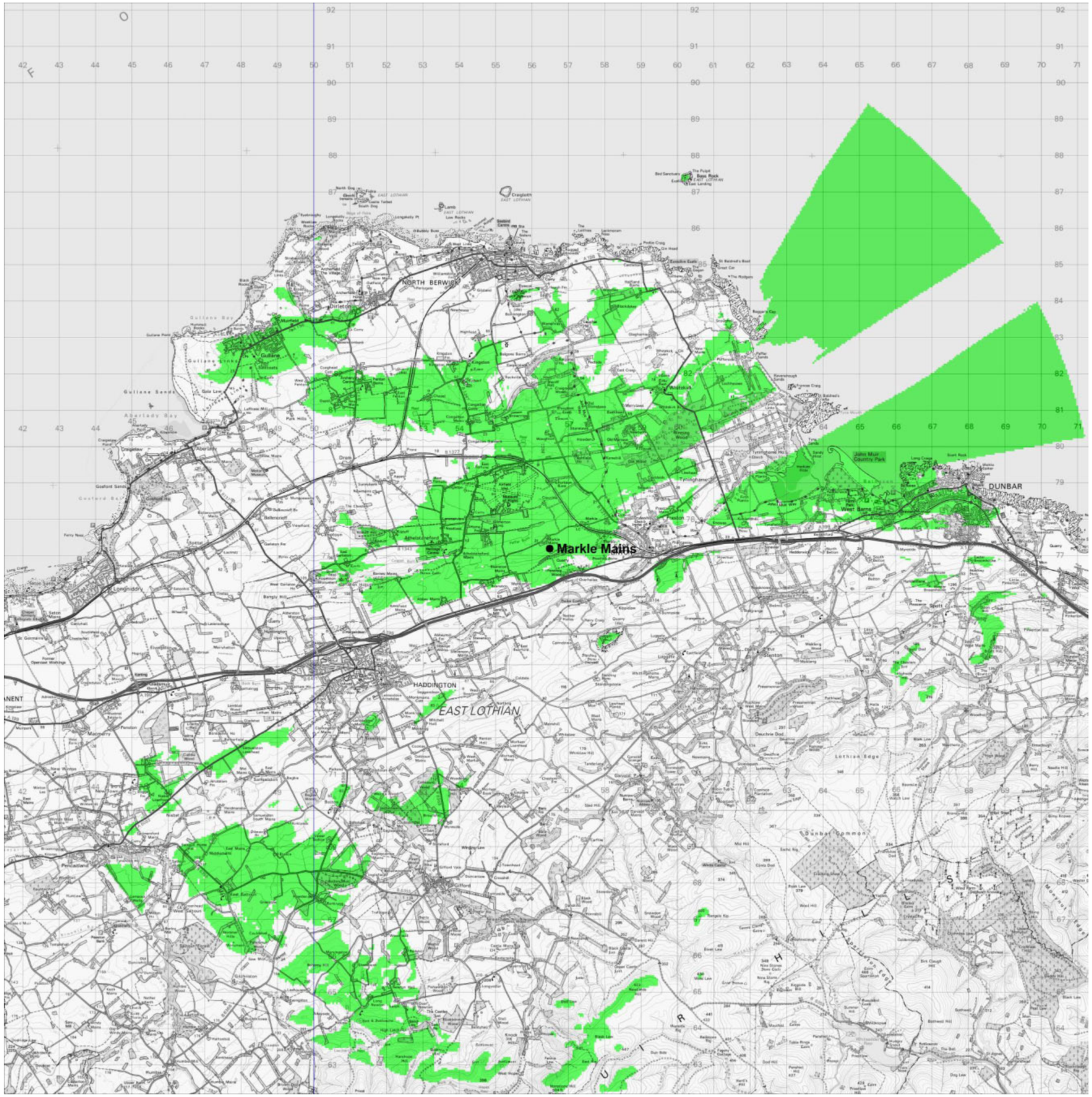
Appendix 1 – Key Viewpoint Locations


Viewpoint 1
Viewpoint 2
Viewpoint 3
Viewpoint 4
Viewpoint 5
Turbine Location
EAST LINTON
Preston
Whitekirk
Tyninghame
West Barns
John Muir Country Park
Tyne Mouth
Tyninghame Links
Tyninghame Ho
Binning Wood
Oak Wood
Stonelaws
Old Stonelaws
Merrylaws
Bankhead
Congalton Cotts
Congalton Mains
Congalton Gardens
Brownrigg
Rockville
Sydserf
Sheriff Hall
Craigmoor Wood
Waughton Castle
Waughton
Howden
Newbyth
Old Mansion Ho
Kamehill
Ashfield Ho
East Fortune
Airfield (disl)
Museum of Flight
Fortoun Bank
Crauchie
Merryhatton
Dingleton
Cemy
Lammerview
Needless
Home Fm
Gilmerton Ho
Markle
Markle Mains
Peffer Burn
Athelstaneford Mains
Beanston Mains
Beanston
Monksmuir
Overhailes
Hailes Castle
Sandy's Mill
Nether Hailes
Hairy Craig
Quarry (dis)
Kippielaw
Traprain
Sunnyside
Grangemuir
Luggate
Luggate Burn
Eastfield
Cairndinnis
Stevenson Ho
Stevenson Mains
East Bearford
Standing Stone (moved)
Standing Stone
Drylawhill
Preston Mains
Cauldside
Smeaton Ho
Firth Plantn
Salt Greens Plantn
Heckies Hole
Sandy Hirst
Tyne Sands
Ravensheugh Sands
Frances Craig
St Baldred's Cradle
Lochhouses
Garleton Walk
