176.WMA*	*Pipistrellus pipistrellus*	Commuting	1
20.27	Hedge line bounded by an area of scrub.	*VN35177.WMA*	*Pipistrellus spp.*	Commuting	1

Objective Evidence of Species e.g. Sonograms



A spectrogram of the Pipistrellus spp. recorded on track no. VN350177.WMA.

Additional Comments / Observations

Moderate level of activity observed at this site, however the scrub area is a low hollow and the bats were flying mostly between 2 and 3 metres. The proposed OHL in this area will likely over sail the area of scrub and therefore the bats will be able to forage normally.

Qualifications, Experience and Relevant Licenses:

MSc, CEnv, MIEEM

DUSK SURVEY	Recorder(s): Remote survey Data interpreted by M. Maguire	Qualifications, Experience and Relevant Licenses: A Batbox Baton was used to record over a 12 hour period, these are the results from the first hour after sunset.
Date:	25th May 2009	
Arrival time:	n/a	Site: Artasooley Wood
Departure time:	n/a	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2140hrs
Wind speed & direction	Calm	Air temperature (C)	15°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
In a small wood of semi mature alders and sycamores, adjacent to a tributary of the River Blackwater and an improved agricultural field.

Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
21.41	51.645 – 55.605	Flying in the tree line around the river	*Nyctalus leisleri*	Commuting	1
21.41	76.692 – 77.397	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
21.42	93.953 – 94.558	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
21.42	112.140 – 113.647	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Commuting	1
21.43	198.650 – 202.885	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging	1
21.43	203.512 – 206.495	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging	2
21.43 – 21.44	207.243 – 213.183	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Foraging and Commuting	1
21.44	217.568 – 218.933	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
21.44	235.343 – 241.077	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
21.44	246.450 – 249.915	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Foraging and commuting	1
21.46	375.955 – 377.530	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging	1
21.47	424.642 – 430.750	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Foraging and Commuting	1
21.50	595.355 – 597.295	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
21.50	611.095 – 613.288	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Foraging	1
21.52	723.775 – 727.212	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging	1

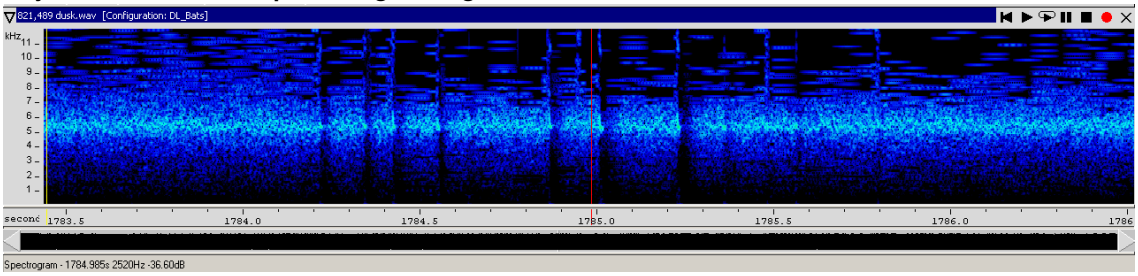
21.52 – 21.53	726.500 – 764.945	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Commuting	1
21.54	854.163 – 856.515	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
21.54	857.260 – 859.138	Flying in the tree line around the river	*Myotis spp.*	Foraging	1
21.55	872.885 – 874.438	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging	1
21.55	875.510 – 886.090	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
21.55	890.183 – 895.033	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
21.55	904.997 – 911.278	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
21.55	921.760 – 923.325	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
21.56	931.300 – 933.008	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
21.56	945.008 – 956.395	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	2
21.56	964.835 – 970.563	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Foraging and Commuting	2
21.56	975.997 – 981.850	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	2
21.57	999.612 – 1003.308	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
21.57	1006.410 – 1009.483	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Foraging and commuting	1
21.57	1021.245 – 1021.798	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Commuting	1
22.00	1170.878 – 1176.415	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Foraging and Commuting	1
22.00	1180.275 – 1183.688	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Foraging and commuting	1
22.00	1196.595 – 1199.655	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
22.00	1203.493 – 1206.443	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
22.01	1237.818 – 1240.660	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
22.03	1405.668 – 1409.198	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
22.04	1429.703 – 1432.818	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Foraging and Commuting	1
22.04	1456.493 – 1460.013	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
22.05	1481.865 – 1489.710	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
22.05	1526.475 – 1527.920	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.07	1594.453 – 1601.615	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging and Commuting	1
22.07	1617.045 – 1618.095	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.10	1784.215 – 1785.255	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1

22.10	1797.218 – 1801.253	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.12	1908.260 – 1915.925	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting and Foraging	2
22.14	2045.848 – 2029.533	Flying in the tree line around the river	*Myotis spp.*	Commuting and Foraging	1
22.15	2111.208 – 2121.878	Flying in the tree line around the river	*Pipistrellus spp. and Pipistrellus pygmaeus*	Commuting and Social calls	1
22.16	2133.430 – 2140.992	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	2
22.16	2155.430 – 2169.895	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	2
22.16 – 22.17	2184.965 – 2202.983	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting and Foarging	2
22.17	2204.418 – 2213.775	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.17	2218.282 – 2222.350	Flying in the tree line around the river	*Pipistrellus spp. and Myotis spp.*	Commuting and Foraging	1
22.17	2239.278 – 2242.035	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.17	2245.195 – 2246.238	Flying in the tree line around the river	*Myotis spp.*	Commuting	1`
22.17 – 22.18	2248.195 – 2253.340	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting, Foraging and Social Calls	2
22.18	2267.778 – 2274.660	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.18	2275.485 – 2285.840	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.18 – 22.19	2309.970 – 2313.055	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.19	2313.577 – 2316.682	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.19	2327.778 – 2337.608	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	2
22.19	2352.753 – 2354.740	Flying in the tree line around the river	*Pipistrellus spp.*	Foraging	1
22.19	2355.965 – 2359.807	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.22	2487.653 – 2499.860	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting and Social calls	2
22.22	2511.200 – 2517.015	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	2
22.22	2520.515 – 2522.128	Flying in the tree line around the river	*Myotis spp.*	Foraging	1
22.22	2526.775 – 2531.055	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Commuting and Foraging	1
22.22	2537.265 – 2541.097	Flying in the tree line around the river	*Myotis spp.*	Commuting	1
22.23	2550.052 – 2555.415	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Commuting and Foraging	1
22.23	2586.077 – 2591.242	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting and Social call	1
22.24	2623.875 – 2630.418	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1

22.24	2664.060 – 2668.875	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.25	2705.910 – 2718.415	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.26	2759.972 – 2767.992	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.26 – 22.27	2788.930 – 2796.008	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.27	2830.997 – 2832.403	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.27	2837.923 – 28240.445	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.27 – 22.28	2844.090 – 2851.113	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.28	2856.023 – 2871.980	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	2
22.29	2891.785 – 2909.355	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.29	2944.372 – 2950.330	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.29	2954.157 – 2965.298	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.30	2989.198 – 2990.407	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
22.30	2992.770 – 2998.015	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging (with a social call)	2
22.30	3004.233 – 3008.320	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foaging (with social calls)	2
22.30	3019.097 – 3023.655	Flying in the tree line around the river	*Myotis spp.*	Commuting and Foraging	1
22.31	3030.325 – 3032.622	Flying in the tree line around the river	*Myotis spp.*	Commuting	1
22.31	3049.012 – 3060.005	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.32	3087.758 – 3101.718	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.32	3111.077 – 3124.603	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.32	3127.825 – 3131.520	Flying in the tree line around the river	*Nyctalus leisleri*	Commuting	1
22.34	3226.372 – 3231.250	Flying in the tree line around the river	*Nyctalus leisleri*	Commuting	1
22.34	3255.936 – 3259.425	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Commuting and Foraging	1
22.35	3302.175 – 3304.892	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Commuting	1
22.36	3365.805 – 3372.320	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting and Foraging	1
22.36	3376.080 – 3380.055	Flying in the tree line around the river	*Myotis spp.*	Foraging	1
22.36	3380.810 – 3381.865	Flying in the tree line around the river	*Myotis spp.*	Foraging	1
22.37	3396.225 – 3400.177	Flying in the tree line around the river	*Pipistrellus pygmaeus*	Foraging and Commuting	1

22.37	3441.813 – 3443.932	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.38	3476.843 – 3484.310	Flying in the tree line around the river	*Pipistrellus spp.*	Commuting	1
22.39 – 22.40	3564.455 – 3576.988	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting and Foraging	2
22.40	3593.780 – 3608.350	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting and Foraging	3
22.40	3618.903 – 3634.725	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting and Foraging	2

Objective Evidence of Species e.g. Sonograms



A sonogram of a *Pipistrellus spp.* commuting at 22.10.

Additional Comments / Observations

Artasooley wood is a hot spot for bat activity with numerous 'bat passes' recorded and a high degree of bat diversity with at least 5 species identified.

DAWN SURVEY	Recorder(s): Remote survey Data interpreted by M. Maguire	Qualifications, Experience and Relevant Licenses: A Batbox Baton was used to record over a 12 hour period, these are the result of the last hour before Dawn.
Date:	25th May 2009	
Arrival time:	n/a	Site: Artasooley Wood
Departure time:	n/a	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:	05.01	Sunset:	N/A
Wind speed & direction	Calm	Air temperature (C)	15°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
In a small wood of semi mature alders and sycamores, adjacent to a tributary of the River Blackwater and an improved agricultural field.

Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
4.01	15.600 – 17.860	Flying in the tree line around the river	*Pipistrellus pipistrellus*	Commuting	1
4.01	18.288 – 20.922	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.02	60.825 – 63.538	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1
4.02	63.722 – 64.945	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1
4.02	65.500 – 68.785	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.02	71.100 – 74.868	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.02	77.965 – 78.332	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.03	113.933 – 114.215	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.03	127.390 – 127.975	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.03	128.382 – 129.260	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.04	170.690 – 171.898	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.05	217.688 – 219.128	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.06	300.385 – 300.630	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.07	333.012 – 343.240	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	2
4.07	344.212 – 346.392	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1

4.07	355.905 – 357.348	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.07	376.835 – 379.392	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.08	399.445 – 402.517	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.09	456.217 – 460.693	Flying in the tree line around the river.	*Nyctalus leisleri*	Commuting	1
4.10	534.803 – 535.188	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.10	555.832 – 560.565	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	2
4.11	590.125 – 592.205	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.12	628.668 – 632.925	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	2
4.13	735.367 – 735.875	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.14	750.643 – 753.360	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting and social calls	1
4.15	854.815 – 857.023	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.15	858.352 – 858.798	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.16	868.545 – 874.063	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Foraging	1
4.16	888.482 – 893.400	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1
4.16	894.860 – 895.325	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.16 - 4.17	927.367 – 937.895	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging and Commuting	2
4.17	961.755 – 962.735	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.17	974.087 – 975.707	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.18	1004.903 – 1007.108	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.18	1048.108 – 1048.978	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.19	1050.198 – 1052.705	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.19	1053.688 – 1055.613	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.19	1056.480 – 1063.805	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging and Commuting	2
4.19	1065.223 – 1072.715	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging and Social calls	1
4.20	1133.470 – 1138.655	Flying in the tree line around the river.	*Nyctalus leisleri* and *Pipistrellus spp.*	Commuting	2
4.20	1138.665 – 1144.283	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.20	1151.273 – 1152.563	Flying in the tree line around the river.	*Nyctalus leisleri*	Commuting	1

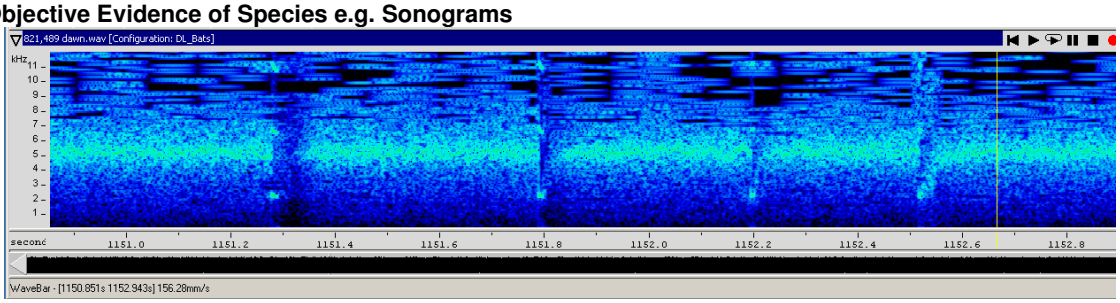
4.20	1153.320 – 1154.713	Flying in the tree line around the river.	*Nyctalus leisleri*	Commuting	1
4.20	1160.485 – 1164.800	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.21	1170.670 – 1172.372	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.21	1205.743 – 1208.088	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.21	1216.043 – 1216.553	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.21 - 4.22	1229.547 – 1232.150	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.22	1258.750 – 1260.685	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.23	1308.530 – 1310.063	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.23	1325.997 – 1328.773	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1
4.23	1330.455 – 1331.818	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.23	1342.103 – 1345.765	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.25	1443.713 – 1447.668	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.26	1477.235 – 1478.372	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.26	1482.523 – 1484.027	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.26	1553.080 – 1557.728	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.26	1559.988 – 1563.753	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.28	1620.128 – 1622.115	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.28 – 4.29	1645.628 – 1655.090	Flying in the tree line around the river.	*Nyctalus leisleri*	Commuting	2
4.29	1675.228 – 1676.360	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.29	1676.898 – 1677.882	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.29	1682.668 – 1682.995	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.30	1732.053 – 1734.523	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.33	1901.648 – 1903.287	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Foraging	1
4.33	1903.932 – 1905.890	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.33	19.06.988 – 1909.033	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.33	1935.608 – 1936.978	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.33	1938.228 – 1938.833	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.33	1939.350 – 1944.733	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1

4.33 - 4.34	1946.293 – 1951.757	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Foraging	1
4.34	1977.380 – 1980.245	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.34	1980.642 – 1981.993	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.35	2018.860 – 2020.213	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.35	2037.648 – 2038.290	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.35	2041.353 – 2042.497	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.36	2103.245 – 2105.545	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.37	2176.208 – 2179.032	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.37	2180.213 – 2182.070	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.38	2223.565 – 2224.050	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.38	2231.173 – 2232.655	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.39	2255.688 – 2257.228	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.39	2271.503 – 2274.943	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.42	2444.418 – 2449.622	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1
4.43	2521.105 – 2522.510	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.43	2523.770 – 2524.855	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.43	2526.190 – 2527.925	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.43	2528.515 – 2528.843	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.43	2536.273 – 2539.693	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting and Foraging	1
4.43	2542.400 – 2542.943	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.43 – 4.44	2549.653 – 2567.145	Flying in the tree line around the river.	*Pipistrellus pipistrellus, Pipistrellus spp.*	Foraging and Commuting	2
4.44	2598.590 – 2599.880	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Foraging	1
4.45	2619.043 – 2620.525	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.45	2643.372 – 2646.867	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging and Commuting	1
4.45	2665.358 – 2666.890	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.46	2670.005 – 2674.387	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Foraging	1
4.46	2698.680 – 2704.600	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting and Foraging	1

4.47	2732.275 – 2737.430	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting and Foraging	1
4.48	2803.097 – 2804.608	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.48	2835.122 – 2836.863	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.50	2940.965 – 2941.395	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.50	2946.497 – 2953.948	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.51	2987.483 – 2988.725	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.51	2989.398 – 2991.927	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.51	2997.560 – 2999.628	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.52	3046.372 – 3050.730	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging and Commuting	1
4.52	3079.470 – 3083.512	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting and Foraging	1
4.52	3087.270 – 3088.548	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.52 – 4.53	3088.988 – 3090.290	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.53	3110.815 – 3114.860	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Commuting	1
4.53	3140.833 – 3142.090	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Foraging	1
4.53	3147.688 – 3148.202	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1
4.54	3157.787 – 3159.222	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Foraging	1
4.54	3161.015 – 3161.655	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.54	3195.273 – 3198.015	Flying in the tree line around the river.	*Pipistrellus spp.*, *Pipistrellus pygmaeus*	Foraging	2
4.55	3238.992 – 3239.517	Flying in the tree line around the river.	*Pipistrellus pygmaeus*	Commuting	1
4.55	3245.228 – 3248.660	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
4.59	3481.613 – 3482.978	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
4.59	3484.060 – 3484.878	Flying in the tree line around the river.	*Pipistrellus pipistrellus*	Foraging	1
5.00	3513.682 – 3514.528	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
5.01	3640.945 – 3641.713	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
5.01	3685.290 – 3685.400	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
5.03	3715.548 – 3716.555	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
5.03	3764.930 – 3767.233	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1

5.03	3768.815 – 3771.023	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
5.05	3826.105 – 3826.708	Flying in the tree line around the river.	*Pipistrellus spp.*	Foraging	1
5.06	3901.435 – 3902.500	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1
5.07	3955.468 – 3956.693	Flying in the tree line around the river.	*Pipistrellus spp.*	Commuting	1

Objective Evidence of Species e.g. Sonograms



Sonogram of a commuting *Nyctalus leisleri*.

Additional Comments / Observations

The survey was a remote survey, so there are no details of flying heights or directions for bats.

DUSK SURVEY	Recorder(s): Mary Maguire & Cormac Loughran	Qualifications, Experience and Relevant Licenses: BSc, MSc, AIEMA MSc, CEnv, MIEEM
Date:	24th June 2009	
Arrival time:	2230hrs	Site: Artasooley Wood
Departure time:	2346hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	22.04
Wind speed & direction	Calm	Air temperature (C)	15°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
A mature tree line along a tributary to the Blackwater River and surrounded by agricultural fields.

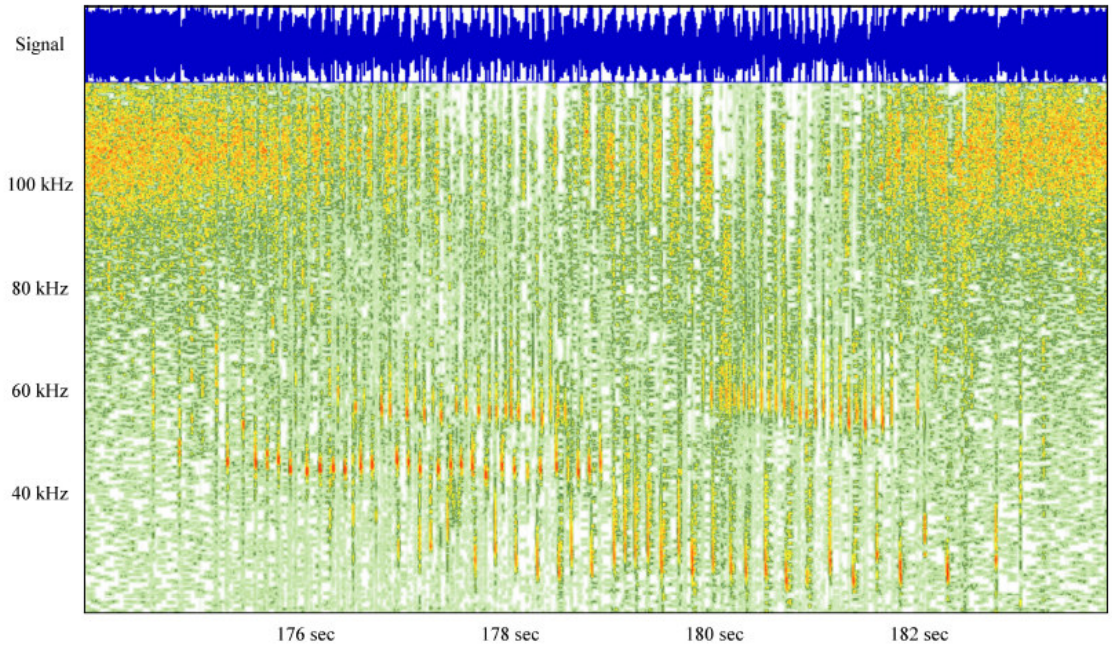
Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
22.46	0.083-2.842	The tree line adjacent to the river	*Pipistrellus spp.* and *Nyctalus leisleri*	Commuting	2
22.46	3.420 – 4.145	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
22.46	12.108-16.102	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
22.48	136.783 – 138.125	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	1
22.48	138.393 – 140.845	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	2
22.48	145.585 – 147.035	The tree line adjacent to the river	*Pipistrellus pipistrellus* and *Pipistrellus spp.*	Commuting	2
22.48 – 22.49	147.220 – 151.742	The tree line adjacent to the river	*Pipistrellus pipistrellus* and *Pipistrellus spp.*	Commuting	2
22.49	156.063 – 156.225	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
22.49	156.885 – 159.548	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
22.49	175.440-176.855	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	1
22.49	176.855 – 177.593	The tree line adjacent to the river	*Pipistrellus pygmaeus* and *Pipistrellus pipistrellus*	Commuting and Foraging	2
22.49	177.593 – 179.088	The tree line adjacent to the river	*Pipistrellus pipistrellus, Pipistrellus pygmaeus* and *Nyctalus leisleri*	Commuting and Foraging	3

22.49	179.215 – 179.993	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
22.49	180.165 – 182.495	The tree line adjacent to the river	*Pipistrellus pygmaeus* and *Nyctalus leisleri*	Pipistrellus pygmaeus Foraging and Commuting. Nyctalus leisleri Commuting	2
22.49	188.905 – 189.515	The tree line adjacent to the river	*Pipistrellus pygmaeus*	Commuting	1
22.49	190.045- 191.610	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	1
22.49	193.548 – 197.137	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging	1
22.49	198.285 – 200.205	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging and Commuting	1
22.49	204.183 – 205.257	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
22.49	208.700 – 212.393	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	1
22.49	219.553- 220.723	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	1
22.49	220.757 – 222.655	The tree line adjacent to the river	*Pipistrellus pygmaeus* and *Pipistrellus pipistrellus*	Foraging	2
22.49	290.9 – 294.5	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	1
22.49 – 22.50	341.702 – 342.215	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	1
22.50	415.038 – 416.262	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging	1
22.50	418.092 – 420.225	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	2
22.51	420.383 – 421.858	The tree line adjacent to the river	*Pipistrellus pipistrellus, Nyctalus leisleri*	Commuting	2
22.52	422.383 – 423.983	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
22.53	452.210 – 426.065	The tree line adjacent to the river	*Nyctalus leisleri*	Foraging	1
22.53	447.928 – 451.938	The tree line adjacent to the river	*Nyctalus leisleri*	Foraging	1
22.53	576.830 – 580.915	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
22.53	623.347 – 632.660	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
22.53 – 22.54	750.038 – 760.737	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging	1
22.56	779.818 – 781.163	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
22.56 – 22.57	781.253 – 782.183	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
22.59	782.332- 782.962	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1

22.59	783.500 – 785.290	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
22.59	810.737 – 812.700	The tree line adjacent to the river	*Pipistrellus pygmaeus*	Foraging	1
22.59	891.327 – 93.680	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
22.59	912.840 – 195.890	The tree line adjacent to the river	*Pipistrellus pygmaeus*	Commuting	1
23.00	1002.492 – 1012.745	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	2
23.01	1018.978 – 1024.287	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	2
23.01	1040.763 – 1042.912	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.03	1064.618 – 1066.985	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.03	1068.290 – 1072.705	The tree line adjacent to the river	*Nyctalus leisleri*	Foraging	1
23.03	1093.688 – 1095.680	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	1
23.04	1096.730 – 1099.963	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	1
23.04	1100.715 – 1102.978	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.04	1103.448 – 1107.145	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.04	1121.560 – 1124.047	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging	1
23.04	1156.415 - 1161.428	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	2
23.04	1175.142 – 1178.257	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging	1
23.05	1208.658 – 1211.138	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	1
23.06	1237.835 – 1242.490	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.06	1243.315 – 1245.170	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.07	1270.622 – 1273.580	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.07	1274.380 – 1276.198	The tree line adjacent to the river	*Nyctalus leisleri*	Foraging	1
23.07	1281.172 – 1282.898	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.07	1341.603 – 1345.260	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.07	1359.610 – 1362.215	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.08	1367.368 – 1369.910	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1
23.09	1491.517 – 1493.260	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.09	1516.390 – 1523.030	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	1
23.11	1557.928 – 1560.895	The tree line adjacent to the river	*Nyctalus leisleri*	Commuting	1

23.11	1661.690 – 1663.878	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging	1
23.12	1663.920 – 1665.277	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Foraging	1
23.14	1665.080 – 1667.132	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	1
23.14	1788.303 – 1790.770	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.16	1860.735 – 1865.043	The tree line adjacent to the river	*Pipistrellus pipistrellus*	Commuting	1
23.17	1866.705 – 1867.468	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.17	1903.188 – 1907.475	The tree line adjacent to the river	*Pipistrellus spp.*	Foraging	1
23.18 – 23.19	1946.005 – 1952.105	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.20	2030.948 – 2032.243	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.20	2033.108 – 2035.110	The tree line adjacent to the river	*Pipistrellus spp.*	Commuting	1
23.22	2143.358 – 2154.188	The tree line adjacent to the river	*Pipistrellus spp., Nyctalus leisleri*	Foraging	2

Objective Evidence of Species e.g. Sonograms



A spectrogram showing *Pipistrellus pygmaeus*, *Pipistrellus pipistrellus* and *Nyctalus leisleri* at 22.49

Additional Comments / Observations

There were intermittently sighting of bats breaking the canopy during the survey, they were identified as *Pipistrellus spp.*

DAWN SURVEY

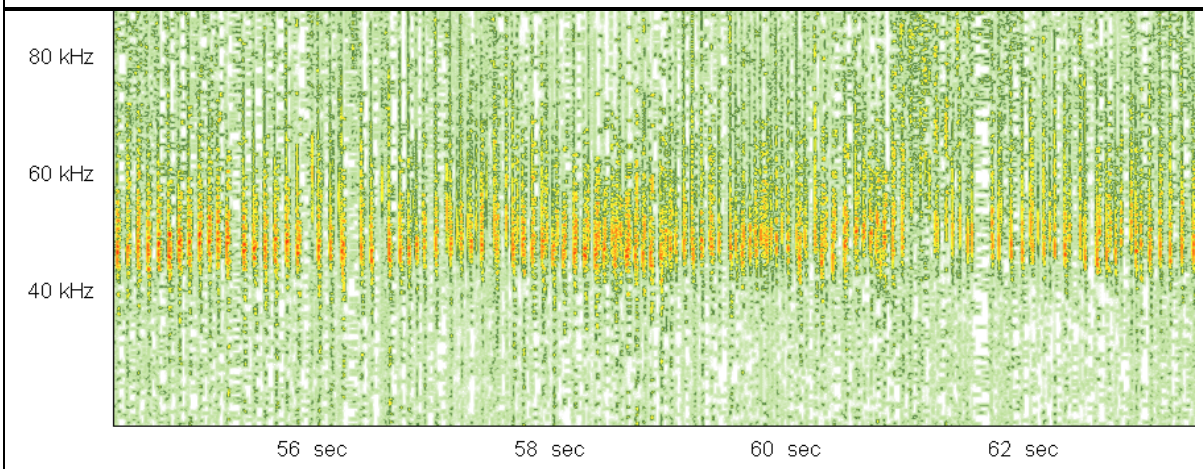
Site: Tower 42			
Project and Reference: 60032220 Tyrone to Cavan Interconnector			
Recorder(s):	Debbie Brown	**Arrival time:**	0319hrs
Date:	05th July 2010	**Departure time:**	0437hrs

Weather conditions			
Sunrise:	0504hrs	**Sunset:**	
Wind speed & direction:	0.8 mph	**Air temperature (C):**	16°C
Weather (rain etc):	Intermittent showers. 10% cloud cover		

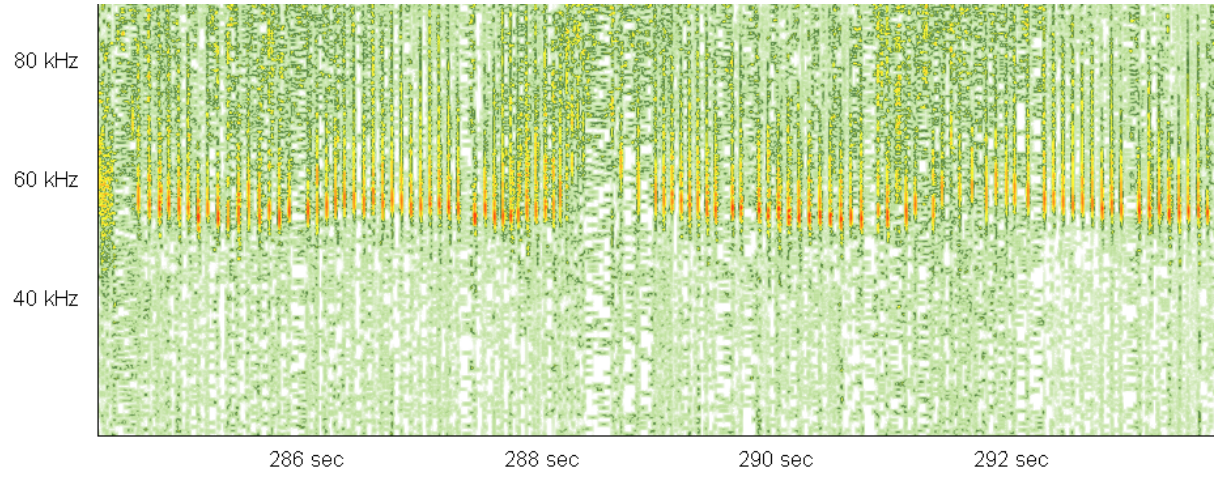
Habitat / corridors / nearby water bodies and general habitat:
Tall alder/hawthorn/ash hedgerow along stream/field drain – semi-improved grassland (dry during survey)

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
0344	Tall hedgerow along stream	Common pipistrelle	foraging	1
0345	Tall hedgerow along stream	Common pipistrelle	Commuting	3
0345	Tall hedgerow along stream	Unidentified	Social call	1
0346	Tall hedgerow along stream	Common pipistrelle	Commuting	1
0346	Tall hedgerow along stream	Unidentified	Social call	1
0348	Tall hedgerow along stream	Soprano pipistrelle	Commuting	6
0348	Tall hedgerow along stream	Soprano pipistrelle	Foraging	5
0354	Tall hedgerow along stream	Soprano pipistrelle	Foraging	2
0355	Tall hedgerow along stream	Common pipistrelle	Commuting	4
0355	Tall hedgerow along stream	common pipistrelle	Foraging	1
0355	Tall hedgerow along stream	Soprano pipistrelle	Commuting	1
0356	Tall hedgerow along stream	common pipistrelle	Constant feeding buzzes recorded for 3 minutes.	
0359	Tall hedgerow along stream	soprano pipistrelle	Constant feeding buzzes recorded for 3 minutes.	
0402	Tall hedgerow along stream	Pipistrelle sp.	Commuting	2
0403	Tall hedgerow along stream	Common pipistrelle	Commuting	1
0404	Tall hedgerow along stream	Common pipistrelle	Commuting	1
0405	Tall hedgerow along stream	Common pipistrelle	Commuting	2
0406	Tall hedgerow along stream	Common pipistrelle	Commuting	12
0407	Tall hedgerow along stream	Common pipistrelle	Commuting	3
0413	Tall hedgerow along stream	Common pipistrelle	Commuting	2
0413	Tall hedgerow along stream	Common pipistrelle	Foraging	1
0418	Tall hedgerow along stream	Common pipistrelle	Commuting	1
0419	Tall hedgerow along stream	Common pipistrelle	Commuting	2
0419	Tall hedgerow along stream	Common pipistrelle	foraging	2
0420	Tall hedgerow along stream	Leisler's	foraging	3
0421	Tall hedgerow along stream	Leisler's	Foraging	2

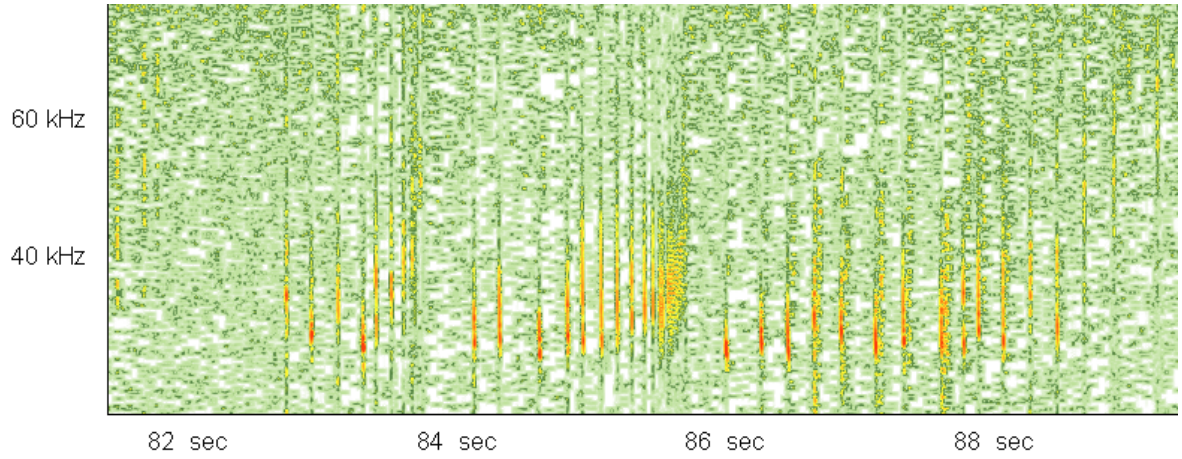
Objective Evidence of Species e.g. Sonograms



Constant common pipistrelle activity recorded from Tower 42 location at 0358 hrs



Constant soprano pipistrelle activity recorded from Tower 42 location at 0401 hrs



Leisler's foraging activity recorded from Tower 42 location at 0420 hrs

Additional Comments / Observations

This area was a hotspot of bat activity, with much common and soprano pipistrelle foraging and commuting activity recorded. Foraging Leisler's bats were recorded towards the end of the survey.

Qualifications, Experience and Relevant Licenses:

B.Sc. M.Sc. 5 years bat survey experience.

DAWN SURVEY

Site: Towers 43			
Project and Reference: N/S Interconnector			
Recorder(s):	Mary Maguire	**Arrival time:**	0309hrs
Date:	05th July 2010	**Departure time:**	0439hrs

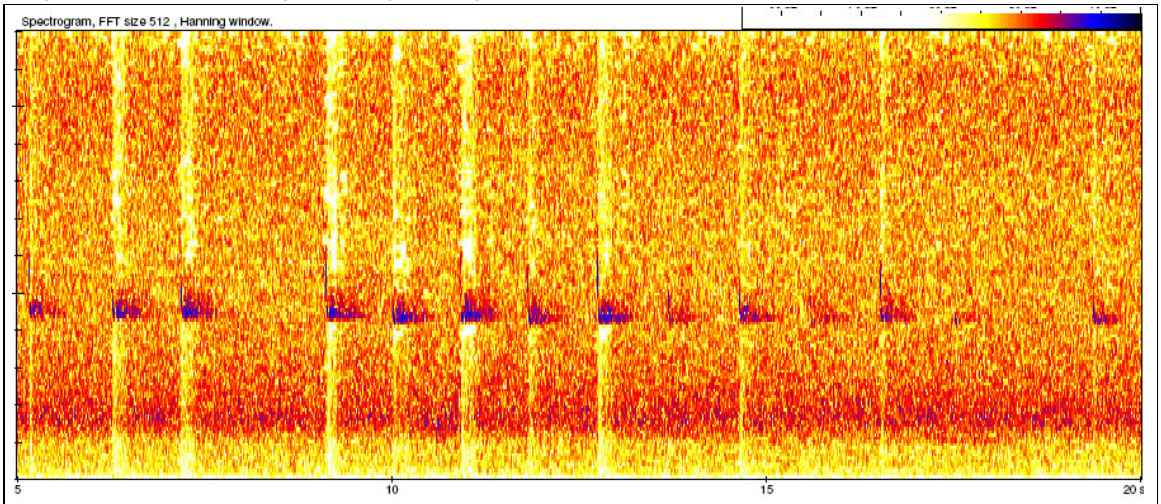
Weather conditions			
Sunrise:	0504hrs	**Sunset:**	
Wind speed & direction:	0.8	**Air temperature (C):**	16°C
Weather (rain etc):	None – cloud cover 10%		

Habitat / corridors / nearby water bodies and general habitat:
Corner of a field with an impenetrable copse to the southwest and a small river to the southeast. Both boundaries were marked out by mature hedge lines.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
0339	Eastern boundary of the copse	*VN350273.WMA*	No bats recorded.		
0348	Eastern boundary of the copse.	*VN350274.WMA*	No bats recorded.		
0357	Southern corner of the field.	*VN350275.WMA*	Pipistrellus pipistrellus	Commuting	1
0404	Southern corner of the field.	*VN350276.WMA*	*Pipistrellus spp.*	Commuting	3
0404	Southern corner of the field.	*VN350276.WMA*	*Pipistrellus spp.*	Social call	1
0407	Southern corner of the field.	*VN350277.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0408	Southern corner of the field.	*VN350278.WMA*	*Nyctalus leisleri*	Commuting	1
0410	Southern corner of the field.	*VN350279.WMA*	*Pipistrellus spp.*	Commuting	1
0411	Southern corner of the field.	*VN350280.WMA*	*Pipistrellus pipistrellus*	Commuting	2
0411	Southern corner of the field.	*VN350280.WMA*	*Pipistrellus spp.*	Commuting	1
0412	Southern corner of the field.	*VN350281.WMA*	*Pipistrellus pipistrellus*	Commuting	2
0413	Southern corner of the field.	*VN350282.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0414	Southern corner of the field.	*VN350283.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0416	South eastern boundary of the field, by the river.	*VN350284.WMA*	*Pipistrellus spp.*	Commuting	1

0417	South eastern boundary of the field	*VN350285.WMA*	*No bats recorded.*		
0417	South eastern boundary of the field	*VN350286.WMA*	*No bats recorded.*		
0417	South eastern boundary of the field	*VN350287.WMA*	*Pipistrellus spp.*	Commuting	2
0417	South eastern boundary of the field	*VN350287.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0420	South eastern boundary of the field	*VN350288.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0420	South eastern boundary of the field	*VN350289.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0421	South eastern boundary of the field	*VN350290.WMA*	*Pipistrelle nathusii*	Commuting	1
0421	South eastern boundary of the field	*VN350291.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0422	South eastern boundary of the field	*VN350292.WMA*	*Pipistrellus pipistrellus*	Commuting	1
0424	South eastern boundary of the field	*VN350293.WMA*	*No bats recorded.*		
0427	South eastern boundary of the field	*VN350294.WMA*	*No bats recorded.*		
0429	South eastern boundary of the field	*VN350295.WMA*	*Pipistrelle nathusii*	Commuting	1
0430	South eastern boundary of the field	*VN350296.WMA*	*No bats recorded.*		
0432	South eastern boundary of the field	*VN350297.WMA*	*Pipistrellus pipistrellus*	Commuting	3
0432	South eastern boundary of the field	*VN350297.WMA*	*Pipistrellus pipistrellus*	Social call	1

Objective Evidence of Species e.g. Sonograms



The *Pipistrellus pipistrellus* (x3) recorded on VN350297.WMA.

Additional Comments / Observations

Bats were spotted circling in the southern corner of the field at 0400hrs.

