Blade		Tower					
						©F	Pell Frischmann
Pell Frischmann	Project		Drawn	Name JS	Date 03/03/2021	Scale 1:500_1 @ A3	
Tel: +44 (0)131 240 1270 Emoil: pfedinburch@pellfischmann.com	Craig Watch Wind Farm		Designed	JS	03/03/2021	File No. 210202 Craig Watch Track	ng.dwg
www.pellfrischmann.com	5		Checked	GB	03/03/2021	Drawing Status	
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Key ///////////////////////////////			Urawing No.	Notes: 1. All mitiga	tion is subject to c	onfirmation through a test run.	Revision
Wheel SPA Body SPA Load SPA Indicative Over-run Over-sail	SPA Location A96 / A920 West Junction		J SNZO	2. This is no	ot a construction dr	awing and is intended for illustration purposes only.	1

		the traffic bollard, fence, vegetation and one road sign to be removed. Third party land required.		Blade tip to oversail two bollards. One road sign to be removed.
Pell Frischmann	Project			Name         Date         Scale         1:500_1         @ A3
93 GEORGE STREET, EDINBURGH. EH2 3ES Tel: +44 (0)131 240 1270		Craig Watch Wind Farm	Designed	JS 03/03/2021 File No. 210202 Craig Watch Trackina.dwa
Email: pfedinburgh@pellfrischmann.com www.pellfrischmann.com			Checked	GB 03/03/2021 Drawing Status
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Statkraft		SGRE 155 Blade and Tower	Drawing No.	Notes: Revision
Key	SPA Location	A96 / A920 West Junction	SK25A	<ol> <li>All mitigation is subject to confirmation through a test run.</li> <li>This is not a construction drawing and is intended for illustration purposes only.</li> </ol>



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Pell Frischmann	Project	
93 GEORGE STREET, EDINBURGH. EH2 3ES Tel: +44 (0)131 240 1270	Craig Watch Wind Farm	Drawn Desianed
Email: pfedinburgh@pellfrischmann.com www.pellfrischmann.com		Checked
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	Vegetation to be trimmed.	
Loads to be raised to av for verge repro Vegetation to A land search is reco confirm the exter	oid the need ofiling works. be trimmed. mmended to t of adopted boundary.	
Pell Frischmann	Project	
93 GEORGE STREET, EDINBURGH. EH2 3ES Tel: +44 (0)131 240 1270	Craig Watch Wind Farm	Drawn Designed
Email: ptedinburgh@pellfrischmann.com www.pellfrischmann.com	Drawing Title	Checked
Statkraft	SGRE 155 Blade and Tower	Point of Inte Drawing No.
Key            Wheel SPA     Body SPA     Load SPA     Indicative     Over-run     Over-sail	SPA Location A920 Cairnford	SK28A

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	Load bearing surface to be laid. $\$	
	+ 266.0m	
Pell Frischmann 93 george street, EDINBURGH, EH2 365 Tel: +44 (0)131 240 1270 Eropit: oferlieburg/enellfischmann.com	Project Craig Watch Wind Farm	Drawn Designed
Client Statkraft	Drawing Title SGRE 155 Blade and Tower	Checked Point of Intere Drawing No.
Key	SPA Location A920 Easter Bodylair	SK31A



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Blade		+ 193	202.7m	
	Pell Frischmann	Project		
	93 GEORGE STREET, EDINBURGH. EH2 3ES Tel: +44 (0) 131 240 1270 Email: pfedinburgh@pellfifschmann.com		Craig Watch Wind Farm	Designed
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Key Wheel SP/	A Body SPA Load SPA Indicative Over-run Over-sa	SPA Location	A920 Bakebare	SK32

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Tower	202.7m 214.4m	221.7m		© Pell Frischman
Pell Frischmann	Project	Drawn	Name JS	Date Scale 1:1000 @ A3
Tel: +44 (0)131 240 1270 Email: pfedinburgh@pellfrischmann.com	Craig Watch Wind Farm	Designed	JS	03/03/2021 File No. 210202 Craig Watch Tracking.dwg
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Pell Frischmann	Project			<b>D</b>	Name	Dat
Pell Frischmann 93 GEORGE STREET, EDINBURGH. EH2 3ES Tei: +44 (0)131 240 1270 Email: afadinburgh/impallificchmann com	Project Craig \	Watch Wind Farm		Drawn Designed	JS JS	Date 03/03/ 03/03/
Pell Frischmann 93 GEORGE STREET, EDINBURGH. EH2 3ES Tel: +44 (0)131 240 1270 Email: pfedinburgh@pellfrischmann.com www.pellfrischmann.com	Project Craig \	Watch Wind Farm		Drawn Designed Checked	JS JS GB	Date 03/03/ 03/03/ 03/03/
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Test run required to confirm the ability of loads to oversail the safety barrier at this location. A land search is recommended to confirm the extent of adopted boundary. Potential **third party land** required. A topographical survey at this location is recommended.

183.3m

														102.0m	Pell Frischmann
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			Te Email: pfedinbural	el: +44 (0)131 240 12 @pellfrischmann.co	70 pm			Cruig Watch wind Fulli		Designed	JS	03/03/2021		<sup>0.</sup> 210202 Craig Watch Tro	cking.dwg
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Wheel SPA Boc		Body SPA	Load SPA	Indicative	Over-run	Over-sail		A920 Coldhome							

Vegetation and trees to be removed. Land search recommended to confirm the extent of adopted boundary.Potential **third party land** required.