Limetree Walk
The Avenue
Kirklandhill
Tynefield
Knowes
Ford
Standing Stone
Phantassie
Ninewar
Howmuir
Hedderwick
Hedderwick Hill
Farm Park
North Belton
South Belton
Old Belton
Beltonford
Beesknowe
Bielhill
Biel
Bielmill
Bielgrange
Ginglet
Ritcox
Little Spott
Spott Mill
Meiklerig Wood
Meiklerig
Stenton
Ruchlaw Mains
Ruchlaw
Well
Church
Mon
Tyne
River
B1377
B1347
B1407
A198
A1087
B6370
2500 feet
1 km

Appendix 2 – Comparable Zone of Theoretical Visibility (ZTV) Maps

- The First ZTV reflects the theoretical visible of a turbine at a height of 48m
- The Second ZTV reflects the theoretical visible of a turbine at a height of 42m



Legend

Approximate area from which the Wind Turbine Tip (48.6m) may be visible

Proposed location of the Wind Turbine

Notes

1. Predicted visibility defined from an observer eye level of 2m above ground level.
2. Created using Ordnance Survey Digital Terrain data at a 50m grid interval.
3. The analysis does not take into account intervening screening vegetation or buildings.
4. Reproduced from OS 1:50 000 scale raster maps by permission of Ordnance Survey® ©Crown copyright, all rights reserved. 2011 License number 100049996 (2011).