Qualifications, Experience and Relevant Licenses:

BSc, MSc, AIEMA
5+ years of bat survey experience

DAWN SURVEY

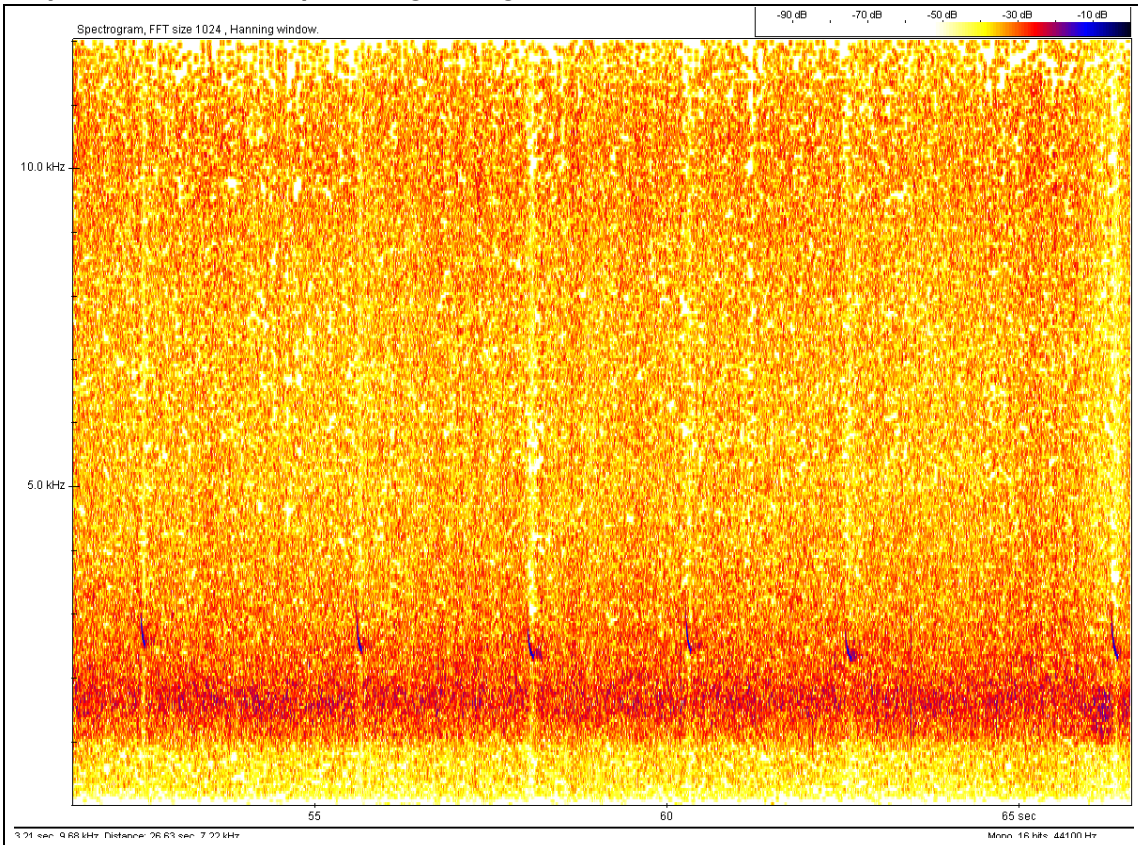
Site: Towers 46 to 47			
Project and Reference: N/S Interconnector (60032220)			
Recorder(s):	Mary Maguire	**Arrival time:**	0500hrs
Date:	07th September 10	**Departure time:**	0615hrs

Weather conditions			
Sunrise:	0644hrs	**Sunset:**	
Wind speed & direction:	3mph	**Air temperature (C):**	12°C
Weather (rain etc):	None – cloud cover 70%		

Habitat / corridors / nearby water bodies and general habitat:
Mature tree lines adjacent to an abandoned house and shed.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
0505	Mature tree lines adjacent to an abandoned house and shed.	*VN350441.WMA*	No bats recorded.		
0508		*VN350442.WMA*	No bats recorded.		
0511		*VN350443.WMA*	*Nyctalus leisleri*	Commuting	1
0515		*VN350444.WMA*	*Nyctalus leisleri*	Commuting	1
			Pipistrellus pipistrellus	Commuting	4
0518		*VN350445.WMA*	*Pipistrellus pipistrellus*	Commuting	6
			Pipistrellus pipistrellus	Foraging	1
			Nyctalus leisleri	Commuting	2
0522		*VN350446.WMA*	*No bats recorded.*		
0526		*VN350447.WMA*	*No bats recorded.*		
0531		*VN350448.WMA*	*Pipistrellus pipistrellus*	Commuting	8
0536		*VN350449.WMA*	*Pipistrellus pipistrellus*	Commuting	5
0539		*VN350450.WMA*	*Pipistrellus pipistrellus*	Commuting	5
0545		*VN350451.WMA*	*Pipistrellus pipistrellus*	Commuting	4
0548		*VN350452.WMA*	*Nyctalus leisleri*	Commuting	1

Objective Evidence of Species e.g. Sonograms



A *Nyctalus leisleri* commuting on track no. *VN350452.WMA*

Additional Comments / Observations

Mature hedgeline with commuting bats but no evidence of roosting behaviour or opportunities.

Qualifications, Experience and Relevant Licenses:

MSc, BSc, AIEMA

DUSK SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: BSc, MSc 5 years of bat survey experience
Date:	14th September 2009	
Arrival time:	2000 hrs	Site: Tower 49 – old railway line
Departure time:	2115 hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	1949 hrs
Wind speed & direction	Calm	Air temperature (C)	10
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:

Old railway line overgrown with dense gorse and willow scrub, tall ruderal vegetation and scattered mature ash. Adjacent to improved pasture.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	20.35	Track 4 duet	In distance along railway line	Common Pipistrelle	Commuting	1
2	20.37	Track 4 duet	In distance along railway line	Common Pipistrelle	Commuting	1
3	20.44	Track 4 duet	In distance along railway line	Common Pipistrelle	Commuting	1
4	20.51	Track 5 duet	In distance along railway line	Leisler	Commuting	1
5	20.55	Track 6 duet	Along scrub just west of proposed tower location	Leisler	Commuting	2
6	20.57	Track 6 duet	Along scrub just west of proposed tower location	Leisler	Commuting	2
7	21.00	Track 6 duet	Along scrub just west of proposed tower location	Pipistrelle species	Commuting	2
8	21.02	Track 6 duet	Along scrub just west of proposed tower location	Pipistrelle species	Foraging	2

Additional Comments / Observations

Most of the bat activity recorded was along the dense scrub and vegetation fringing the railway line, west of the proposed tower location.

Objective Evidence of Species e.g. Sonograms

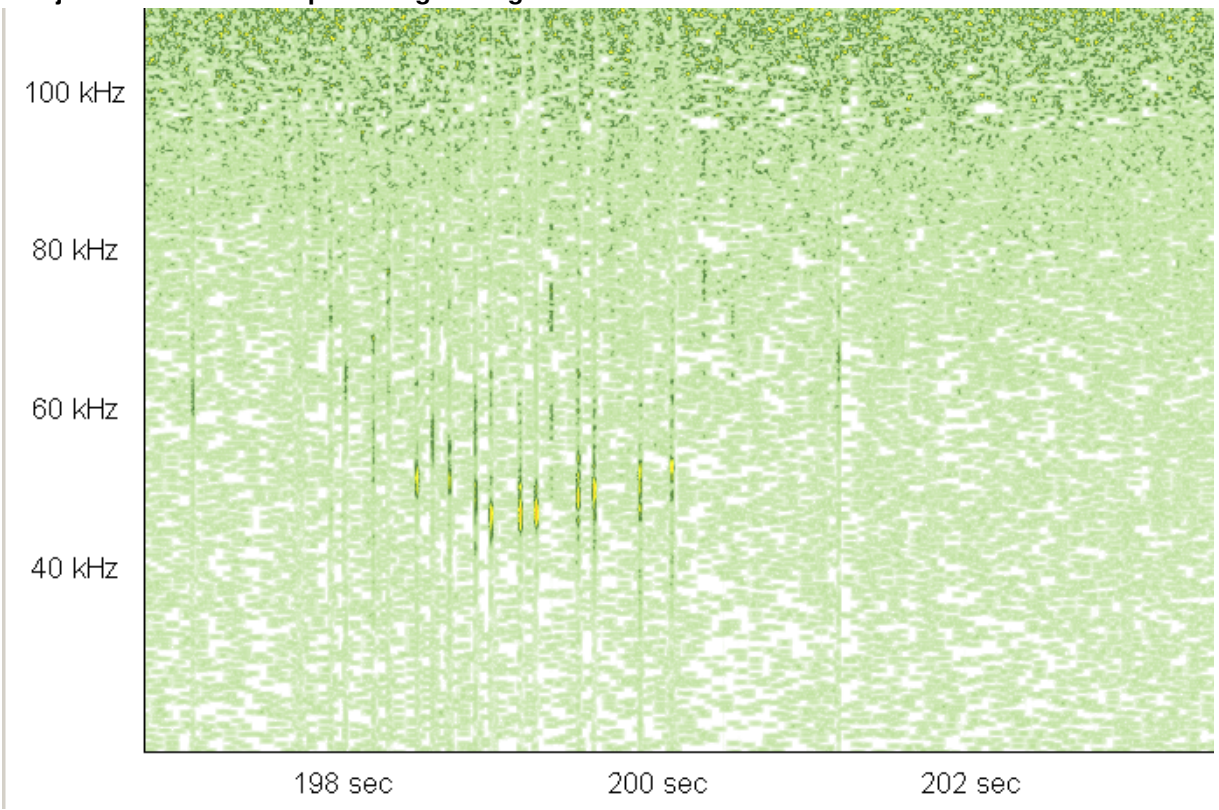


Plate 1: Sonogram of Common pipistrelle commuting along old railway line at 2037 hrs on 14/09/09

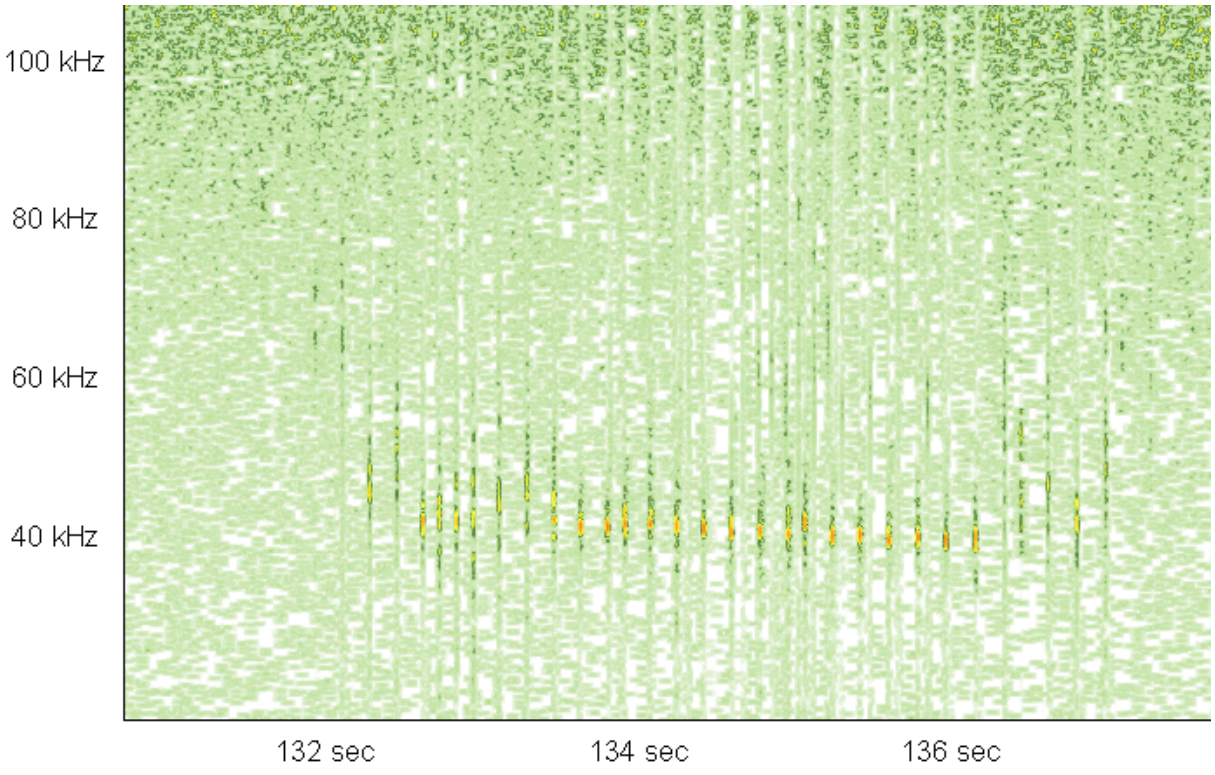


Plate 2: Sonogram of Leisler's bat commuting along scrub at proposed location of Tower 49 at 2057 hrs on 14/09/09

DUSK SURVEY	Recorder(s): Mary Maguire	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. AIEMA
Date:	14th September 2009	
Arrival time:	1955hrs	Site: Tower 51
Departure time:	2059hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	1944hrs
Wind speed & direction	Blustery	Air temperature (C)	10°C
Weather (rain etc):	Dry, with light rain beginning towards the end of the survey.		

Habitat / corridors / nearby water bodies and general habitat:

Fixed survey point at the base of proposed tower 51. Base in mature hedge with hawthorn, blackthorn, dog rose and holly. The hedge bounded an agricultural field which contained sheep.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	20.06	1	Mature trees and associated hedgeline	Common pipistrelle	Commuting	1
2	20.06	1	Mature trees and associated hedgeline	Soprano pipistrelle	Commuting	1
3	20.06	1	Mature trees and associated hedgeline	Leisler's bat	Commuting	1
4	20.06	2	Mature trees and associated hedgeline	Pipistrelle sp.	Commuting	1
5	20.06	2	Mature trees and associated hedgeline	Soprano pipistrelle	Commuting	1
6	20.06	2	Mature trees and associated hedgeline	Pipistrelle sp.	Commuting	1
7	20.11	2	Mature trees and associated hedgeline	Pipistrelle sp.	Commuting	1
8	20.11	2	Mature trees and associated hedgeline	Pipistrelle sp.	Commuting	1
9	20.13	2	Mature trees and associated hedgeline	Soprano pipistrelle	Commuting	2
10	20.16	3	Mature trees and associated hedgeline	Leisler's bat	Foraging	2
11	20.18	3	Mature trees and associated hedgeline	Leisler's bat	Foraging	2
12	20.26	4	Mature trees and associated hedgeline	Leisler's bat	Foraging	2
13	20.26 to 20.27	4	Mature trees and associated hedgeline	Leisler's bat	Foraging	2
14	20.27	4	Mature trees and associated hedgeline	Leisler's bat	Foraging	1
15	20.27 to 20.29	4	Mature trees and associated hedgeline	Leisler's bat	Foraging	1

16	20.29	4	Mature trees and associated hedgeline	Leisler's bat	Foraging	1
17	20.34	4	Mature trees and associated hedgeline	Leisler's bat	Commuting	1
18	20.34	4	Mature trees and associated hedgeline	Leisler's bat	Commuting	1
19	20.34	4	Mature trees and associated hedgeline	Leisler's bat	Commuting	2
20	20.34	4	Mature trees and associated hedgeline	Leisler's bat	Commuting	2
21	20.35	4	Mature trees and associated hedgeline	Leisler's bat	Foraging	2
22	20.40	5	Mature trees and associated hedgeline	Soprano pipistrelle	Foraging	1
23	20.45	5	Mature trees and associated hedgeline	Leisler's bat	Foraging	1
24	20.45	5	Mature trees and associated hedgeline	Leisler's bat	Commuting	1
25	20.46	5	Mature trees and associated hedgeline	Leisler's bat	Commuting	1
26	20.47 to 20.48	6	Mature trees and associated hedgeline	Leisler's bat	Commuting	2
27	20.48	6	Mature trees and associated hedgeline	Leisler's bat	Commuting	1
28	20.49	6	Mature trees and associated hedgeline	Pipistrelle sp.	Foraging	1
29	20.49 to 20.50	6	Mature trees and associated hedgeline	Pipistrelle sp.	Foraging	1
30	20.50	6	Mature trees and associated hedgeline	Pipistrelle sp.	Commuting	1
31	20.51	6	Mature trees and associated hedgeline	Soprano pipistrelle	Commuting	1
32	20.51 to 20.52	6	Mature trees and associated hedgeline	Leisler's bat	Commuting	1

Objective Evidence of Species e.g. Sonograms

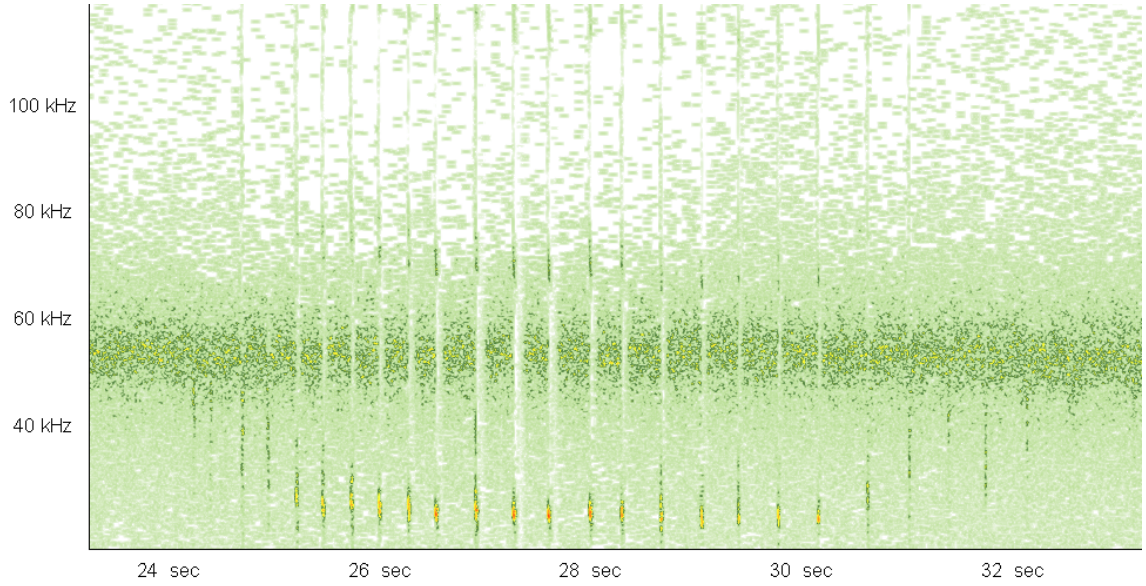


Plate 1: Sonogram of foraging Leisler's bat recorded at 2016 hrs on 14/09/09

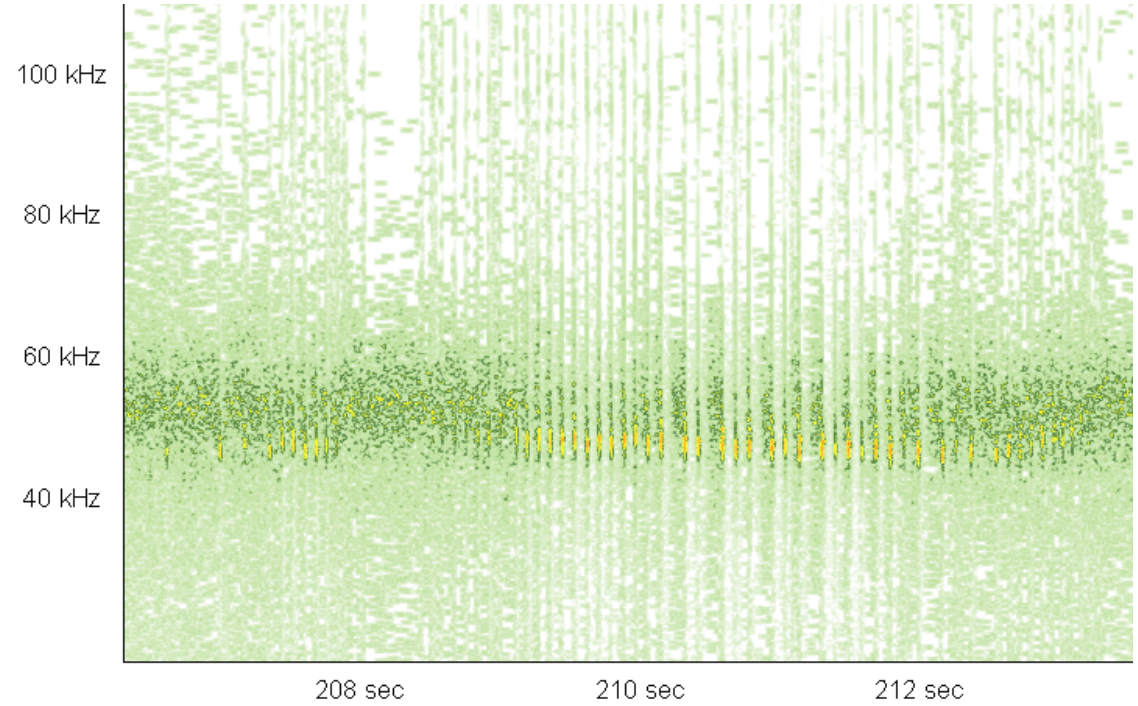


Plate 2: Sonogram of foraging Pipistrelle sp. recorded at 2016 hrs on 14/09/09

Additional Comments / Observations

Reasonable amount of activity given the impoverished habitat in this area. Trees will need to be inspected by a licensed bat worker immediately prior to any required vegetation cutting.

DUSK SURVEY	Recorder(s): Cormac Loughran	Qualifications, Experience and Relevant Licenses: MSc, CEnv, MIEEM
Date:	14th September 2009	
Arrival time:	2000hrs	Site: Tower 53
Departure time:	2115hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	1949hrs
Wind speed & direction	Calm	Air temperature (C)	10°C
Weather (rain etc):	Dry		
Habitat / corridors / nearby water bodies and general habitat: Tall overgrown hedgerow with mature trees with improved grassland field grazed by cattle			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2022	VN350181	Along hedgerow	Pipistrelle species	Commuting	1
2	2034	VN350183	Along hedgerow	Leisler's bat	Commuting	2
3	2035	VN350184	Along hedgerow	Leisler's bat	Commuting	2
4	2035	VN350185	Along hedgerow	Leisler's bat	Commuting	2
5	2036	VN350186	Along hedgerow	Leisler's bat	Commuting	2
6	2041	VN350187	Along hedgerow	Common pipistrelles	Commuting	1
7	2043	VN350188	Along hedgerow	Pipistrelle species	Commuting	1
8	2043	VN350189	Along hedgerow	Pipistrelle species	Commuting	1
9	2045	VN350190	Along hedgerow	Common pipistrelles	Commuting	1

Additional Comments / Observations

Sub-optimal conditions for bats but still within known tolerances. 12 degrees centigrade and with a light breeze I would have expected significantly higher levels of bat activity.

Objective Evidence of Species e.g. Sonograms

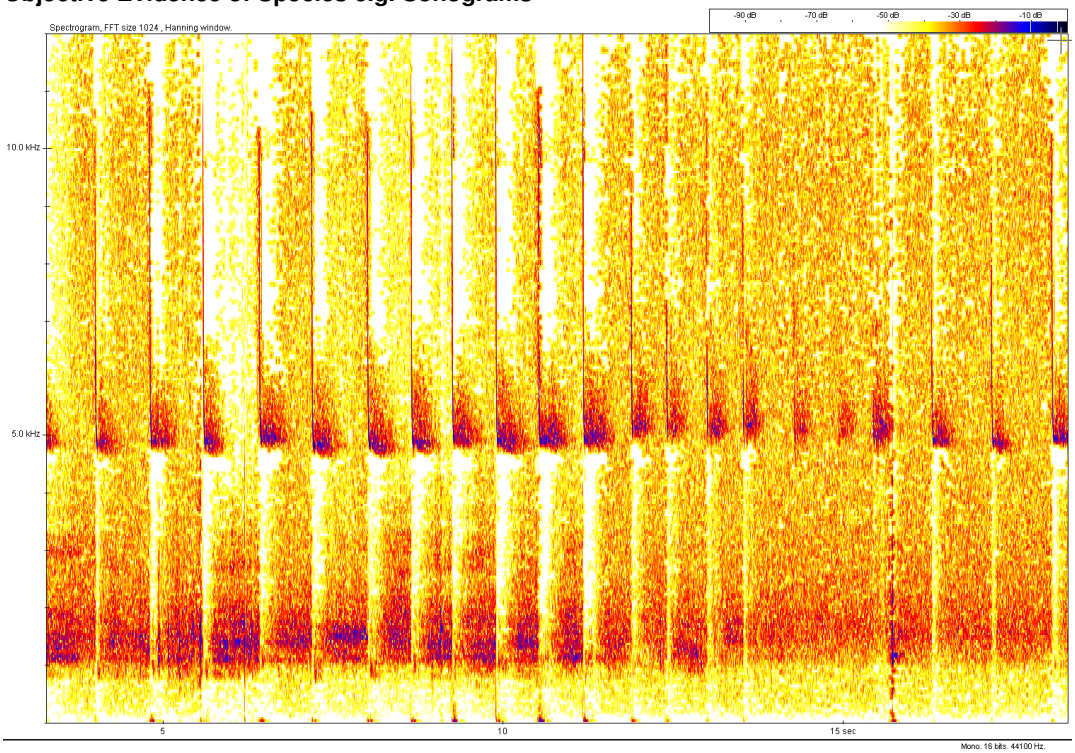


Plate 1 – Shows the Pip spp as recorded from track 1 in the table above.

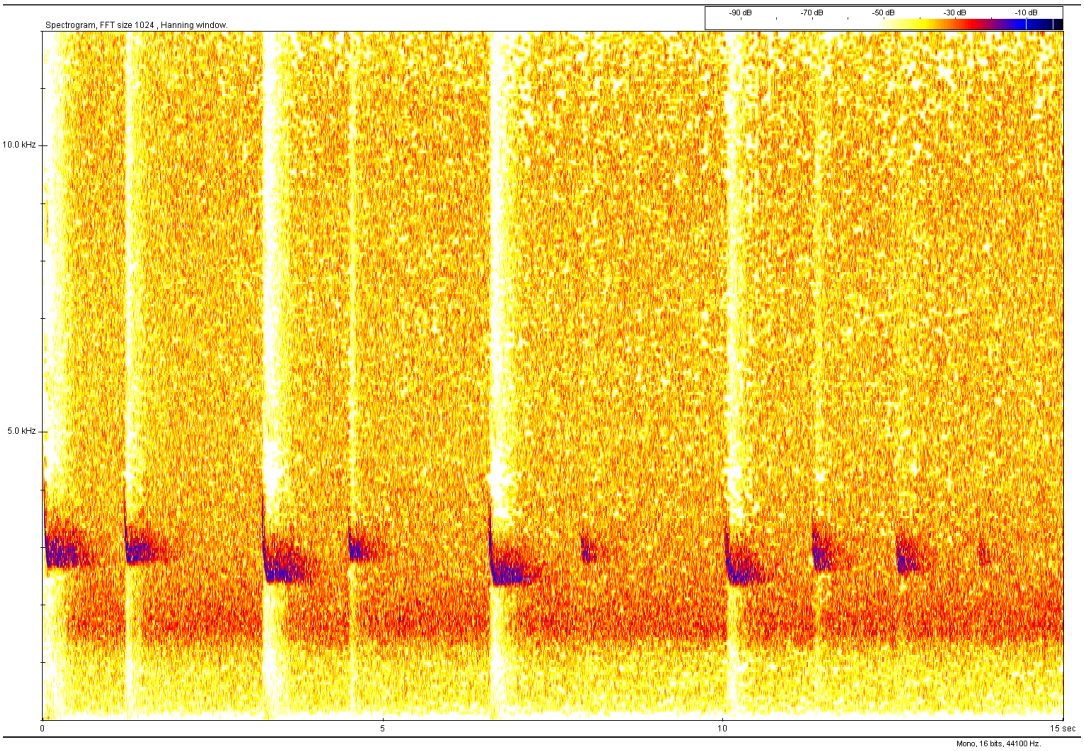


Plate 2 – Shows the 2 commuting Leisler's bat as recorded from track 2 in the table above.

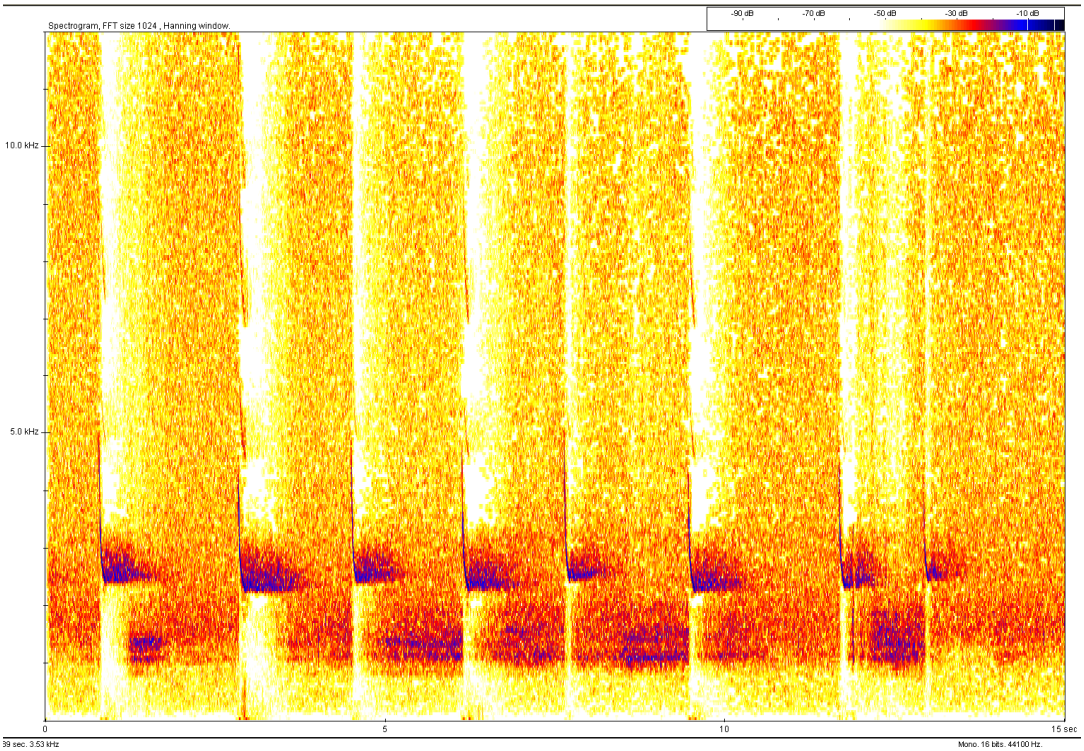


Plate 3 – Shows the 2 commuting Leisler's bat as recorded from track 5 in the table above.

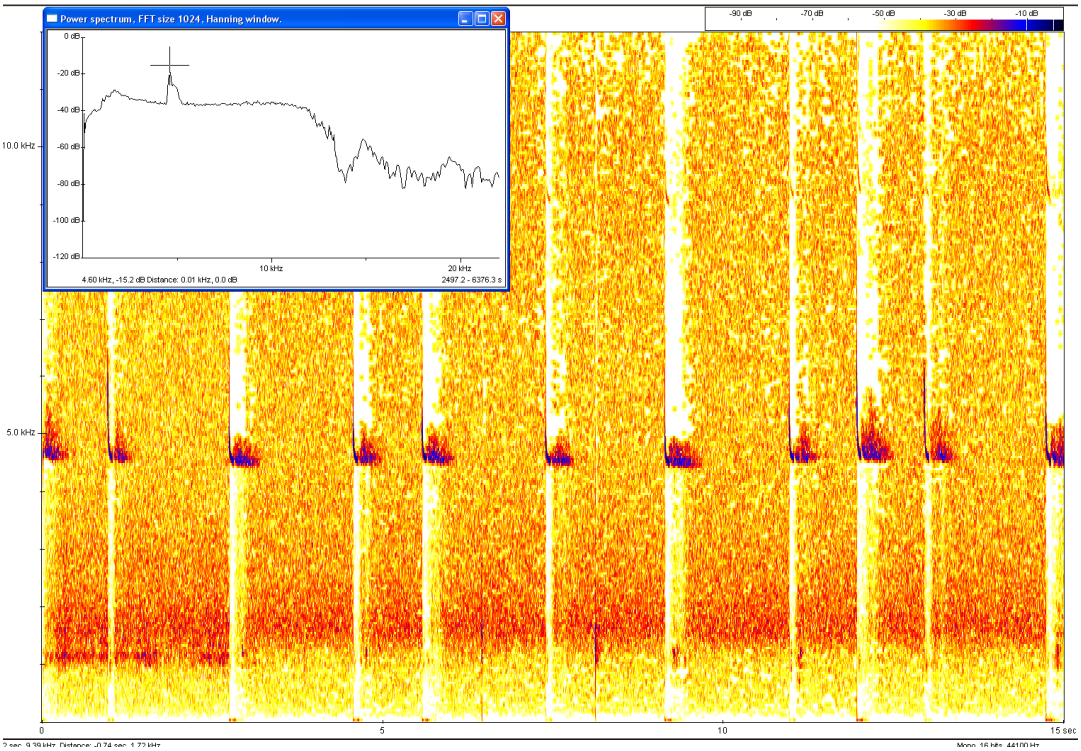


Plate 4 – Shows a Common pipistrelle with a peak frequency of 45khz as recorded from track 6 in the table above.

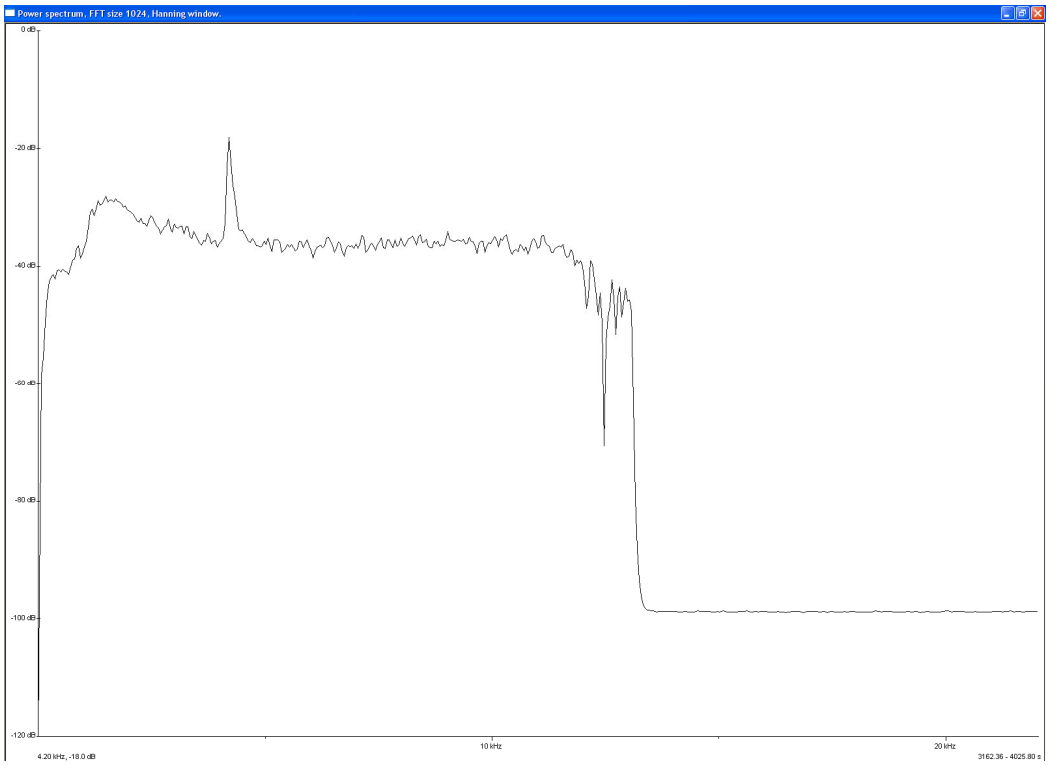


Plate 5 – Shows the power spectrum for the Common pipistrelle recorded from track 9 in the table above. The peak frequency is at 42khz, quite low but still within the recorded range for a 45 pip (Russ, 1999)

DUSK SURVEY	Recorder(s): Mary Maguire	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. AIEMA
Date:	7th September 2009	
Arrival time:	2119hrs	Site: Tower 54
Departure time:	2220hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	NA	Sunset:	2049hrs
Wind speed & direction	Breezy	Air temperature (C)	15.5°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:

The static survey point was between two improved grassland field with a mature tree line which included ash oak and sycamore.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	21.22	21.19 batbaton	Mature hedgerow trees	Leisler's bat	Distant call	1
2	21.22	21.19 batbaton	Mature hedgerow trees	Soprano pipistrelle	Commuting	2
3	21.28	21.19 batbaton	Mature hedgerow trees	Soprano pipistrelle	Commuting	1
4	21.41	21.19 batbaton	Mature hedgerow trees	Pipistrelle spp.	Commuting	1
5	21.42	21.19 batbaton	Mature hedgerow trees	Leisler's bat	Foraging	1
6	22.08	21.19 batbaton	Mature hedgerow trees	Pipistrelle sp.	Commuting	1
7	22.12	21.19 batbaton	Mature hedgerow trees	Soprano pipistrelle	Commuting	2
8	22.21	21.19 batbaton	Mature hedgerow trees	Myotis spp.	Commuting	1

Objective Evidence of Species e.g. Sonograms

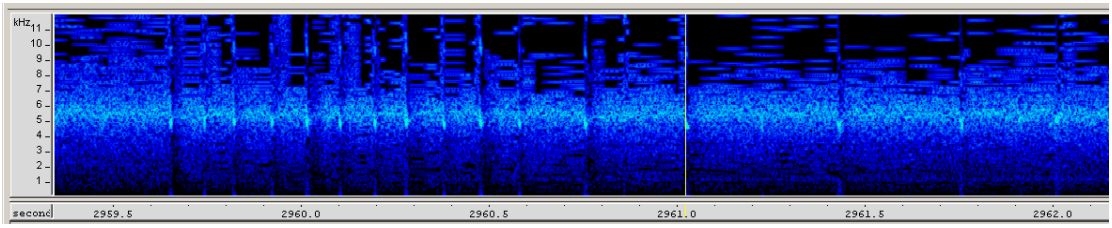


Plate 1: Sonogram of commuting Pipistrelle sp. recorded at 22.08 hrs 18/08/08.

Additional information
At 2210 a bat was spotted leaving the tree line and heading east.

DUSK SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: BSc, MSc
Date:	18th August 2009	
Arrival time:	2130hrs	Site: Tower 55
Departure time:	2230hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2052hrs
Wind speed & direction	Breezy	Air temperature (C)	15.5°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
Tall hawthorn and ash hedgerow with occasional mature Oak and Beech forming boundary between arable field and pasture

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	21.45	Unrecorded	Distant field to west of tower 55 location, close to farm buildings	Pipistrelle spp.	Commuting	1
2	21.46	Unrecorded	Distant field to west of tower 55 location, close to farm buildings	Pipistrelle spp.	Commuting	1
3	21.53	Unrecorded	Distant field to west of tower 55 location, close to farm buildings	Pipistrelle spp.	Commuting	1
4	21.57	Unrecorded	Distant field to west of tower 55 location, close to farm buildings	Leisler's bat	Commuting	1
5	22.05	Unrecorded	In field west of tower location	Pipistrelle spp.	Commuting south	1
6	22.10	Unrecorded	In field north-west of tower location	Leisler's bat	Commuting south	1

Objective Evidence of Species e.g. Sonograms

Unavailable – recorder did not work properly.

Additional Comments / Observations

Most of the bat activity noted during the survey was in the vicinity of the farm buildings to the west of the proposed tower location. The lack of bat activity at the tower location may be attributed to the exposed location and breezy conditions during the survey.