Name       Dote         JS       03/03/2021         JS       03/03/2021         File No. 210202 Croig Watch Tracking.dwg         CB       03/03/2021         Dote:       Dote:         JS       03/03/2021         Distance:       Drowing Status         Drowing Status       Droft         Maria:       Period         Proving Status       Droft								
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Load bearing surface to be laid. Potential <b>third</b> <b>party land</b> required. Load bearing surface to be laid. <b>Third party</b> <b>land</b> required. Detailed design required on a topogaphical base to confirm the extent of mitigation required. It will be necessary to build the land up at this location to form the overrun area. One telegraph pole to be removed.	Belrunnan The Mill	
Pell Frischmann 93 GEORGE STREET, EDINBURGH. EH2 3ES Tel: +44 (0)131 240 1270 Email: pfedinburgh@pellfrischmann.com www.pellfrischmann.com	Project Craig Watch Wind Farm	Drawn Designed
Client Statkraft	Drawing Title SGRF 155 Blade and Tower	Point of Inter
Key          Wheel SPA     Body SPA     Load SPA     Indicative     Over-run     Over-sail	SPA Location A920 Milltown of Auchindoun	SK34A

		©	Pell Frischmann
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	Load bearing surface to be laid. Vegetation to be cleared.	
Pell Frischmann 93 GEORGE STREET, EDINBURGH, EH2 3ES	Project Craig Watch Wind Earm	Drawn
Tel: +44 (0) 131 240 1270 Email: pfedinburgh@pellfrischmann.com	Craig watch wind Farm	Designed
or I		Checked
Client Statkraft	Drawing Title SGRE 155 Blade and Tower	Point of Interes
Key ///////	SPA Location	SK36A
Wheel SPA Body SPA Load SPA Indicative Over-run	Over-sail A941 South of Bridge of Burnend	

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Pell Frischmann 93 George street, Edinburgh, EH2 3ES	Project Craig Watch Wind Farm	Drawn
tei: +44 (u)131 240 1270 Email: pfedinburgh@pellfrischmann.com www.pellfrischmann.com		Designed Checked
Client Statkraft	Drawing Title SGRF 155 Blade and Tower	Point of Inter
Key /////	SPA Location	SK38
Wheel SPA Body SPA Load SPA Indicative Over-run Over-sail	A941 South of Tomnoan	

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Pell Frischmann 93 GEORGE STREET, EDINBURGH, EH2 3ES Tel: +44 (0)131 240 1270	Project Craig Watch Wind Farm	Drawn
Email: pfedinburgh@pellfrischmann.com www.pellfrischmann.com	Drawing Title	Checked
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Wheel SPA Body SPA Load SPA Indicative Over-run Over-sail	SPA Location A941 South of Tomnoan	SK38A

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	Vegetation to be trimmed.	16 2
	Potential <b>third party land</b> required.	RS
Pell Frischmann	Project	Drawn
93 GEORGE STREET, EDINBURGH, EH2 3ES Tel: +44 (0)131 240 1270 Email: pfedinburgh@pellfrischmann.com	Craig Watch Wind Farm	Designed
Client Ct-atline Ct	Drawing Title	Checked Point of Int
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Key </th <th>SPA Location A941 South of Tomnoan</th> <th>SK38B</th>	SPA Location A941 South of Tomnoan	SK38B

			© Pell Frischmann	
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The OS mapping does not accurately represent the road network as noted on site. An indicative road edge has been provided for illustration only and should		
be confirmed during the test run or through a topographical survey.	Project	
Pell Frischmann 93 GEORGE STREET, EDINBURGH. EH2 3ES	Craia Watch Wind Farm	Drawn
Tel: +44 (0)131 240 1270 Email: pfedinburgh@pellfrischmann.com		Designed
www.pellfrischmann.com		Checked
Client Statkraft	Drawing Title SGRF 155 Blade and Tower	Point of Intere
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Pell Frischmann 93 GEORGE STREET, EDINBURGH. EH2 3ES Tel: +44 (0)131 240 1270 Ernail: pfedinburgh@ellfischmann.com	Project Craig Watch Wind Farm	Drawn Designed					
Client Statkraft	Drawing Title SCRF 155 Blade and Tower	Checked Point of Intere					
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Load bearing surface to be laid. Detailed design on a topographical survey is required -to confirm the mitigation. Verge to be reprofiled. Stone wall and fence to be removed. **Third party land** be required

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## Appendix C Weight Review Correspondence

### **Craig Watch Wind Farm RSR**

From: Ann Porter < Sent: 05 March 2021 11:34 To: Jordan Stirrat Cc: Claire Robertson Subject: RE: Craig Watch Wind Farm ESDAL

Good Morning,

I have looked at the proposed route and checked structures on it. Aberdeenshire Council have 5 structures on the A920 that fall under its responsibility:

Cairnford (Grid ref: NJ 487 406) Bogforth (Grid ref: NJ 467 408) Cairnborrow (Grid ref: NJ 461 408) Parkhall (Grid ref: NJ 453 406) Barefold (Grid ref: NJ 433 405)

None of them are flagging up as concerns with the information you have provided. We can't give a definitive answer until axle configurations for the vehicle are provided.

As this is early stages of your assessment, I have not passed the details on to the relevant roads department for them to check. The roads department will be informed once the haulier has been selected and any special order applied for has been provided to us.

Should you require any further information, please do not hesitate to get in touch.

Kind Regards

Ann Porter

**Technical Assistant** 

Aberdeenshire Council Structures Section Infrastructure Services Woodhill House Westburn Road Aberdeen AB16 5GB

www.aberdeenshire.gov.uk

> On Behalf Of Abnormal Loads

From: Gordon Buchan Sent: 28 April 2022 11:00 To: Paul.Winn Cc: Jordan Stirrat Subject: RE: Craig Watch Wind Farm ESDAL

Dear Paul

Access from Inverness and Invergordon is not possible due to the size of the loads passing through Keith. Access from Peterhead is not possible due to the size of the vessels required to transport the components and numerous constraints on the route from the harbour.

Aberdeen Harbour does not have any storage areas required to store the equipment when unloading from the ships, nor has it previously allowed wind farm deliveries of this size into the port.

Dundee is the only feasible port for use for deliveries of this size. The harbour and access roads was upgraded to accommodate turbine deliveries and the trunk road was modified to enable access.

The project is in pre-planning determination at present and a final decision on the port will be made once the turbine model has been confirmed, post consent.

Kind regards

Gordon

**Gordon Buchan Divisional Director** 

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### in 💟 www.pellfrischmann.com

From: Paul.Winn Sent: 03 March 2021 10:37 To: Jordan Stirrat Subject: RE: Craig Watch Wind Farm ESDAL

Hi

We would prefer Inverness to be used as the port of entry if possible because this is the closest suitable port. Invergordon, Peterhead and Aberdeen are also closer to this wind farm than Dundee.