Project

Markle Mains, East Lothian - 15km Radius

Title

Zone of Theoretical Visibility

Scale: 1:50,000

Drawing Ref: MMains / ZTV

Drawn: SS / 08.11.12

3R Energy Solutions

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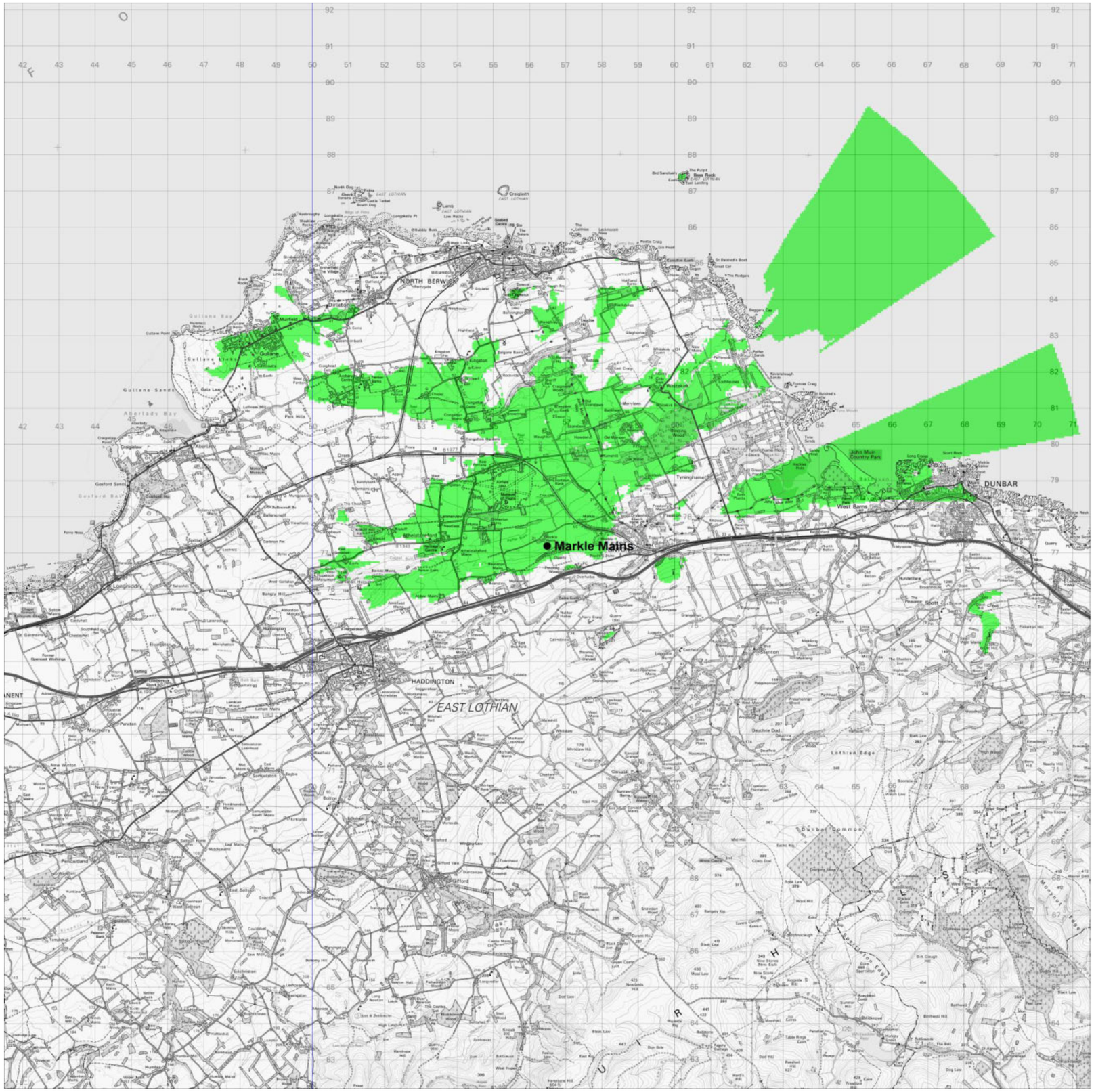

Legend

Approximate area from which the Wind Turbine Tip (41.8m) may be visible

Proposed location of the Wind Turbine

Notes

1. Predicted visibility defined from an observer eye level of 2m above ground level.
2. Created using Ordnance Survey Digital Terrain data at a 50m grid interval.
3. The analysis does not take into account intervening screening vegetation or buildings.
4. Reproduced from OS 1:50 000 scale raster maps by permission of Ordnance Survey® ©Crown copyright, all rights reserved. 2011 License number 100049996 (2011).

Project

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Zone of Theoretical Visibility

Scale: 1:50,000

Drawing Ref: MMains / ZTV

Drawn: SS / 08.11.12

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Appendix 3 – Noise Assessment

TECHNICAL REPORT P5405

MARKLE MAINS FARM
EAST LOTHIAN

WIND TURBINE NOISE

Prepared For

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NOVEMBER 2012

PROJECT DETAILS

Project Title	Markle Mains Farm Wind Turbine Noise	Project Number	
		P5405	
Document Title	Noise Impact Assessment Under Planning Advice Note PAN 1/2011	Date of site work:	Date of issue:
		9th October 2012	23rd November 2012

Revision	Date Written	Filename	Report_1B	
Issue 1B	05/11/12		Prepared By	Checked By
		Name	Chris Flynn	Scott Carlin
		Signature		

Issue		Filename		
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		Name		
		Signature		

Issue		Filename		
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		Signature		

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1.0 INTRODUCTION

At the request of Mr Craig Miles, Planning Consultant, Smiths Gore, a noise assessment was undertaken to assess the potential impact of the installation of a wind turbine at the following site:

Markle Mains Farm
Markle
East Linton
EH40 3EB

The purpose of the assessment was to undertake monitoring of current on site noise levels at the farm and investigate how the introduction of the new wind turbine will affect the current noise climate in the area.

The assessment used the information contained in PAN 1/2011 (Planning and Noise) and the associated Technical Advice Note (TAN)

This noise assessment was undertaken on the 9th of October 2012 by Mr Chris Flynn, Acoustic Consultant of Ethos Environmental Limited.

The main findings from this survey are discussed in Section 4.0 of this report.

Conclusions and recommendations are made in Section 5.0.

2.0 BACKGROUND

2.1 Site Details

Markle Farm is located approximately 1.2km north of the A1 and A199. To the south-east is Markle Quarry and to the west is the East Coast Mainline. The proposed wind turbine location is shown at Figure 1. The nearest noise sensitive receptors (NSRs) are identified in Figure 2.