DUSK SURVEY	Recorder(s): Cormac Loughran	Qualifications, Experience and Relevant Licenses: MSc, CEnv, MIEEM
Date:	18th August 2009	
Arrival time:	2125hrs	Site: Tower 56
Departure time:	2235hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2052hrs
Wind speed & direction	Breezy	Air temperature (C)	15.5°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
Tall alder and ash along a deep drain/stream forming boundary between arable field and pasture

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2134	Bat1.wma	Very faint signal in distance	Common pipistrelle	Commuting	1
2	2136	Bat2.wma	Along vegetation beside stream/drain in distance	Common pipistrelle	Commuting	1
3	2140	Bat3.wma	Along vegetation beside stream/drain in distance	Common pipistrelle	Commuting	1
4	2141	Bat4.wma	Along vegetation beside stream/drain in distance	Common pipistrelle	Commuting	1
5	2147	Bat5.wma	Along vegetation beside stream/drain	Common pipistrelle	Commuting	2
6	2148	Bat6.wma	Very faint signal in distance	Common pipistrelle	Commuting	1
7	2149	Bat7.wma	Along vegetation beside stream/drain	Common pipistrelle	Commuting	2
8	2153	Bat8.wma	Along vegetation beside stream/drain	Soprano pipistrelle	Commuting	1
9	2153	Bat9.wma	Along vegetation beside stream/drain	Common pipistrelle	Commuting	1
10	2200	Bat10.wma	Along vegetation beside stream/drain	Common pipistrelle	Commuting	1
11	2205	Bat11.wma	Along vegetation beside stream/drain	Common pipistrelle	Commuting	2
12	2213	Bat13.wma	Along vegetation beside stream/drain	Daubenton's bat	Commuting	1
13	2215	Bat14.wma	Along vegetation beside stream/drain	Soprano pipistrelles & Daubenton's bat	Commuting	2
14	2218	Bat15.wma	Along vegetation beside stream/drain	Pipistrelle species	Commuting	2

15	2220	Bat16.wma	Along vegetation beside stream/drain	Common pipistrelle	Commuting	1

Additional Comments / Observations

It was quite blustery at times and the bats appeared to move towards a minor road nearby which was sheltered by mature trees and probably provided better foraging conditions than the more exposed arable field and adjacent stream/drain.

Objective Evidence of Species e.g. Sonograms

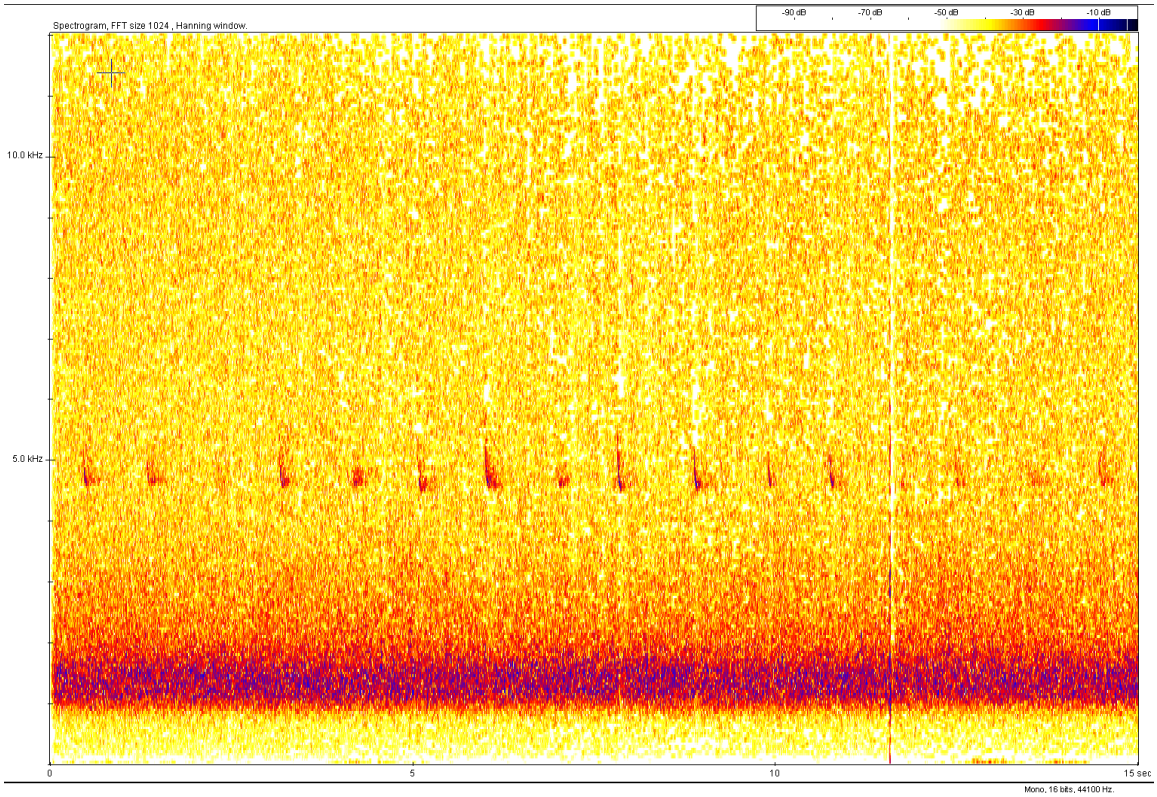


Plate 1 – Shows a distant common pip commuting along the stream/drain corridor (TN2 above).

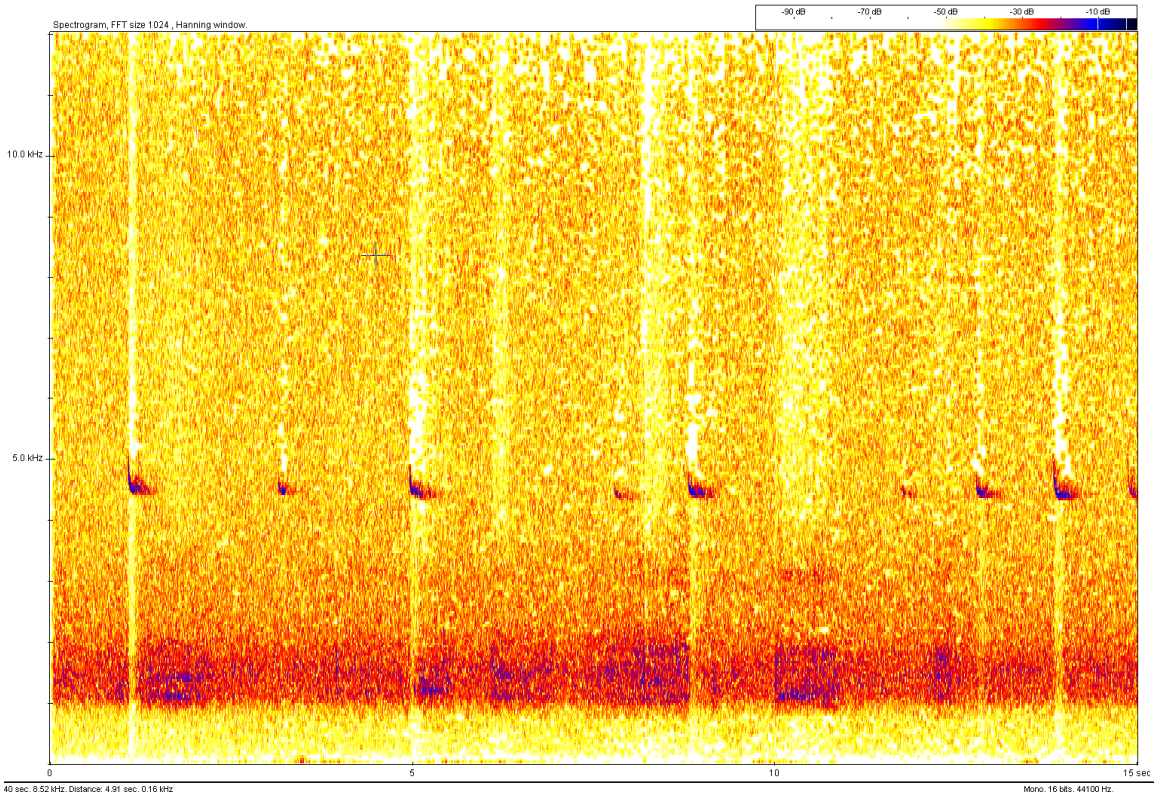


Plate 2 – Shows to common pips commuting along the stream corridor (TN 7 above).

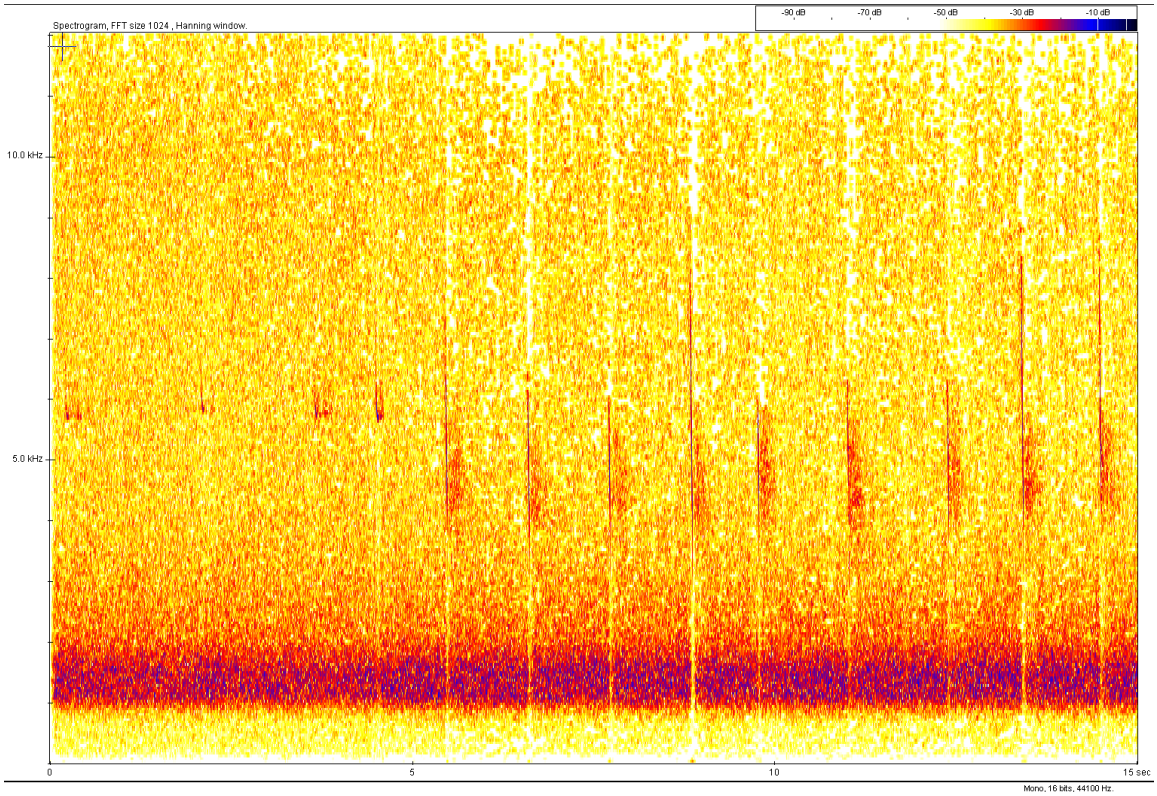


Plate 3 – Shows a distant soprano pip then a Daubenton's bat commuting along the stream/drain (TN 13).

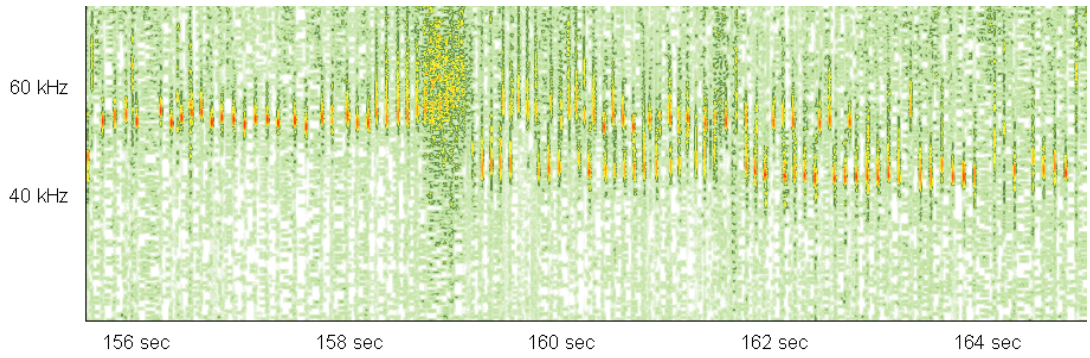
DUSK SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. 5 years bat survey experience
Date:	19th July 2010	
Arrival time:	2144hrs	Site: Interconnector – area between Towers 58 and 60
Departure time:	2330hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2150hrs
Wind speed & direction	0.8mph	Air temperature (C)	12.9°C
Weather (rain etc):	Dry. 60% cloud cover		
Habitat / corridors / nearby water bodies and general habitat: Tall hawthorn and ash hedgerow with mature trees between arable field and low-lying rush pasture			

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	22.44	Track 1	Tall hedgerow/tree line	Soprano pipistrelle	Foraging	1
2	22.46	Track 1	Tall hedgerow/tree line	Soprano pipistrelle	Commuting	1
3	22.47	Track 1	Tall hedgerow/tree line	Common pipistrelle	Commuting	1
4	22.51	Track 2	Tall hedgerow/tree line	Common pipistrelle	Commuting	1
5	22.58	Track 3	Tall hedgerow/tree line	Soprano pipistrelle	Commuting	1
6	22.59	Track 3	Tall hedgerow/tree line	Soprano pipistrelle	Commuting	2
7	23.00	Track 3	Tall hedgerow/tree line	Soprano pipistrelle	Commuting	2
8	23.00	Track 3	Tall hedgerow/tree line	Common pipistrelle	Commuting	2
9	23.01	Track 3	Tall hedgerow/tree line	Common pipistrelle	Commuting	3
10	23.05	Track 4	Tall hedgerow/tree line	Common pipistrelle	Commuting	1
11	23.05	Track 4	Tall hedgerow/tree line	Soprano pipistrelle	Commuting	1
12	23.05	Track 4	Tall hedgerow/tree line	Common pipistrelle	Foraging	1
13	23.05	Track 4	Tall hedgerow/tree line	Soprano pipistrelle	Foraging	1
14	23.13	Track 5	Tall hedgerow/tree line	Common pipistrelle	Commuting	1
15	23.13	Track 5	Tall hedgerow/tree line	Common pipistrelle	Foraging	1
16	23.13	Track 5	Tall hedgerow/tree line	Common pipistrelle	Foraging	3
17	23.13	Track 5	Tall hedgerow/tree line	Common pipistrelle	Commuting	1
18	23.13	Track 5	Tall hedgerow/tree line	Common pipistrelle	Commuting	1
19	23.13	Track 5	Tall hedgerow/tree line	Unidentified	Social call	1

20	23.13	Track 5	Tall hedgerow/tree line	Common pipistrelle	Commuting	6
21	23.13	Track 5	Tall hedgerow/tree line	Common pipistrelle	Foraging	3
22	23.13	Track 5	Tall hedgerow/tree line	Soprano pipistrelle	Foraging	1
23	23.17 – 23.20	Track 6	Tall hedgerow/tree line	Constant bat activity was recorded here for 3 minutes – mostly common pipistrelle with soprano pipistrelles also present. Visual sightings were made of 3 bats flying together along the hedgerow and foraging over the adjacent rush pasture. 20 feeding buzzes were recorded.		
24	23.22	Track 7	Tall hedgerow/tree line	Common pipistrelle		3
25	23.22	Track 7	Tall hedgerow/tree line	Common pipistrelle		2
26	23.23	Track 7	Tall hedgerow/tree line	Common pipistrelle		1
27	23.23	Track 7	Tall hedgerow/tree line	Common pipistrelle		6
28	23.24	Track 7	Tall hedgerow/tree line	Common pipistrelle		4
29	23.24	Track 7	Tall hedgerow/tree line	Common pipistrelle		5
30	23.25	Track 7	Tall hedgerow/tree line	Common pipistrelle		2

Objective Evidence of Species e.g. Sonograms



Sonogram of constant common pipistrelle and soprano pipistrelle recorded at 23.19

Additional Comments / Observations

The area in the vicinity of Tower 59 was a hotspot of bat activity, although bats were recorded commuting along the entire hedgerow and foraging over the rush pasture. A dawn survey is recommended to identify if any roosts are present.

DAWN SURVEY

Site: Towers 58-60			
Project and Reference: Tyrone to Cavan Interconnector (60032220)			
Recorder(s):	Mary Maguire	**Arrival time:**	0256hrs
Date:	02nd August 2010	**Departure time:**	0530hrs

Weather conditions			
Sunrise:	0536hrs	**Sunset:**	
Wind speed & direction:	1.8 mph	**Air temperature (C):**	12°C
Weather (rain etc):	Dry – 30% cloud cover.		

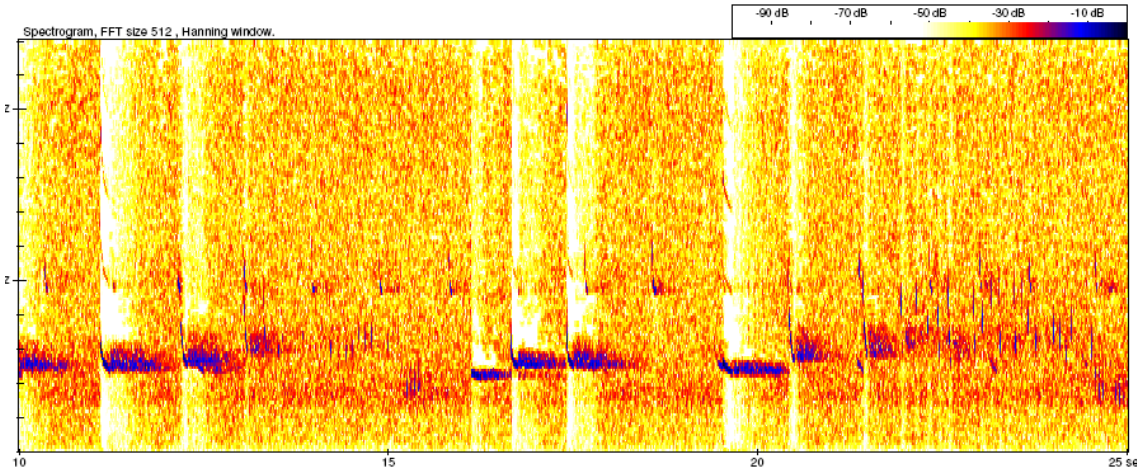
Habitat / corridors / nearby water bodies and general habitat:
Tall hawthorn and ash hedgerow with mature trees (forming tree line) between cereal fields, semi-improved grassland and low-lying rush pasture.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
02.56	Mature tree line	VN350339.WMA	No bats recorded.		
03.03	Mature tree line	VN350340.WMA	No bats recorded.		
03.05	Mature tree line	VN350341.WMA	*Nyctalus leisleri*	Commuting	1
03.07	Mature tree line	VN350342.WMA	*Nyctalus leisleri*	Commuting	1
03.08	Mature tree line	VN350343.WMA	*No bats recorded.*		
03.08	Mature tree line	VN350344.WMA	*Pipistrellus pipistrellus*	Commuting	1
03.10	Mature tree line	VN350345.WMA	*Pipistrellus pipistrellus*	Social call	1
	Mature tree line		*Pipistrellus pipistrellus*	Commuting	1
03.11	Mature tree line	VN350346.WMA	*Pipistrellus pipistrellus*	Commuting	1
03.12	Mature tree line	VN350347.WMA	Pipistrellus pipistrellus	Commuting	1
03.13	Mature tree line	VN350348.WMA	*Pipistrellus spp.*	Commuting	1
03.14	Mature tree line	VN350349.WMA	*Pipistrellus pipistrellus*	Commuting	2
03.15	Mature tree line	VN350350.WMA	*Pipistrellus pipistrellus*	Commuting	2
03.16	Mature tree line	VN350351.WMA	*Pipistrellus pipistrellus*	Commuting	2
03.18	Mature tree line	VN350352.WMA	*Pipistrellus spp.*	Commuting	2
03.19	Mature tree line	VN350353.WMA	*Nyctalus leisleri*	Commuting	1
03.20	Mature tree line	VN350354.WMA	*Pipistrellus pipistrellus*	Commuting	2

03.21	Mature tree line	VN350355.WMA	*Pipistrellus spp.*	Commuting	2
03.29	Mature tree line	VN350356.WMA	*Pipistrellus pipistrellus*	Commuting	2
03.30	Mature tree line	VN350357.WMA	*Pipistrellus pipistrellus*	Commuting	1
03.31	Mature tree line	VN350358.WMA	*Pipistrellus pipistrellus*	Commuting	1
03.32	Mature tree line	VN350359.WMA	*Pipistrellus pipistrellus*	Commuting	1
03.39	Around mature ivy-covered ash trees close to location of tower 60	VN350360.WMA	*Nyctalus leisleri*	Foraging	1
	Around mature ivy-covered ash trees close to location of tower 60		*Nyctalus leisleri*	Commuting	1
03.40	Around mature ivy-covered ash trees close to location of tower 60	VN350361.WMA	*Pipistrellus pipistrellus*	Commuting	1
	Around mature ivy-covered ash trees close to location of tower 60		*Nyctalus leisleri*	Commuting	2
03.42	Around mature ivy-covered ash trees close to location of tower 60	VN350362.WMA	*Nyctalus leisleri*	Commuting	2
	Around mature ivy-covered ash trees close to location of tower 60		*Pipistrellus pipistrellus*	Commuting	1
03.43	Around mature ivy-covered ash trees close to location of tower 60	VN350363.WMA	*Nyctalus leisleri*	Foraging	2
	Around mature ivy-covered ash trees close to location of tower 60		*Nyctalus leisleri*	Commuting	2
	Around mature ivy-covered ash trees close to location of tower 60		*Pipistrellus pipistrellus*	Commuting	2
03.45	Around mature ivy-covered ash trees close to location of tower 60	VN350364.WMA	*Nyctalus leisleri*	Foraging	1
03.46	Around mature ivy-covered ash trees close to location of tower 60	VN350365.WMA	*Nyctalus leisleri*	Foraging	2

03.46	Around mature ivy-covered ash trees close to location of tower 60	VN350366.WMA	*Nyctalus leisleri*	Commuting	1
	Around mature ivy-covered ash trees close to location of tower 60		*Nyctalus leisleri*	Foraging	1
	Around mature ivy-covered ash trees close to location of tower 60		*Pipistrellus spp.*	Commuting	1
03.47	Around mature ivy-covered ash trees close to location of tower 60	VN350367.WMA	*Pipistrellus pygmaeus*	Commuting	1
03.48	Around mature ivy-covered ash trees close to location of tower 60	VN350368.WMA	*Pipistrellus spp.*	Commuting	2
03.49	Around mature ivy-covered ash trees close to location of tower 60	VN350369.WMA	*Pipistrellus pygmaeus*	Foraging	1
	Around mature ivy-covered ash trees close to location of tower 60		*Pipistrellus pygmaeus*	Commuting	1
03.52	Around mature ivy-covered ash trees close to location of tower 60	VN350370.WMA	*Nyctalus leisleri*	Commuting	2
03.53	Around mature ivy-covered ash trees close to location of tower 60	VN350371.WMA	*Pipistrellus pygmaeus*	Commuting	1
03.54	Around mature ivy-covered ash trees close to location of tower 60	VN350372.WMA	*Pipistrellus pygmaeus*	Commuting	1
03.56	Around mature ivy-covered ash trees close to location of tower 60	VN350373.WMA	*Nyctalus leisleri*	Commuting	1
03.58	Around mature ivy-covered ash trees close to location of tower 60	VN350374.WMA	*No bats recorded.*		

Objective Evidence of Species e.g. Sonograms



A spectrogram showing two *Nyctalus leisleri* foraging calls and a *Pipistrellus pipistrellus* commuting call on track no. VN350363.WMA

Additional Comments / Observations

The area between Towers 58 and 60 is a significant area for bat activity and all trees would need to be checked by a licensed bat surveyor immediately prior to vegetation pollarding. Another point to note is that the landowners in this area have been removing trees and several large boughs and trunks along with evidence of recent excavator activity were apparent during survey.

Qualifications, Experience and Relevant Licenses:

BSc, MSc, AIEMA 5+ years of bat survey experience

DUSK SURVEY

Site: Tower 60			
Project and Reference: N/S Interconnector			
Recorder(s):	Mary Maguire	**Arrival time:**	2144hrs
Date:	19th July 2010	**Departure time:**	2322hrs

Weather conditions			
Sunrise:		**Sunset:**	2246hrs
Wind speed & direction:	0.8mph	**Air temperature (C):**	12.9°C
Weather (rain etc):	None – 60% cloud cover		

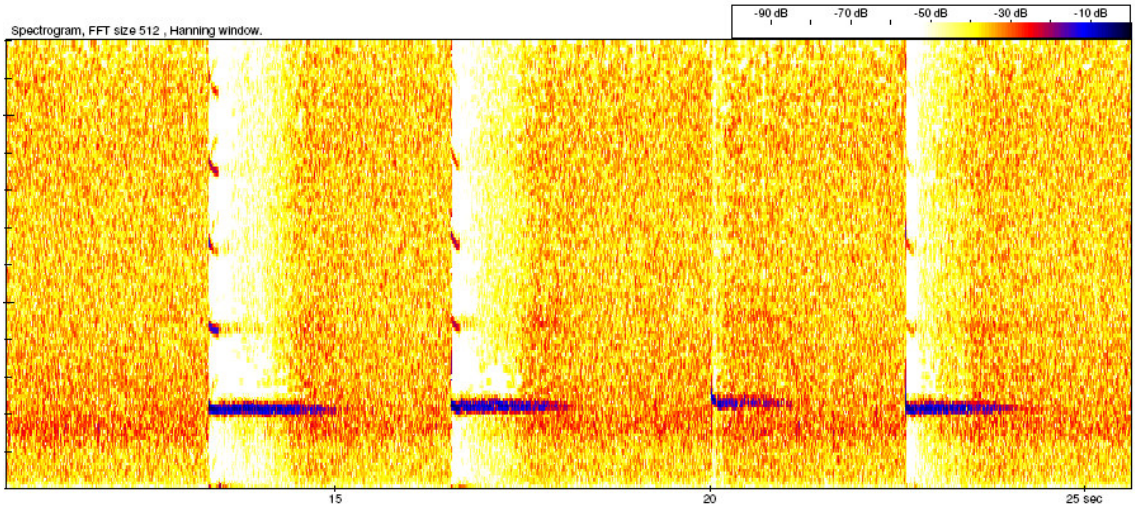
Habitat / corridors / nearby water bodies and general habitat:
A mature tree line

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
21.34	A mature tree line	*VN350322.WMA*	*Pipistrellus nathusii*	Commuting	1
	A mature tree line		*Nyctalus leisleri*	Commuting	1
21.35	A mature tree line	*VN350323.WMA*	*Pipistrellus pygmaeus*	Commuting	2
21.36	A mature tree line	*VN350324.WMA*	*Nyctalus leisleri*	Commuting	1
21.37	A mature tree line	*VN350325.WMA*	*No bats recorded.*		
21.38	A mature tree line	*VN350326.WMA*	*Pipistrellus pipistrellus*	Commuting	1
	A mature tree line		*Nyctalus leisleri*	Commuting	1
21.42	A mature tree line	*VN350327.WMA*	*Pipistrellus pygmaeus*	Commuting	1
	A mature tree line		*Nyctalus leisleri*	Commuting	1
21.43	A mature tree line	*VN350328.WMA*	*Pipistrellus nathusii*	Commuting	2
21.44	A mature tree line	*VN350329.WMA*	*Pipistrellus pipistrellus*	Commuting	1
21.45	A mature tree line	*VN350330.WMA*	*Nyctalus leisleri*	Commuting	1
21.45	A mature tree line	*VN350331.WMA*	*Pipistrellus nathusii*	Commuting	1
	A mature tree line		*Nyctalus leisleri*	Commuting	1
21.46	A mature tree line	*VN350332.WMA*	*Pipistrellus pipistrellus*	Commuting	3

21.47	A mature tree line	*VN350333.WMA*	*Pipistrellus pygmaeus*	Commuting	1
	A mature tree line		*Pipistrellus pipistrellus*	Commuting	2
21.48	A mature tree line	*VN350334.WMA*	*Pipistrellus pipistrellus*	Foraging	1
	A mature tree line		*Pipistrellus pipistrellus*	Commuting	1
	A mature tree line		*Pipistrellus pipistrellus*	Social call	1
	A mature tree line		*Pipistrellus pygmaeus*	Commuting	1
	A mature tree line		*Nyctalus leisleri*	Commuting	1
21.48	A mature tree line	*VN350335.WMA*	*Pipistrellus spp.*	Commuting	1
21.50	A mature tree line	*VN350336.WMA*	Pipistrellus pipistrellus	Commuting	1
21.51	A mature tree line	*VN350337.WMA*	*Pipistrellus nathusii*	Commuting	2
	A mature tree line		*Nyctalus leisleri*	Commuting	1
21.54	A mature tree line	*VN350338.WMA*	*Pipistrellus pipistrellus*	Commuting	1
21.55	A mature tree line	*VN350339.WMA*	*Pipistrellus pipistrellus*	Foraging	1
	A mature tree line		*Pipistrellus nathusii*	Commuting	1
21.55	A mature tree line	*VN350340.WMA*	*Pipistrellus pipistrellus*	Commuting	1
21.56	A mature tree line	*VN350341.WMA*	*Pipistrellus pipistrellus*	Commuting	1
21.57	A mature tree line	*VN350342.WMA*	*Pipistrellus pipistrellus*	Commuting	1
21.58	A mature tree line	*VN350343.WMA*	*Pipistrellus pipistrellus*	Commuting	2
21.59	A mature tree line	*VN350344.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.00	A mature tree line	*VN350345.WMA*	Pipistrellus pipistrellus	Foraging	1
	A mature tree line		Pipistrellus pipistrellus	Commuting	1
22.01	A mature tree line	*VN350346.WMA*	Pipistrellus pipistrellus	Commuting	1
	A mature tree line		Pipistrellus spp.	Commuting	1
22.02	A mature tree line	*VN350347.WMA*	*Pipistrellus spp.*	Foraging	1
	A mature tree line		*Pipistrellus spp.*	Commuting	1
22.03	A mature tree line	*VN350348.WMA*	Pipistrellus pipistrellus	Foraging	2
	A mature tree line		Pipistrellus pipistrellus	Commuting	1

22.04	A mature tree line	*VN350349.WMA*	*Pipistrellus spp.*	Commuting	1
	A mature tree line		*Pipistrellus pipistrellus*	Commuting	2
22.04	A mature tree line	*VN350350.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.05	A mature tree line	*VN350351.WMA*	*Pipistrellus pipistrellus*	Commuting	1
22.06	A mature tree line	*VN350352.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.06	A mature tree line	*VN350353.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.07	A mature tree line	*VN350354.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.08	A mature tree line	*VN350355.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.09	A mature tree line	*VN350356.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.10	A mature tree line	*VN350357.WMA*	*Pipistrellus nathusii*	Commuting	1
22.11	A mature tree line	*VN350358.WMA*	*Pipistrellus pipistrellus*	Commuting	1
22.12	A mature tree line	*VN350359.WMA*	*Pipistrellus nathusii*	Commuting	1
22.13	A mature tree line	*VN350360.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.18	A mature tree line	*VN350361.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.19	A mature tree line	*VN350362.WMA*	*No bats recorded.*		
22.20	A mature tree line	*VN350363.WMA*	*Pipistrellus pipistrellus*	Commuting	2
22.21	A mature tree line	*VN350364.WMA*	*Pipistrellus nathusii*	Commuting	1
22.22	A mature tree line	*VN350365.WMA*	*Pipistrellus pipistrellus*	Foraging	1
	A mature tree line		*Pipistrellus pipistrellus*	Commuting	2

Objective Evidence of Species e.g. Sonograms



Spectrogram of the *Nyctalus leisleri* commuting on track no. VN350324.WMA.

Additional Comments / Observations

Bats were seen flying through the southern section of the tree line for the entire survey.

Qualifications, Experience and Relevant Licenses:

BSc, MSc, AIEMA
5+ years of bat survey experience

DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. 5 years bat survey experience
Date:	2nd August 2010	
Arrival time:	0256hrs	Site: Interconnector – area between Towers 58 and 60
Departure time:	0530hrs	Project and Reference: 60032220 NS Interconnector

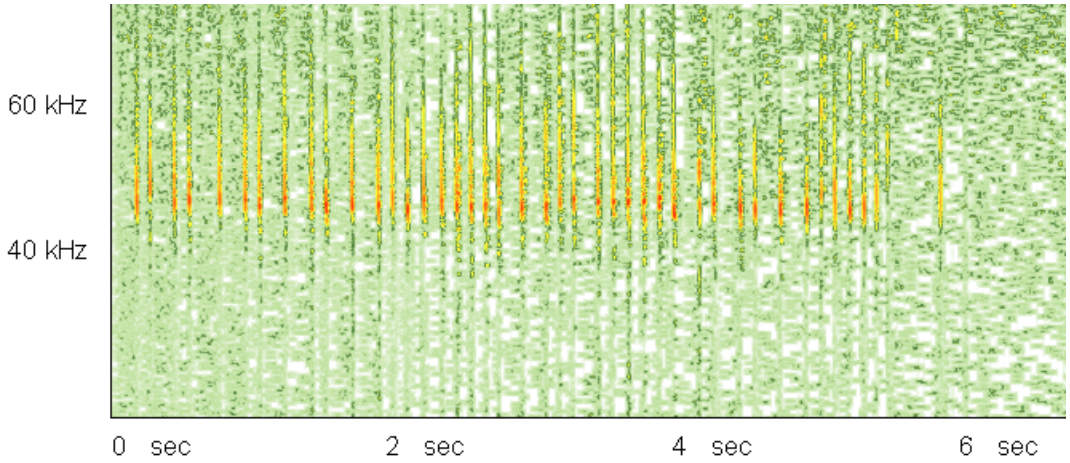
Weather conditions			
Sunrise:	0536hrs	Sunset:	
Wind speed & direction	1.8mph	Air temperature (C)	12°C
Weather (rain etc):	Dry. 30% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:
Tall hawthorn and ash hedgerow with mature trees (forming tree line) between cereal fields, semi-improved grassland and low-lying rush pasture

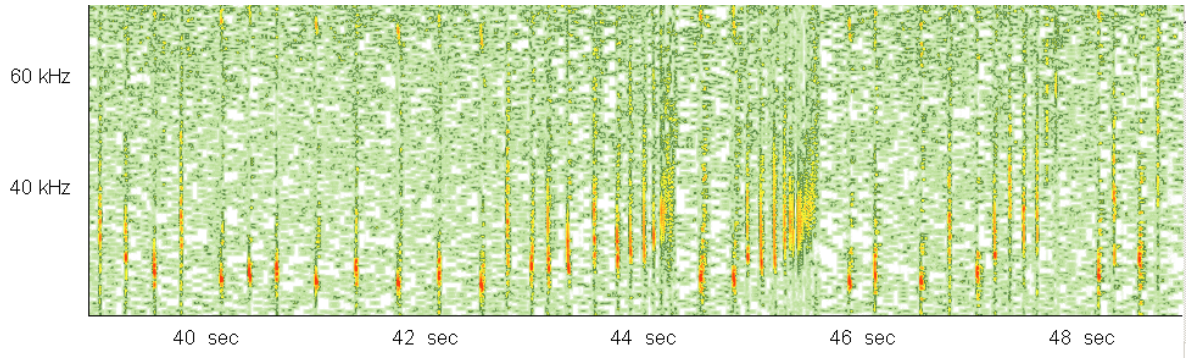
TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	03.53	Track 1	Along tree line	Common pipistrelle	commuting	1
2	04.01	Track 2	Along tree line	Common pipistrelle	Commuting	1
3	04.22	Track 3	From west across field towards tree-line	Common pipistrelle	Commuting	1
4	04.26	Track 4	Along tree line	Common pipistrelle	Commuting	2
5	04.28	Track 4	Along tree line	Common pipistrelle	Commuting	2
6	04.45	Track 6	Along tree line	Common pipistrelle	Commuting	3
7	04.45	Track 6	Around mature ivy-covered ash trees close to location of tower 60	Leisler's	Foraging	3
8	04.45	Track 6	Around mature ivy-covered ash trees close to location of tower 60	Leisler's	Commuting	1
9	04.46	Track 6	Around mature ivy-covered ash trees close to location of tower 60	Common pipistrelle	Foraging	1
10	04.50	Track 7	Around mature ivy-covered ash trees close to location of tower 60	Soprano pipistrelle	Foraging	2
11	04.50	Track 7	Around mature ivy-covered ash trees close to location of tower 60	Soprano pipistrelle	Commuting	4

12	04.50	Track 7	Around mature ivy-covered ash trees close to location of tower 60	Leisler's	Commuting	3
13	04.50	Track 7	Around mature ivy-covered ash trees close to location of tower 60	Leisler's	Foraging	2
14	04.54	Track 8	Around mature ivy-covered ash trees close to location of tower 60	Leisler's	Foraging	1
15	04.54	Track 8	Around mature ivy-covered ash trees close to location of tower 60	Leisler's	Commuting	3
16	04.55	Track 8	Around mature ivy-covered ash trees close to location of tower 60	Leisler's	commuting	1

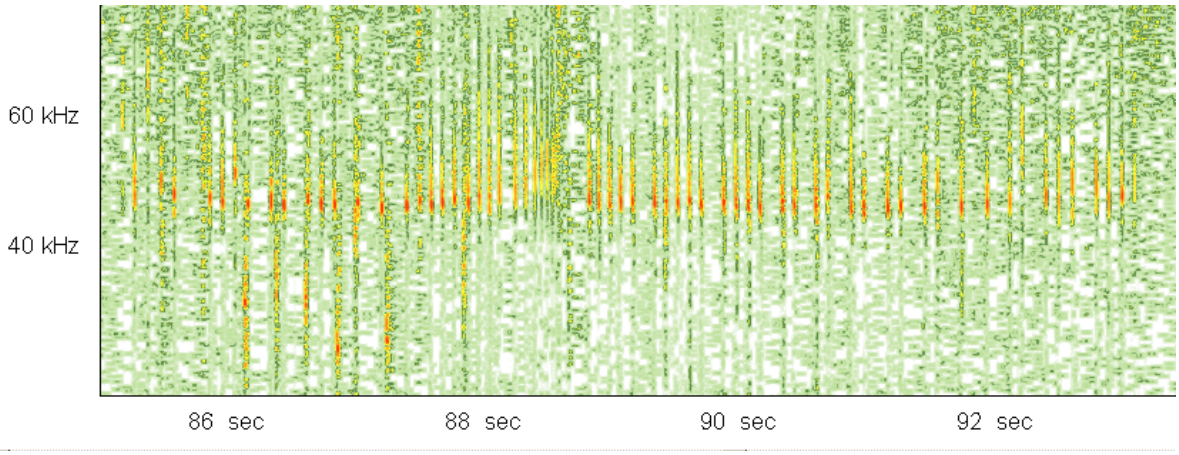
Objective Evidence of Species e.g. Sonograms



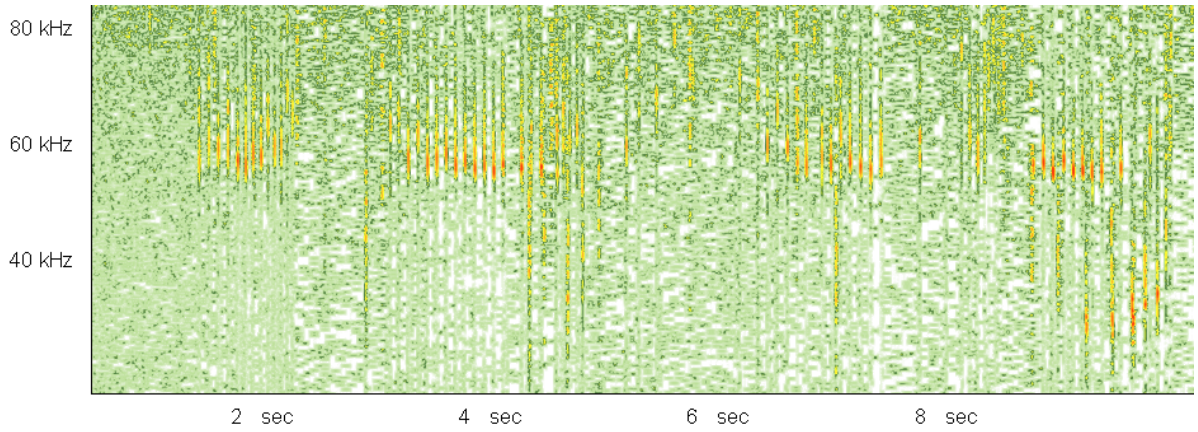
Sonogram of commuting common pipistrelle recorded at 03.53 hrs



Sonogram of Leisler's bat foraging activity recorded at 04.45 hrs



Sonogram of common pipistrelle foraging activity with one commuting Leisler's bat recorded at 04.46 hrs



Sonogram of soprano pipistrelles and Leisler's bat recorded at 04.50 hrs

Additional Comments / Observations

A dawn survey was conducted here after much bat activity was recorded during a dusk survey on 19th July 2010. Most activity during this survey was detected around mature ivy-covered ash close to the location of tower 60.