Regards, Paul Paul Winn Network Administrator Administration Team **Roads Directorate** T: 0141 272 7339 transport.gov.scot

### **Craig Watch Wind Farm RSR**

From: OSD Wind Farm Abnormal Loads Sent: 10 March 2021 08:53 To: Jordan Stirrat Subject: RE: Craig Watch Wind Farm ESDAL [OFFICIAL]

OFFICIAL Good Morning,

In response to your email enquiry dated 03rd March 2021, I can provide the following information on behalf of Police Scotland.

When a haulier has been selected for a particular project and they have been furnished with precise dimensions of the load to be transported by road, thereafter as part of the planning process a detailed route survey is produced by the haulier identifying all potential issues often referred to as "pinch points" along the entire proposed route. The route is then examined and commented upon by Transport Scotland /Transerv and the relevant Local Council amongst other partners.

Police Scotland consider the proposed route primarily from a road safety perspective .If due to the abnormal dimensions it is apparent other road users will be required to be directed to stop along the route by police in order to safely facilitate the movement or encroachment into an opposing undivided carriageway will occur, then police officers will be deployed to warn other road users of the presence of the abnormal load. The timings of the movements are dependent on many factors dependant on the route and Transport Scotland may place restrictions on travel during peak times to ensure journey time reliability along their trunk road network.

In general terms the movement of Abnormal Indivisible Loads (A.I.L) along most if not all routes in more rural areas, from my experience has an impact on the infrastructure of the general area and local community although Police Scotland are not best placed to comment in detail on this subject. Examples of this from previous projects could include, delays to freight traffic travelling to or from ferry ports, delays experienced by bus services including tourist bus tours operated in the area (Invergordon Port being a cruise ship port), delays to teachers and or pupils attending for scheduled school start times and delays to staff and the public attending hospital or medical appointments.

Regards

Frankie Anderson **Business Support Administrator** Vehicle Recovery & Abnormal Loads Police Scotland Fife Divisional HQ Detroit Road Glenrothes Fife KY6 2RJ

Tel: 01592 418421 (not monitored 24/7 if no response call 101 or send email)

Email: OSDAbnormalLoadsScotland@scotland.pnn.police.uk

From: SC Abnormal Loads Sent: 05 March 2021 09:36 To: Jordan Stirrat Subject: RE: Craig Watch Wind Farm ESDAL

Good morning,

No Scottish Canals structures affected.

Thanks, Brian.

From: rsgbrb Sent: 03 March 2021 14:36 To: Jordan Stirrat Subject: RE: Craig Watch Wind Farm ESDAL

Dear Jordan,

Thank you for your enquiry.

I have assessed the route on behalf of Highways England Historical Railways Estate, and can confirm that no structures belonging to that Authority will be affected.

Regards Tania

Tania Howell

Abnormal Loads Officer (on behalf of Highways England Historical Railways Estate)

Jacobs

DDI:

If your mail concerns abnormal load movements, please reply to

From: Abnormal Loads Sent: 04 March 2021 14:22 To: Jordan Stirrat Subject: RE: Craig Watch Wind Farm ESDAL

Afternoon

As per our previous e-mail:

Thank you for making these early stage enquiries. I have complied a list of the affected structures with some outline details for your information. 12T axle loads should be OK on the majority of these bridges, although some further analysis will likely be required for the specific axle arrangements once these are established.

It is noted that the proposed route utilises the

- A920, a relatively narrow 2-way road, with a winding route and some steep gradients and tight bends.
- steep gradients and tight bends.

None of the structures to be crossed on this route are hump-backed. The various affected Moray Council bridges are listed below:

### A920 from Aberdeenshire Boundary to A941 junction

A920/170 Boghead Bridge wide carriageway	1.9m span pipe
A920/180 Fiddich Bridge	16.9m span beam a
A920/190 Keithmore Bridge	2.5m span Armco
carriageway	

### A941 from A920 junction to Garbet Hill / Rinturk (these structures were also crossed by the Dorenell

Wind Farm abnormal loads som	ie years ago)
A941/150 Bridgehaugh Bridge	11.6m span beam and
camageway	
A941/140 Balloch Bridge	2.4m span masonr
carriageway	
A941/130 Ballochford Culvert	2.4m span masonry
carriageway	

### A941 from Garbet Hill / Rinturk to Bridgend (not clear if the route ends before these structures or not)

A941/110 Ardluie Bridge 3.5m span masonry carriageway (8.5m between the parapets) A941/100 Bridgend Bridge 6.4m span masonry carriageway (3.9m between the parapets)

Regards

Kay Rizza | Technical Support Officer | Environmental and Commercial Services

kay.rizza@moray.gov.uk | website | facebook | twitter | News page

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A941, a very narrow 2-way road, with large sections which are single-track. There are many

## 15.0m wide structure 6.3m and slab 11.8m wide structure 7.4m wide 16.2m wide structure 6.8m wide

d slab 11.6m wide structure 6.7m wide ry arch 10.7m wide structure 4.7m wide 13.1m wide structure 5.6m wide arch

/ arch	8.9m wide structure	5.6m wide
arch	4.88m wide structure	3.94m wide

## **Technical Appendix 11: Noise and Vibration**

- TA 11.1: Construction Noise Report
- TA 11.2: Operational Noise Report
- TA 11.3: Battery Energy Storage System Noise Report

CRAIG WATCH WIND FARM

### TA 11.1: Construction Noise Report

CRAIG WATCH WIND FARM



Technical Appendix 11.1

# **Construction Noise Report**

## **Craig Watch Wind Farm**

Craig Watch Wind Farm Limited

14138-010 10 May 2022

COMMERCIAL IN CONFIDENCE



Construction Noise Report Craig Watch Wind Farm

## **Quality Assurance**

TNEI Services Ltd and TNEI Africa (PTY) Ltd operate an Integrated Management System and is registered with The British Assessment Bureau as being compliant with ISO 9001(Quality), ISO 14001 (Environmental) and ISO 45001 (Health and Safety).