2.2 Assessment Location

The background noise measurement was taken at approximately 1.5m from any reflecting surface (e.g. façade or wall) and at a height of 1.5m from the ground.

The proposed wind turbine location is detailed in Figure 1 and the nearest Noise Sensitive Receptors are detailed in Figure 2 below.

2.3 Monitoring Conditions

During the monitoring period the conditions were generally good with no precipitation. It was not possible to measure in elevated wind speed. The average wind speed for the location is 6m/s.

2.4 Noise Measurement Instrumentation

Measurements were taken using a Norsonic 140, Type 1 integrating sound level meter and octave band analysers. This meter was placed in a Norsonic (NOR1506) environmental enclosure with an environmental microphone enclosure (NOR1212).

This meter satisfies IEC 60651-1993, IEC 6084-1993 and ANSI S1.4 1985. The digital filters with real time rate to 20 kHz satisfy IEC 1260-1995 Class 1 and ANSI S1.11-1986 Type 1_D meeting linearity specifications over a range of 85 dB:

- $^{1}/_{1}$ Octave, 16 Hz to 16 kHz (11 filters);
- $^{1}/_{3}$ Octave, 12.5 Hz to 20 kHz (33 filters).

All measurements were made taking due cognisance of information contained in BS7445: Part 1: 2003 *Description and measurement of environmental noise - Guide to quantities and procedures and* BS7445: Part 2: 1991 *Description and measurement of environmental noise - Guide to the acquisition of data pertinent to land use.*

Figure 1: Wind Turbine Proposed Location

Figure 2: Nearest Noise Sensitive Receptors

3.0 METHODOLOGY

3.1 Noise Assessment

3.1.1 Client Brief

The client was provided with a brief from the local authority. It is as follows:

An assessment of noise from the operation of the turbine shall be carried out. The assessment should include details of any mitigation measures considered necessary to ensure that the external free-field noise levels at any neighbouring residential property shall not exceed 35dB($L_{A90\ 10min}$) at any wind speed up to 10m/s. However, this limit can be increased to 45dB(A) where the occupier of the property has some financial interest in the wind farm.

3.1.2 Legislative Background

Noise can have a significant impact upon health, quality of life and the environment generally.

The Scottish Executive has issued an advice note to demarcate the role of the planning system in preventing and limiting the adverse effects of noise without prejudicing investment in enterprise, development and transport.

The Scottish Government's policies on noise-related planning issues are set out in PAN 1/2011, *'Planning and Noise'* and its Technical Advice Note (TAN), *'Assessment of Noise'*. Specifically it outlines the considerations to be taken into account when determining planning applications for both noise-sensitive development (NSD) and for noise generating development (NGD).

The objective is to evaluate the noise impact of the Noise Generating Development (NGD) (the proposed wind turbine) on the existing Noise Sensitive Receptors (NSR).

The scope of the noise assessment does not include for construction phase noise from the proposed development.

4.0 RESULTS

4.1 Monitoring Results

4.1.1 Noise Monitoring Results

A 24 hour noise measurement was carried out in the garden area of Markle Mains Farm. The measurement location is detailed in Figure 1. The measured noise levels are detailed in Table 1 below.

Table 1: Measured Noise Levels

Location	L_{A90} dB	L_{Aeq} dB
Markle Mains Farm	32.4	48.1

An independent noise assessment was carried out by Northern Power Systems who manufacture the wind turbine. The noise levels provided were used to calculate the Sound Power Level of the Northern Power 100 Turbine. The noise levels are detailed in Table 2 below.

Table 2: Wind Turbine Noise Levels

Wind Speed m/s	L_{Aeq} dB @ 500m	L_w dB[1]
6.0	28.6	93.6
8.0	30.7	95.7
10.0	34.3	99.3

4.1.2 Output from Noise Model Results

Receivers were placed in the Acoustic Digital Terrain Model at positions representing the nearest noise sensitive receptors. In order for the model to generate noise levels which can be modelled to the noise sensitive receptors, the operating noise levels of the wind turbine have to be added.

The Scottish Agricultural College (SAC) collect wind speeds at Markle Mains Farm via wind monitoring equipment. The data SAC have provided indicate that the wind speed for most of the time is below 6.0 m/s. As such, the noise level for the wind turbine operating at 10.0 m/s was added to the model as this was considered the worst case scenario.

[1] Calculated using the relationship Lp= Lw + 20log r – 11 (for free field conditions were r is the distance from the source point where the measurement was taken.

The noise levels at the façade of the nearest NSR are calculated by the CADNA A noise modelling software (see Appendix 3). The results of the model are detailed in Table 3 below.