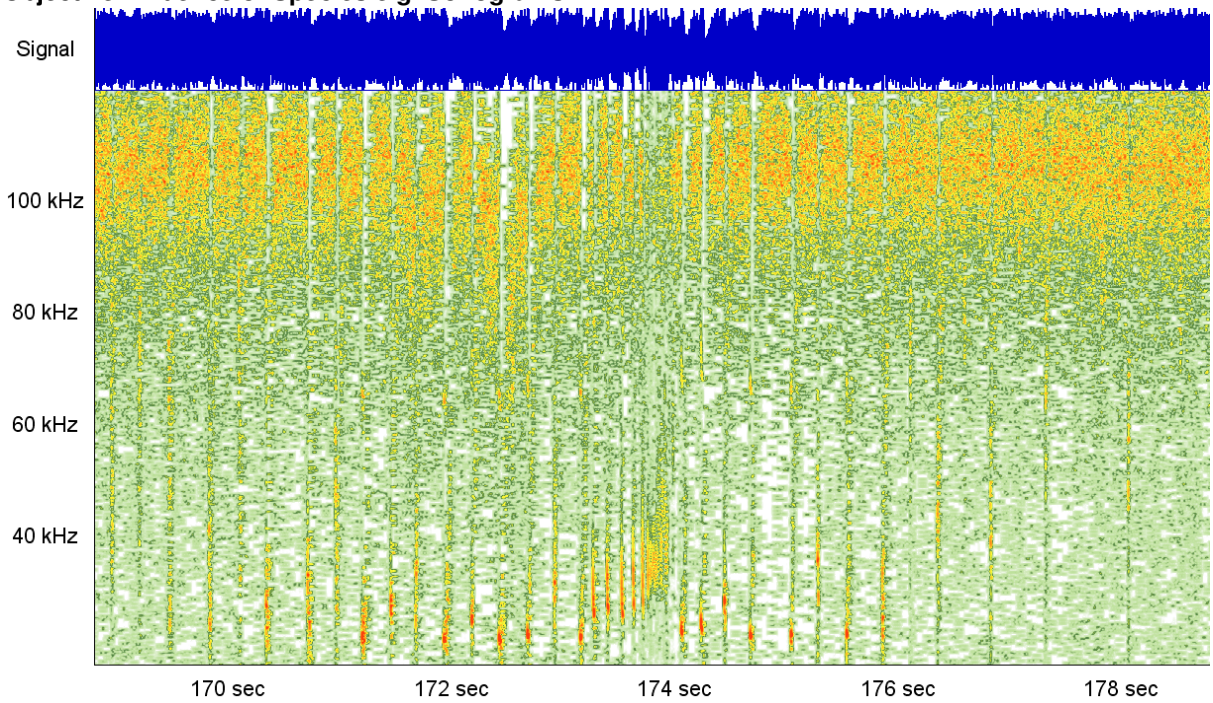
DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: BSc. MSc 5 years bat survey experience
Date:	9th June 2010	
Arrival time:	0345hrs	Site: Interconnector Tower 63
Departure time:	0500hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	0458hrs	Sunset:	
Wind speed & direction	1/2 mph SE	Air temperature (C)	11°C
Weather (rain etc):	Dry ~ 30% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:
Agricultural grassland fringed with tall hedgerows

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0446	Track 1	Row of tall alders fringing stream	Leisler's bat	Foraging	1
2	0454	Track 3	Tall ash, hawthorn and willow hedge at tower location	Leisler's bat	Commuting	1
3	0455	Track 3	Tall ash, hawthorn and willow hedge at tower location	Leisler's bat	Commuting (distant)	1

Objective Evidence of Species e.g. Sonograms



Leisler's bat feeding buzz recorded along row of tall alder fringing stream at 0446hrs

Additional Comments / Observations

Limited bat activity apart from a few commuting Leisler's bats passing overhead.

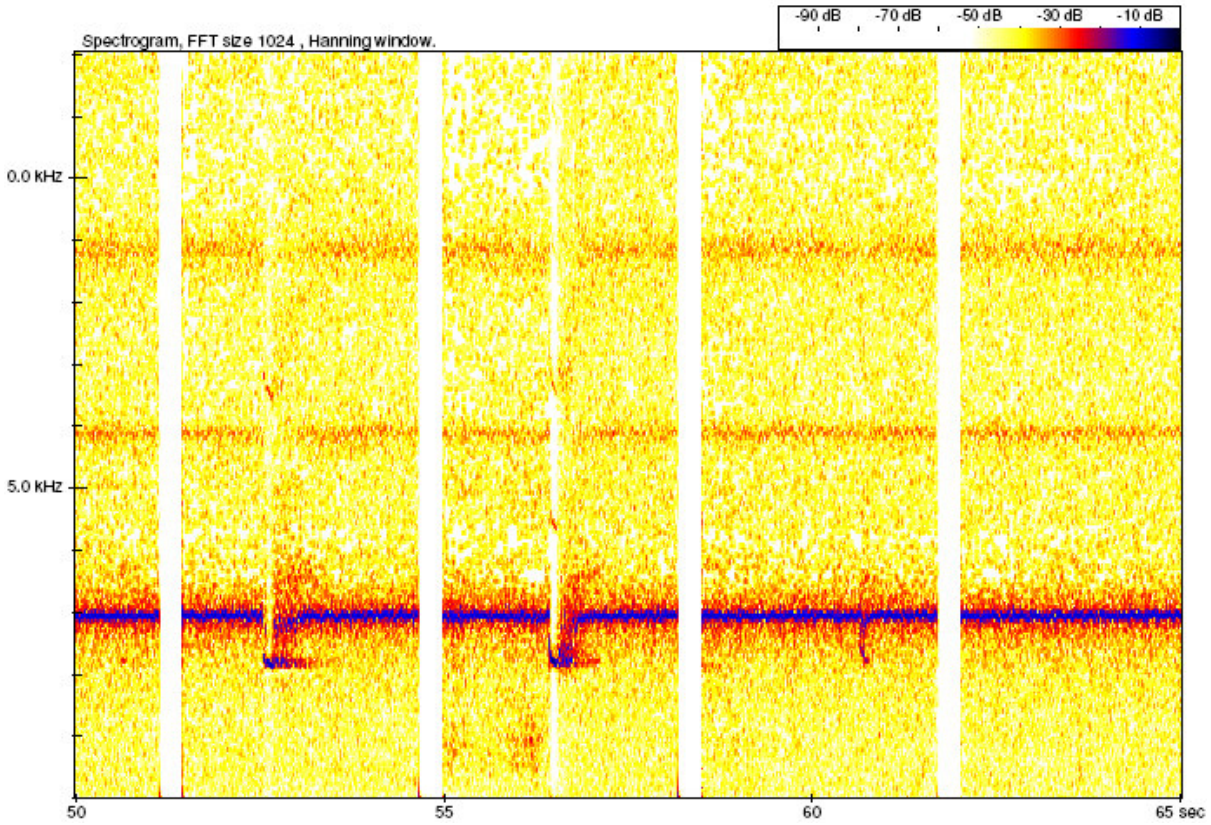
DUSK SURVEY

Site: Tower 63			
Project and Reference: Tyrone to Cavan Interconnector			
Recorder(s):	Brendan Kemp	**Arrival time:**	2143hrs
Date:	09th June 2010	**Departure time:**	2330hrs

Weather conditions			
Sunrise:		**Sunset:**	2157hrs
Wind speed & direction:	1/2 mph	**Air temperature (C):**	11°C
Weather (rain etc):	Dry – 30% cloud cover		
Habitat / corridors / nearby water bodies and general habitat: Agricultural grassland fringed with tall hedgerows			

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
22.00	Along hedgerow	*Recording 1 VN350206.WMA*	Nyctalus leisleri	Commuting	1
22.09	Along hedgerow	Recording 2 VN350207.WMA	No bats recorded.		

Objective Evidence of Species e.g. Sonograms



A *Nyctalus leisleri* recorded commuting on track recording 1 VN350206.WMA.

Additional Comments / Observations

Very limited bat activity

Qualifications, Experience and Relevant Licenses:

Analysed by Debbie Brown BSc, MSc.

DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B. Sc. M.Sc 5 years bat survey experience
Date:	2th June 2010	
Arrival time:	0400hrs	Site: Interconnector Tower 64
Departure time:	0503hrs	Project and Reference: 60032220

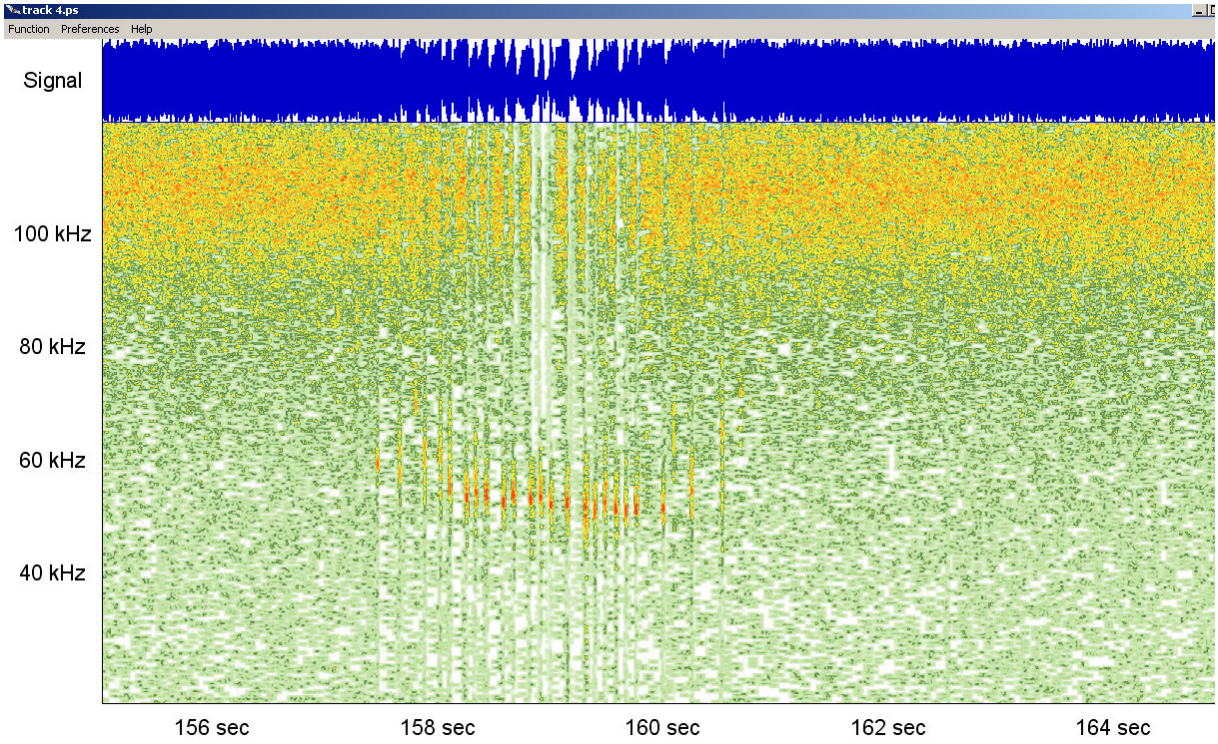
Weather conditions			
Sunrise:	0502hrs	Sunset:	
Wind speed & direction	12 mph SE	Air temperature (C)	11°C
Weather (rain etc):	Dry ~ 30% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

Tower is located in the centre of a meadow managed for silage. Surveys concentrated along hedgerows oversailed by the line.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0413	Track 4	Mature ash in tall hawthorn hedge in hollow as SW corner of meadow	Soprano pipistrelle	Commuting	1

Objective Evidence of Species e.g. Sonograms



Sonogram of commuting soprano pipistrelle recorded at 0413hrs

Additional Comments / Observations

Very little bat activity was recorded along any hedgerows or trees in the vicinity of the impact zone. Where possible, surveys were concentrated on leeward side of hedgerows because of gusts.

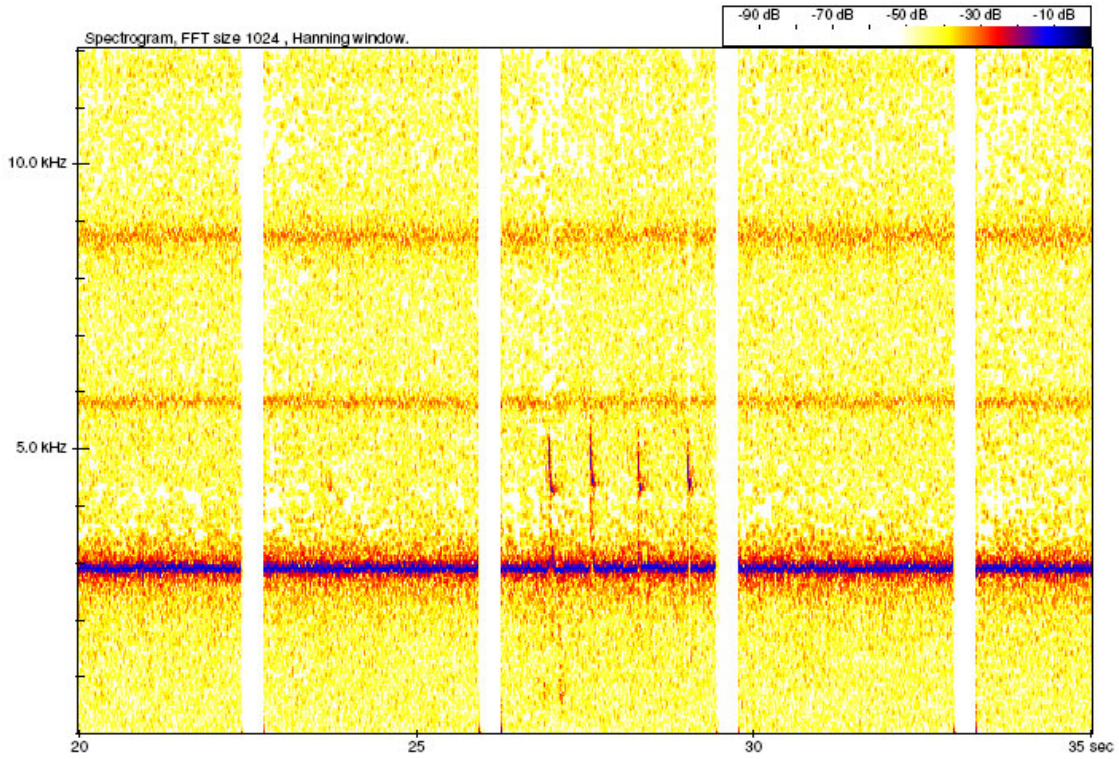
DUSK SURVEY

Site: Tower 64			
Project and Reference: Tyrone to Cavan Interconnector (60032220)			
Recorder(s):	Brendan Kemp/Debbie Brown	**Arrival time:**	2230hrs
Date:	09th June 2010	**Departure time:**	2330hrs

Weather conditions			
Sunrise:		**Sunset:**	2157hrs
Wind speed & direction:	1/2mph	**Air temperature (C):**	11°C
Weather (rain etc):	Dry – 30% cloud cover		
Habitat / corridors / nearby water bodies and general habitat: Agricultural grassland fringed with tall hedgerows			

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
22.22	Tall ash, hawthorn and willow hedge at tower location	*VN350209 .WMA*	*Pipistrellus pipistrellus*	Commuting	1
22.35	Tall ash, hawthorn and willow hedge at tower location	VN350210 .WMA	No bats recorded.		

Objective Evidence of Species e.g. Sonograms



A *Pipistrellus pipistrellus* commuting on track no. Recording 4 VN350209.WMA

Additional Comments / Observations

Very limited bat activity, despite good conditions and suitable habitat

Qualifications, Experience and Relevant Licenses:

Debbie Brown - BSc, MSc
Brendan Kemp - BSc (Hons), AIEMA

DUSK SURVEY	Recorder(s): Debbie Brown		Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc.
Date:	21st August 2009		
Arrival time:	2120hrs		Site: Tower 68
Departure time:	2230hrs		Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2042hrs
Wind speed & direction	Blustery	Air temperature (C)	15.5°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
Transect along tall hedge/scrub of hawthorn, blackthorn, willow and ash between fast-flowing stream and recently cut meadow.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	21.25	Track 1 duet	At NE corner of field, adjacent to tower location	Leisler's bat	Foraging/social calls	2
2	21.26	Track 1 duet	At NE corner of field, adjacent to tower location	Pipistrelle sp.	Commuting (very distant)	1
3	21.26	Track 1 duet	At NE corner of field, adjacent to tower location	Leisler's bat	Social call	1
4	21.26	Track 1 duet	At NE corner of field, adjacent to tower location	Soprano pipistrelle	Foraging along edge of hedgerow	1
5	21.26	Track 1 duet	At NE corner of field, adjacent to tower location	Leisler's bat	Foraging and social call	1
6	21.27	Track 1 duet	At NE corner of field, adjacent to tower location	Leisler's bat	Social call	1
7	21.28	Track 1 duet	At NE corner of field, adjacent to tower location	*Myotis sp.*	Commuting SW along stream	1

Objective Evidence of Species e.g. Sonograms

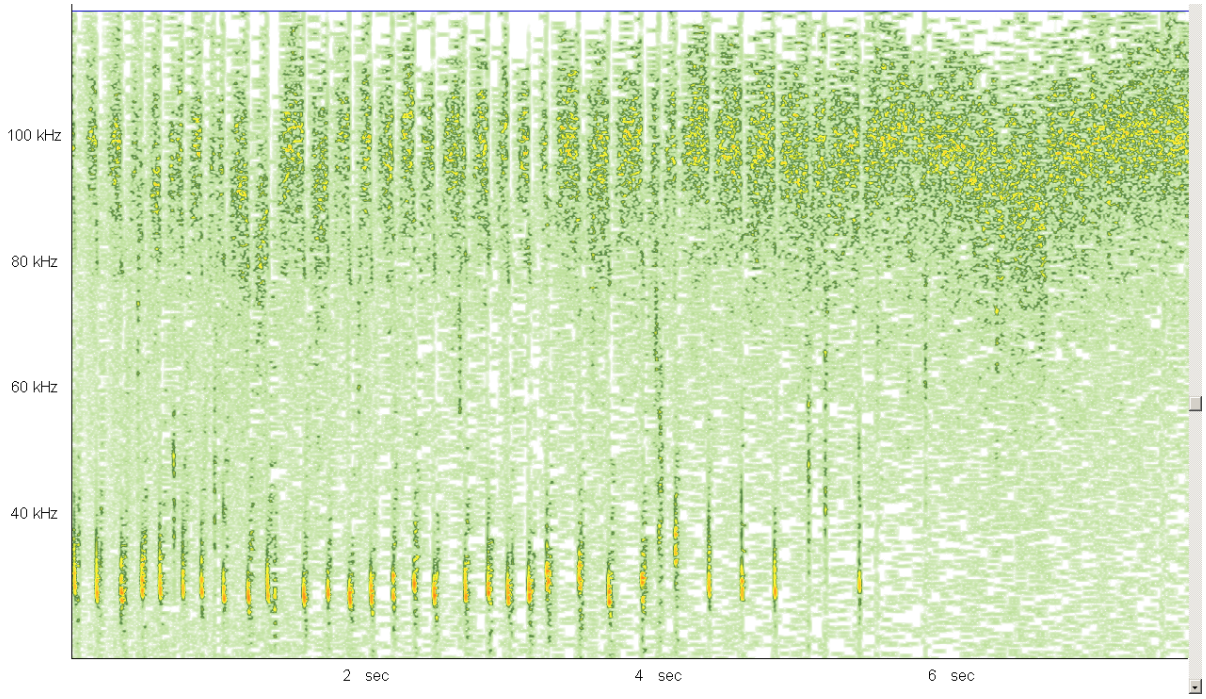


Plate 1: Sonogram of Leisler's bat's bat commuting along hedgerow at tower location at 21.25 hrs (track 1 duet)

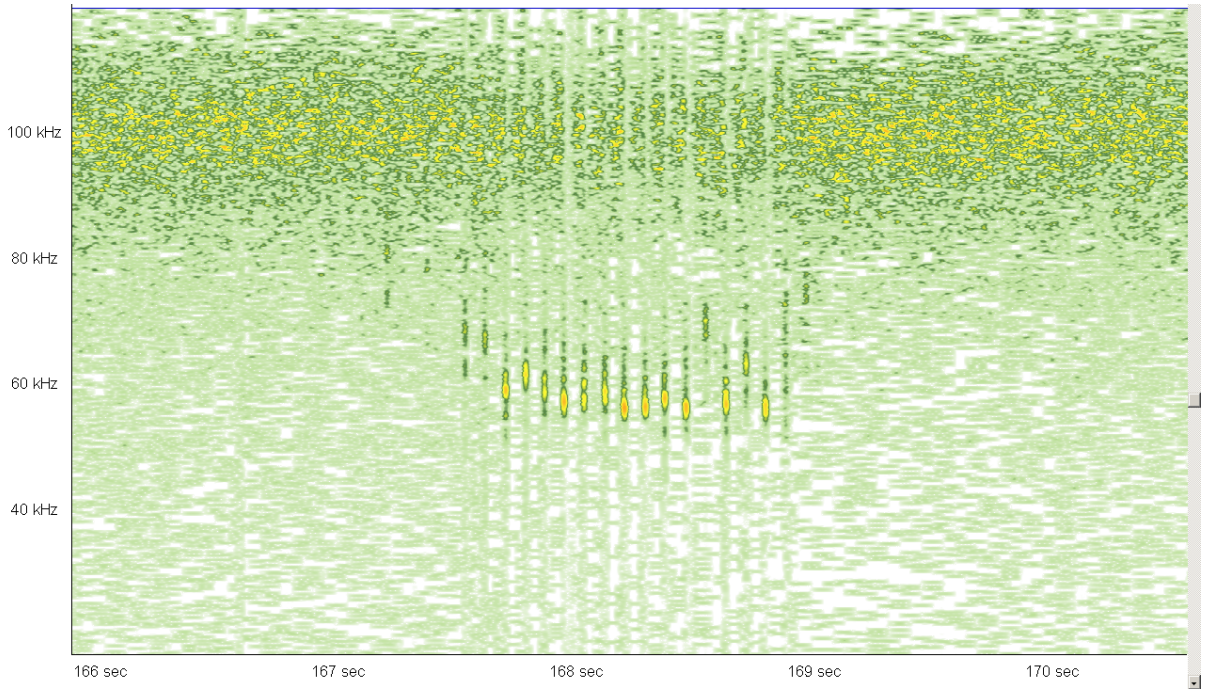


Plate 2: Sonogram of Myotis sp. commuting along wooded stream at 21.28 hrs (track 1 duet)

Additional Comments / Observations

Tall intact native species hedgerow at this location. Bat activity was only recorded in sheltered area in a hollow at the northern boundary of the field. A transect was walked along the western boundary but no further bat activity was recorded, possibly due to blustery conditions.

DUSK SURVEY	Recorder(s): Cormac Loughran	Qualifications, Experience and Relevant Licenses: MSc, MIEEM
Date:	21st August 2009	
Arrival time:	2115hrs	Site: Adjacent to the proposed site for tower 72.
Departure time:	2232hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:	NA	Sunset:	2042hrs
Wind speed & direction	Gusts of ~10-15 mph at times	Air temperature (C)	15.5
Weather (rain etc):	Dry, mild with 80% cloud cover		
Habitat / corridors / nearby water bodies and general habitat: Open fields with hedges and mature trees in boundaries and along nearby minor roads.			

TN	**Time of sighting (24 hr clock)**	**MP3 time and track**	**Feature of the building/structure and location of sighting**	**Bat species**	**Behaviour (e.g. foraging / commuting)**	**No. of Bats**
1	2142	Bat pass 1	Along the leeward side of a hedgerow.	Common Pip	Commuting	1
2	2143	Bat pass 2	Along the leeward side of a hedgerow.	Leisler's bat	Commuting	1
3	2148:06	Bat pass 3	Along nearby minor road.	Common Pip	Commuting	1
4	2148:30	Bat pass 4	Along nearby minor road	Common Pip	Foraging	1
5	2150	Bat pass 5	Along the edges of the trees nearby trees.	Common Pip	Commuting	1
6	2153	Bat pass 6	Along nearby minor road	Pip spp	Commuting and Foraging	1
7	2159	Bat pass 7	Along nearby minor road	Natterer's bat	Commuting and Foraging	1
8	2207	Bat pass 8	Along the leeward side of a hedgerow.	Pip spp	Foraging	1
9	2217	Bat pass 9	Along the leeward side of a hedgerow.	Pip spp	Commuting	1

Additional Comments / Observations

Windy conditions seemed to concentrate a small number of foraging bats along the leeward side of adjacent hedges and along a tree covered minor road, 100m to the west. Limited bat activity was recorded or observed within the impact zone for tower 72.

Objective Evidence of Species e.g. Sonograms

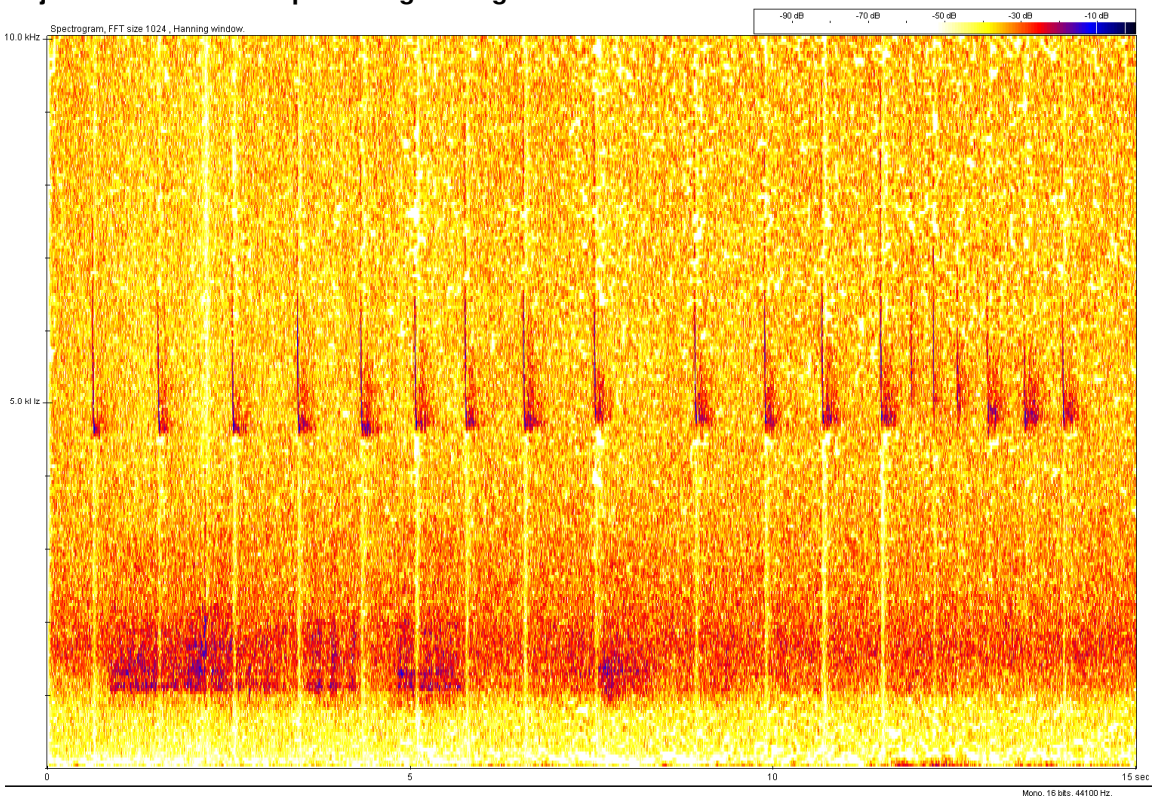


Plate 1: Spectrogram of common pipistrelle in TN 1 from table above.

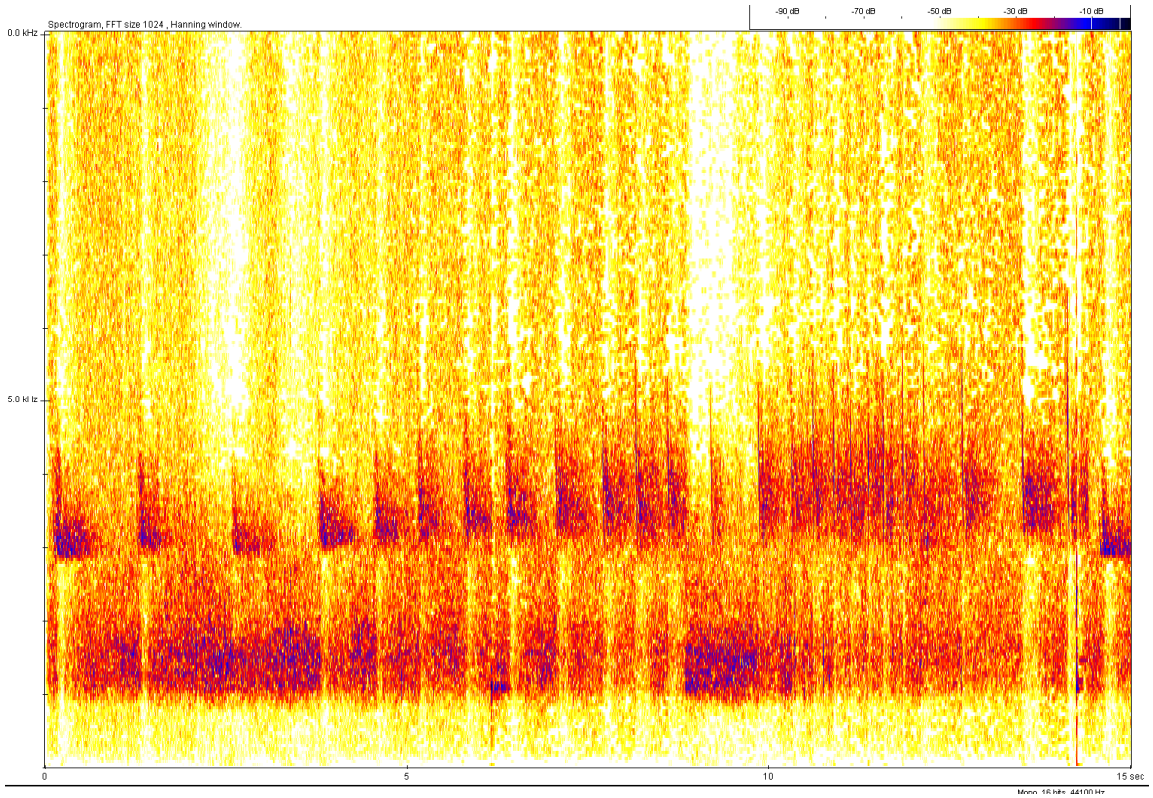


Plate 2: Spectrogram of file ‘bat pass 2’ from the table above and shows a foraging Leisler’s bat.

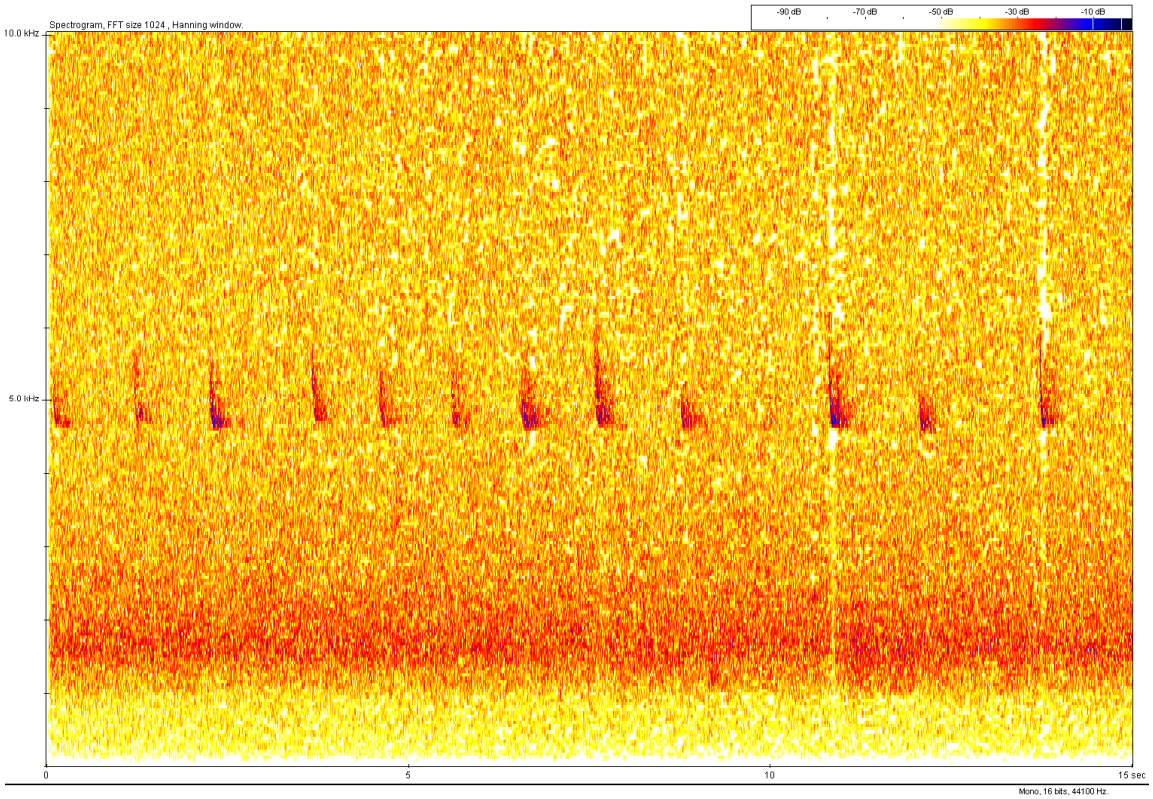


Plate 3: Spectrogram of a commuting common pip (TN 3 in table above).

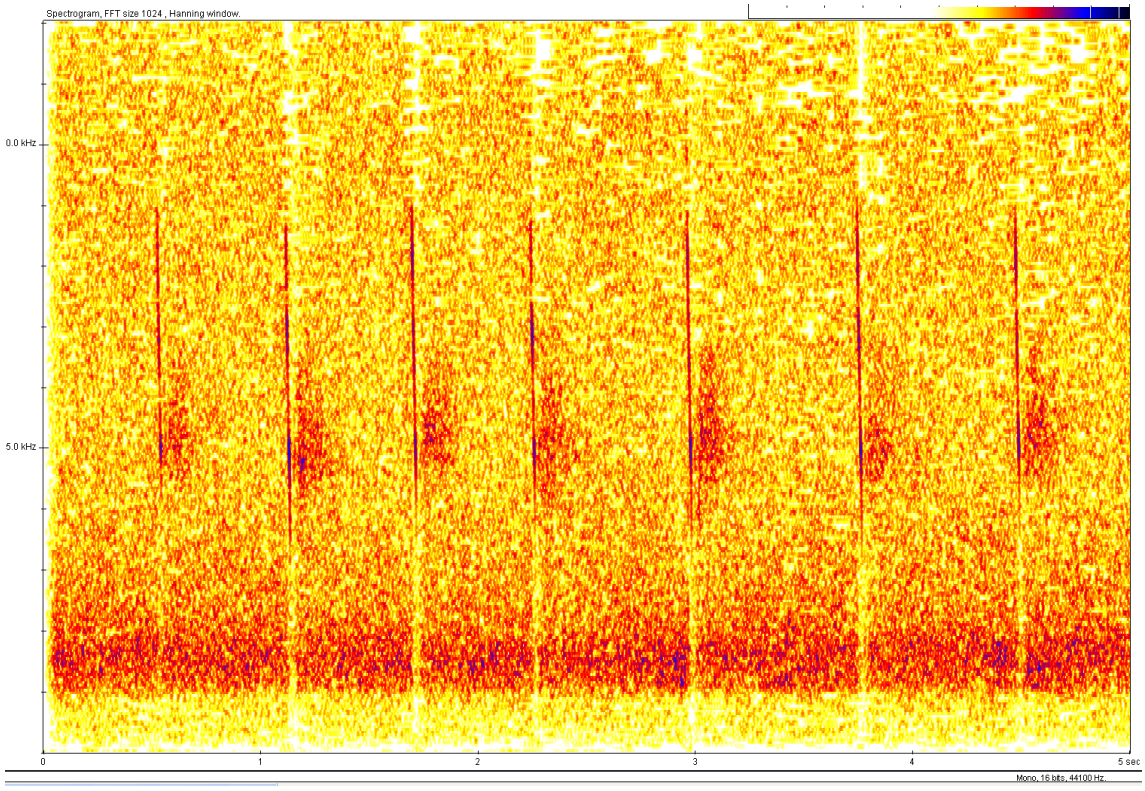


Plate 4: Spectrogram of TN7 from the table above, *Myotis spp* which appears to have the characteristics of a Natterer's bat.

DUSK SURVEY	Recorder(s): Mary Maguire	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. AIEMA
Date:	21st August 2009	
Arrival time:	2133hrs	Site: Tower 75
Departure time:	2230hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2042hrs
Wind speed & direction	Blustery	Air temperature (C)	15.5°C
Weather (rain etc):	Dry		

Habitat / corridors / nearby water bodies and general habitat:
The static point was along the corner of an improved grassland field which was bounded by two hawthorn and blackthorn hedges.