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## **Document Control**

Revision	Status	Prepared by	Checked by	Approved by	Date	
D0	DRAFT	AD	JS	JS	01/04/2022	
RO	FINAL ISSUE	AD	JS	JS	10/05/2022	

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Otnei

Construction Noise Report Craig Watch Wind Farm

## **Executive Summary**

TNEI Services Limited (TNEI) was commissioned by Craig Watch Wind Farm Limited ('the Applicant') to undertake predictions of noise levels associated with the construction of the proposed Craig Watch Wind Farm (the Proposed Development). The noise predictions were used to assess the potential impact of noise attributable to the construction of the Proposed Development on the occupiers of nearby noise sensitive receptors.

The noise impact assessment was undertaken using guidance contained in BS 5228: Part 1 2009+A1:2014 'Noise and vibration control on construction and open sites- Noise' and the calculation methodology in ISO9613: 1996 'Acoustics - Attenuation of sound during propagation outdoors' -Part 2: General Method of Calculation', together with noise data for appropriate construction plant.

Twelve residential receptors neighbouring the Proposed Development were identified as the nearest properties located to the proposed construction activities on the Site. Predictions have been made assuming that all items of plant are operating continually throughout the assessment period to provide a worst-case scenario. In addition, the noise model assumes that noise sources would be located within the most likely activity areas closest to the receptors, whereas in reality plant would move around the site and only a proportion of the plant may be operating at any one time. As such, the predictions are inherently likely to over-predict the actual sound levels that are likely to be experienced.

The results show that the predicted noise levels would be below the most stringent of the noise threshold levels detailed in BS 5228. Accordingly, the assessment concludes that there would be no significant construction noise impacts.

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### Construction Noise Report Craig Watch Wind Farm

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### Introduction 1

#### 1.1 Brief

- TNEI was commissioned by Craig Watch Wind Farm Limited to undertake a construction 1.1.1 noise assessment for the proposed Craig Watch Wind Farm (hereinafter referred to as the Proposed Development). The following steps summarise the noise assessment process:
  - Establish typical ambient noise levels at sensitive receptors located closest to the anticipated construction activities and derive appropriate noise threshold levels in accordance with BS5228-1:2009 +A1:2014<sup>(1)</sup>;
  - Undertake predictions of activity noise from different construction phases that would be incident at the nearest sensitive receptors;
  - Compare the predicted noise levels with the derived threshold values; and,
  - Identify any requirements for mitigation measures, if needed.

#### 1.2 Nomenclature

- 1.2.1 The following terms and definitions are used throughout this report;
  - Emission refers to the sound level emitted from a sound source, expressed as either a sound power level or a sound pressure level;
  - Immission refers to the sound pressure level received at a specific location from a noise source(s);
  - SWL indicates the sound power level in decibels (dB);
  - **SPL** indicates the sound pressure level in decibels (dB);
  - **NSR** (Noise Sensitive Receptor) are identified receptors that are sensitive to noise;
  - NML (Noise Monitoring Location) refers to any location where baseline or specific noise levels have been measured; and
  - CNAL (Construction Noise Assessment Location) refers to any location where the noise immission levels are calculated and assessed.
- 1.2.2 Unless otherwise stated, all noise levels refer to free field levels i.e. noise levels without influence from any nearby reflective surfaces.

#### 1.3 Site Description

- 1.3.1 The Proposed Development is located approximately 8 km south east of Dufftown, Moray. The approximate OS Grid Reference for the centre of the site is NJ 37509 34022 and the proposed layout is shown on Figure A.1.1 in Annex 1.
- The Proposed Development Area would be accessed through an improved entrance off the 1.3.2 A941. Construction noise impacts from vehicles improving and using this access track will be considered, with all activity being modelled within the Site.
- Construction of the Proposed Development would require felling, the laying of tracks across 1.3.3 the site, establishing two construction compounds, the opening up of a borrow pit, excavation of turbine foundations, concrete batching, construction of turbine bases,

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**Construction Noise Report Craig Watch Wind Farm** 

> installation of turbines, and the installation of a substation and other infrastructure. EIAR Chapter 2: The Proposed Development can be referred to for a detailed description of the Proposed Development and the construction requirements.

1.3.4 assessment as they are not expected to generate high levels of noise.

### **Table 1.1: Indicative Construction Timetable**

Task		Month																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Site Investigation / Forestry felling																		
Site establishment / Plant deliveries																		
Borrow pit, access tracks and turbine hardstandings																		
Turbine foundations																		
Substation construction																		
Cabling																		
Erection of Turbines																		
Site reinstatement and restoration																		

1.3.5 over-night.

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Construction is anticipated to last for 18 months. An indicative construction timetable is shown as Table 1.1. Activities denoted with blue cells have been included in the noise assessment. Periods denoted with grey cells have not been considered within the

TNEI has undertaken noise propagation modelling for months 1, 4, 7, 8, 10, 11 and 13, on the assumption that activities undertaken during these periods would generate the highest noise levels. An additional night-time scenario has also been considered to model any potential noise from the operation of generators and other types of plant typically left on



### Noise Planning Policy and Guidance 2

#### 2.1 **Overview of Noise Planning Policy and Guidance**

- 2.1.1 In assessing the potential noise impacts from the construction of the Proposed Development, the following guidance and policy documents have been considered:
  - The Environmental Noise (Scotland) Regulations <sup>(2)</sup>;
  - Planning and Advice Note (PAN) 1/2011 'Planning and Noise' <sup>(3)</sup>;
  - Technical Advice Note (TAN) 'Assessment of Noise' <sup>(4)</sup>; and
  - BS5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise'.
- 2.1.2 The overarching legislation in relation to terrestrial environmental noise is 'The Environmental Noise (Scotland) Regulations' (Scottish Statutory Instruments, 2006). The regulations aim to limit peoples noise exposure, and to develop action plans to prevent or reduce noise exposure, and to preserve existing quiet areas. The regulations do not prescribe noise limits.