Table 3: Modelled Noise Level at NSRs

Name	Modelled Noise Level dB(A)
Markle Mains Farm	43.7
NSR 1	24.3
NSR 2	26.4
NSR 3	23.5
NSR 4	26.6

5.0 CONCLUSIONS

The Noise Impact Assessment is broken down into four stages:

- Stage 1: Initial Process – Identifies all noise sensitive receptors (NSRs) that may be potentially affected by the development and to prioritise each NSR according to their level of sensitivity.

- Stage 2: Quantitative Assessment: The procedure for the quantitative assessment assumes that this is a noise generating development.

- Stage 3: Qualitative Assessment: The qualitative assessment allows additional factors to be assessed to determine the magnitude of the impacts.

- Stage 4: Level of Significance: The level of significance of the noise impact at the NSRs is obtained through the relationship of the receptor sensitivity to noise and the magnitude of the noise impact.

5.1 Stage 1 – Identification of Noise Sensitive Receptors

The NSRs associated with the wind turbine project are all residential premises. These are detailed in Table 4 below with their appropriate sensitivity indicated.

Table 4: Level of Sensitivity of NSRs

Location	Sensitivity	Reason for Sensitivity
Markle Mains Farm	Medium	Residential (with ownership of Turbine)
NSR 1	High	Residential
NSR 2	High	Residential
NSR 3	High	Residential
NSR 4	High	Residential

These identified NSRs are closest to the proposed wind turbine and as such are considered to potentially experience the highest impact. As all of the NSRs are residential properties, for the purposes of this assessment we have assumed that the sensitivity of all properties will be high with the exception of Markle Mains Farm as this property is owned by the wind turbine proposer.

5.2 Stage 2 – Quantitative Assessment

For the quantitative assessment we will consider the noise levels affecting the NSRs before and after the construction of the sheds. The magnitude of noise impacts are described in Table 2.2 in the PAN 1/2011 Technical Advice Note. See below.

Table 2.2 Classification of Magnitude on Noise Impacts

Descriptors for Magnitude of Impact	Generic Criteria of Descriptor
Major	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Moderate	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Minor	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse).
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Table 5 below details the difference between the modelled values and the existing measured values. The change in L_{Aeq} before and after the industrial development is operational will determine whether complaints are likely.

The numerical difference is compared against Table 3.4 in the Technical Advice Note.

Table 3.4: Assigning Magnitudes of Noise Impact

Magnitude	Change in noise level, $L_{Aeq,T}$ dB (After – Before)[1]
Major	≥ 5
Moderate	3 to 4.9
Minor	1 to 2.9
Negligible	0.1 to 0.9
No change	0

Table 5: Comparison of Noise Levels Before and After Installation of Wind Turbine

Location	Modelled Levels dB(A)	Measured Existing Levels (L_{Aeq})	Difference between Modelled and Existing dB
Markle Mains Farm	43.7	48.1	-4.4
NSR 1	24.3	48.1*	-23.8
NSR 2	26.4	48.1*	-21.7
NSR 3	23.5	48.1*	-24.6
NSR 4	26.6	48.1*	-21.5

* Considered for the purposes of the exercise to be equivalent or greater than the levels measured at Markle Mains farm due to closer proximity of roads.

From the comparison of the noise levels before and after the installation of the wind turbine it can be seen that there will be no change in the magnitude of noise impacts.

5.3 Qualitative Assessment

The noise produced by the wind turbine is likely to be less than the noise produced by other noise sources in the area, such as the A1 and A199, Markle Mains Quarry and the East Coast Main Line.

5.4 Level of Significance

The significance of the noise impact is considered **neutral** given that the noise from the wind turbine will not be audible within any of the NSRs.

APPENDIX 1: GLOSSARY OF TERMS

The following terminology is employed in this report:

L_{Aeq}: The continuous equivalent noise level, LAeq, of a time-varying noise; the steady noise level (in dB(A)) which, over the period of time under consideration, contains the same amount of (A-weighted) sound energy as the time-varying noise over the same period of time.

A-Weighted: The A in dB(A) refers to the A-weighted sound pressure level of the noise in decibels. A-weighting is obtained through the use of a filter in the sound level meter which is designed to produce the relative response of the human ear to sound at different frequencies.