TN	**Time of sighting (24 hr clock)**	**MP3 time and track**	**Feature of the building/structure and location of sighting**	**Bat species**	**Behaviour (e.g. foraging / commuting)**	**No. of Bats**
1	21.33	2133 Baton	Tall hedgerow with gorse and mature trees	Leisler's bat	Commuting	1
2	21.39	2133 Baton	Tall hedgerow with gorse and mature trees	Leisler's bat	Commuting	2
3	21.40	2133 Baton	Tall hedgerow with gorse and mature trees	Leisler's bat	Commuting	1
4	21.42	2133 Baton	Tall hedgerow with gorse and mature trees	Pipistrelle sp.	Commuting	1
5	21.42	2133 Baton	Tall hedgerow with gorse and mature trees	Leisler's bat	Commuting	1
6	21.45	2133 Baton	Tall hedgerow with gorse and mature trees	Pipistrelle sp.	Commuting	1
7	21.47	2133 Baton	Tall hedgerow with gorse and mature trees	Leisler's bat	Commuting	1
8	21.49	2133 Baton	Tall hedgerow with gorse and mature trees	Common pipistrelle	Commuting	1
9	21.53	2133 Baton	Tall hedgerow with gorse and mature trees	Soprano pipistrelle	Commuting	1
10	22.03	2133 Baton	Tall hedgerow with gorse and mature trees	Common pipistrelle	Commuting	1
11	22.05	2133 Baton	Tall hedgerow with gorse and mature trees	Common pipistrelle.	Commuting	1
12	22.06	2133 Baton	Tall hedgerow with gorse and mature trees	Common pipistrelle	Commuting and foraging	1
13	22.12	2133 Baton	Tall hedgerow with gorse and mature trees	Common pipistrelle	Commuting and foraging	1
14	22.20	2133 Baton	Tall hedgerow with gorse and mature trees	Pipistrelle sp.	Commuting	1
15	22.28	2133 Baton	Tall hedgerow with gorse and mature trees	Common pipistrelle	Commuting	1

Objective Evidence of Species e.g. Sonograms

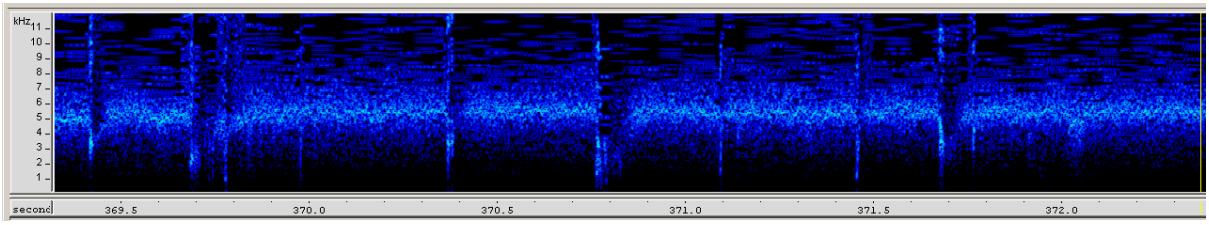


Plate 1: Sonogram of commuting Leisler's bat recorded at 21.39 hrs on 28/08/09

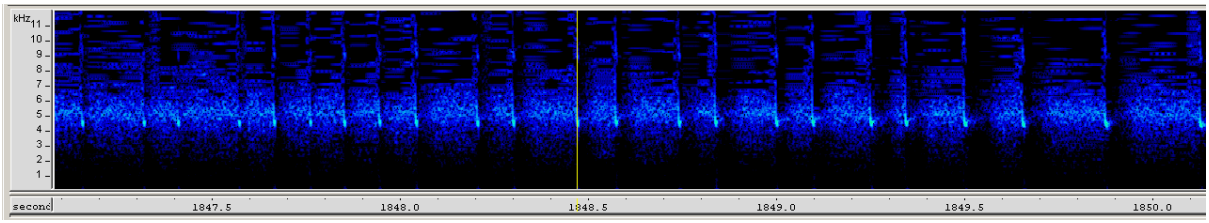


Plate 2: Sonogram of commuting Common pipistrelle recorded at 22.03 hrs on 28/08/09

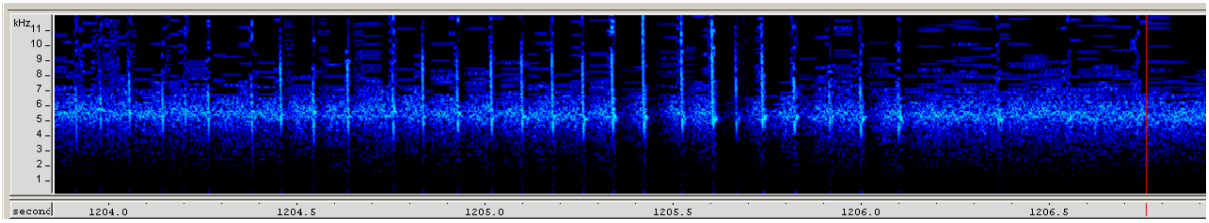


Plate 3: Sonogram of commuting Soprano pipistrelle recorded at 21.53 hrs on 28/08/09

Additional Comments / Observations

At 21.45 a Leisler's bat was spotted exiting the tree line heading south across the agricultural field to an adjacent tree line.

DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. 5 years bat survey experience
Date:	29th July 2010	
Arrival time:	0420hrs	Site: Interconnector – area between Tower 76
Departure time:	0520hrs	Project and Reference: 60032220 NS Interconnector

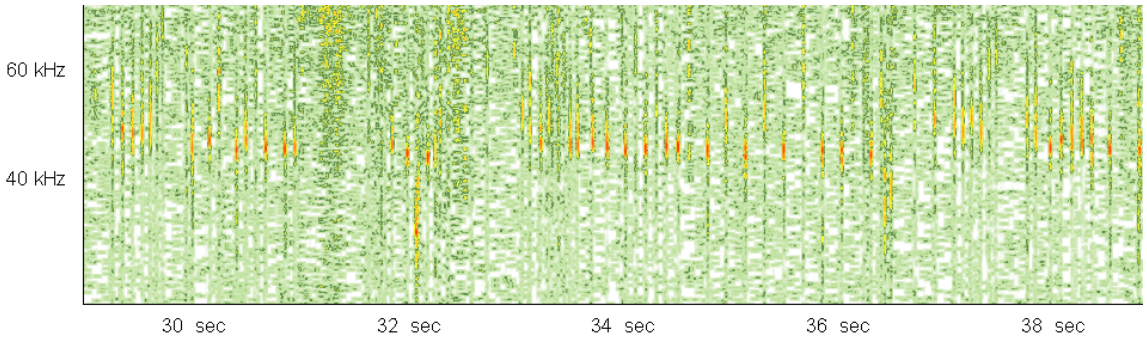
Weather conditions			
Sunrise:	0536hrs	Sunset:	
Wind speed & direction	Calm	Air temperature (C)	11°C
Weather (rain etc):	Dry – 100% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

Improved pasture bounded by tall hedgerows with mature trees. The southern boundary joins an area of semi-natural broadleaf woodland.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0434	Track 1	Tall hedgerow with mature trees	Common pipistrelle	Commuting	1
2	0439	Track 2	Tall hedgerow with mature trees	Leisler's bat	Commuting (distant)	1
3	0439	Track 2	Tall hedgerow with mature trees	Leisler's bat	Social call	1
4	0442	Track 2	Tall hedgerow with mature trees	Common pipistrelle	Commuting	1
5	0451	Track 5	Tall hedgerow with mature trees	Leisler's bat	Social call	1

Objective Evidence of Species e.g. Sonograms



Sonogram of common pipistrelle recorded commuting along hedgerow at 0434hrs

Additional Comments / Observations

Despite ideal conditions and habitat, very little bat activity was recorded in this area.

DAWN SURVEY

Site: Tower 80			
Project and Reference: N/S Interconnector (60032220)			
Recorder(s):	Mary Maguire	**Arrival time:**	0335hrs
Date:	20th July 10	**Departure time:**	0455hrs

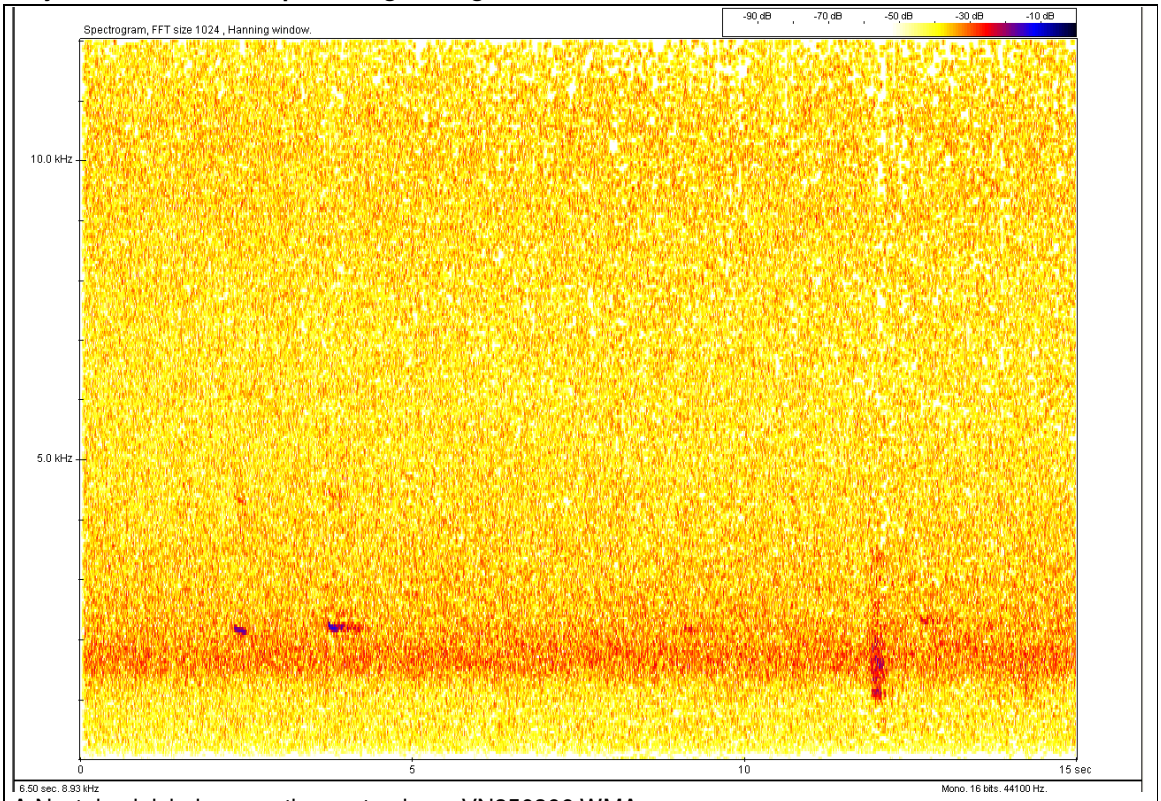
Weather conditions			
Sunrise:	0522hrs	**Sunset:**	
Wind speed & direction:	0.8mph	**Air temperature (C):**	15°C
Weather (rain etc):	None – 50% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:
Area of scrub to the north of proposed tower location 80.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
0354	Area of scrub to the north of tower 80	*VN350366.WMA*	Nyctalus leisleri	Commuting	1
0312	Area of scrub to the north of tower 80	*VN350367.WMA*	No bats recorded.		
0320	Area of scrub to the north of tower 80	*VN350368.WMA*	*No bats recorded.*		
0321	Area of scrub to the north of tower 80	*VN350369.WMA*	*Myotis spp.*	Commuting	1
0321	Area of scrub to the north of tower 80	*VN350370.WMA*	*No bats recorded.*		
0322	Area of scrub to the north of tower 80	*VN350371.WMA*	*No bats recorded.*		
0322	Area of scrub to the north of tower 80	*VN350372.WMA*	*No bats recorded.*		
0334	Area of scrub to the north of tower 80	*VN350373.WMA*	*No bats recorded.*		
0336	Mature tree line to the north of tower 80	*VN350374.WMA*	*No bats recorded.*		
0341	Mature tree line to the north of tower 80	*VN350375.WMA*	*No bats recorded.*		
0341	Mature tree line to the north of tower 80	*VN350376.WMA*	*No bats recorded.*		
0345	Mature tree line to the north of tower 80	*VN350377.WMA*	*No bats recorded.*		
0351	Mature tree line to the north of tower 80	*VN350378.WMA*	*No bats recorded.*		

0358	Mature tree line to the north of tower 80	*VN350379.WMA*	*No bats recorded.*
0401	Mature tree line to the north of tower 80	*VN350380.WMA*	*No bats recorded.*

Objective Evidence of Species e.g. Sonograms



A Nyctalus leisleri commuting on track no. VN350366.WMA**.**

Additional Comments / Observations

Surprisingly little activity given the abundance of insect prey, limited wind and mild temperatures.

Qualifications, Experience and Relevant Licenses:

MSc, BSc, AIEMA

DUSK SURVEY	Recorder(s): Mary Maguire	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc. AIEMA
Date:	24th August 2009	
Arrival time:	2112hrs	Site: Tower 80
Departure time:	2212hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2040hrs
Wind speed & direction	Calm with occasional light gusts	Air temperature (C)	12°C
Weather (rain etc):	Mostly dry, light drizzle around 22.00		

Habitat / corridors / nearby water bodies and general habitat:
The field, in which tower 80 will be located is semi improved and wet. It is lined by semi mature alder, ash and sycamore species. The field to the south was improved and dryer. Both fields sloped to the north.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	21.19	Track 01	Tall mature hedgeline	Pipistrelle. Sp.	Foraging	1
2	21.22	Track 01	Tall mature hedgeline	Leisler's bat	Foraging	1
3	21.39	Track 01	Tall mature hedgeline	Pipistrelle. Sp	Commuting	2
4	21.39	Track 01	Tall mature hedgeline	Pipistrelle. Sp.	Foraging	1
5	21.39	Track 01	Tall mature hedgeline	Pipistrelle. Sp	Commuting	1
6	21.47	Track 01	Tall mature hedgeline	Common pipistrelle	Foraging	1
7	21.47	Track 01	Tall mature hedgeline	Common pipistrelle	Commuting	1
8	21.47	Track 01	Tall mature hedgeline	Common pipistrelle	Commuting	1
9	21.47	Track 01	Tall mature hedgeline	Pipistrelle. Sp	Foraging	1
10	21.48	Track 01	Tall mature hedgeline	Common pipistrelle	Commuting	1
11	21.48	Track 01	Tall mature hedgeline	Soprano pipistrelle	Commuting	1
12	21.54	Track 01	Tall mature hedgeline	Soprano pipistrelle	commuting	1
13	21.54	Track 01	Tall mature hedgeline	Pipistrelle. Sp	commuting	1
14	21.54	Track 01	Tall mature hedgeline	Pipistrelle. Sp	commuting	1
15	21.56	Track 01	Tall mature hedgeline	Pipistrelle. Sp	commuting	1
16	21.56	Track 01	Tall mature hedgeline	Pipistrelle. Sp	commuting	1
17	21.56	Track 01	Tall mature hedgeline	Pipistrelle. Sp	commuting	1

Objective Evidence of Species e.g. Sonograms

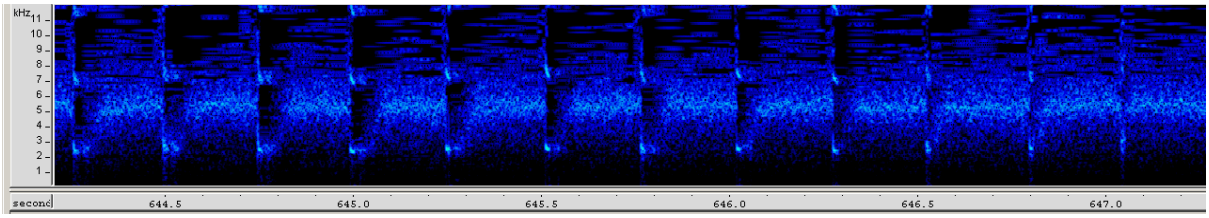


Plate 1: Sonogram of Leisler's bat foraging at 21.22 hrs on 24/08/09

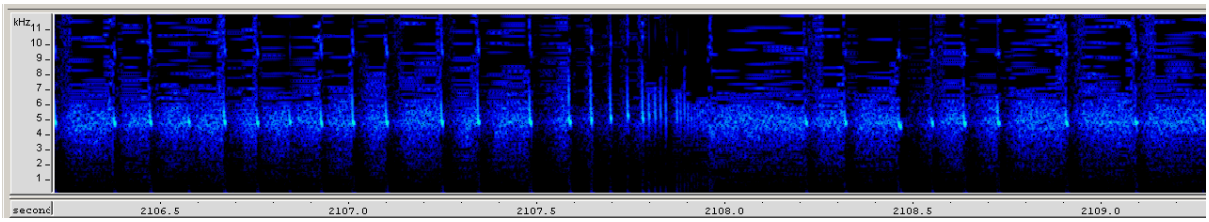


Plate 2: Sonogram of Common pipistrelle 'feeding buzz' at 21.47 hrs on 24/08/09

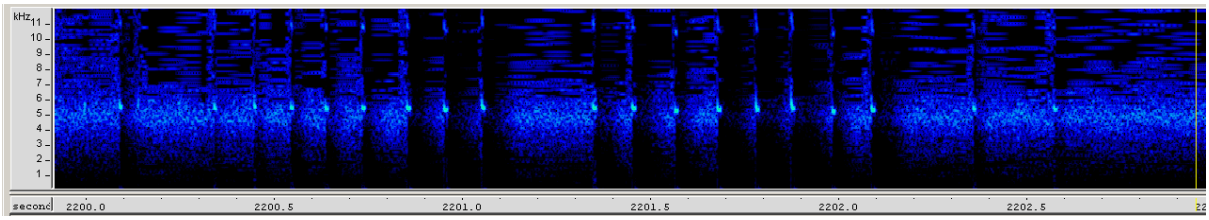


Plate 3: sonogram of Soprano pipistrelle commuting at 21.48 hrs on 24/08/09

Additional Comments / Observations

Moderate level of activity at this site although as trees will need to be inspected before pollarding takes place.

DAWN SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B. Sc. M.Sc 5 years bat survey experience
Date:	22nd June 2010	
Arrival time:	0325hrs	Site: Interconnector Tower 82
Departure time:	0445hrs	Project and Reference: 60032220

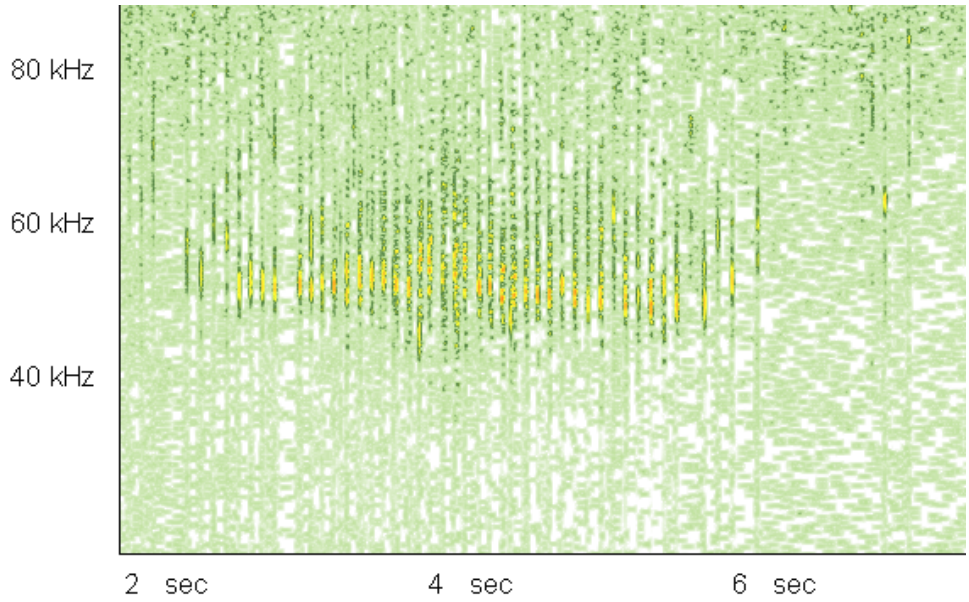
Weather conditions			
Sunrise:	0456hrs	Sunset:	
Wind speed & direction	Calm	Air temperature (C)	11°C
Weather (rain etc):	Dry ~ 90% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

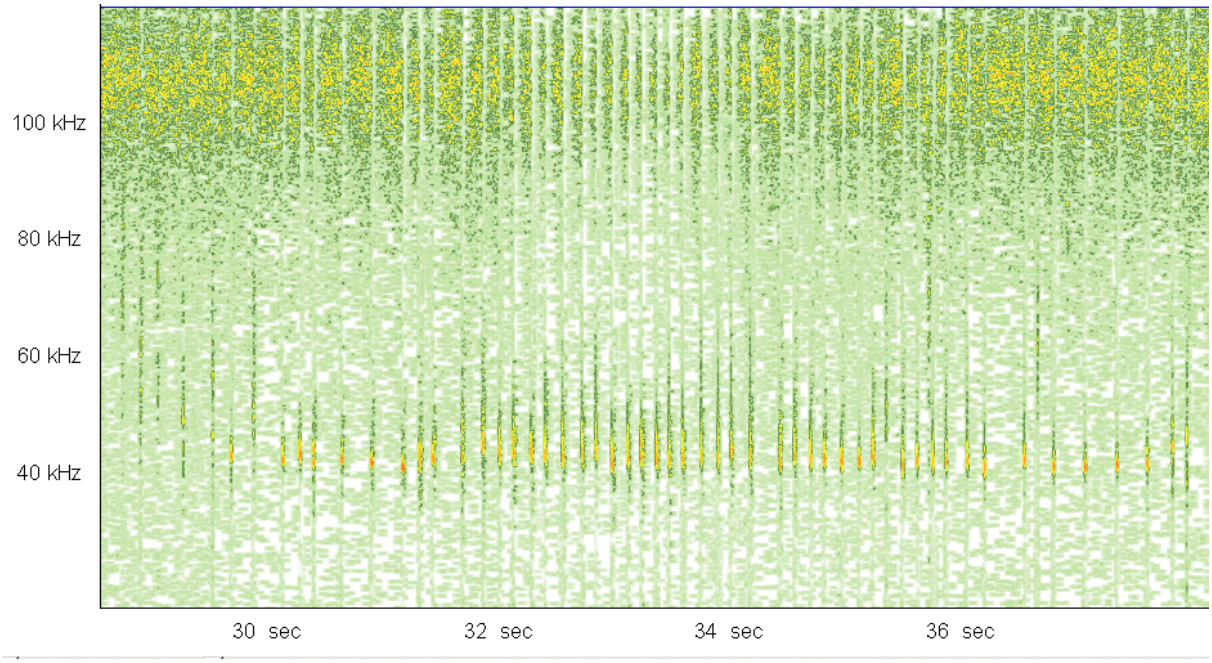
Semi-improved cattle pasture fringed with tall hedgerows. Stream and tall hedgerow/trees from western boundary.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0359	Track 1	Tall hedgerow	Common pipistrelle	Commuting	1
2	0359	Track 1	Tall hedgerow	Soprano pipistrelle	Commuting	1
3	0402	Track 2	Tall hedgerow	Pipistrelle sp.	Commuting (distant)	2
4	0408	Track 3	Tall hedgerow	Soprano pipistrelle	Commuting	1
5	0410	Track 3	Tall hedgerow	Soprano pipistrelle	Commuting	1
6	0416	Track 4	Tall hedgerow	Common pipistrelle	Commuting	2
7	0418	Track 5	Tall hedgerow	Common pipistrelle	Commuting	5
8	0433	Track 8	Stream fringed with tall hedgerow/trees	Common pipistrelle	Commuting	2
9	0434	Track 9	Stream fringed with tall hedgerow/trees	Soprano pipistrelle	Commuting	1
10	0436	Track 9	Stream fringed with tall hedgerow/trees	Common pipistrelle	Commuting	1
11	0437	Track 10	Stream fringed with tall hedgerow/trees	Common pipistrelle	Commuting	2
12	0440	Track 11	Stream fringed with tall hedgerow/trees	Soprano pipistrelle	Commuting	2
13	0441	Track 11	Stream fringed with tall hedgerow/trees	Common pipistrelle	Commuting	1

Objective Evidence of Species e.g. Sonograms



Sonogram of commuting soprano pipistrelle recorded at 0359hrs



Sonogram of commuting common pipistrelle recorded at 0418hrs

Additional Comments / Observations

Conditions for bat survey were ideal. Pipistrelles appear to use the hedgerows in the vicinity of tower 82 for commuting to feeding areas. No feeding buzzes were recorded in this area.

DUSK SURVEY

Site: Tower 82			
Project and Reference: N/S Interconnector			
Recorder(s):	Mary Maguire	**Arrival time:**	2100hrs
Date:	29th July 2010	**Departure time:**	2241hrs

Weather conditions			
Sunrise:		**Sunset:**	2130hrs
Wind speed & direction:	Calm	**Air temperature (C):**	12°C
Weather (rain etc):	Dry – 60% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:
Semi-improved grassland field bounded by tall hedges. Stream and trees along the western boundary.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
21.12	Along the tree fringed stream.	*VN350477.WMA*	No bats recorded.		
21.14	Along the tree fringed stream.	*VN350478.WMA*	Pipistrellus spp.	Commuting	1
21.21	Along the tree fringed stream.	*VN350479.WMA*	*Pipistrellus pipistrellus*	Commuting	1
21.22	Along the tree fringed stream.	*VN350480.WMA*	*Pipistrellus pipistrellus*	Commuting	1
			Pipistrellus pipistrellus	Foraging	1
21.23	Along the tree fringed stream.	*VN350481.WMA*	*Pipistrellus pipistrellus*	Commuting	3
21.24	Along the tree fringed stream.	*VN350482.WMA*	*Pipistrellus pipistrellus*	Commuting	1
			Pipistrellus pygmaeus	Commuting	1
21.26	Along the tree fringed stream.	*VN350483.WMA*	*Pipistrellus pipistrellus*	Commuting	2
			Pipistrellus pygmaeus	Commuting	1
21.27	Along the tree fringed stream.	*VN350484.WMA*	*Pipistrellus pipistrellus*	Foraging	1
			Pipistrellus pipistrellus	Commuting	4
21.31	Along the tree fringed stream.	*VN350485.WMA*	*Nyctalus leisleri*	Commuting	4
			Pipistrellus pipistrellus	Commuting	3
21.35	Along the tree fringed stream.	*VN350486.WMA*	*Nyctalus leisleri*	Commuting	6
			Pipistrellus pipistrellus	Commuting	5

21.42	Along the tree fringed stream.	*VN350487.WMA*	*No bats recorded.*		
21.44	Along the tree fringed stream.	*VN350488.WMA*	*Pipistrellus pipistrellus*	Commuting	2
21.47	Along the tree fringed stream.	*VN350489.WMA*	*No bats recorded.*		
21.50	Along the tree fringed stream.	*VN350490.WMA*	*Pipistrellus pipistrellus*	Commuting	2
21.59	Along the tree fringed stream.	*VN350491.WMA*	*Pipistrellus spp.*	Commuting	2
			Pipistrellus pipistrellus	Commuting	2
21.59	Along the tree fringed stream.	*VN350492.WMA*	*No bats recorded.*		
22.05	Along the tree fringed stream.	*VN350493.WMA*	*Myotis nattereri*	Commuting	1
22.13	Along the tree fringed stream.	*VN350494.WMA*	*No bats recorded.*		
22.15	Along the tree fringed stream.	*VN350495.WMA*	*Pipistrellus pipistrellus*	Commuting	1
22.16	Along the tree fringed stream.	*VN350496.WMA*	*Pipistrellus pipistrellus*	Commuting	1
22.22	In the south western corner of the semi improved grassland field.	*VN350497.WMA*	*Pipistrellus pipistrellus*	Commuting	1
			Myotis nattereri	Commuting	1
22.24	In the south western corner of the semi improved grassland field.	*VN350498.WMA*	*Pipistrellus pipistrellus*	Commuting	2
			Pipistrellus spp.	Commuting	1
22.29	In the south western corner of the semi improved grassland field.	*VN350499.WMA*	*Myotis nattereri*	Commuting	2

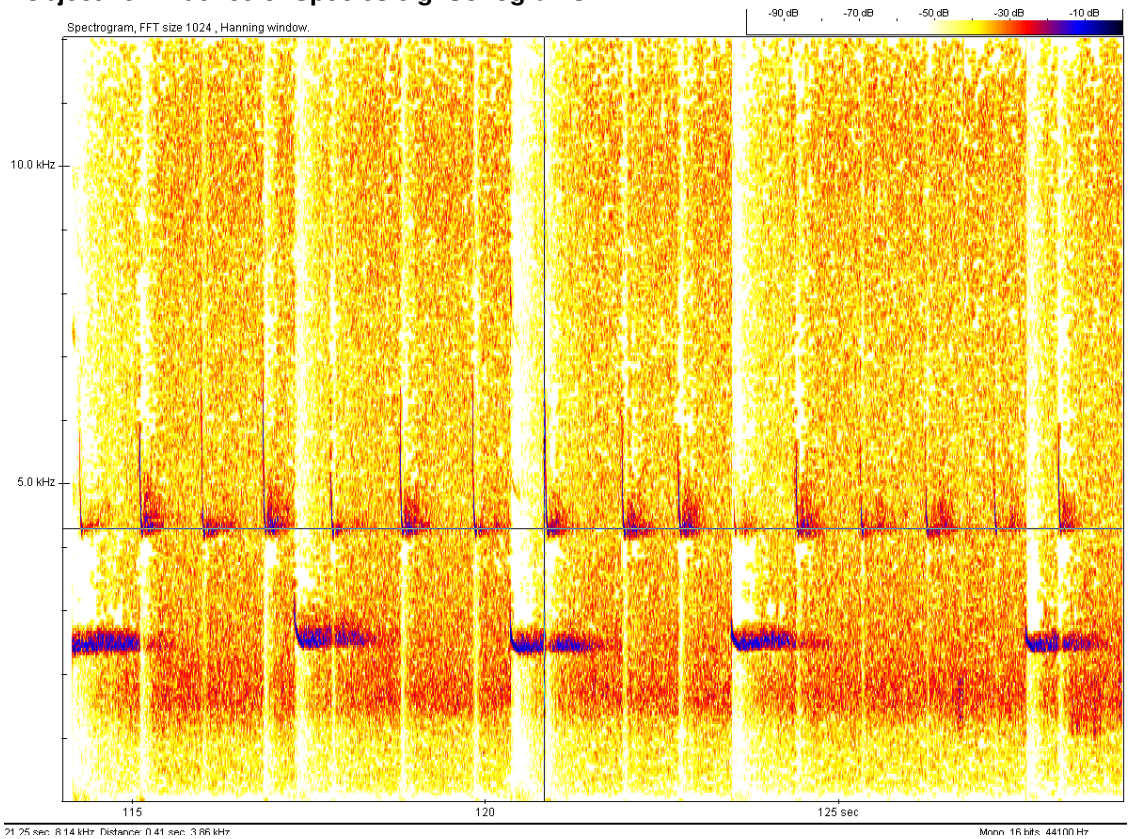
Additional Comments / Observations

Good numbers of commuting bats, although there was little evidence of roosting opportunities, all trees in this area should be checked by a licensed bat worker immediately prior to vegetation clearance works.

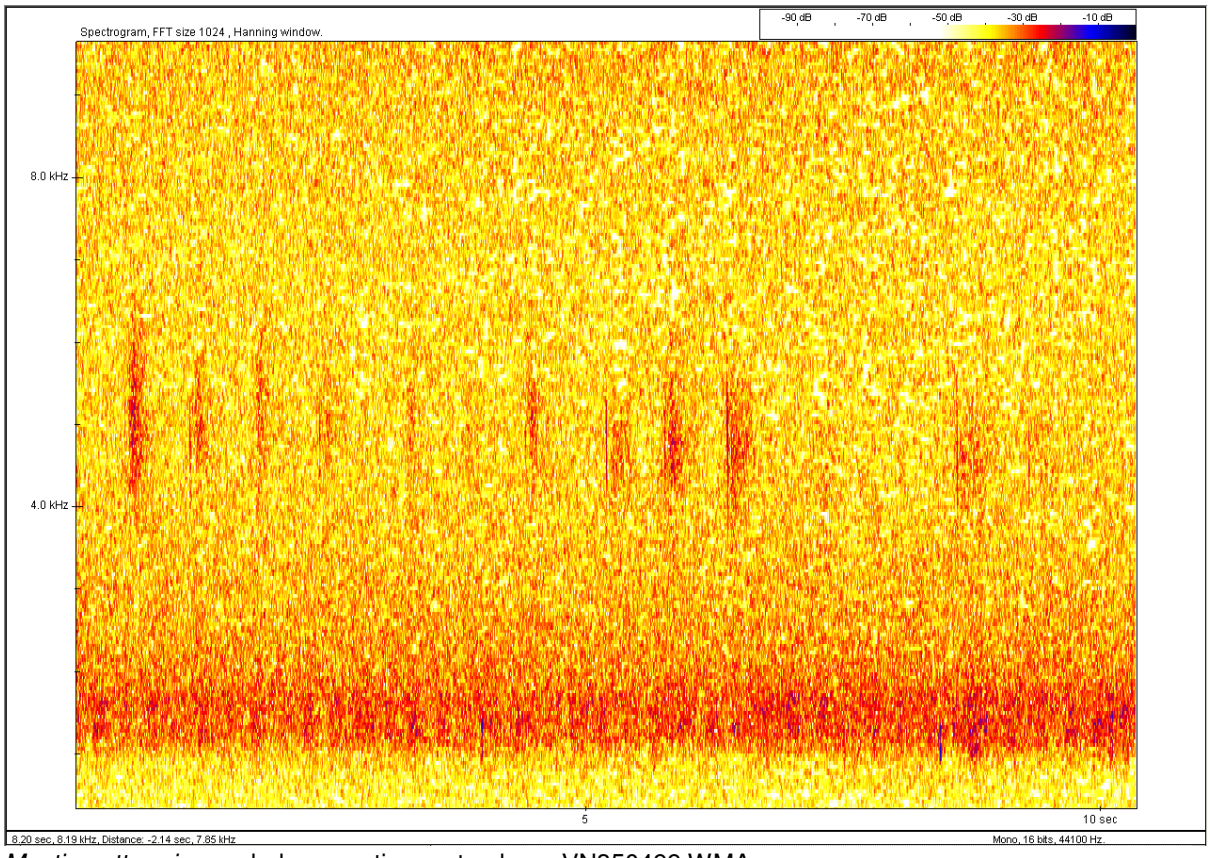
Qualifications, Experience and Relevant Licenses:

BSc, MSc, AIEMA

Objective Evidence of Species e.g. Sonograms



Pipistrellus pipistrellus and *Nyctalus leisleri* commuting together on track VN350485.WMA



Myotis nattereri recorded commuting on track no. VN350499.WMA.

DUSK SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: B.Sc. M.Sc.
Date:	24th August 09	
Arrival time:	2110hrs	Site: Tower 83
Departure time:	2210hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2040hrs
Wind speed & direction	Calm with occasional light gusts	Air temperature (C)	12°C
Weather (rain etc):	Mostly dry, light drizzle around 2200hrs		

Habitat / corridors / nearby water bodies and general habitat:
Tall overgrown hedgerow with mature trees along fast-flowing stream with scrub encroachment onto surrounding pasture

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	21.20	Track 1 duet	Along stream – very distant	Daubenton's bat	Foraging	1
2	21.20	Track 1 duet	Along trees and scrub fringing stream	Common pipistrelle	Commuting	2
3	21.20	Track 1 duet	Along hedgerow perpendicular to east bank of stream	Soprano pipistrelle	Commuting and foraging	2
4	21.30	Track 2 duet	Along trees and scrub fringing stream	Common pipistrelle	Commuting and foraging	9
5	21.30	Track 2 duet	Along stream – very distant	Daubenton's bat	Foraging	1
6	21.30	Track 2 duet	Along trees and scrub fringing stream	Soprano pipistrelle	Commuting	2
7	21.36	Track 3 duet	Along trees and scrub fringing stream	Common pipistrelle	Commuting	5
8	21.47	Track 4 duet	Along trees and scrub fringing stream in the distance	Pipistrelle sp.	Commuting	6

Additional Comments / Observations

Daubenton's bats were recorded foraging along the stream but not in the immediate vicinity of the proposed tower location. Common and Soprano pipistrelles were noted commuting along the trees and scrub fringing the stream close to the tower location.

Objective Evidence of Species e.g. Sonograms

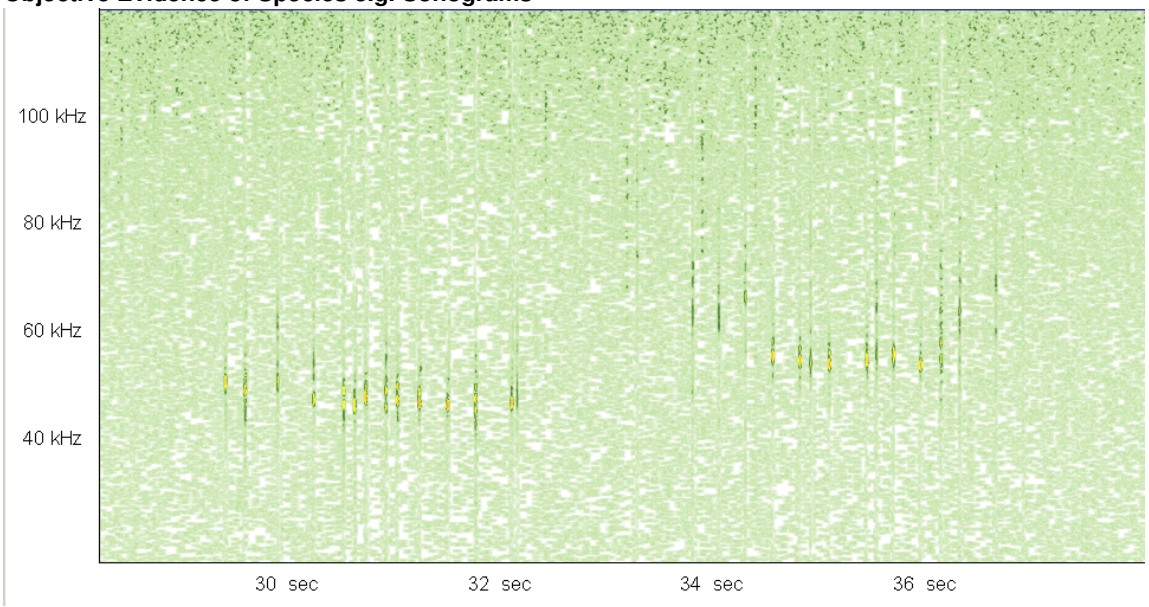


Plate 1: Sonograms of Common pipistrelle and Soprano pipistrelle commuting along the stream and adjacent hedgerow at 21.20 hrs on 24/08/09

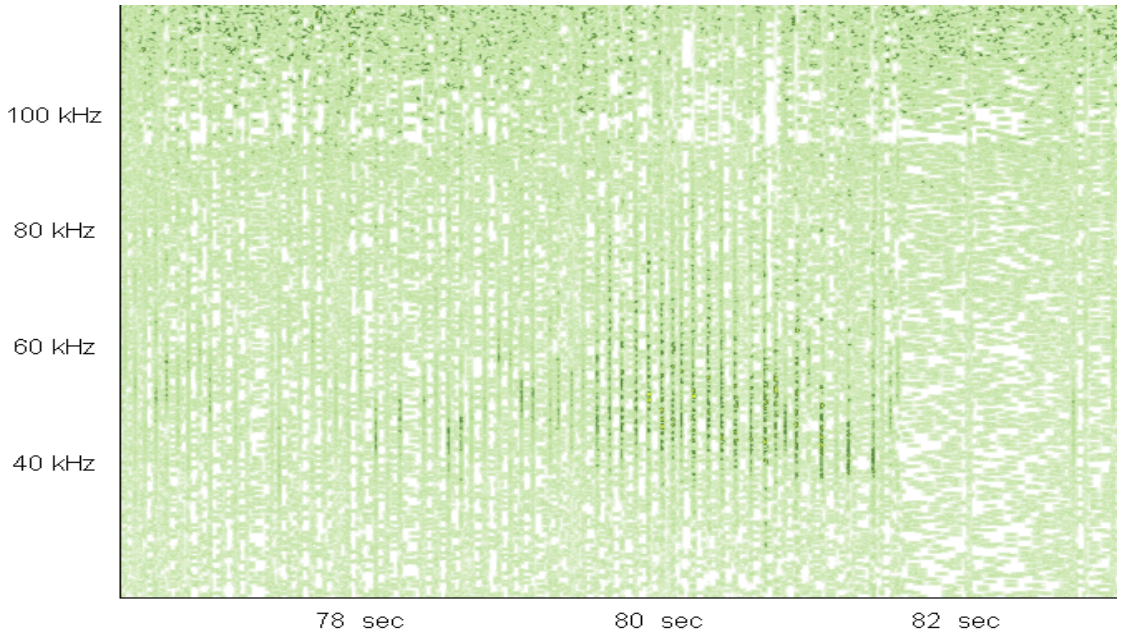


Plate 2: Sonogram of Daubenton's bat foraging along the stream at 21.30 hrs on 24/08/09

DAWN SURVEY	Recorder(s): Mary Maguire	Qualifications, Experience and Relevant Licenses: BSc MSc AIEMA.
Date:	22nd June 2010	
Arrival time:	0335hrs	Site: Interconnector –Tower 87
Departure time:	0445hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:	0456hrs	Sunset:	
Wind speed & direction	0.4	Air temperature (C)	17.3°C
Weather (rain etc):	95% cloud cover		

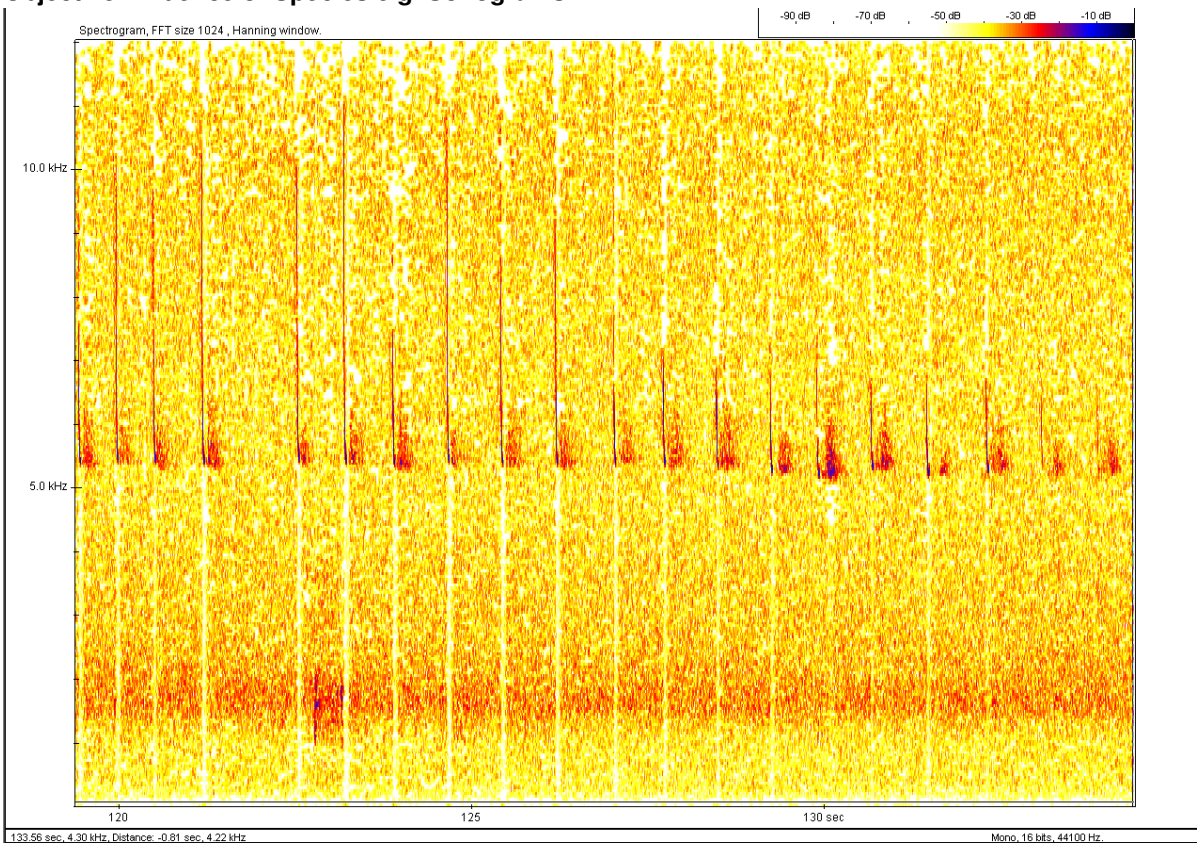
Habitat / corridors / nearby water bodies and general habitat:
Mature hedgerow with scattered mature standard trees bordering a field

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	0347	Track 1	Mature hedgerow	Pipistrellus spp.	Commuting	1
2	0350	Track 2	Mature hedgerow	No bat activity recorded		
3	0354	Track 3	Mature hedgerow	Pipistrellus spp.	Commuting	1
4	0358	Track 4	Mature hedgerow	No bat activity recorded		
5	0301	Track 5	Mature hedgerow	Common pipistrelle	Commuting	2
6	0305	Track 6	Mature hedgerow	Common pipistrelle	Commuting	1
7	0307	Track 7	Mature hedgerow	No bat activity recorded		
8	0311	Track 8	Mature hedgerow	Soprano pipistrelle	Foraging	2
9	0313	Track 9	Mature hedgerow	Pipistrelle spp.	Foraging	1
10	0317	Track 10	Mature hedgerow	No bat activity recorded		
11	0320	Track 11	Mature hedgerow	Common pipistrelle	Commuting	1
12	0322	Track 11	Mature hedgerow	Leisler's bat	Commuting	1
13	0324	Track 12	Mature hedgerow	Common pipistrelle	Foraging	2
14	0329	Track 13	Mature hedgerow	Common pipistrelle	Commuting	2
15	0333	Track 14	Mature hedgerow	Common pipistrelle.	Commuting	1
16	0337	Track 15	Mature hedgerow	Pipistrellus spp.	Commuting	1
17	0340	Track 16	Mature hedgerow	No bat activity recorded		
18	0343	Track 17	Mature hedgerow			
19	0345	Track 18	Mature hedgerow	Common pipistrelle	Commuting	1

Additional Comments / Observations

Moderate level of activity given the habitat and conditions.