#### 2.2 National Planning Policy

- At a national level the relevant policy documents are Planning Advice Note (PAN) 1/2011 -2.2.1 'Planning and Noise,' and the associated Technical Advice Note (TAN) - 'Assessment of Noise'.
- 2.2.2 PAN 1/2011 provides little guidance in respect of construction noise, other than recommending that the use of planning conditions is not the preferred method for controlling temporary construction noise. Specifically, the document states:

"32. While planning conditions can be used to limit noise from temporary construction sites, it is most effectively controlled through the Control of Pollution Act 1974 (COPA74) and the Pollution and Prevention Control Act 1999 for relevant installations. Notice can be served in advance of works and site conditions set to control activities."

BS5228:1997 'Noise and vibration control on construction and open sites. Code of practice 2.2.3 for basic information and procedures for noise and vibration control' parts 1 to 5 (BSI, 1997) is the approved Code of Practice under COPA74<sup>(5)</sup>, however, it is the 2009 version of the Standard which should be used for Environmental Impact Assessments (EIA) and planning applications. In this regards the TAN states:

"However, under Environmental Impact Assessments and for planning purposes i.e. not in regard to the Control of Pollution Act 1974, the 2009 version of BS 5228 is applicable. The 2009 version of the standard consists of Parts 1 and 2 for noise and vibration respectively."

#### 2.3 **Relevant Guidance**

. . . . . . . . . . . . . . . . . .

2.3.1 The BS5228:2009 standard provides useful guidance on practical noise control. Part 1, provides recommendations for basic methods of noise control including sections on community relations, training, occupational noise effects, neighbourhood nuisance and

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**Construction Noise Report** Craig Watch Wind Farm

> project supervision. The annexes provide information on noise sources, noise calculation procedures, mitigation measures and their effectiveness.

- 2.3.2 construction noise predictions.
- 2.3.3 open sites. Noise', (BSI, 2009), hereinafter referred to as BS5228.

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Part 1 also contains sound power level data for a variety of construction plant. This data was obtained from field measurements of actual plant operating on construction and open sites in the United Kingdom and is therefore appropriate to use as source level data for

The 2009 version of BS5228 was subject to an additional update in 2014. Accordingly, the construction noise assessment in this chapter has been undertaken in accordance with BS5228 1:2009+A1:2014 'Code of practice for noise and vibration control on construction and



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### **Potential Impacts** 3

#### 3.1 **Construction Noise Sources**

Noise levels from construction activities would vary continually over time as activities and 3.1.1 plant start and stop and move around the site. In order to assess the potential impacts of construction noise a worst-case scenario is considered where all construction plant and activities are assumed to be working continually and in locations closest to the nearest NSRs.

#### 3.2 **Construction Phases**

- Although an indicative timetable has been provided, a specific construction schedule has not 3.2.1 been determined at this stage. Chapter 2: The Proposed Development of this EIAR does, however, provide descriptions of some of the likely construction activities that would be undertaken and the type of plant that would be used.
- 3.2.2 It is also noted that construction activities are likely to be limited to between 07:00 and 19:00 on weekdays and 07:00 – 13:00 on Saturdays. No working would be undertaken on Sundays or Public Holidays without prior agreement with the relevant Local Authorities (LAs).
- 3.2.3 To consider the variation in noise levels that would occur throughout the construction period a series of construction scenarios have been modelled. The scenarios are based on the combination of construction tasks detailed in the indicative timetable (see Table 1.1), Chapter 2: The Proposed Development and TNEI's knowledge and experience of other similar sites and construction schedules.
- 3.2.4 Each scenario has been assessed against a set of threshold levels in order to determine the likely temporary noise impacts.
- 3.2.5 The assessment does not consider the noise impacts associated with decommissioning, as the plant and activities used for that phase are assumed to be similar in nature (and noise output) to those already considered in the modelled construction scenarios. Accordingly, if noise levels during the construction phases are acceptable, they should also be acceptable during decommissioning.

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**Construction Noise Report** Craig Watch Wind Farm

### Methodology 4

#### Methodology for the Prediction of Noise 4.1

- In order to predict the noise immission levels attributable to the construction of the 4.1.1 the propagation of noise according to a range of international calculation standards.
- 4.1.2 calculation'.<sup>(6)</sup>
- The ISO 9613 propagation model was chosen in preference to the calculation method 4.1.3 been validated up to 1,000 m.
- 4.1.4 propagation outdoors:
  - geometric divergence;
  - air absorption;
  - reflecting obstacles;
  - screening;
  - vegetation; and
  - ground reflections.
- 4.1.5 atmospheric absorption and ground effects.
- 4.1.6 humidity has been assumed.

#### 4.2 Limitations of the Noise Model

4.2.1 in the model should be considered:

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Proposed Development, noise propagation models are produced using the propriety noise modelling software CadnaA. Within the software, complex models can be used to simulate

For each CNAL, the  $L_{\mbox{Aeq}(t)}$  levels have been predicted in accordance with ISO9613-2:1996 'Acoustics - Attenuation of sound during propagation outdoors: General method of

presented in BS5228, primarily because of some of the significant distances from source to receptor evident on this site. Specifically, BS5228 notes in F 2.2.2.2, that at distances over 300 m noise predictions using the BS5228 methodology should be treated with caution, especially where a soft ground correction factor has been applied because of the increasing importance of meteorological effects; whereas ISO 9613-2 provides equations that have

The ISO 9613 model can take account of the following factors that influence sound

The model uses the octave band sound power output of the proposed plant as its acoustic input data, and calculates on an octave band basis, attenuation due to geometric spreading,

For the purposes of this assessment, all noise level predictions have been undertaken using a receiver height of 1.5 m above local ground level. Soft ground (G=1) attenuation has been assumed at all locations except for water bodies, construction compounds, turbine bases and similar areas of hardstanding, which have been modelled with a ground attenuation of G=0 (hard ground). Air absorption based on a temperature of 10°C and 70 % relative

The noise propagation models are intended to give a good approximation of the specific noise level and the contribution of each individual source. However, it is expected that actual levels are unlikely to be matched exactly with modelled values and the following limitations



- In accordance with ISO 9613-2, all assessment locations are modelled as downwind of all noise sources and propagation calculations are based on a moderate ground-based temperature inversion, such as commonly occurs at night;
- The predicted barrier attenuation provided by local topography, embankments, walls, buildings and other structures in the intervening ground between source and receiver can only be approximated and not all barrier attenuation will have been accounted for;
- Unless specifically stated, the models assume all noise sources are operating continuously and simultaneously, estimating a worst-case source noise level; and
- All mobile plant assumed to be working on tracks (excavators, dozers, rollers etc) have ٠ been modelled as moving point sources along their anticipated movement paths and the sound power level of the source is effectively averaged out across the length of the entire line. This will give an approximation of the overall noise levels from mobile plant at receptor locations; however, in reality noise levels would fluctuate as construction plant and activities move around in their activity areas.