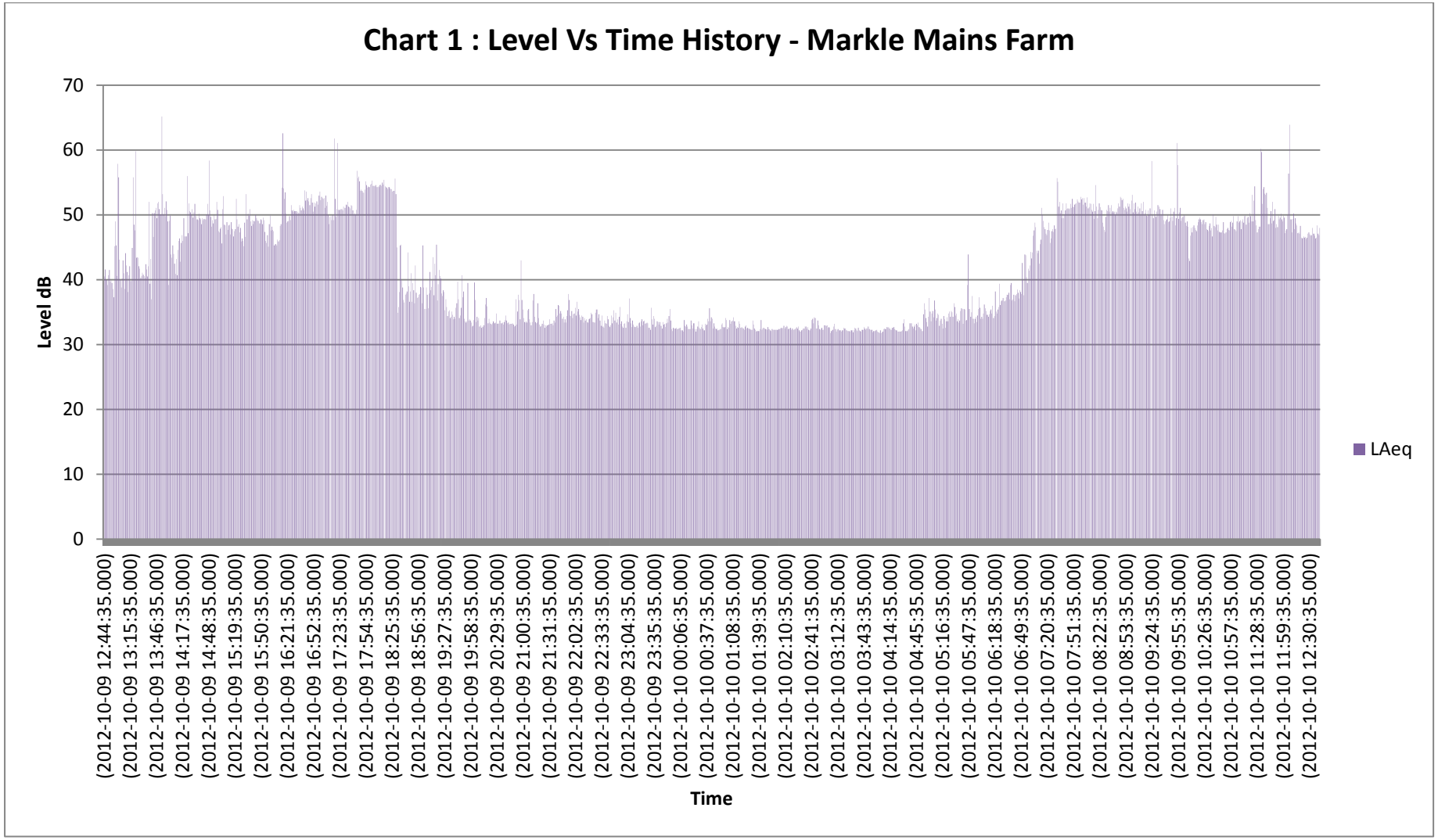
Specific Noise Source: The noise source under investigation for assessing the likelihood of complaints.

Background Noise Level (L_{A90}): The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval, T, measured using time weighting, F, and quoted to the nearest whole number of decibels.