Objective Evidence of Species e.g. Sonograms



Sonogram of a Soprano pipistrelle commuting on track no. VN350205.MWA.

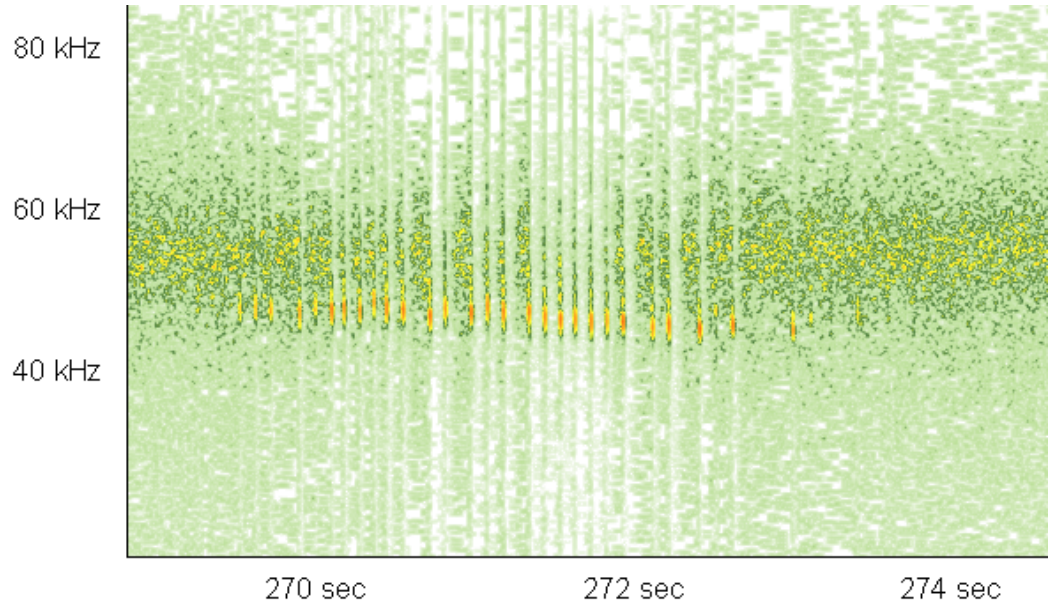
DUSK SURVEY	Recorder(s): Recorded by Brendan Kemp, analysed by Debbie Brown	Qualifications, Experience and Relevant Licenses: Environmental Auditor, 50+ hrs Bat Monitoring experience
Date:	22nd June 2010	
Arrival time:	2215hrs	Site: Tower 88-89
Departure time:	2350hrs	Project and Reference: 60032220 NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2205hrs
Wind speed & direction	Calm	Air temperature (C)	14
Weather (rain etc):	Dry		

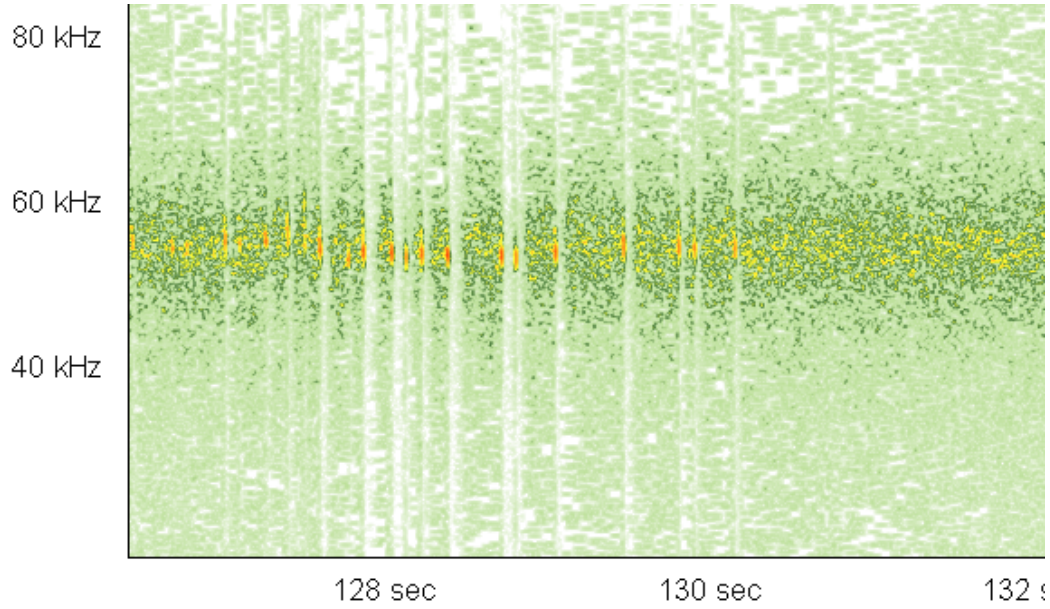
Habitat / corridors / nearby water bodies and general habitat:
Mature hedgerow with intermittent mature trees bordering a field of uncut (30cm) grass/weeds to the west. Immediately east of the hedgerow is a small stream.

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	23.11	Track 4	15m south of proposed line crossing hedgerow	Common pipistrelle	Commuting	1
2	23.17	Track 5	20m south of proposed line crossing hedgerow	Leisler's bat	Social call	1
3	23.34	Track 7	30m south of proposed line crossing hedgerow	Soprano pipistrelle	Commuting	1

Objective Evidence of Species e.g. Sonograms



Sonogram of commuting common pipistrelle recorded at 23.13



Sonogram of commuting soprano pipistrelle recorded at 23.34

Additional Comments / Observations

Visual sightings of bats in hedge lined laneway immediately west of Gaffney farm (Approx 200m south of monitoring location). Sighting taken en-route to survey location at approximately 2208hrs.

DUSK SURVEY	Recorder(s): Cormac Loughran	Qualifications, Experience and Relevant Licenses: MSc, MIEEM
Date:	24/08/09	
Arrival time:	2110hrs	Site: Tower 90
Departure time:	2210hrs	Project and Reference: NS Interconnector

Weather conditions			
Sunrise:		Sunset:	2040hrs
Wind speed & direction	Calm with occasional light gusts	Air temperature (C)	12°C
Weather (rain etc):	Mostly dry, light drizzle around 2200hrs		

Habitat / corridors / nearby water bodies and general habitat:
Tall overgrown hedgerow with mature trees along fast-flowing stream with scrub encroachment onto surrounding pasture

TN	Time of sighting (24 hr)	MP3 time and track	Feature and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
1	2116	VN350065	Along nearby road	Common pip	Commuting	1
2	2118	VN350066	Along nearby road	Soprano pip	Commuting	1
3	2120	VN350067	Along nearby road	Common pip	Commuting	1

Additional Comments / Observations

Sub-optimal conditions for bats but still within known tolerances. 12°C and with a light breeze I would have expected significantly higher levels of bat activity. Bats were present along nearby road and were not using the scrub area underneath the proposed OHL. The scrub is also low growing and will not be impacted upon by vegetation cutting during construction.

Objective Evidence of Species e.g. Sonograms

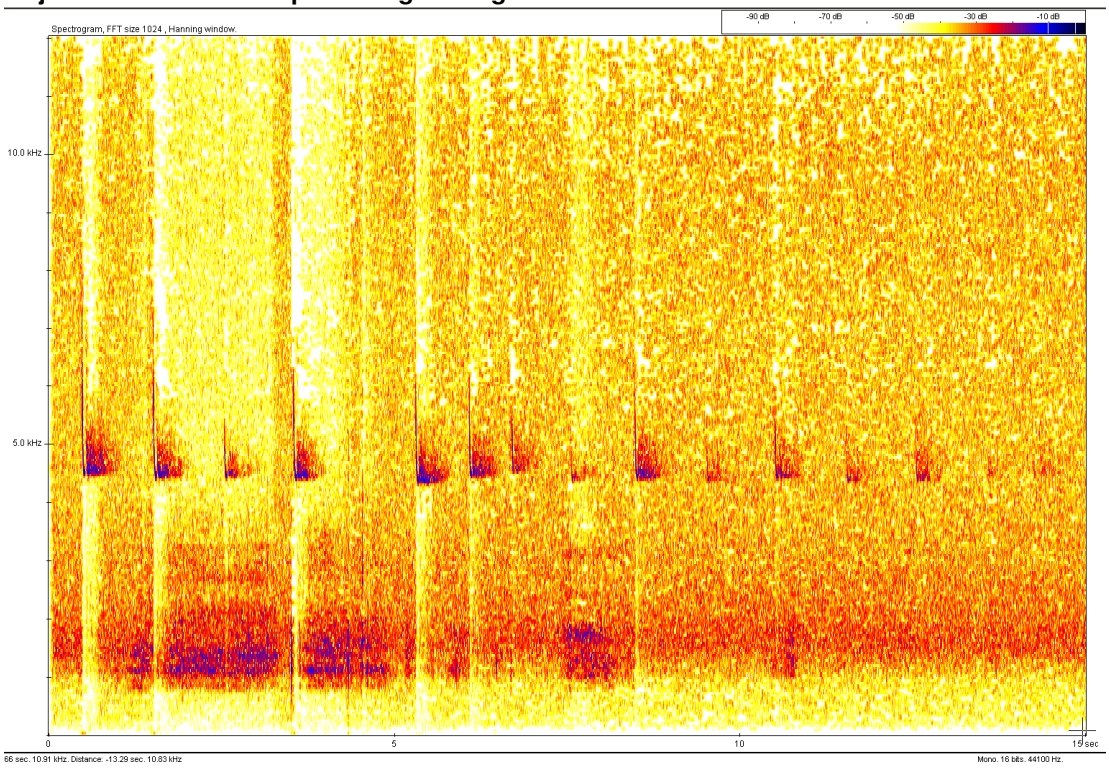


Plate 1 – Shows the common pip as recorded from track 1 in the table above.

DUSK SURVEY

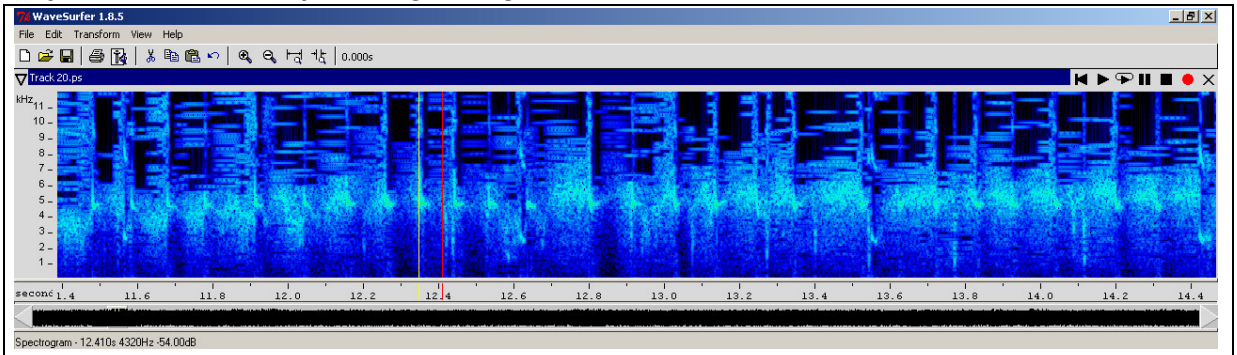
Site: Tower 91			
Project and Reference: N/S Interconnector (60032220)			
Recorder(s):	Recorded by Joe Martin, Analysed by Debbie Brown	**Arrival time:**	1955hrs
Date:	08th September 2010	**Departure time:**	2155hrs

Weather conditions			
Sunrise:		**Sunset:**	2008hrs
Wind speed & direction:	2mph	**Air temperature (C):**	13°C
Weather (rain etc):	Optimal conditions for survey		
Habitat / corridors / nearby water bodies and general habitat: Tree line behind a farm house.			

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
19.59	Tree line behind a farm house	VN350327.WMA	*No bats recorded.*		
20.02		VN350328.WMA	*Pipistrellus pygmaeus*	Commuting	3
			Pipistrellus pygmaeus	Foraging	2
20.05		VN350329.WMA	*Pipistrellus pygmaeus*	Commuting	1
20.09		VN350330.WMA	*Pipistrellus pygmaeus*	Commuting	4
			Pipistrellus pygmaeus	Foraging	1
20.12		VN350331.WMA	*Pipistrellus spp.*	Commuting	10
			Pipistrellus pygmaeus	Foraging	2
			Pipistrellus pygmaeus	Commuting	2
20.15		VN350332.WMA	*No bats recorded.*		
20.19		VN350333.WMA	*Pipistrellus pygmaeus*	Commuting	3
20.23		VN350334.WMA	*Pipistrellus pygmaeus*	Commuting	1
20.26		VN350335.WMA	*No bats recorded.*		
20.32		VN350336.WMA	*No bats recorded.*		
20.35		VN350337.WMA	*Pipistrellus pipistrellus*	Commuting	1
20.38		VN350338.WMA	*Pipistrellus spp.*	Foraging	1
			Pipistrellus spp.	Commuting	1
20.41		VN350339.WMA	*No bats recorded.*		
20.44		VN350340.WMA	*No bats recorded.*		

20.47		VN350341.WMA	*Pipistrellus spp.*	Commuting	1
20.50		VN350342.WMA	*No bats recorded.*		
20.53		VN350343.WMA	*No bats recorded.*		
20.57		VN350344.WMA	*No bats recorded.*		
21.01		VN350345.WMA	*No bats recorded.*		
21.05		VN350346.WMA	*Pipistrellus spp.*	Commuting	1
			Pipistrellus spp.	Social call	1

Objective Evidence of Species e.g. Sonograms



A *Pipistrellus spp.* commuting and socialising on track no. VN350346.WMA.

Additional Comments / Observations

Trees and gorse scrub not particularly significant without any roosting potential. However reasonable levels of bat activity in terms of commuting and foraging Soprano pipistrelles.

Qualifications, Experience and Relevant Licenses:

MSc, BSc

DUSK SURVEY	Recorder(s): Debbie Brown	Qualifications, Experience and Relevant Licenses: BSc, MSc 5 years bat survey experience
Date:	2th June 2010	
Arrival time:	2200hrs	Site: Interconnector Tower 93
Departure time:	2330hrs	Project and Reference: 60032220

Weather conditions			
Sunrise:		Sunset:	2205hrs
Wind speed & direction	2 mph	Air temperature (C)	15°C
Weather (rain etc):	Dry ~ 30% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

Uncut meadows fringed with tall hedgerows

TN	Time of sighting (24 hr clock)	MP3 time and track	Feature of the building/structure and location of sighting	Bat species	Behaviour (e.g. foraging / commuting)	No. of Bats
No bat activity recorded						

Additional Comments / Observations

The survey concentrated on the hedgerow at the location of tower 93, and the hedgerow at the south of the field to be over-sailed by the line. Despite perfect weather conditions, an abundance of prey and a continuous network of tall hedgerows in the area, no bat activity was observed or recorded during the survey.

DUSK SURVEY

Site: Towers 93 to 94			
Project and Reference: N/S Interconnector (60032220)			
Recorder(s):	**Brendan Kemp**	**Arrival time:**	2200hrs
Date:	15th June 2010	**Departure time:**	2330hrs

Weather conditions			
Sunrise:		**Sunset:**	2205
Wind speed & direction:	2mph	**Air temperature (C):**	15°C
Weather (rain etc):	None – 30% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

Tall hedgerow surrounding an uncut meadow.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
21.02	Tall hedgerow surrounding an uncut meadow.	*VN350230.WMA*	No bats recorded.		
21.06		*VN350231.WMA*	No bats recorded.		
21.10		*VN350232.WMA*	No bats recorded.		
21.16		*VN350233.WMA*	*No bats recorded.*		
21.20		*VN350234.WMA*	*No bats recorded.*		
21.27		*VN350235.WMA*	*No bats recorded.*		
21.35		*VN350236.WMA*	*No bats recorded.*		
21.38		*VN350237.WMA*	*No bats recorded.*		

Objective Evidence of Species e.g. Sonograms

No evidence

Additional Comments / Observations

Analysed by Debbie Brown

Qualifications, Experience and Relevant Licenses:

BSc, MSc

DUSK SURVEY

Site: Towers 95 – 96			
Project and Reference:			
Recorder(s):	Mary Maguire	**Arrival time:**	2030hrs
Date:	15th September 10	**Departure time:**	2200hrs

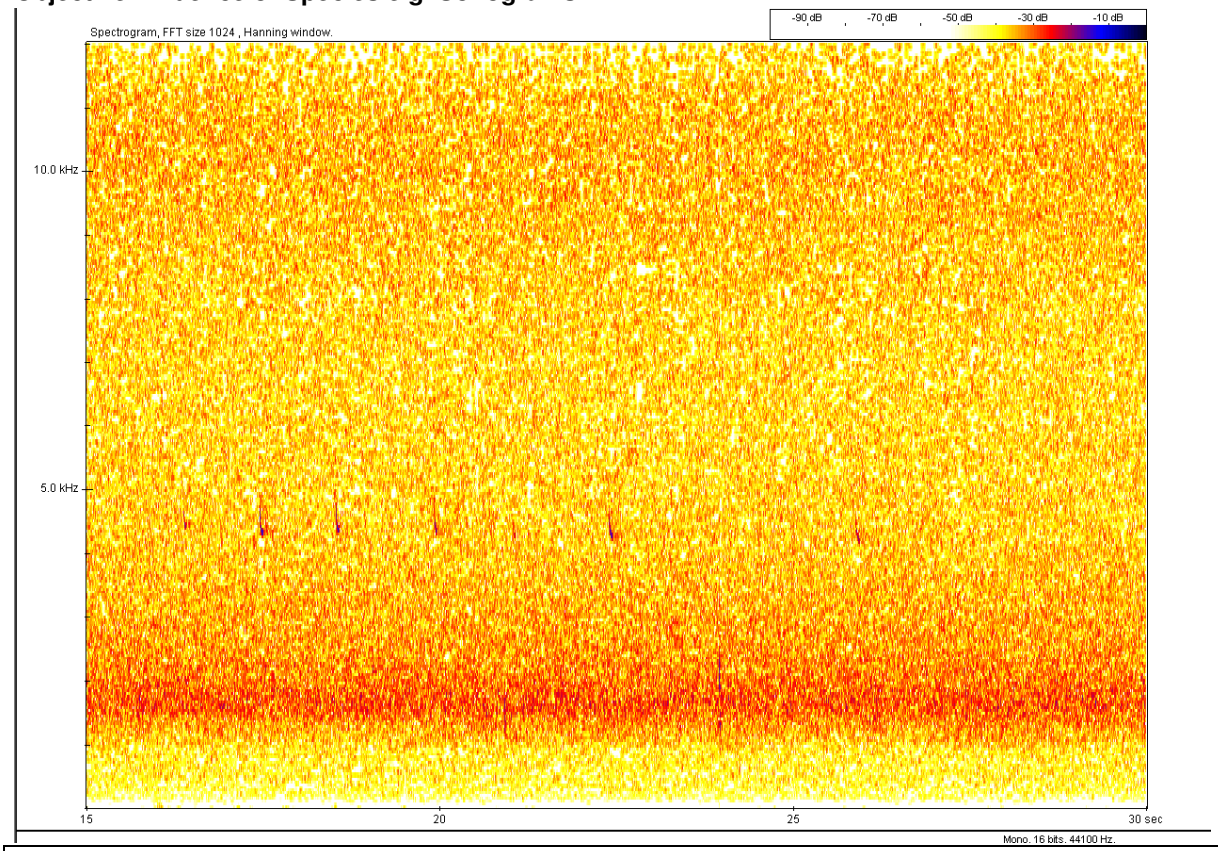
Weather conditions			
Sunrise:		**Sunset:**	2000hrs
Wind speed & direction:	3.8mph	**Air temperature (C):**	12°C
Weather (rain etc):	No rain – 80% cloud cover		

Habitat / corridors / nearby water bodies and general habitat:

Mature hedge lines which were part of the eastern and southern extent of an enlarged improved grassland field.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting		Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
20.46	Eastern boundary hedge	*VN350188.WMA*	*No bats*		
20.53		VN350189.WMA	No bats		
20.59		VN350190.WMA	*Nyctalus leisleri*	Commuting	1
21.05		VN350191.WMA	No bats		
21.11		*VN350192.WMA*	*No bats*		
21.17		VN350193.WMA	No bats		
21.23		VN350194.WMA	No bats		
21.29		VN350195.WMA	No bats		
21.35	Southern boundary hedge	VN350196.WMA	*Pipistrellus pipistrellus*	Commuting	1
			Pipistrellus spp.	Commuting	2
21.40		VN350197.WMA	*Pipistrellus pipistrellus*	Commuting	3
21.45		VN350198.WMA	No bats recorded.		
21.51		VN350199.WMA	*Pipistrellus pipistrellus*	Commuting	3
21.56		VN350200.WMA	*Nyctalus leisleri*	Commuting	1

Objective Evidence of Species e.g. Sonograms



A *Pipistrellus pipistrellus* commuting on track no. VN350196.WMA

Additional Comments / Observations

None

Qualifications, Experience and Relevant Licenses:

BSc, MSc, AIEMA

DUSK SURVEY

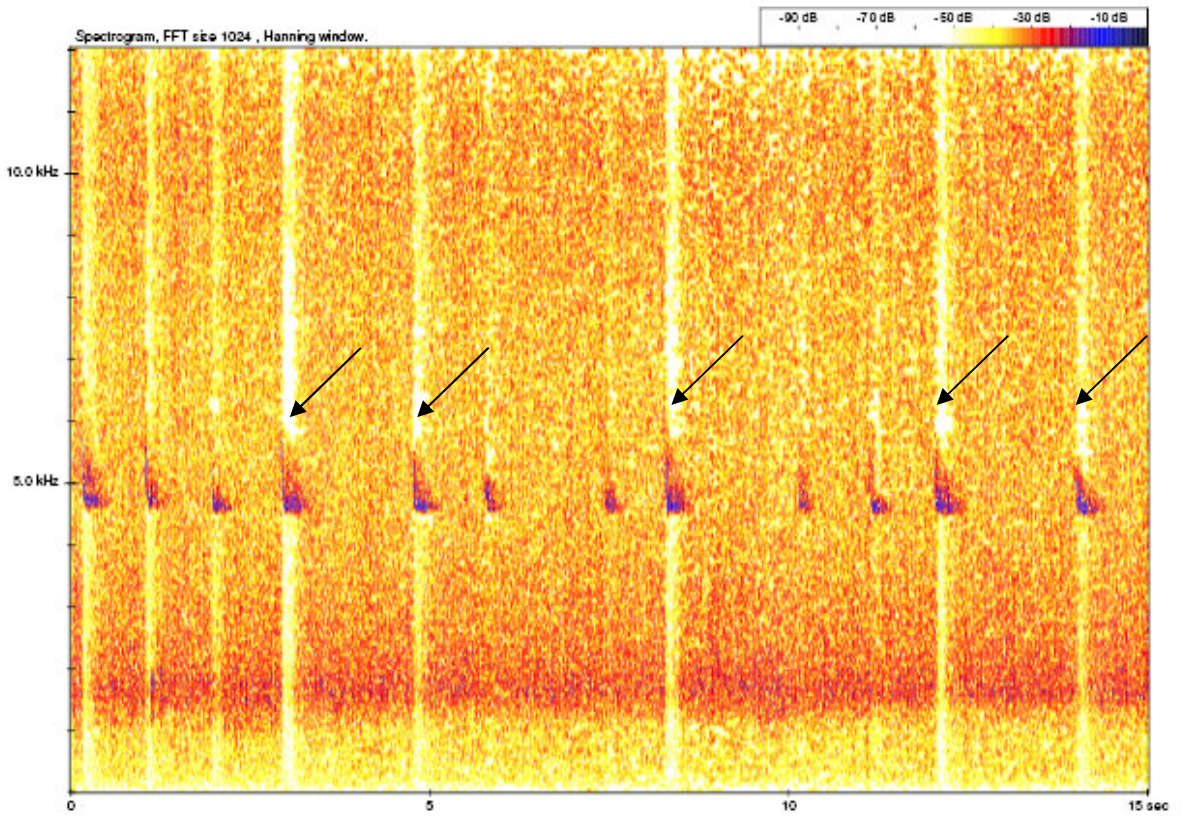
Site: Towers 97 - 98			
Project and Reference:			
Recorder(s):	Mary Maguire	**Arrival time:**	2100hrs
Date:	08th September 10	**Departure time:**	2200hrs

Weather conditions			
Sunrise:		**Sunset:**	2008hrs
Wind speed & direction:	2mph	**Air temperature (C):**	13°C
Weather (rain etc):			

Habitat / corridors / nearby water bodies and general habitat:
A mature hedge line

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
21.20	Mature hedge line	VN350453.WMA	*No bats*		
21.24		VN350454.WMA	*Pipistrellus spp.*	Commuting	2
21.24		VN350454.WMA	*Nyctalus leisleri*	Commuting	1
21.24		VN350454.WMA	*Pipistrellus pipistrellus*	Commuting	1
21.26		VN350455.WMA	*Pipistrellus pipistrellus*	Commuting	1
21.27		VN350456.WMA	*Pipistrellus pipistrellus*	Commuting	5
21.29		VN350457.WMA	*Pipistrellus spp.*	Commuting	2
21.29		VN350457.WMA	*Pipistrellus pipistrellus*	Commuting	2
21.31		VN350458.WMA	*Pipistrellus pipistrellus*	Commuting	1
21.31		VN350458.WMA	*Nyctalus leisleri*	Commuting	1
21.33		VN350459.WMA	*Pipistrellus pipistrellus*	Commuting	1
21.33		VN350459.WMA	*Nyctalus leisleri*	Commuting	1
21.33		VN350459.WMA	*Pipistrellus spp.*	Commuting	1
21.36		VN350460.WMA	*Nyctalus leisleri*	Commuting	1
21.39		VN350461.WMA	No bats		

Objective Evidence of Species e.g. Sonograms



Two individual *Pipistrellus pipistrellus* recorded together, the calls marked by the black arrows are closer to the surveyor, than the other calls shown at the same 45KHz frequency.

Additional Comments / Observations

Reasonable degree of commuting activity but no evidence of roosting behaviour. Limited foraging also.

Qualifications, Experience and Relevant Licenses:

MSc, BSc, AIEMA

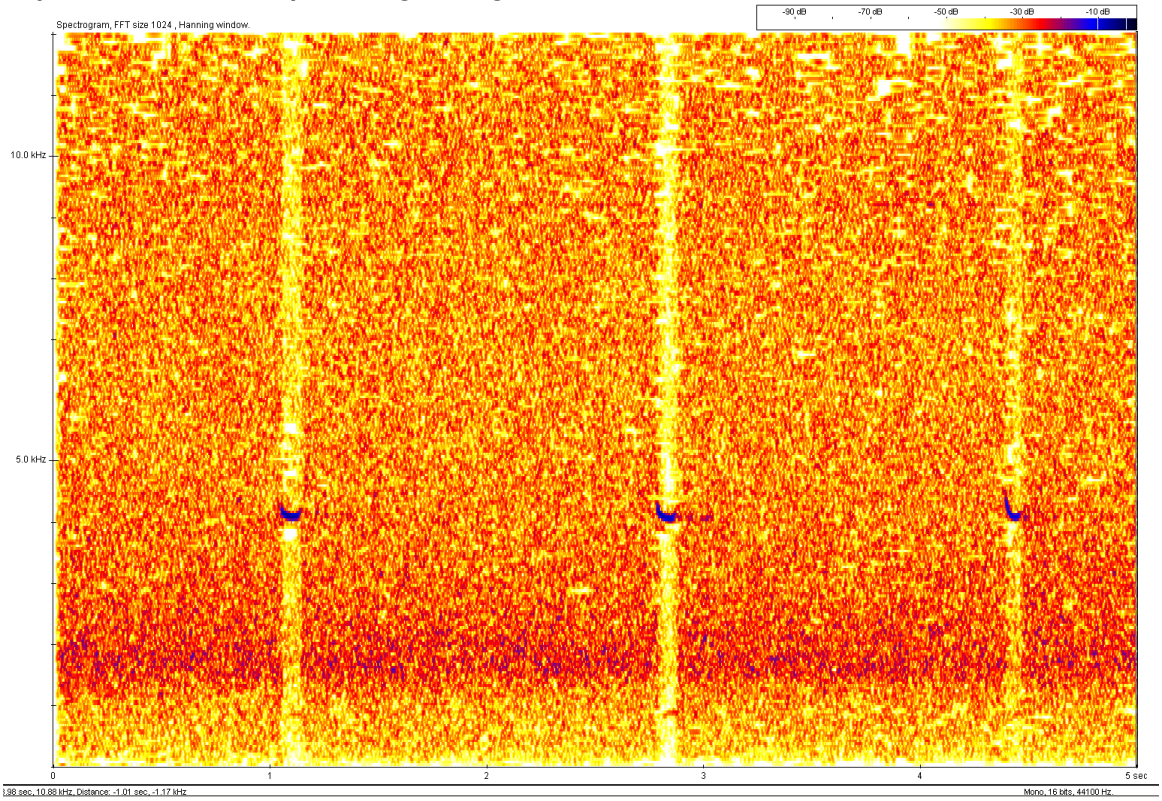
DUSK SURVEY

Site: Between Towers 100 & 101			
Project and Reference: N/S Interconnector			
Recorder(s):	Cormac Loughran	**Arrival time:**	1954hrs
Date:	15th September 2010	**Departure time:**	2130hrs

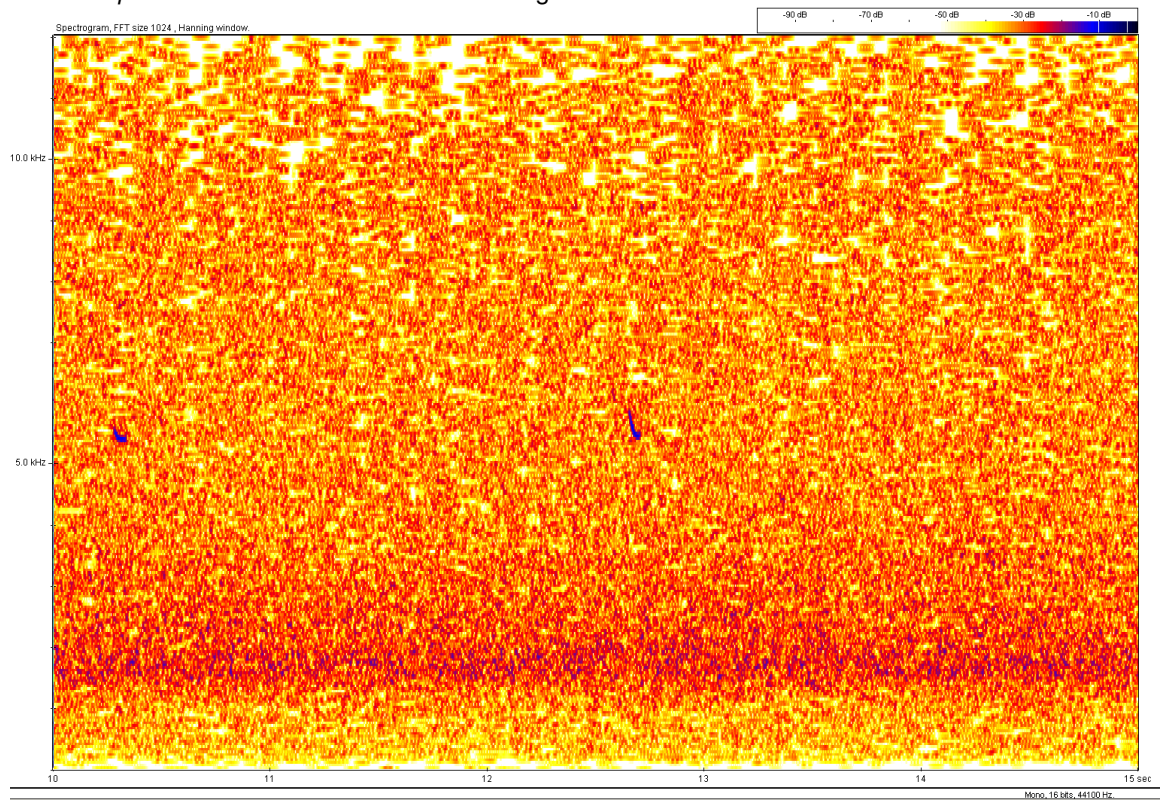
Weather conditions			
Sunrise:		**Sunset:**	2000hrs
Wind speed & direction:	3.8mph	**Air temperature (C):**	12°C
Weather (rain etc):	No rain – 80% cloud cover.		
Habitat / corridors / nearby water bodies and general habitat: Mature hedge			

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting	Track No.	Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
20.06	Mature Hedge	*VN350483.WMA*	*Myotis spp*	Distant commuting	1
20.17		*VN350484.WMA*	*Pipistrellus nathusii*	Commuting	1
20.18		*VN350485.WMA*	*Myotis spp*	Distant commuting	1
20.21		*VN350486.WMA*	*Pipistrellus pygmaeus*	Commuting	1
20.25		*VN350487.WMA*	*Myotis daubentonii*	Commuting	1
20.28		*VN350488.WMA*	*Pipistrellus pipistrellus*	Commuting	1
20.36		*VN350489.WMA*	*Pipistrellus pipistrellus*	Commuting	1
20.42		*VN350490.WMA*	*Myotis spp* possible *Nattereri*	Commuting	1

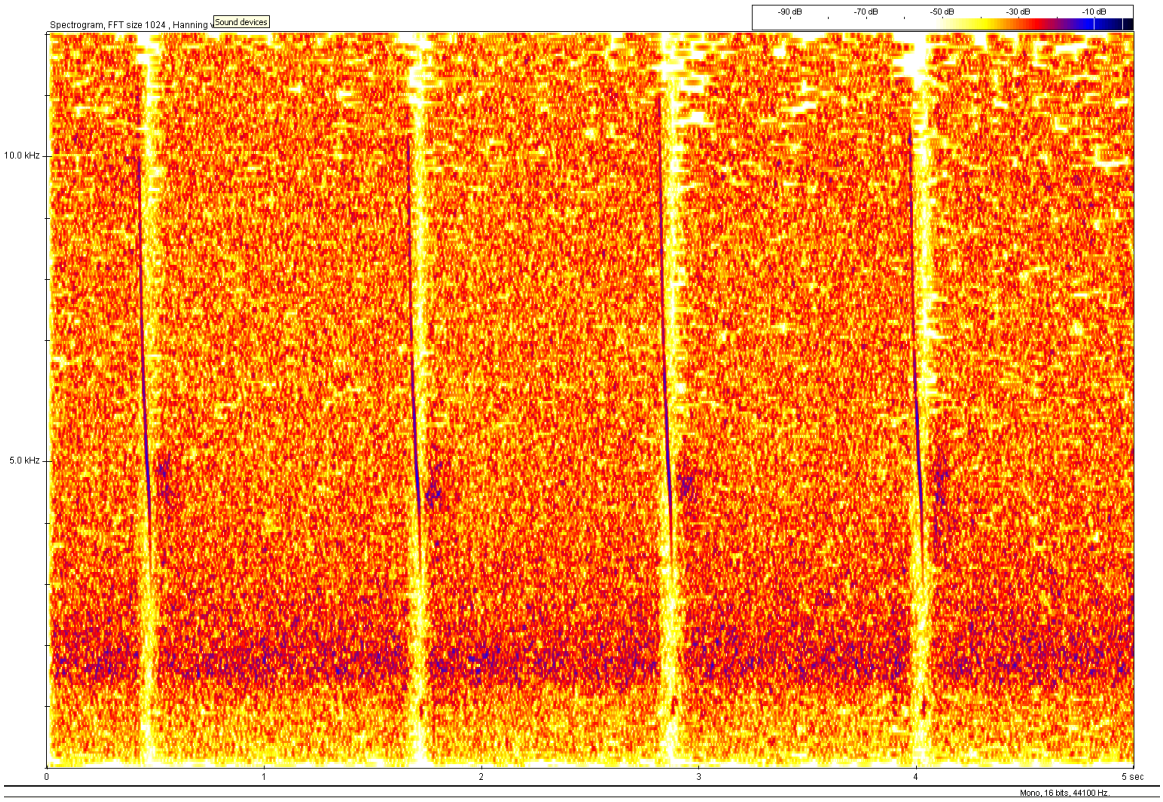
Objective Evidence of Species e.g. Sonograms



Possible *Pipistrellus nathusii* recorded commuting on track no. VN350484.WMA



Classic ’55 pip’ *Pipistrellus pygmaeus* recorded commuting on track no. VN350486.WMA



Myotis spp, possibly a *Myotis nattereri* recorded commuting on track no. VN350490.WMA

Additional Comments / Observations

Surprising diversity of species give that only 8 bats were recorded in total.