#### 4.3 Assessing Construction Noise Effects

- 4.3.1 Annex E, part E.3.2 of BS5228 provides example criteria for assessing the significance of construction noise effects and acceptable limits for construction noise.
- 4.3.2 Table E.1 of BS5228 (represented here as Table 4.1) contains an example of the significance criteria that can be used to assess construction activities.

### Table 4.1: Example of Threshold of Potential Significant Effect at Dwellings (dB<sub>(A)</sub>)

Assessment Category and Threshold Value Period	Threshold Value L <sub>Aeq,T</sub> dB					
	Category A <sub>(A)</sub>	Category B(B)	Category C <sub>(c)</sub>			
Night-Time (23:00 – 07:00)	45	50	55			
Evenings and Weekends	55	60	65			
Daytime (07:00 – 19:00) and Saturdays (07:00 to 13:00)	65	70	75			

(A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values:

(B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values;

(C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values;

4.3.3 The values can be considered thresholds for the construction noise levels (quantified using the L<sub>Aea</sub> noise metric). The values in each category are to be used where the existing noise



. . . . . . . . . . . . . . . . .



### **Construction Noise Report** Craig Watch Wind Farm

level at each location, rounded to the nearest 5 dB, is below the level given for a particular time of day. BS5228 provides the following advice regarding the threshold levels:

"Note: 1 A potential significant effect is indicated if the  $L_{Aeq,T}$  noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Note 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total  $L_{Aea,T}$  noise level for the period increases by more than 3 dB due to site noise.

Note 3: Applied to residential receptors only."

- 4.3.4 rather than an absolute noise level.
- 4.3.5 character of the impact, to determine if there is a significant effect".

#### 4.4 Study Area

- 4.4.1 receptor or group of receptors.
- 4.4.2 more distant locations.
- 4.4.3 Figure A1.1 included in Annex A.

### Table 4.2: Construction Noise Assessment Locations

	Coordinates								
CNAL Name	Eastings	Northings							
CNAL01 – Backside	341064	836153							
CNAL02 – Mill of Lynebain	341194	835296							
CNAL03 – Belcherrie	340033	834094							
CNAL04 – Greenloan	339849	833907							

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Therefore, the assessment of construction noise reflects a specific noise threshold for the locality (set relative to the existing ambient noise levels) for a particular period of the day,

It should be noted that exceedance of the limit does not in itself indicate a significant effect, rather, the standard states "If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and

NSRs are properties, people or fauna which are sensitive to noise and, therefore, may require protection from nearby noise sources. The Study Area for the noise assessment has been defined through the identification of the closest NSRs to the Proposed Development. Of the NSRs identified a representative sample of CNALs have been chosen to represent the closest

The CNALs were chosen on the assumption that if noise levels are within acceptable levels at the closest receptors then it is reasonable to assume they would also be acceptable at

Table 4.2 details the CNALs considered within the assessment and they are also shown on



CNAL Name	Coordinates	
	Eastings	Northings
CNAL05 – Succoth	339606	833351
CNAL06 – Easterton	339516	833044
CNAL07 – Ardleuie	337448	832304
CNAL08 – Rhinturk	336639	832954
CNAL09 – Ballochford	335986	833709
CNAL10 – Building SE of Greens of Glenburg	340416	837360
CNAL11 – Building NW of Chapel Hill	340620	837170
CNAL12 – Chapel Hill	340770	836922

#### 4.5 Baseline Noise Levels

- 4.5.1 Baseline noise level monitoring was undertaken as part of the operational noise assessment undertaken for Craig Watch Wind Farm.
- 4.5.2 At all locations the ambient sound levels were below the Category A Threshold Values, as detailed in Table 4.1: Example of Threshold of Potential Significant Effect at Dwellings (dB(A)).

#### 4.6 **Construction Noise Level Thresholds**

- 4.6.1 Having due regard to the existing ambient noise levels at NSRs around the Proposed Development, the BS5228 Category A Threshold Values have been considered for the construction noise assessment.
- 4.6.2 Accordingly, the assessment is made against the following noise level limits for all NALs;
  - Daytime weekdays 07:00 19:00: 65 dB LAeg (12 hours)
  - Saturday 07:00 13:00: 65 dB LAeq (6 hours)
  - No construction activities are anticipated outwith these times.

**Construction Noise Report** Craig Watch Wind Farm

### Noise Impact Assessment 5

#### 5.1 Modelling of Individual Sound Sources

Noise immission levels would vary throughout the construction period as construction 5.1.1 activities, plant and locations vary. For much of the working day the noise associated with construction activities would be less than predicted, as the assessment assumes all equipment is continually operating at full power and in locations closest to the NSRs, whereas in practice, equipment load and precise location may vary throughout the day. This approach has been adopted to represent a worst-case assessment.

- 5.1.2 At this stage a detailed plant list is not available, therefore, a generic plant list based upon Model Data.
- 5.1.3 of 1 m.
- 5.1.4 suitable for the estimation of noise immission levels.
- 5.1.5 time.
- 5.1.6 changes in location, on/off periods, and fluctuations of load on any individual machine.
- 5.1.7 at the closest point of its anticipated work area to any given CNAL.

#### 5.2 Modelling of Construction Activities.

5.2.1 (Table 1.1 of this report).