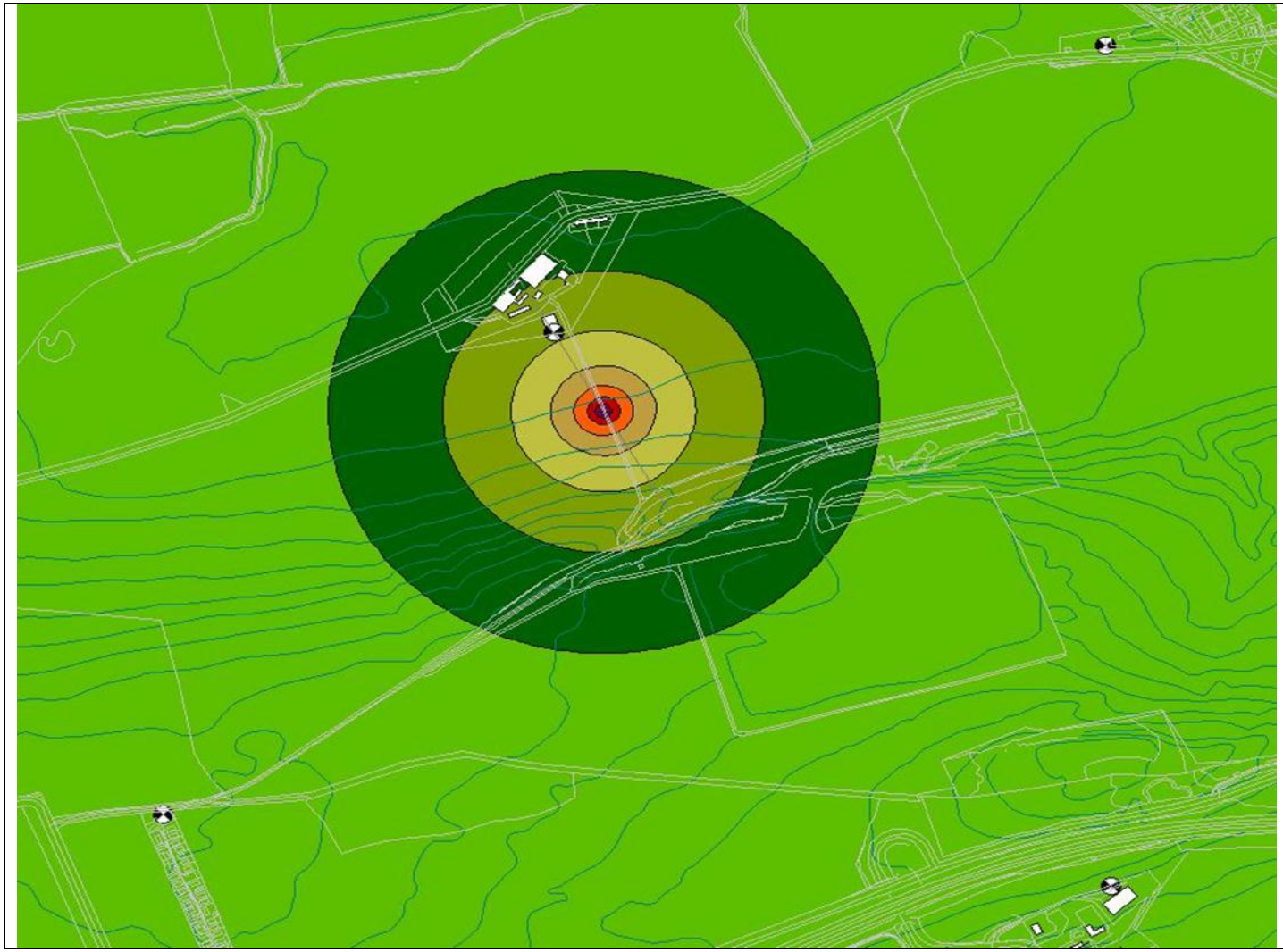
Residual Noise: The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Ambient Noise: Totally encompassing sound in a given situation at a time usually composed of sound from many sources near and far.