Qualifications, Experience and Relevant Licenses:

MSc, CEnv, MIEEM

DUSK SURVEY

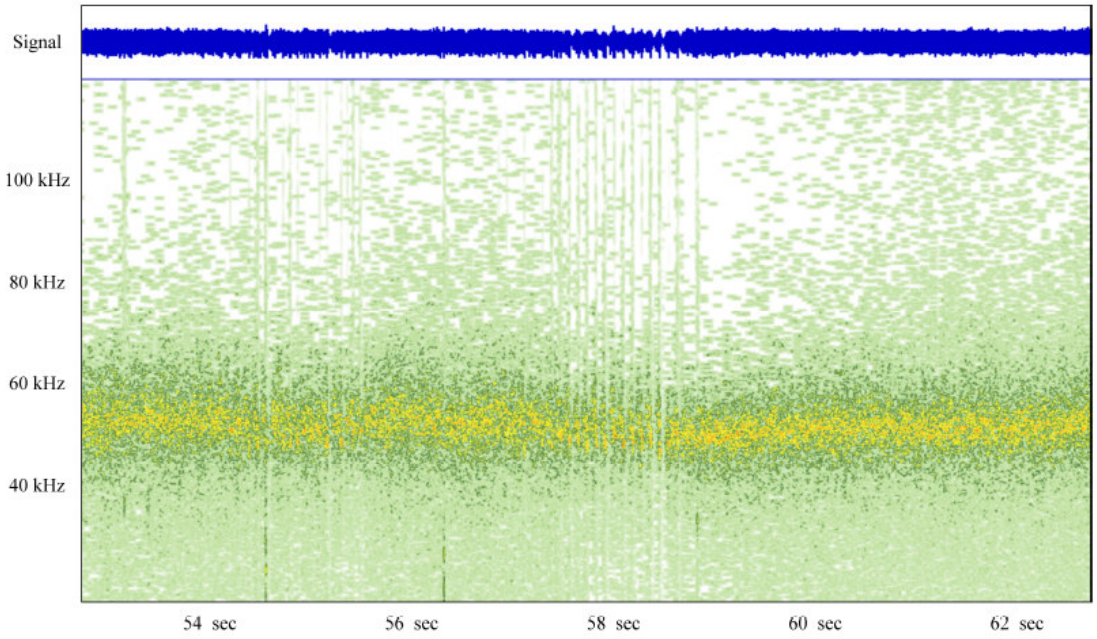
Site: Tower 102 – 103			
Project and Reference:			
Recorder(s):	Amy Craig	**Arrival time:**	2040hrs
Date:	15th September 2010	**Departure time:**	2200hrs

Weather conditions			
Sunrise:		**Sunset:**	2000hrs
Wind speed & direction:	3.8mph	**Air temperature (C):**	12°C
Weather (rain etc):	No rain, cloud cover 80%		

Habitat / corridors / nearby water bodies and general habitat:
A mature hedgerow.

Time of sighting (24 hr clock)	Feature of the building/structure and location of sighting		Bat species	Behaviour (e.g. foraging / commuting)	Number of Bats
20.48	Mature hedgerow, adjacent to the proposed location of tower 102.	Track 1	*Pipistrellus spp.*	Commuting	2
20.50		Track 1	*Pipistrellus spp.*	Commuting	1
20.52		Track 2	No bats		
20.55		Track 3	No bats		
20.58		Track 4	No bats		
21.02		Track 5	No bats		
21.05		Track 6	No bats		
21.10		Track 7	No bats		
21.13		Track 8	No bats		
21.16		Track 9	No bats		
21.20		Track 10	No bats		
21.23		Track 11	No bats		
21.26		Track 12	No bats		
21.29		Track 13	No bats		
21.32		Track 14	No bats		
21.36		Track 15	No bats		
21.39		Track 16	No bats		
21.42		Track 17	No bats		
21.45		Track 18	No bats		
21.49		Track 19	No bats		
21.52		Track 20	No bats		

Objective Evidence of Species e.g. Sonograms



The Pipistrellus spp. recorded on Track one at 20.48.

Additional Comments / Observations

Very limited activity, despite good conditions for survey.

Qualifications, Experience and Relevant Licenses:

MSc, BSc

Annex 3 – Correspondence with NIEA

Loughran, Cormac

From: Firth, Jennifer [Jennifer.Firth@doeni.gov.uk]
Sent: 13 May 2009 11:16
To: Loughran, Cormac
Subject: RE: PAD North South Electricity Interconnector (16506-1)
Attachments: GENERAL Survey Specs.doc

Hello Cormac,

Thanks for your email. I have attached the specification required for this bat survey. If you have any further questions, let me know.

All the best,

Jennifer Firth

Scientific Officer
Development Control
Natural Heritage
Northern Ireland Environment Agency
Klondyke Building
Cromac Avenue
Gas Works Business Park
Belfast
BT7 2JA

Tel: 028 905 69666

email: Jennifer.Firth@doeni.gov.uk

From: Loughran, Cormac [mailto:cormac.loughran@aecom.com]
Sent: 13 May 2009 11:01
To: Firth, Jennifer
Cc: McIntosh, Andrew
Subject: Re: PAD North South Electricity Interconnector (16506-1)

Hi,

I was trying to contact Andrew McIntosh who I believe is on annual leave today so I was given your name as an alternative contact. I had query that I hoped you could help me with. In a recent NIEA response to planning service for the above PAD the following was requested; a 'Bat roost survey of mature trees along the route'. We were hoping to commence work on this in next week or two. I was hoping that NIEA could be a bit more descriptive in terms of the methodology required for the bat roost survey? Is this possible? I have checked the NIEA website and with regards to bat survey methods it simply says 'bat survey requirements will vary depending on the development proposal. Please contact NIEA Natural Heritage Development Management Team for further information'. So I thought you could help?

Any assistance in this matter would be greatly appreciated.

Kind regards

Cormac

BAT SURVEY - SPECIFIC REQUIREMENTS

The applicant's attention is drawn to The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended), which states that it is an offence to deliberately capture, injure or kill a wild animal of a European protected species included in Schedule II of these Regulations, which includes bats. It is also an offence;

(a) Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
(b) Deliberately to disturb such an animal in such a way as to be likely to;
  (i) affect the local distribution or abundance of the species to which it belongs;
  (ii) Impair its ability to survive, breed or reproduce, or rear or care for its young; or
  (iii) Impair its ability to hibernate or migrate;
(c) Deliberately to obstruct access to a breeding site or resting place of such an animal; or
(d) To damage or destroy a breeding site or resting place of such an animal.

If there is evidence of bat activity on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA. Tel. 02890 569623

To ensure your development proposals comply with the Regulations, Northern Ireland Environment Agency has asked you to carry out an appropriate Bat survey. Seasonal activity in Bats means that surveys can only be done at certain times of year. Your consultants should advise you what type of Bat survey you require.

- The surveyor contracted to undertake this work must have relevant experience which is deemed acceptable to the Department, for example an ecological consultant with experience of, and/or qualifications in bat surveying.

- The survey should be carried out between May and September

- **The survey effort must be enough to cover all buildings, bridges, trees and other structures on site**

- **Survey effort should take place at dusk and dawn to assess emergence and re-entry. This will enable the surveyor to locate roosting sites.**

- All trees, bridges, buildings and any other suitable structures must be surveyed.

- The date and time of the survey and the qualifications of the surveyor should be included in the survey report.

- Surveys should be carried out well in advance of any planned construction works.

- Approximate numbers and species of bats must be specified.

- The survey should ascertain whether bats have established roosts, (active or inactive) or use the area for foraging, migrating or for breeding purposes, e.g. advertising posts for

individual males.

- Swarming sites or significant hibernation sites should also be investigated and recorded.
- The survey should assess the presence of any established flight paths within the survey area.
- Approximate flying height should be specified if possible.
- Temperature and weather conditions at the time of surveying should be provided in the survey report.
- The information should be presented in a written report and must include large scale maps, at 1:500 scale. The exact location of roosts, roost entrances, advertising posts, swarming activity and foraging movements should be shown. All evidence of use by Bats found, for example droppings, should be included.
- If necessary, the survey should recommend the most appropriate ways in which the Bats can be protected during the construction or demolition works.
- In the event that the planning application goes to appeal or public inquiry, the person contracted may be required to appear at, or give evidence to, the inquiry.
- For more information on Bats and development, contact NIEA, NH.

Loughran, Cormac

From: McIntosh, Andrew [Andrew.McIntosh@doeni.gov.uk]
Sent: 05 June 2009 23:46
To: Loughran, Cormac
Subject: Re: North South Interconnector

Cormac,

Wednesday sounds ok. I will get back to you on Monday re. this

Regards

Andrew Mc Intosh

This message was sent from my Blackberry device.

From: Loughran, Cormac
To: McIntosh, Andrew
Sent: Fri Jun 05 15:05:53 2009
Subject: RE: North South Interconnector

Andrew,

I have pinned down a few times for this meeting. Can you do Tuesday morning at 11am or Wednesday morning at 10?

Thanks

Cormac

Cormac Loughran
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Belfast, BT2 8BG
T +44 (0)28 9060 7200 F +44 (0)28 9060 7399
www.aecom.com

From: McIntosh, Andrew [mailto:Andrew.McIntosh@doeni.gov.uk]
Sent: 04 June 2009 17:30
To: Loughran, Cormac
Subject: Re: North South Interconnector

ok Cormac

This message was sent from my Blackberry device.

From: Loughran, Cormac
To: McIntosh, Andrew

Sent: Thu Jun 04 17:24:16 2009
Subject: RE: North South Interconnector

Thanks Andrew,

I'll get a few dates from NIE and get back to you asap.

Regards

Cormac

From: McIntosh, Andrew [mailto:Andrew.McIntosh@doeni.gov.uk]
Sent: 04 June 2009 16:02
To: Loughran, Cormac
Subject: RE: North South Interconnector

Hi Cormac,

Can you suggest some dates for the potential meeting and I will try and see which is most suitable?

Thanks

Andrew Mc Intosh

From: Loughran, Cormac [mailto:cormac.loughran@aecom.com]
Sent: 04 June 2009 14:55
To: McIntosh, Andrew
Cc: Doyle, Carey; McDowell, Julie; Harvey Clem; Hewitt Michael; Maguire, Mary K
Subject: RE: North South Interconnector

Andrew,

Thank you for the recent help concerning the bat surveys for the Interconnector project. We have begun to gather data on the basis of the previously agreed methodology. I have also recently met with a number of NIE staff to try to accurately estimate the number of hedges which will be potentially impacted upon by the project, and thus those which will require a bat survey. We came up with a preliminary figure of 96 sites which will have to be surveyed. These 96 sites will have to visited twice to conform to NIEA survey requirements. This may be too many to survey before the end of September 09 and we may need to complete follow up surveys during 2010. As a result of this meeting NIE are keen to meet with NIEA to discuss the detail of the project, prioritise important locations for the first round of surveys, finalise survey locations along the line route and how we might reduce the number of sites requiring a survey by using mitigation measures which NIE could introduce to minimise the impact of the scheme on the local bat population (for example using tree surgeons to reduce important hedges thus leaving the flightline intact). Due to the timescales involved both AECOM and NIE would be keen to organise a meeting with NIEA as soon as is convenient. Is it possible for you to organise this? Attending the meeting as a minimum would be the following;

Cormac Loughran (AECOM);
Carey Doyle (AECOM);
Mary Maguire (AECOM);
Brian Sutton (AECOM);
Clem Harvey (NIE);
Michael Hewitt (NIE);

Many thanks,

Cormac

Cormac Loughran
Senior Ecologist
AECOM

From: McIntosh, Andrew [mailto:Andrew.McIntosh@doeni.gov.uk]
Sent: 26 May 2009 14:21
To: Loughran, Cormac
Subject: RE: North South Interconnector

Cormac,

Thanks for providing that clarification about the monoculture/flailed hedges. We are content with this as it is now clear that they won't be directly impacted by the proposal.

The proposed timescale outlined below is also acceptable as it targets the surveys for the most optimum timescale for bat activity.

Regards,

Andrew Mc Intosh

From: Loughran, Cormac [mailto:cormac.loughran@aecom.com]
Sent: 25 May 2009 15:48
To: McIntosh, Andrew
Cc: Maguire, Mary K; Doyle, Carey
Subject: RE: North South Interconnector

Thanks Andrew,

Useful comments which I shall build into the methodology.

To answer your question regarding the monoculture/flailed hedges. These for the most part tend to be lower in height and less likely to be directly impacted upon by the scheme. Sorry if this wasn't clear. Therefore we are only planning to survey those hedges which are likely to be directly impacted upon, during either construction or operation of the development. Should a particular hedge not be directly impacted upon (i.e. not trimmed, coppiced or standards removed) , either by the construction of a tower or during erection of the overhead lines then it was our intention not to survey it, as existing flightlines should be maintained. Is NIEA content with this?

Also as you suggested we will survey each location during 2 separate visits in good weather. However to delve into the minutiae a little. We had intended to record an single hour of data commencing at dusk followed by an hour of data before and up to dawn (at each location). This will be repeated on two separate occasions for each site. This is to allow for more efficient targeting of data recording and more importantly, analysis of the data the following day.

Is this acceptable to NIEA?

Thanks

Cormac

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From: McIntosh, Andrew [mailto:Andrew.McIntosh@doeni.gov.uk]
Sent: 22 May 2009 11:32
To: Loughran, Cormac
Subject: RE: North South Interconnector

Cormac,

I have discussed the scope of this report with colleagues in the team and we are generally content with the proposed methodology. We do have a few additional comments to make, outlined below:

1. We advise that at least 2 full night surveys are carried out (in good weather) at the same locations chosen.
2. Surveys must be carried out between May and September
3. Each location surveyed must be named, with habitat present identified, and this must be presented on an indexed map.

The only other query was as to why monoculture hedges (other than those modified by flailing/cutting) wouldn't be surveyed, as they are linear features.

Hope these comments help.

Regards,

Andrew Mc Intosh

From: Loughran, Cormac [mailto:cormac.loughran@aecom.com]
Sent: 21 May 2009 15:27
To: McIntosh, Andrew
Cc: McDowell, Julie; Sutton, Brian; McDowell, Julie; Maguire, Mary K; Doyle, Carey
Subject: North South Interconnector

Andrew,

Thanks for your help yesterday. As you recommended I have put together a brief methodology for discussion (see attached), which is specifically tailored to a linear electricity line development. Please have a read and let me know what you think. I am available anytime should you or Sandra wish to develop this further or query any issues.

I look forward to your response.

Kind regards

Cormac <<NS Bat Survey - NIEA_v3.doc>>

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www.aecom.com

Please note: My e-mail has changed to cormac.loughran@aecom.com. Please update your address books accordingly.

Loughran, Cormac

From: Loughran, Cormac
Sent: 21 May 2009 15:27
To: 'McIntosh, Andrew'
Cc: McDowell, Julie; Sutton, Brian; McDowell, Julie; Maguire, Mary K; Doyle, Carey
Subject: North South Interconnector

Follow Up Flag: Follow up
Flag Status: Completed

Categories: CD reviewed

Andrew,

Thanks for your help yesterday. As you recommended I have put together a brief methodology for discussion (see attached), which is specifically tailored to a linear electricity line development. Please have a read and let me know what you think. I am available anytime should you or Sandra wish to develop this further or query any issues.

I look forward to your response.

Kind regards

NS Bat Survey - NIEA_v3.doc

Cormac

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AECOM

BAT SURVEY – NORTH SOUTH INTERCONNECTOR (NIE)

The Northern Ireland section of the proposed North South electricity interconnector is approximately 35kms in length. The general guidance received from NIEA entitled Bat Survey -General Requirements (Jan 2009) while thorough and comprehensive is not tailored specifically to a linear development of this nature. It is an all encompassing methodology arguably more applicable to an individual site, such as a new housing development or similar project.

These general requirements if applied to a 35km overhead transmission line would be inefficient and could potentially take a number of seasons to complete for a project of this size & scale with limited associated benefits. In addition, the outputs required by the NIEA guidance, such as the requirement for 'approximate numbers of bats' is likely to prove all but impossible to obtain in this case using currently established technologies and bat survey techniques.

Therefore we propose the following modified methodology for discussion and approval with NIEA. The aim of the methodology is to gather sufficient data during the 2009 season on the 35km line route to allow NIEA to comment upon the potential impact of the proposed development on the local bat population while at the same time taking cognisance of the linear nature of this project. It suggests an approach that aims to optimise the resources utilised and the data collected for the 2009 Survey period.

Methodology

Existing phase 1 habitat survey maps (recently completed during 2007-8) and aerial photographs (provided by NIE) will be analysed to identify features of interest for bats (provisionally estimated at 50 locations) currently bisected by the proposed line route. These will include;

- hedgerows with mature trees;
- riparian corridors;
- areas of semi-natural habitats (fens, bogs, woodland etc);
- individual mature standard trees and,
- orchards.

Monoculture hedges (without mature standard trees) and those structurally modified by flailing/cutting will **not be surveyed** unless high levels of bat activity are recorded nearby (i.e. adjacent to woodland). No buildings, bridges or other structures are currently impacted upon by the proposed line route and will **not be surveyed** unless high levels of bat activity indicate the presence of an active roost in a nearby structure.

Once the locations have been identified (and agreed) it is proposed to monitor bat activity remotely. This will be done using a series of frequency division detectors (Bat Batons) attached to a digital audio recorder (8.5 hours recording time) left in situ overnight. This will allow for one full nights activity at each location and will include the important crepuscular period (dawn and dusk). Survey will only take place during appropriate weather conditions, avoiding cold, wet and windy nights when insect prey is likely to be scarce.

Recordings will be analysed using batscan software to ascertain the species involved (where possible) and provide an index of bat activity at each location. The raw data will be used to determine “bat passes” per unit time for each recognisable species. A “bat pass” can be defined as a sequence of two or more echolocation calls registered as a bat passes within range of the detector. This method will permit a comparison of activity levels among the various sites but it will not be possible to estimate absolute numbers of bats present. This will only be possible should a roost be located during survey work. This is because detectors cannot differentiate between several passes by the same bat and a single pass by several bats. There is no simple correlation between passes and the number of bats present. Nor is any means currently known for evaluating this relation to provide population density data.

Sites shown to have significant numbers of bat passes or a high level of bat species diversity (as discernible from remote recordings) will be followed up with a dusk visit by an ecologist, and further investigations will take place. These physical surveys will look for the presence of roosts, advertising posts, foraging areas and assess the presence of any established flight paths. The approximate height of flying bats will be estimated if possible and the number and species determined should a roost be recorded. The presence of roost will also trigger further consultation with NIEA.

The information from each survey location (whether remote or in person) will be presented in a written report, including maps, at 1:2500 scale. The exact location of any roosts, advertising posts, swarming activity and foraging movements will be shown (for each of the activities/signs recorded during field survey). The date and time of remote surveys including a record of the weather conditions at the time of survey will also be included.

Finally the completed bat report (or addendum) will aim to evaluate the potential impact of the scheme on the local bat population and recommend appropriate ways in which bats can be protected during the construction and operational phase of the proposed development.

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Andrew McIntosh

NIEA
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Gasworks Business Park
Cromac Avenue
Belfast
BT7 2JA

10th August 2009

Our Ref: Tyrone to Cavan Interconnector (60032220)

Dear Andrew;

Subject: Bat Survey Methodology

Further to our recent e-mail correspondence and discussions cumulating in our June 10th meeting at AECOM's Belfast Office. I have outlined the following methodology which best fulfils the agreed requirements. NIE have requested that I get final agreement from NIEA on the methodology before completing any more work on the project. Please can you read through the following paragraphs and confirm that this accurately represents what we have previously agreed. Should you have any comments please do not hesitate to contact me with same.

The following methodology is based on the discussions between NIE, NIEA and AECOM during a meeting on the 10th June 2009 at AECOM's Belfast Office. It was agreed that the aim of the 2009 surveys is to search for potential roosts within hedgerows and trees along the line route which are directly impacted upon by the proposed route and that surveys to identify important flightlines could be conducted during (May to Sept) 2010 to supplement the 2009 survey. The overall aim of the survey is to gather sufficient data on bat activity along the line route during 2009 & 2010 to allow NIEA to comment upon the potential impact of the proposed development on the local bat population.

Methodology
It was agreed that the first step should be to identify all sites along the line route potentially useful to bats for commuting, foraging, roosting, hibernating or as advertising posts. This was to be achieved by reviewing aerial photographs and the phase 1 habitat survey completed for the ES. This desktop analysis along with local knowledge could be used to identify features potentially significant to the local bat population which are likely to be impacted by the proposed line route. These are likely to include the following;

- hedgerows with mature trees;

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- riparian corridors;
- areas of semi-natural habitats (fens, bogs, woodland etc);
- individual mature standard trees and,
- Orchards.

Once the desktop review is complete a daytime assessment at each location will be conducted to assess the potential for roosting bats to be present in any mature trees. This daytime assessment will look for, dead/damaged limbs, scratch marks, urine stains, droppings etc on any mature trees. This will also help to familiarise surveyors with individual sites which will require follow up crepuscular surveys using time expansion bat detectors and night vision equipment. It was further agreed that hedges unlikely to harbour bat roosts (i.e. those without mature standard trees, monoculture hedges and those structurally modified by flailing/cutting) do not require a bat roost survey, but will require the identification of bat flightlines (commuting roosts) between roosts and foraging areas. NIEA agreed that flightline surveys could be postponed until the 2010 survey season to allow the most significant areas to be prioritised for survey during 2009. All surveys are to take place during appropriate weather conditions, avoiding cold, wet and windy nights when insect prey is likely to be scarce.

No buildings, bridges or other structures are currently impacted upon by the proposed line route and will not therefore require survey unless it becomes necessary to follow large numbers of commuting bats over a period of nights to locate a specific significant roost.

Recordings from all surveys will be analysed using batsound software to ascertain the species involved (where possible) and provide an index of bat activity at each location. The raw data will be used to determine “bat passes” per unit time for each recognisable species. A “bat pass” can be defined as a sequence of two or more echolocation calls registered as a bat passes within range of the detector. This method will permit a comparison of activity levels among the various sites but it will not be possible to estimate absolute numbers of bats present. This will only be possible should a roost be located during survey work. This is because detectors cannot differentiate between several passes by the same bat and a single pass by several bats. There is no simple correlation between passes and the number of bats present. Nor is any means currently known for evaluating this relation to provide population density data.

All potentially significant sites will be subject to two full dawn and dusk survey visits by an ecologist. These surveys will look for the presence of roosts, advertising posts, foraging areas and assess the presence of any established flight paths. The approximate height of flying bats will be estimated if possible and the number and species determined should a roost be recorded. The presence of roost will also trigger further consultation with NIEA.

The information from each survey location will be presented in a written report, including maps, at 1:2500 scale. The exact location of any roosts, advertising posts, swarming activity and foraging movements will be shown (for each of the activities/signs recorded during field survey).

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The habitat present, date and time of survey including a record of the weather conditions at the time of survey will also be included.

Finally the completed bat report (or addendum to the ES) will aim to evaluate the potential impact of the scheme on the local bat population and recommend appropriate ways in which bats can be protected during the construction and operational phase of the proposed development.

We thank you for the opportunity to continue to work with you on this project and I look forward to your response.

Yours sincerely

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Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Date: 27 January 2009
Telephone: 028 905 69615
Your Ref: O/08/0822
Our Ref: 16506-1

PAD
RE: PAD for proposed North South Electricity Interconnector
Location: Lands within Armagh District Council and Dungannon Borough Council

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 6 January 2009. We acknowledge receipt of a draft Environmental Statement (ES) submitted in CD-ROM format.

Position

NIEA, Natural Heritage considers that there is **insufficient information** provided at present with the application to fully assess the importance of natural heritage interests. It is unlikely that we will object to this proposal on nature conservation grounds, subject to appropriate conditions. However as some surveys are on-going, and we consider further surveys to be required, we wish to defer full comment until we have all the information which we consider to be relevant.

Appraisal of the proposal: Natural Heritage Interest

The scheme covers a large geographical area and includes a number of habitats present, as highlighted in Appendix H1 of the ES. Some of these habitats may be used by species which are protected under The Wildlife (Northern Ireland) Order 1985 (as amended).

We note that the nearest recorded badger sett is located 40m from the nearest line route. Any works closer than 25m to badger setts will require a licence from the NIEA: Natural Heritage Wildlife Officer. Evidence of otter activity has been provided.

We note the bird surveys presented in the ES. We further note that additional bird surveys are scheduled for 2008-2009 and will provide comment on this upon receipt of this information.

We note that bat surveys have not been undertaken at this stage, rather an assessment of the potential use of habitat features by bats. We consider that there may be mature trees within the line route which support roosting bats, and these should be subject to a bat survey.

We are concerned that there may be potentially suitable habitat for newts within parts of the proposed line route. We note that Target Notes 8, 32 and 39, for example, may be habitat which is suitable for newts, and consider that a newt survey is required.

Additional Information Required

- Bat roost survey of mature trees along the route
- Newt survey of wetland habitats along the route
- Presentation of the additional ornithological survey work currently being undertaken.

Once this additional survey work has been presented in the ES, NIEA, NH will be in a position to give further consideration to this proposal.

Andrew Mc Intosh
On behalf of NIEA: Natural Heritage

NIEA Northern Ireland Environment Agency
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Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Date: 3 February 2010
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-1

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon. Overhead electrical transmission line detailed in Form P1(NIE) application attached

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 6 January 2010. We acknowledge receipt of an Environmental Statement (ES).

Position

NIEA, Natural Heritage has **no objection** to the proposed development **subject to conditions** which would overcome our concerns.

Appraisal of the proposal: Natural Heritage Interest

The Environmental Statement provides a report of ecological assessment of habitats and species present along the interconnector route. We note that bat surveys, as agreed with NIEA: Natural Heritage, are ongoing, and bat roosts, flightlines and feeding areas, and 2010 results will be issued in a separate report to NIEA: Natural Heritage.

We are content with the quality of the ecological reports contained within the ES, and consider that a number of mitigation measures are required to minimise the impact of the proposal on local biodiversity.

Recommendations

Should approval be granted, the following Conditions should be attached to the Decision Notice.

Conditions

Any removal of hedgerow trees, cutting of hedgerows and woodland clearance shall take place outside the bird breeding season which lasts from the 1st of March to the 31st of August.
Reason: To protect breeding birds and protect the biodiversity of the site.

Deflectors shall be inserted on lines that cross the Blackwater River Valley.
Reason: To reduce the risk of collision to swans.

Works in the vicinity of watercourses will avoid contact with the watercourse surface and bed.
Reason: To minimise impacts to riverine habitats.

Once all mature trees to be removed and lopped have been identified, any potential roost sites shall be inspected for the presence of bats by an experienced bat worker or surveyor on the day of felling. If evidence of bats is found during inspection, all work shall cease immediately and advice shall be sought from the Northern Ireland Environment Agency Wildlife Officer.
Reason: To minimise the impact of the proposal on bats

Informatives

The applicant's attention is drawn to The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended), which states that it is an offence to deliberately capture, injure or kill a wild animal of a European protected species included in Schedule II of these Regulations, which includes all species of bat. It is also an offence;
(a) Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;
(b) Deliberately to disturb such an animal in such a way as to be likely to;
(i) Affect the local distribution or abundance of the species to which it belongs;
(ii) Impair its ability to survive, breed or reproduce, or rear or care for its young; or
(iii) Impair its ability to hibernate or migrate;
(c) Deliberately to obstruct access to a breeding site or resting place of such an animal; or
(d) To damage or destroy a breeding site or resting place of such an animal.

To avoid any breach of The Conservation (Natural Habitats, etc) Regulations (Northern Ireland) 1995 (as amended), all mature trees and buildings to be removed should be checked on the day of felling for the presence of bats, by an experienced bat worker or surveyor.

If there is any evidence of bats on site, all works must cease immediately and further advice must be sought from the NIEA Wildlife Officer (Tel: 02890 569623), **as a European Protected Species (EPS) License may be required.**

The applicant's attention is drawn to The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995 (as amended), which states that it is an offence to deliberately capture, injure or kill a wild animal of a European protected species included in Schedule II of these Regulations, which includes otters (*Lutra lutra*) . It is also an offence;

(a) Deliberately to disturb such an animal while it is occupying a structure or place which it uses for shelter or protection;

(b) Deliberately to disturb such an animal in such a way as to be likely to;

(i) affect the local distribution or abundance of the species to which it belongs;

(ii) Impair its ability to survive, breed or reproduce, or rear or care for its young; or

(iii) Impair its ability to hibernate or migrate;

(c) Deliberately to obstruct access to a breeding site or resting place of such an animal; or

(d) To damage or destroy a breeding site or resting place of such an animal.

If there is evidence of otter activity on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA. Tel. 02890 569623

The applicant's attention is drawn to the Wildlife (Northern Ireland) Order 1985 which indicates that it is an offence to intentionally kill, injure or take any wild animal included in Schedule 5 of this Order which includes the badger (*Meles meles*). It is also an offence to disturb these animals or damage or obstruct access to their place of refuge, or damage or destroy anything which conceals or protects their place of refuge.

If there is evidence of badger on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA.

The applicant's attention is drawn to the Wildlife (Northern Ireland) Order 1985 which indicates that it is an offence to intentionally kill, injure or take any wild animal included in Schedule 5 of this Order which includes the smooth newt (*Triturus vulgaris*). It is also an offence to disturb these animals or damage or obstruct access to their place of refuge, or damage or destroy anything which conceals or protects their place of refuge.

If there is evidence of newts on the site, all work must cease immediately and further advice must be sought from the Wildlife Officer, Northern Ireland Environment Agency, Klondyke Building, Cromac Avenue, Gasworks Business Park, Lower Ormeau Road, Belfast. BT72JA.

The applicant's attention is drawn to the Wildlife (Northern Ireland) Order 1985 which states that it is an offence to intentionally kill, injure or take any wild bird. It is also an offence to take or damage or destroy the nest or egg(s) of these birds or to disturb bird(s) while they are building, in or at a nest, or whilst they have dependant young. Where the bird is included in Schedule 1 of the Order any offence is liable to a special penalty.

Andrew McIntosh
On behalf of NIEA: Natural Heritage

Northern Ireland Environment Agency
www.ni-environment.gov.uk

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Email:
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Date: 29 April 2010
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-3

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
17-25 Great Victoria Street
Belfast
BT2 7BN

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon Co Tyrone and overhead electrical transmission line from Trewmount Road Moy to the townlands of Crossreagh and Crossbane Co Armagh

Dear Mr Moore

I refer to your consultation letter for the above planning application which was received in this office on 12 April 2010. We acknowledge receipt of a submission by Michael Burrows Associates on behalf of SEAT dated 19 February 2010.

On page 8 of the submission a formal request has been made under the Environmental Information Regulations (NI) 2004 for details of any formal or informal advice or agreements limiting or forming the scope and methodologies to be employed during ecological surveys carried out by the applicant in relation to this proposal.

Accordingly we submit with this letter the following information:

1. Copy of an e-mail from Cormac Loughran of AECOM dated 21 May 2009 providing a bat survey methodology for the proposal.
2. Draft bat survey methodology (21 May 2009).
3. Letter dated 10 August 2009 detailing the bat survey methodology which was detailed at a meeting held on 10 June 2009.
4. Letter from NIEA: Natural Heritage to Planning Service dated 27 January 2009 (This letter has not been presented in Appendix A of Volume 3 of the Environmental Statement.

Andrew McIntosh
On behalf of NIEA: Natural Heritage

Northern Ireland Environment Agency
Natural Heritage
Klondyke Building
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Gasworks Business Park
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Email:
planningreminders@doeni.gov.uk

Date: 26 May 2010
Telephone: 028 905 69615
Your Ref: O/09/0792
Our Ref: 17178-2,4,5 and 6

Mr A Moore
Planning Service
Planning Service Headquarters
Millennium House
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Belfast
BT2 7BN

Full
RE: Erection of a single circuit 400kv overhead line (33.9km) from a new 400/275KV substation at Trewmount Road Moy to the border where it connects with the proposed network in the Republic of Ireland
Location: Land to the rear of 152 Trewmount Road in the townland of Turleenan Moy Dungannon Co Tyrone and overhead electrical transmission line from Trewmount Road Moy to the townlands of Crossreagh and Crossbane Co Armagh

Dear Mr Moore

I refer to your consultation letters for the above planning application which was received in this office on 9, 15 and 20 April 2010 and 13 May 2010. We acknowledge the receipt of objection letters.

We have considered the issues related to ecology which have been raised in the objection letters and request the submission of information which was omitted from the Environmental Statement.

We note that the numbering sequence of target notes in Appendix D1 of Volume 3 of the Environmental Statement does not include the following target notes (TN) : TN 1-5, 9, 10, 16-21, 23-28, 30, 33-37, 40-42 and 48-52. We consider that these TNs should be submitted to NIEA: Natural Heritage for consideration. We do note that the TNs included in the Environmental Statement relate to those areas within the line route study area which are of nature conservation value.

The badger survey does not provide a map outlining the location of recorded setts within the site. A report should be submitted of this survey and presented in the following format:

- The date and time of the survey and the qualifications of the surveyor should be included in the survey report.
- The survey should establish whether or not Badgers have established sett(s) (active or inactive) or use the area for foraging. All evidence of use by Badgers found, for example latrines, hair caught on wire or bedding should be included.

- The information should be presented in a written report and must include large scale maps at 1:500 scale for those areas in the line route study area where badger setts were recorded.

Once this information has been provided NIEA: Natural Heritage can provide further consideration to this proposal.