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experience of similar projects has been used. All modelled noise sources and associated sound power level (SWL) and sound pressure level (SPL) data is included in Annex B: Noise

For felling activities broadband noise level data for a harvester, a forwarder and a skidder has been taken from Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment (7) (Forestry Commission). No octave band data is available therefore modelling has been undertaken using the 500 Hz octave band data, as recommended in ISO 9613. Noise levels for the Harvester and Forwarder are actually given at the operator position inside a Q Cab. In order to estimate external levels 10 dB has been added to the guoted levels and the sound power level for each item of plant has been calculated within CadnaA assuming the quoted sound pressure levels (SPLs) have been measured at a distance

For all other construction activities source noise level data is taken from Annex C of BS 5228, which provides octave band SPL levels for a wide variety of construction plant and activities

Construction noise sources for any given activity will generally comprise a mix of both moving and static sources. Mobile sources include mobile construction plant and Heavy Goods Vehicles (HGVs), while static construction plant could include generators, lighting rigs and pumps. Static equipment is usually located at a fixed location for an extended period of

For both mobile and static plant, activity noise levels would be transient in nature due to

All static items of plant and activities have been modelled as single point sources. All mobile plant (excavators, dozers, dumpers etc.) have been modelled as either a moving point source (line source) along their anticipated movement paths or as a stationary point source located

The assessment considers a number of construction scenarios based on the key construction activities detailed in Chapter 2: The Proposed Development and the indicative timetable


- 5.2.2 Noise propagation modelling has been undertaken considering the key activities that are likely to occur throughout the construction period. Details of the items of plant assumed to be operating in each modelled scenario, as well as noise data for each modelled noise source, are included in Annex B: Noise Model Data.
- 5.2.3 The modelled scenarios represent the following construction activities;
  - Scenario 01: Forestry activities, including felling of trees and forwarding for transportation off site. Instances of felling activity have been modelled along the most Northern and Eastern sections of the indicative felling boundary. This is to ensure all associated felling plant is operating as close to the CNALs as possible, to give a realistic worst case scenario.
  - Scenario 02: Felling activities are still active and are assumed to be occurring in the worst-case locations, as per scenario 1. Track installation has now begun, with the initial upgrade works beginning on the entrance track up to the southern construction compound. Both construction compounds under construction.
  - Scenario 03: Felling activities and track installation are still active. Work on the access track has been expanded to encompass more of the site. The construction compounds are assumed to be active. Work has now begun within the borrow pit and construction of the met mast foundations and the hardstandings for turbines 1, 2, 3 and 5 are underway.
  - Scenario 04: Felling activities and track installation are still active. The construction compounds and borrow pit are active. The batching plant, which is situated within the borrow pit boundary, is operational. Work has now begun on the hardstandings for turbines 4, 6, 7 and 8. Construction of the foundations for turbines 1, 2, 3 and 5 are underway. Construction of the substation has now begun.
  - Scenario 05: Track installation is still active. The construction compounds, batching plant and borrow pit are active. Work has now begun on the hardstandings for turbines 9, 10 and 11. Construction of the foundations for turbines 4, 6, 7 and 8 are underway. Construction of the substation is on-going.
  - Scenario 06: The construction compounds are active. Erection of turbines 1, 2, 3 and 5 and the met-mast is underway. Construction of the substation is on-going and foundations for turbines 9, 10 and 11 are being constructed.
  - Scenario 07: The construction compounds are active and turbines 9, 10 and 11 are being erected.
  - Night-time: Diesel generators for the cabin and lighting at both construction compounds are operational. An additional generator for lighting and a water pump are operational at the batching plant.

#### **Calculated Noise Immission Levels** 5.3

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Table 5.1 presents the calculated noise immission levels at each CNAL for all modelled 5.3.1 scenarios.

### **Construction Noise Report** Craig Watch Wind Farm

#### Table 5.1: Predicted Construction Noise Immission Levels, dB LAea(t)

CNIAL				Scen	ario			
CNAL	1	2	3	4	5	6	7	Night
CNAL01 Backside	37	36	48	46	49	28	33	33
CNAL02 Mill of Lynebain	27	28	38	37	37	24	28	28
CNAL03 Belcherrie	37	37	41	41	38	32	33	33
CNAL04 Greenloan	38	38	41	40	36	32	32	32
CNAL05 Succoth	34	34	38	37	33	32	30	30
CNAL06 Easterton	34	34	38	37	33	31	29	29
CNAL07 Ardleuie	27	33	34	33	31	32	25	25
CNAL08 Rhinturk	27	52	35	39	38	38	25	25
CNAL09 Ballochford	15	20	22	22	18	19	18	18
CNAL10 Building SE of Greens of Glenbeg	35	35	47	48	47	28	35	35
CNAL11 Building NW of Chapel Hill	36	36	47	48	48	29	35	35
CNAL12 Chapel Hill	36	36	44	44	44	28	33	33

- 5.3.2 Saturday daytime threshold value of 65 dBA.
- 5.3.3 of 55 dBA.

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For all CNALs the predicted noise levels for all scenarios are well below the weekday and

It is noted that although construction activities are not anticipated during weekend or evening hours the predicted levels are also below the evening and weekend threshold level



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#### Summary 6

- 6.1.1 The noise impact assessment has considered the existing noise environment at local residential receptors to determine appropriate noise threshold levels for construction activities.
- 6.1.2 Noise propagation modelling has been undertaken in accordance with ISO 9613-2:1996 and the anticipated noise immission levels presented for scenarios likely to occur throughout the construction period of the Proposed Development. The modelled scenarios consider the 'noisiest' activities that are likely to occur during the construction period and the modelling assumes that the construction activities are occurring at locations within the development site that are closest to the NSRs.
- 6.1.3 The predicted levels are below the Category A Threshold Levels as detailed within BS 5228:2009. Accordingly, construction noise impacts are below the indicator for a potential significant effect.
- No regular construction activities are currently proposed outwith of the BS 5228 defined 6.1.4 daytime periods, however, it is noted that the predicted noise levels are also below the BS 5228 threshold levels for evenings, weekends and night-time.
- 6.1.5 The assessment concludes that construction noise levels would remain below the indicator for a potential significant effect.