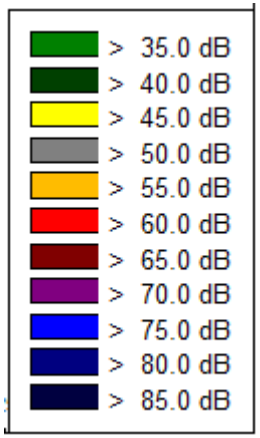
APPENDIX 2: MEASUREMENTS – TIME HISTORY



APPENDIX 3: CADNA NOISE MODEL



Receiver Position



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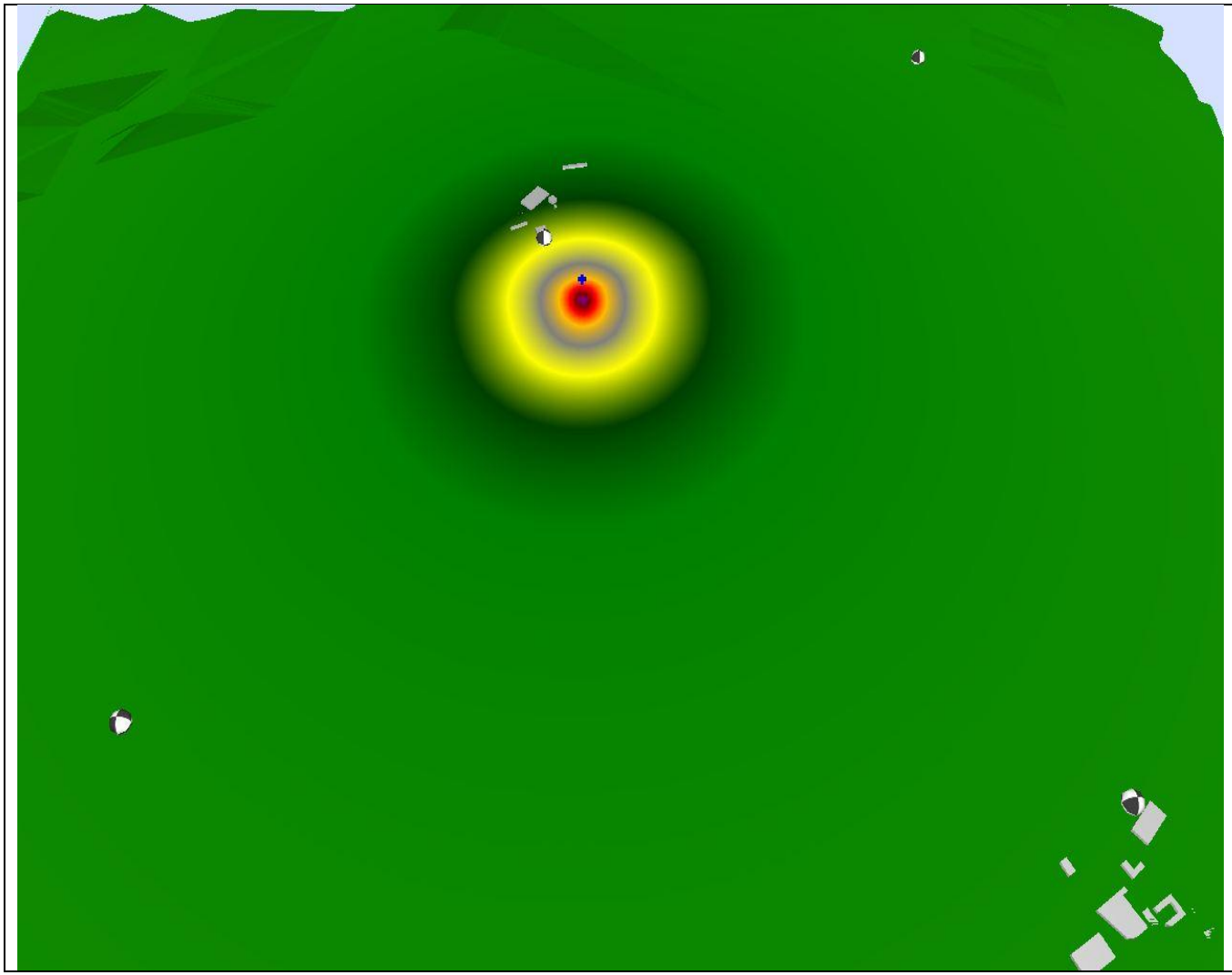

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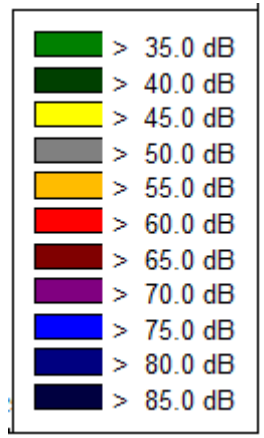

Key

Appendix 4 – Response from Dunpender Community Council

Dunpender Community Council

www.eastlinton.uk.com
Chairman: Mrs Judith M. Priest, 83 High Street, East Linton, EH40 3BQ. Tel: 01620-860380
e-mail: judith.priest@talk21.com

9th September 2012

Iain McFarlane
Planning Officer
East Lothian Council
John Muir House
Haddington
EH41 3HA

Dear Mr McFarlane,

Planning Application 11/00234/P Markle Mains Wind Turbine, Officers Report 30/08/12

It has been pointed out to Dunpender Community Council that this report on the planning application submitted by William Middlemass states "As a consultee, Dunpender Community Council objects to the proposed wind turbine".

In fact Dunpender Community Council did not formally object to the proposed turbine as the enclosed excerpts from the minute of our meetings in June and September 2011 show. Mrs Ferguson was asked to write to East Lothian Council to reflect the views of residents in the Markle area but was instructed not to frame this as a formal objection from Dunpender Community Council. She was asked to make this clear and if she did not do that then I am making it clear now. Dunpender Community Council do not formally object to the proposed turbine at Markle Mains

Yours sincerely

Mrs JM Priest

cc Brian Stalker
W Middlemass

enc.