Andrew McIntosh

Andrew McIntosh
On behalf of NIEA: Natural Heritage

N

TREW MOUNT ROAD

LE 5-7m

1

LE 4-6m

LE 3-5m

2

LE
SP
CP
3-4m

DA probably along adjacent ditches

LEGEND

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.1: BAT ACTIVITY BETWEEN TOWERS 1 & 2

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Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.1

N

MAJOR LANE

4

5

6

CP

SP 3-4m

DA 0.5m

CP

SP

LE

CP

SP

LEGEND

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.2: BAT ACTIVITY BETWEEN TOWERS 4-6

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Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.2

N

PSP
42
LE
CP
SP

PSP
LE
NP
CP
43

44

TULLYSARAN

TULLYBRACH ROAD

Tank (covd)

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.10: BAT ACTIVITY BETWEEN TOWERS 42-44

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.10

N

46

LE

CP

47

48

49

CP 2-3m

LE 4-5m

Ballybrocky House

LISDOWN

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.11: BAT ACTIVITY BETWEEN TOWERS 46-49

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3
No. 60032220/B1.11	

N

CP 3m

LE 3-4m

51

SP 2-3m

52

CP 2-3m

SP 3-4m

PSP

LE

53

BRACKNAGH ROAD

CULLENTRAGH

KILLYLEA ROAD

Laurel Hill

NAVAN FORT ROAD

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.12: BAT ACTIVITY BETWEEN TOWERS 51-53

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.12

N

SP

54

LE 4-5m

LE

55

LE

SP 2-3m

CP 2-3m

DA 1m

SP 2-3m

CP 1-2m

56

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.13: BAT ACTIVITY BETWEEN TOWERS 54-56

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.13

N

58

59

60

CP

CP

CP

SP

LE

NP

PSP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.14: BAT ACTIVITY BETWEEN TOWERS 58-60

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.14

N

62

63

LE

LE

64

SP

CP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.15: BAT ACTIVITY BETWEEN TOWERS 62-64

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.15

N

DERN ALE A R OAD

67

68

69

LE 3-4m

SP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.16: BAT ACTIVITY BETWEEN TOWERS 67-69

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.16

N

DERNAL EA ROAD

TAMLAGHT

71

LE 2-3m

NA

CP 2m

PSP

72

CP 2-3m

MONAGHAN ROAD

73

Norton's Cross Roads

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.17: BAT ACTIVITY BETWEEN TOWERS 71-73

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.17

N

PSP

2-3m LE

75

SP

LE

76

CP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.18: BAT ACTIVITY BETWEEN TOWERS 75-76

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.18

N

79

LE

MSP

LE

80

SP

PSP 3-4m

81

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.19: BAT ACTIVITY BETWEEN TOWERS 79-81

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.19

N

CP
SP
82
CP
SP
SP
83
LE
DA
CP 3m
84

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.20: BAT ACTIVITY BETWEEN TOWERS 82-84

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.20

N

TIVNACREE ROAD

87

88

89

SP

CP

LE

PSP

CP

LE

SP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

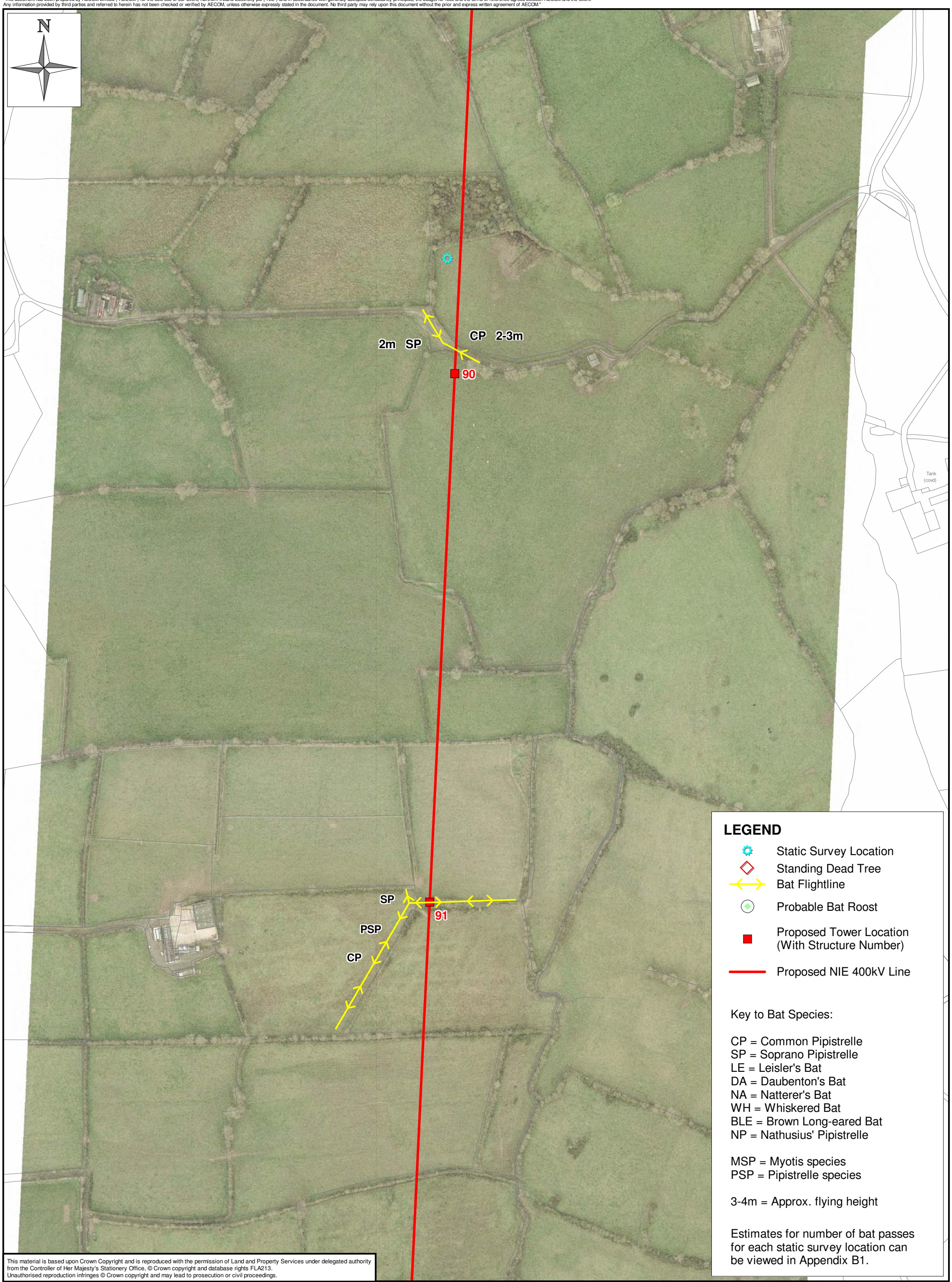
Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.21: BAT ACTIVITY BETWEEN TOWERS 87-89

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.21



LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.22: BAT ACTIVITY BETWEEN TOWERS 90-91

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.22

N

93

94

No bats recorded

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.23: BAT ACTIVITY BETWEEN TOWERS 93-94

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.23

N

95

LE

CP

PSP

LE

96

97

PSP

LE

CP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.24: BAT ACTIVITY BETWEEN TOWERS 95-97

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
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Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.24

N

100

SP

NA

DA

NP

CP

101

102

PSP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line
- International Border

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.25: BAT ACTIVITY BETWEEN TOWERS 100-102

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.25

N

LE

CP

15

SP

PSP

16

Social Call

CP

LE

17

LEGEND

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.4: BAT ACTIVITY BETWEEN TOWERS 15-17

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.4

N

CULREVOG ROAD

18

19

20

LE

SP

CP

SP

LE

CP

SP

CP

SP

LE

LE

CP

SP

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

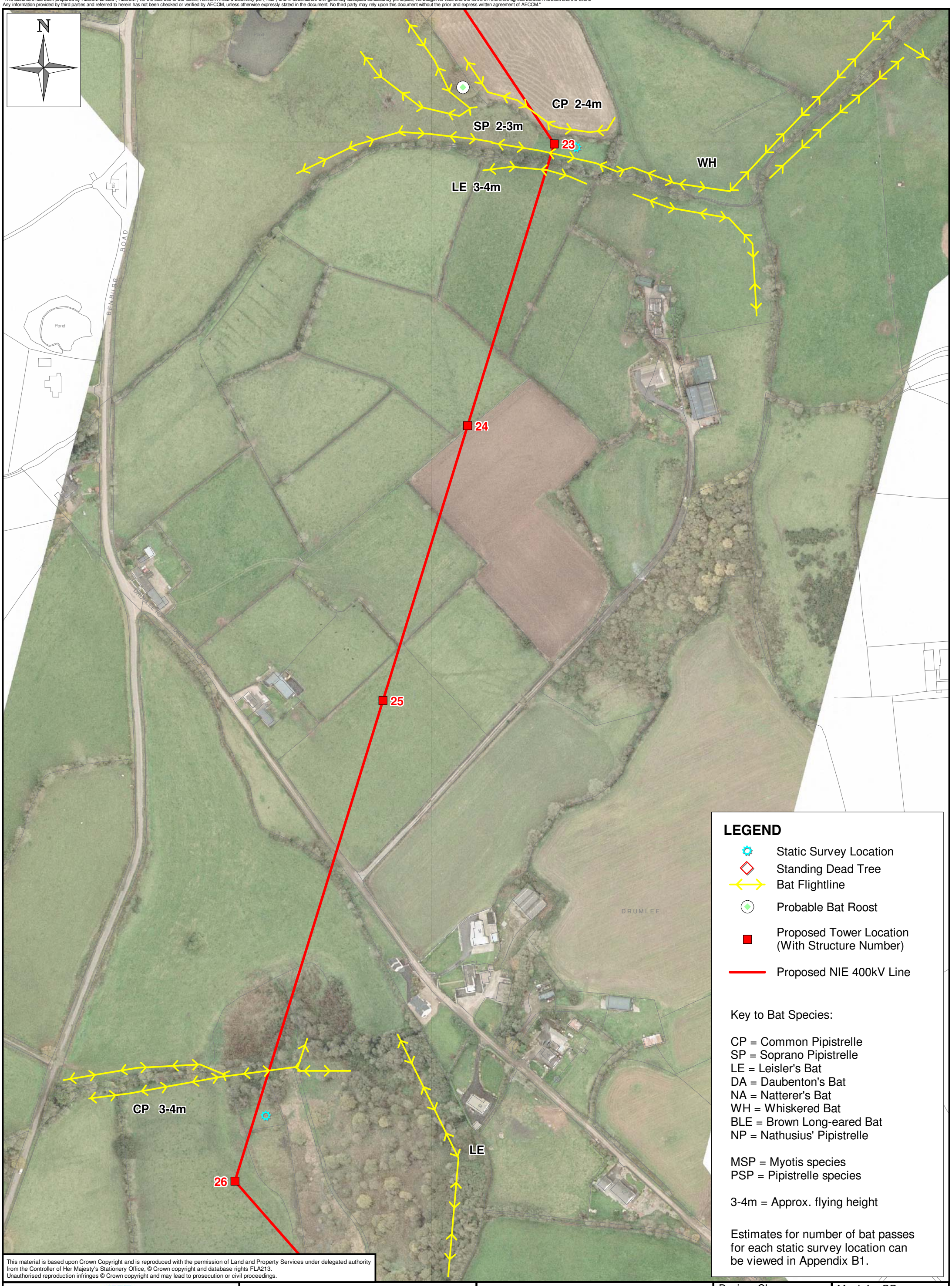
Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.5: BAT ACTIVITY BETWEEN TOWERS 18-20

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.5



Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title:
FIGURE B1.6:
BAT ACTIVITY
BETWEEN TOWERS 23-26

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.6

N

27

28

29

LE

PSP

SP

CP 2-3m

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.7: BAT ACTIVITY BETWEEN TOWERS 27-29

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3

No. 60032220/B1.7

N

32

SP 3m

DA 0.5m

LE 3-4m

33

LE

PSP

CP

SP

34

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.8: BAT ACTIVITY BETWEEN TOWERS 32-34

AECOM
24 Linenhall Street
Belfast
BT2 8BG
Tel: +44 (0) 28 9060 7200
Fax: +44 (0) 28 9060 7399
www.aecom.com

Design: CL	MapInfo: GB
Chk'd: MM	App'd: CL
Date: 19/11/2010	Scale: 1:2500 @ A3
No. 60032220/B1.8	

N

39

40

41

LE 2-6m

SP

CP

LE

CP

MSP

SP

BLE

LEGEND

- Static Survey Location
- Standing Dead Tree
- Bat Flightline
- Probable Bat Roost
- Proposed Tower Location (With Structure Number)
- Proposed NIE 400kV Line

Key to Bat Species:

CP = Common Pipistrelle
SP = Soprano Pipistrelle
LE = Leisler's Bat
DA = Daubenton's Bat
NA = Natterer's Bat
WH = Whiskered Bat
BLE = Brown Long-eared Bat
NP = Nathusius' Pipistrelle

MSP = Myotis species
PSP = Pipistrelle species

3-4m = Approx. flying height

Estimates for number of bat passes for each static survey location can be viewed in Appendix B1.

Client: Northern Ireland Electricity

Project: **TYRONE-CAVAN INTERCONNECTOR**

Title: FIGURE B1.9: BAT ACTIVITY BETWEEN TOWERS 39-41

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Date: 19/11/2010	Scale: 1:2500 @ A3

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Appendix 10C Phase 1 Habitat Survey Target Notes

Appendix 10C

Phase 1 Habitat Survey Target Notes

PHASE 1 HABITAT SURVEY TARGET NOTES

To read with Chapter 10 (Ecology) and Figures 10.5 – 10.14 (Phase 1 Habitat Mapping)

TN1: Extensive area of marshy grassland, rather dry but retaining good populations of sedges – mainly *Carex rostrata*, but including *C. disticha*, *C. nigra, C. vesicaria*, *C. flacca*, *C. lasiocarpa*. Good range of herbs, but rather scattered. Frequent stands of *Iris pseudacorus*, *Filipendula ulmaria,* the notable *Thalictrum flavum*, occasional *Stachys palustris*, *Viola palustris, Potentilla palustris.* Now much drier than when surveyed in 2006, when at least 3 pairs sedge warbler, possibly 3 pairs snipe. Drain bisecting field choked with *C. rostrata*, *Galium palustre, I. pseudacorus*, *Phalaris arundinacea*, and lined with occasional *Salix cinerea*. East end of field marked by broad band of mainly *Prunus spinosa* along drain.

TN2: Small dense conifer plantation, mainly *Picea sitchensis,* occasional *Larix decidua*. Occasional young *Betula pubescens* and *B. pendula*, and rarely *Quercus petraea* saplings. Largely impenetrable, with dense *Rubus fruticosus* field layer. Becomes more open towards the north, with isolated young conifers, *Sorbus aucuparia* and *Salix caprea* separated by marshy grassland. *Phalaris arundinacea* is here dominant, with frequent *Filipendula ulmaria*, locally frequent *Iris pseudacorus,* and locally abundant *Valeriana officinalis*.

TN3: Species rich maintained hedgerow, located beside proposed site for Tower 11. Woody species include *Crataegus monogyna*, *Fraxinus excelsior*, *Ilex aquifolium*, *Ulmus* sp., *Acer pseudoplatanus*, *Prunus spinosa*, *Salix* sp., *Prunus* sp. and *Fagus sylvatica,* and include 6 native species within 30m. Flora along the base of this hedge includes *Glyceria fluitans, Geum urbanum, Ranunculus repens, Filipendula ulmaria, Chrysosplenium oppositofolium, Geranimum robertianum, Asplenium scolopendrium, Dryopteris affinis, Stachys sylvatica, Stachys palustris* and *Rubus* sp.

TN4: Mosaic of wet woodland/scrub, swamp and fen/marshy grassland, possibly a small area of bog which has been modified by past draining and continuing eutrophication. Much of the site is inaccessible due to the quaking nature of the ground. Woodland and scrub consists of patchy *Salix cinerea/caprea*, with occasional substantial stands of *Alnus glutinosa.* Swamp areas generally dominated by *Equisetum fluviatile* or *Phalaris arundinacea*, with locally frequent *Typha, Iris pseudacorus, Sparganium erectum*. Fen/marshy grassland dominated by grass species such as *Arrhenatherum elatius*, *Holcus lanatus*, with occasional *Festuca rubra*, *Anthoxanthum odoratum*. Wetter parts with stands of *P. arundinacea* and occasional *I. pseudacorus*. *Filipendula ulmaria*, *Lathyrus pratensis*, *Lotus uliginosus* all frequent, *Stellaria graminea* occasional. *Potentilla palustris*, *Galium palustre*, *Lychnis flos-cuculi*, Water-mint *Mentha aquatica* all locally frequent. Site bounded by drains, with much *E. fluviatile, Glyceria fluitans*

TN5: Pond, largely surrounded by young to mature trees, mainly non-native, including *Chamaecyparis lawsonii, Fagus sylvatica, Alnus incana, Salix caprea, Populus sp.* A small island is densely populated with *S caprea.* Pond banks generally grassy, but stands of *Epilobium hirsutum* are frequent and *Filipendula ulmaria* is occasional. Several tussocks of *Carex paniculata.* Pond discontinuously lined with emergent *Carex rostrata, Equisetum fluviatile. Potamogeton sp* abundant across pond surface.

TN6: *Betula/Salix* species carr, with *B. pubescens*, *S. viminalis, S. cinerea*, *S. caprea*. Rather grassy in places, with much *Holcus lanatus*, and frequent *Juncus effusus*, occasional *Iris pseudacorus*, *Typha latifolia*. *Rubus fruticosus* frequent in drier parts, where *B. pubescens* is the dominant tree species.

TN7: Area of marshy grassland, perhaps modified bog (through drainage and eutrophication) containing a wide array of species that include *Lychnis–flos cuculi*, *Senecio aquaticus, Hypericum tetrapterum, Arrhenatherum elatius, Holcus lanatus, Stachys palustris*, *Lotus pendunculatus, Festuca rubra* and *Dachtyhoriza fuchsia.* Wetter areas support *Phalaris arundinaceae*, *Iris pseudoacorus*, *Mentha aquatica, Filipendula ulmaria*, and *Galium palustre*. There is also extensive *Salix* sp. encroachment into the grassy areas and this adds to the biodiversity value of this site. An adjacent area of *Salix cinerea/Alnus glutinosa* scrub, to the north has ground flora dominated by *Juncus effusus* with abundant *Urtica dioica*, *F. ulmaria* and *Holcus lanatus*.

TN8: A mature species rich hedgerow containing *Ilex aquifolium*, *Crataegus monogyna*, *Ulex europaeus*, *Fraxinus excelsior*, *Sambucus niger* and *Rosa* sp. Adjacent to proposed site for Tower 27. Badger activity also observed in this hedgerow.

TN9: Small area of willow scrub, with much Osier, Grey Willow. Ground flora dominated by Common Nettle *Urtica dioica*, with much Cleavers *Galium aparine*, Bush Vetch *Vicia sepium*, Yorkshire-fog. Locally open water in drains, and wetter areas with much Soft Rush, occasional Yellow Flag, Marsh Marigold *Caltha palustris*, and locally frequent Water-cress *Rorippa nasturtium-aquaticum.*

TN10: A strip of deciduous woodland along ditch and minor stream, with the stream up to 3 m wide in places. The woodland consists of mature veteran status sessile oak *Quercus petraea,* Scots pine *Pinus sylvestris,* ash *Fraxinus excelsior*, poplar *Populus* sp., beech *Fagus sylvatica* and lime *Tilia* sp. Understorey comprised of holly *Ilex aquifolium*, hazel *Corylus avellana*, hawthorn *Crataegus monogyna*, sycamore *Acer pseudoplatanus* and wych elm *Ulmus glabra*. More recent tree planting of oak adds to the biodiversity value of this woodland. Oaks are of a uniform age, suggesting that they were planted as a landscape feature or as a future crop. Alder *Alnus glutinosa*, white willow *Salix alba* frequent along channel edge. Woodland floor dominated by bramble *Rubus* sp. and ivy *Helix hedera* but some pockets of typical woodland flora are found that includes herb bennet *Geum urbanum*, herb-Robert *Geranium robertianum*, bugle *Ajuga reptans*, remote sedge *Carex remota*, wood sedge *C. sylvatica*, false brome *Brachypodium sylvaticum*, sanicle *Sanicula europaea* and violet *Viola* sp. This is an extension of a wider wooded belt towards the south, where mature oak is also dominant, but young/mature ash is also frequent. Here there is a more diverse shrub layer that includes wych elm, holly, hawthorn, elder *Sambucus nigra*. Floor here also generally dominated by common nettle *Urtica dioica*, but frequent woodland indicator species, including bluebell *Hyacinthoides non-scripta*, wood anemone *Anemone nemorum*, herb-Robert, enchanter's-nightshade *Circaea lutetiana*, ransomes *Allium ursinum*.

TN11: A wooded riparian strip along a stream dominated by *Fraxinus excelsior* and *Corrylus avellana*. A possible remnant of former extensive woodland. Rich ground flora includes *Sanicula europaea*, *Carex remota*, *Carex sylvatica*, *Hyacinthoides non-scripta*, *Chrysosplenium oppositifolium*, *Oxalis acetosella*, *Phyllitis scopendrium*, *Blechnum spicant*, *Stellaria holostea* and *Galium odoratum* (this species is rare in Co. Armagh).

TN12: A mosaic of marshy grassland and species-poor semi-improved grassland. Marshy grassland dominated by *Juncus effusus* and *J. inflexus.* Grasses frequent, and include *Holcus lanatus, Agrostis stolonifera, Cynosurus cristatus, Phleum* pratense. Herbs frequent, mainly *Ranunculus acris, R. repens*, but locally frequent *Succisa pratensis*, *Cirsium palustre, Filipendula ulmaria, Lychnis flos-cuculi,* occasional *Potentilla anserina, Senecio aquaticus, Veronica beccabunga*. On drier ground, rushes become less frequent, and *R.repens* becomes abundant, with occasional *Carex hirta.* Marshy grassland is mainly on lower ground near stream, and along drains – these with occasional *Mentha aquatica, Epilobium hirsutum, Dactylorhiza fuchsii,* and frequent *Carex nigra.* A broader drain is choked with *Rorippa nasturtium-aquaticum,* and has occasional *Valeriana officinalis,Galium palustre* and is lined with *Alnus glutinosa.* Stream well-lined with mainly semi-mature trees *Corylus avellana*, *Fraxinus excelsior, Prunus spinosa, Crataegus monogyna, Alnus glutinosa*.

TN13: An extensive area of deciduous woodland dominated by an understorey of *Corylus avellana* with a canopy of *Fraxinus excelsior*, *Crataegus monogyna*, *Ilex aquifolium*, *Prunus spinosa* and *Sambucus nigra* also make up this understorey with mature *Salix* sp. *Acer pseudoplatanus* and *Quercus* sp. occurring sporadically throughout the woodland. There are some instances of livestock intrusion into the woodlands but where this is not an issue a diverse ground flora has become established. Species recorded include *Carex sylvatica, Carex remota, Brachypodeum sylvatica, Blechnm spicant, Dryopteris sp., Polystitchum setiferum, Phyllitis scopendrium, Sanicula europaea, Geum urbanum, Chrysosplenium oppositifolium, Hyacinthoides non-scripta, Schropularia nodosa, Oxalis acetosella, Circaea lutetiana, Veronica montana, Viola* sp.*, Hypericum tetrapterum, Stellaria holostea,* and *Lonicera periclymenum*. *Hedera helix* and *Rubus fruticosus* form extensive ground covere in places.

TN14: Former railway embankment now wooded over. A small stream runs along the middle of the site. Tree species include *Fraxinus excelsior*, *Prunus avium*, *Alnus glutinosa*, *Ulmus glabra*, *Corylus avellana* and *Salix caprea.* Ground flora includes *Glechoma hederacea*, *Chrysosplenium oppositifolium* and *Oenanthe crocata* and *Rorippa nasturtium-aquaticum* in the stream.

TN15: Marshy grassland, with large stands of *Urtica dioica* growing around the perimeter of this site and further into the fen. *Holcus lanatus* is also quite common. The site is dominated by rushes, with *Typha latifolia, Iris pseudoacorus* and *Filipendula ulmaria* in the wetter areas. Other species recorded include *Lotus uliginosus*, *Senecio aquaticus* and *Carex dioica*.

TN16: Damp grassland, though now largely dried out. Dominant grass species *Arrhenatherum elatius*, *Holcus lanatus*, *Festuca rubra, Anthoxanthum odoratum*. Wetter parts with stands of *Phalaris arundicea* and occasional *Iris pseudoacorus*. *Filipendula ulmaris, Lathyrus pratensis*, *Lotus uliginosus* all frequent, *Stellaria graminea* occasional. *Potentilla palustris, Galium palustre, Lychnis flos-cuculi, Mentha aquatica* all locally frequent. Sedges locally abundant (*Carex rostrata, C. nigra, Carex binervis*). *Salix* scrub encroaching in places. In part colonised by *Salix* spp. Grasshopper Warbler *Locustella naevia,* Sedge Warbler *Acrocephalus schoenobaenus*, Reed Bunting *Emberiza schoeniclus* all territorial.

TN17: Basinal wetland complex. Small eutrophic fen, dominated by *Typha latifolia*, with occasional willow scrub surrounding the fen and in one or two drier places within the body of the fen. Alder increases to the east to produce open wet woodland. Graminoids sparse with occasional *Juncus effusus*, *Holcus lanatus, Arrhenatherum elatius* and *Deschampsia cespitosa*. Herbs sparse – occasional *Stellaria graminea*, *Galium palustre*. A field to the west is marshy grassland, dominated by *Juncus effusus.* Grasses here rather sparse-mainly *H.lanatus, Anthoxanthum odoratum.* Herbs frequent – *Ranunculus acris, Vicia cracca, Lotus uliginosus, Filipendula ulmaria, Lychnis flos-cuculi, Mentha aquatica, Rumex acetosa, G. palustre, Plantago lanceolata.* Sedges occasional and include *Carex hirta, C. panicea.*

TN18: Broadleaved woodland remnant on steep slope and adjacent flat ground. There is an extensive mainly deciduous woodland here that contains *Fagus sylvatica*, *Larix decidua*, *Ilex aquifolium* and *Corylus avellana* (often multi-stemmed and reaching canopy). There are also a number of veteran *Tilia* sp. trees in a field next to this woodland. This part of the woodland has a poor ground flora due to the dominance of *Fagus sylvatica*. Heavily poached, field layer generally absent, ground often bare, especially on flatter ground. Herbs abundant on steeper slopes, with abundant *Sanicula europaeus, Geranium robertianum,* frequent *Viola riviniana, Geum urbanum, Primula vulgaris, Rumex sanguineus, Carex sylvatica,* occasional *Lysmachia nemorum*. *Hyacinthoides non-scripta* also present (at least locally frequent). Possible long-established/ancient woodland remnant. Beyond the wooded area, the plot consists of improved grassland that transitions into a marshy *Juncus* sp. dominated area with *Salix* sp. encroachment.

TN19: The tract of deciduous woodland is dominated by mature *Fraxinus excelsior* and *Quercus* sp. with an understorey of *Ilex aquifolium*, *Corylus avellana* and *Sambucus nigra*. Mature *Fagus sylvatica*, *Acer pseudoplatanus* and *Ulmus glabra* also occur. The woodland is accessible to livestock however this appears to be an infrequent occurrence, based on the extensive ground flora coverage. Species recorded include, *Polystitchum setiferum*, *Dryopteris* sp., *Carex sylvatica*, *Oxalis acetosella*, *Ajuga reptans*, *Chrysosplenium oppositifolium*, *Circaea lutetiana*, *Glechoma hederacea*, *Geum urbanum*, *Stachys sylvatica, Carex sylvatica, C. remota, Brachypodium sylvaticum* along with *Helix hedera* and *Rubus fruticosus.*

TN20: An extensive marshy grassland area surrounded by trees, mainly *Salix* sp. Typical flora includes *Glyceria fluitans*, *Phalaris arundinaceae* and *Iris pseudoacorus* in the wetter areas. *Lychnis –flos cuculi, Galium palustre, Ranunculus repens, Ranunculus flammula and Dachtylhoriza fuchsii* occur in less waterlogged areas.

TN21: Possibly a remnant of old ancient woodland with mature *Quercus petraea* and *Fraxinus excelsior*, with an understorey of *Ilex aquifolium*, *Crataegus monogyna*, *Corrylus avellana*, *Prunus spinosa* and *Sambucus nigra*. Some of the *Quercus* specimens are of veteran status and support epiphytic communities e.g. *Polypodium vulgare*. The woodland is subjected to heavy livestock poaching, thus depleting much of the ground flora. *Hyacinthoides non- scripta*, *Ajuga reptans*, *Hypericum androsaemum* and *Viola* sp. were observed in less accessible locations. Wet semi-improved fields surround the woodlands and flora here includes *Senecio*

aquaticus, Cirsium palustre, Mentha aquatica, Ranunculus repens, Hypericum tetrapterum and Lychnis–flos cuculi.

TN22: Stream (c.2m wide). Tree-lined, often with multi-stemmed *Corylus avellana*, and with frequent *Crataegus monogyna, Prunus spinosa,* and occasional *Fraxinus excelsior, Quercus petraea*. Banks generally dominated by *Rubus fruticosus, Urtica dioica* but locally woodland herbs are frequent, and include *Viola riviniana, Oxalis acetosella*, *Hyacinthoides non-scripta*, *Ajuga reptans, Geranium robertianum, Chrysosplenium oppositifolium*.

TN23: Semi-improved grassland field, but with a wide swathe of herb-rich neutral grassland. Grasses here are dominated by *Cynosurus cristatus*, *Anthoxantum odoratum*, with occasional *Holcus lanatus*, *Lolium perenne*, *Agrostis capillaris*. Frequent herbs include *Prunella vulgaris*, *Ranunculus acris*, *Lotus uliginosus*, *Dactylorhiza fuchsii*, *Trifolium repens*, *Trifolium pratense*, *Hypochaeris radicata*, *Plantago lanceolata*, *Stellaria graminea*, *Leontodon autumnalis*. *Centaurea nigra, Carex ovalis*, *C. hirta* are occasional. The adjacent field (to the south) also has a small area with a similar herb-rich community. Drier areas are more improved grassland with *Lolium perenne* being dominant. The location of Tower 84 is in on the edge of an area of scrub adjacent to a stream. The scrub is mainly *Corylus avellana* with an understorey of *Rubus* sp. and *Ulex* sp. There is a small area of marshy grassland also here with *Iris pseudacorus, Filipendula ulmaria*, *Juncus acutiflorus*, *Glyceria fluitans*, *Veronica beccabunga* and *Oenanthe crocata* abundant.

TN24: Minor stream, lined to south by mainly semi-mature *Fraxinus excelsior*, but also with *Acer pseudoplatanus*, *Fagus Sylvatica* and *Quercus petraea,* occasional *Salix caprea*. . Understorey includes *Ilex aquifolium, Corylus avellana, Crataegus monogyna* and *Sambucus nigra*. Steep bank with frequent herbs, mainly *Oxalis acetosella*, *Primula vulgaris*, *Chrysosplenium oppositifolium*. Ferns frequent, mainly *Phyllitis scopendrium*, *Dryopteris filix-mas*.

TN25: Relatively species-rich semi-improved grassland field, with much *Holcus lanatus, Agrostis capillaris, Anthoxanthum odoratum, Cynosurus cristatus*. Herbs frequent, including *Prunella vulgaris, Ranunculus flammula, R. acris, Senecio jacobaea, S. aquaticus, Myosotis laxa, Trifolium pratense, Carex ovalis,* occasional *Dactylorhiza fuchsii, Plantago lanceolata, Lotus uliginosus, Vicia cracca, Achillea ptarmica, Euphrasia agg. Juncus acutiflorus* locally frequent.

TN26: Stream lined with shrubs (*Prunus spinosa, Corylus avellana, Crataegus monogyna*) widening into linear woodland with much multi-stemmed *C. avellana* Heavily poached in places, and ground flora dominated by *Rumex sanguineum,* but *Primula vulgaris, Viola riviniana*, are locally frequent. *Chrysosplenium oppositifolium* frequent in damper parts. Mosses frequent, mainly *Eurynchium praelongum, E. striatum, Thuidium tamariscinum*. The liverwort *Conocephalum conicum* is plentiful. Stream banks support common wetland herbs –*Senecio aquaticus*, *Veronica beccabunga*, *Stellaria alsine*, and occasional ferns –*Athyrium filix-femina*, *Dryopteris dilatata*, with Common Polypody *Polypodium vulgare* as an epiphyte. Banks steepen into a wooded gorge dominated by multi-stemmed *C. avellana* – possible ancient woodland remnant.

TN27: Corner of field with species-rich marshy grassland. *Juncus acutiflorus* abundant, with *J. articulatus* in wetter parts. *Iris pseudacorus, Menyanthes trifoliata, Potentilla palustris* all frequent in wettest parts, with *Mentha aquatica, Viola palustris* occasional. In slightly less wet areas *Rhinanthus minor, Filipendula ulmaria, Lotus uliginosus* frequent, *Ranunculus flammula, Equisetum palustris, Epilobium palustre, Cardamine flexuosa* all occasional. Occasional stands of *Carex rostrata, Galium palustre.*

TN28: Land drain to east of Tower 63, with patches of open, clear water. Much of surface covered with *Lemna minor,* and emergent and marginal *Veronica beccabunga, Glyceria sp,* and *Rorippa nasturtium-aquaticum* all frequent, *Veronica anagallis-aquaticum* occasional. Clear and relatively deep water, with much emergent vegetation suggest potential for smooth newt. Within 200m of T63, (in adjacent improved grassland field) but drain oversailed by line – unlikely to have adverse effects on any newts.

TN29: Land drain with limited areas of open water. Surface with much *Lemna minor,Callitriche stagnalis,* and emergent *Glyceria sp,* occasional *Rorippa nasturtium-aquaticum.* Banks dominated by common grasses, with frequent *Filipendula ulmaria, Ranunculus repens,* locally dominant *Rubus fruticosus.* Potential smooth newt habitat.

Appendix 10D Plant Species List

Appendix 10D

Plant Species List

PLANT SPECIES LIST

Scientific name	English name	Scientific name	English name
Acer platanoides	Norway Maple	*Lolium perenne*	Perennial Rye-grass
Acer pseudoplatanus	Sycamore	*Lolium multiflora*	Italian Rye-grass
Achillea millefolium	Yarrow	*Lonicera periclymenum*	Honeysuckle
Achillea ptarmica	Sneezewort	*Lotus corniculatus*	Common Bird's-foot-trefoil
Agrostis canina	Velvet Bent	*Lotus uliginosus*	Greater Bird's-foot-trefoil
Agrostis capillaris	Common Bent	*Lychnis flos-cuculi*	Ragged-Robin
Agrostis stolonifera	Creeping Bent	*Lysmachia nemorum*	Yellow Pimpernel
Ajuga reptans	Bugle	*Matricaria discoidea*	Pineappleweed
Alnus glutinosa	Alder	*Mentha aquatica*	Water Mint
Alopecurus geniculatus	Marsh Foxtail	*Menyanthes trifoliata*	Bogbean
Alopecurus pratensis	Meadow Foxtail	*Moehringia trinervia*	Three-nerved Sandwort
Anagallis arvensis	Scarlet Pimpernel	*Molinia purpurea*	Purple Moor-grass
Angelica sylvestris	Wild Angelica	*Myosotis arvense*	Field Forget-me-not
Anthoxanthum odoratum	Sweet Vernal-grass	*Myosotis laxa*	Tufted Forget-me-not
Anthriscus sylvestris	Cow Parsley	*Myosotis scorpioides*	Water Forget-me-not
Arctium minus	Lesser Burdock	*Nuphar lutea*	Yellow Water-lily
Arrhenatherum elatius	False Oat-grass	*Nymphaea alba*	White Water-lily
Arum maculata	Cuckoo-pint	*Odontites vernus*	Red Bartsia
Asplenium ruta-muraria	Wall-rue	*Oenanthe crocata*	Hemlock Water-dropwort
Asplenium trichomanes	Maidenhair Spleenwort	*Oxalis acetosella*	Wood Sorrel
Athyrium filix-femina	Lady-fern	*Phalaris arundinaceus*	Reed Canary-grass
Avena sativa	Oat	*Phleum pratense*	Timothy
Bellis perennis	Daisy	*Phyllitis scolopendrium*	Hart's-tongue
Betula pendula	Silver Birch	*Picea sitchensis*	Sitka Spruce
Betula pubescens	Downy Birch	*Pilosella officinarum*	Mouse-ear-hawkweed
Brachypodium sylvaticum	False Brome	*Pinus sylvestris*	Scots Pine
Bromus ramosa	Hairy-brome	*Plantago lanceolata*	Ribwort Plantain
Calliergonella cuspidatum	A moss	*Plantago major*	Greater Plantain
Caltha palustris	Marsh Marigold	*Poa pratensis*	Smooth Meadow-grass
Callitriche stagnalis	Common Water-starwort	*Poa trivialis*	Rough Meadow-grass
Calystegia sepium	Hedge Bindweed	*Polygala serpyllifolia*	Heath Milkwort
Capsella bursa-pastoris	Shepherd's-purse	*Polygonum aviculare*	Knotgrass
Cardamine flexuosa	Wavy Bittercress	*Polygonum persicaria*	Redshank
Cardamine pratensis	Cuckooflower	*Polypodium interjectum*	Intermediate Polypody
Carex disticha	Brown Sedge	*Polypodium vulgare*	Common Polypody
Carex flacca	Glaucous Sedge	*Polystichum setiferum*	Soft Shield-fern
Carex hirta	Hairy Sedge	*Polytrichum commune*	A moss
Carex lasiocarpa	Slender Sedge	*Populus x canadensis*	Hybrid Black-poplar
Carex nigra	Common Sedge	*Potamogeton natans*	Broad-leaved Pondweed
Carex ovalis	Oval Sedge	*Potentilla anglica*	Trailing Tormentil
Carex panicea	Carnation Sedge	*Potentilla anserina*	Silverweed
Carex paniculata	Greater Tussock-sedge	*Potentilla erecta*	Tormentil
Carex remota	Remote Sedge	*Potentilla palustris*	Marsh Cinquefoil
Carex rostrata	Bottle Sedge	*Potentilla reptans*	Creeping Cinquefoil
Carex vesicaria	Bladder-sedge	*Potentilla sterilis*	Barren Strawberry
Centaurea nigra	Common Knapweed	*Primula vulgaris*	Primrose

Scientific name	English name	Scientific name	English name
Cerastium fontanum	Common Mouse-ear	*Prunella vulgaris*	Selfheal
Cerastium glomeratum	Sticky Mouse-ear	*Prunus avium*	Wild Cherry
Chrysosplenium oppositifolium	Opposite-leaved Golden-saxifrage	*Prunus spinosa*	Blackthorn
Cirsium arvense	Creeping Thistle	*Pseudoscleropodium purum*	A moss
Cirsium palustre	Marsh Thistle	*Pteridium aquilinum*	Bracken
Cirsium vulgare	Spear Thistle	*Quercus petraea*	Sessile Oak
Corylus avellana	Hazel	*Ranunculus acris*	Meadow Buttercup
Crataegus monogyna	Hawthorn	*Ranunculus flammula*	Lesser Spearwort
Crepis capillaris	Smooth Hawk's-beard	*Ranunculus repens*	Creeping Buttercup
Cynosurus cristatus	Crested Dog's-tail	*Ranunculus sceleratus*	Celery-leaved Buttercup
Cytisus scoparius	Broom	*Rhinanthus minor*	Yellow-rattle
Dactylis glomerata	Cock's-foot	*Rhytidiadelphus loreus*	A moss
Dactylorhiza fuchsii	Common Spotted-orchid	*Rhytidiadelphus squarrosus*	A moss
Deschampsia cespitosa	Tufted Hair-grass	*Rorippa nasturtium-aquaticum*	Water-cress
Digitalis purpuraea	Foxglove	*Rosa arvensis*	Field-rose
Dryopteris dilatata	Broad Buckler-fern	*Rosa canina*	Dog-rose
Dryopteris filix-mas	Male-fern	*Rubus fruticosus*	Bramble
Epilobium hirsutum	Great Willowherb	*Rumex acetosa*	Common Sorrel
Epilobium montanum	Broad-leaved Willowherb	*Rumex acetosella*	Sheep's Sorrel
Epilobium obscurum	Short-fruited Willowherb	*Rumex crispus*	Curled Dock
Epilobium palustre	Marsh Willowherb	*Rumex obtusifolius*	Broad-leaved Dock
Epilobium parviflorum	Hoary Willowherb	*Rumex sanguineus*	Wood Sorrel
Equisetum arvense	Field Horsetail	*Salix alba*	White Willow
Equisetum fluviatile	Water Horsetail	*Salix caprea*	Goat Willow
Equisetum palustris	Marsh Horsetail	*Salix cinerea*	Grey Willow
Equisetum sylvaticum	Wood Horsetail	*Salix fragilis*	Crack Willow
Euphrasia agg	Eyebright	*Salix viminalis*	Osier
Eurynchium praelongum	A moss	*Sambucus nigra*	Elder
Eurynchium striatum	A moss	*Sanicula europaeus*	Sanicle
Fagus sylvatica	Beech	*Scrophularia nodosa*	Common Figwort
Festuca ovina	Sheep's-fescue	*Senecio jacobaea*	Ragwort
Festuca rubra	Red Fescue	*Senecio aquaticus*	Marsh Ragwort
Filipendula ulmaria	Meadowsweet	*Sinapsis arvensis*	Charlock
Fraxinus excelsior	Ash	*Sonchus asper*	Prickly Sow-thistle
Fumaria muralis	Common Ramping-fumitory	*Sonchus oleraceus*	Smooth Sow-thistle
Galium aparine	Goosegrass	*Solanum dulcamara*	Bittersweet
Galium palustre	Common Marsh-bedstraw	*Sorbus aucuparia*	Rowan
Galium saxatile	Heath Bedstraw	*Sparganium emersum*	Unbranched Bur-reed
Geranium robertianum	Herb-robert	*Sparganium erectum*	Branched Bur-reed
Geum urbanum	Herb-bennet	*Spergula arvensis*	Corn-spurrey
Glechoma hederacea	Ground-ivy	*Stachys officinalis*	Hedge Woundwort
Glyceria fluitans	Floating Sweet-grass	*Stachys palustris*	Marsh Woundwort
Glyceria notata	Plicate Sweet-grass	*Stellaria alsine*	Bog Stitchwort
Hedera helix	Ivy	*Stellaria graminea*	Lesser Stitchwort
Heracleum mantegazzianum	Giant Hogweed	*Stellaria holostea*	Greater Stitchwort

Scientific name	English name	Scientific name	English name
Heracleum sphondylium	Hogweed	*Stellaria media*	Common Chickweed
Holcus lanatus	Yorkshire-fog	*Succisa pratensis*	Devil's-bit Scabious
Holcus mollis	Creeping Soft-grass	*Symphoricarpos albus*	Snowberry
Hordeum vulgare	Six-rowed Barley	*Taraxacum officinale*	Dandelion
Hyacinthoides non-scripta	Bluebell	*Thalictrum flavum*	Common Meadow-rue
Hylocomium splendens	A moss	*Thuidium tamariscinum*	A moss
Hypericum maculatum	Imperforate St John's Wort	*Tilia x europaea*	Lime
Hypericum pulchrum	Slender St John's-wort	*Trifolium dubium*	Yellow Clover
Hypericum tetrapterum	Square-stalked St John's-wort	*Trifolium pratense*	Red Clover
Hypochaeris radicata	Common Cat's-ear	*Trifolium repens*	White Clover
Ilex aquifolium	Holly	*Typha latifolia*	Common Reed-mace
Iris pseudacorus	Yellow Flag	*Ulex europaea*	Gorse
Juncus acutiflorus	Sharp-flowered Rush	*Ulmus glabra*	Wych Elm
Juncus articulatus	Jointed Rush	*Ulmus procera*	English Elm
Juncus bulbosus	Bulbous Rush	*Urtica dioica*	Common Nettle
Juncus effusus	Soft Rush	*Valeriana officinalis*	Common Valerian
Juncus inflexus	Hard Rush	*Veronica anagallis-aquaticua*	Blue Water-speedwell
Lamium purpureum	Red Dead-nettle	*Veronica beccabunga*	Brooklime
Lapsana communis	Nipplewort	*Veronica chamaedrys*	Germander Speedwell
Larix decidua	Larch	*Veronica officinalis*	Heath Speedwell
Lathyrus montanus	Bitter-vetch	*Veronica serpyllifolia*	Thyme-leaved Speedwell
Lathyrus pratensis	Meadow Vetchling	*Vicia cracca*	Tufted Vetch
Leontodon autumnalis	Autumn Hawkbit	*Vicia sepium*	Bush Vetch
Leucanthemum vulgare	Ox-eye Daisy	*Viola palustris*	Marsh Violet
Ligustrum vulgare	Wild Privet	*Viola riviniana*	Common Dog-violet

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