**Construction Noise Report** Craig Watch Wind Farm

### References 7

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A-1

# Annex A – Figure





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B-1

## Annex B – Noise Model Data

Scenario 01Month 1HarvesterSpread evenly around felling area, and along the red line boundary to be as close as possible to the nearest receptors1006ForwarderSpread evenly and along the red line boundary to be as close as possible to the nearest receptorshttps://www.forest research.gov.uk/do cuments/4798/fctn1006ForwarderSpread evenly and along the red line boundary to be as close as possible to the nearest receptors1006ForwarderSpread evenly and along the red line boundary to be as close as possible to the nearest receptors1006SkidderSpread evenly and along the red line boundary to be as close as possible to the nearest receptors1006SkidderSpread evenly and along the red line boundary to be as close as possible to the nearest receptors1006SkidderSpread evenly and along the red line boundary to be as close as possible to the nearest receptors1006SkidderSpread evenly and along the red line boundary to be as close as possible to the nearest receptors1006SkidderSpread evenly and along the red line boundary to be as close as possible to the nearest receptors1006Scenario 02Month 4Korth 4Korth 4	Noise Source	Assumed working	Data Source	Percentage time on	Number of
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cabins compounds	cabins	compounds	55 5220 04.04	100	-
Generator for Construction BS 5228 C4 86 100 2	Generator for	Construction	BS 5228 C/L 86	100	2
lighting compounds	lighting	compounds	55 5220 04.00	100	-
Wheeled Excavator Southern BS 5228 C4 10 100 2	Wheeled Excavator	Southern	BS 5228 C4 10	100	2
construction		construction	23 3220 04.10	100	-



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	compound, track			
	between site			
	entrance and			
	southern			
	construction			
	compound			
Crane	Southern	BS 5228 C4.45	100	1
	construction	20 0120 0 11 10		-
	compound, track			
	between site			
	entrance and			
	southern			
	construction			
	compound			
Dumper	Southern	BS 5228 C4.3	100	2
2 dinper	construction	20 0120 0 110		-
	compound, track			
	between site			
	entrance and			
	southern			
	construction			
	compound			
Dozer	Southern	BS 5228 C2 12	100	2
5010.	construction	20 0110 0111		-
	compound, track			
	between site			
	entrance and			
	southern			
	construction			
	compound			
Tracked Excavator	Southern	BS 5228 C2.14	100	2
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	as close as possible			
	to the nearest			
	receptors			
Generator for	Construction	BS 5228 C4.84	100	2
cabins	compounds			
Generator for	Construction	BS 5228 C4.86	100	2
lighting	compounds			
Wheeled Excavator	Construction	BS 5228 C4.10	100	2
	compounds			
Dumper	Access track	BS 5228 C4.3	100	11
	construction, met			
	mast foundations,			
	turbine			
	hardstandings (T1,			
	T2, T3, T5)			
Dozer	Access track	BS 5228 C2.31	100	11
	construction, met			
	mast foundations,			
	turbine			
	hardstandings (T1,			
	T2, T3, T5)			
Tracked Excavator	Access track	BS 5228 C2.14	100	11
	construction, met			
	mast foundations,			
	turbine			
	hardstandings (11,			
<u></u>	12, 13, 15)	DC 5000 C0 47	100	
Rigid dump truck	Borrow pit	BS 5228 C9.17	100	1
Excavator mounted	Borrow pit	в5 5228 С9.12	100	2
rock breaker	Damasurati	DC 5330 CO 3	100	4
	Borrow pit	BS 5228 C9.3	100	
KOCK Crusher	Borrow pit	BS 5228 C9.15	100	1
Lorry	Noving up and	в5 5228 Сб.21	100	2
	down site entrance			
	to construction			
<u> </u>	compound			
Scenario 4	Nonth 8		400	
Harvester	Spread evenly	https://www.forestr	100	6
	around felling area,	esearch.gov.uk/doc		
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Concrator for	Construction	BC 5228 CA 84	100	2
cabing	compounds	D5 5220 C4.04	100	2
Concreter for	Construction		100	2
	construction	B3 5228 C4.80	100	5
lighting	compounds,			
	batching plant	DC 5330 C4 40	100	2
Wheeled Excavator	Construction	BS 5228 C4.10	100	3
	compounds,			
	substation			
Dumper	Access track	BS 5228 C4.3	100	9
	construction,			
	turbine			
	hardstandings (T4,			
	т6, т7, т8),			
	substation			
Dozer	Access track	BS 5228 C2.31	100	8
	construction,			
	turbine			
	hardstandings (T4,			
	Т6, Т7, Т8)			
Tracked Excavator	Access track	BS 5228 C2.14	100	8
	construction,			
	turbine			
	hardstandings (T4,			
	Т6, Т7, Т8)			
Rigid dump truck	Borrow pit	BS 5228 C9.17	100	1
Excavator mounted	Borrow pit	BS 5228 C9.12	100	2
rock breaker				
Drilling rig	Borrow pit	BS 5228 C9.3	100	1
Rock crusher	Borrow pit	BS 5228 C9.15	100	1
lorry	Substation	BS 5228 C6.21	100	1
Water numn	Batching plant	BS 5228 C4 88	100	1
Cement truck	Batching plant	BS 5228 C4 20	100	1
Concrete mixer	Turbine foundations	BS 5228 C4 32	100	1
truck + truck	(T1 T2 T3 T5)	55 5220 07. 52	100	-
mounted concreto	(11, 12, 13, 13)			
numn + hoom arm				
	Substation	DC 5228 C4 45	100	1
		D3 3228 C4.45	100	1 1
Scenario 5	IVIONTN 10		100	
Generator for	Construction	BS 5228 C4.84	100	2
cabins	compounds			

Generator for	Construction	BS 5228 C4.86	100	3
lighting	compounds,			
	batching plant			
Wheeled Excavator	Construction	BS 5228 C4.10	100	3
	compounds,			
	substation			
Dumper	Access track	BS 5228 C4.3	100	7
	construction,			
	turbine			
	hardstandings (T9,			
	T10, T11),			
	substation			
Dozer	Access track	BS 5228 C2.31	100	6
	construction,			
	turbine			
	hardstandings (T9,			
	T10, T11)			-
Tracked Excavator	Access track	BS 5228 C2.14	100	6
	construction,			
	turbine			
	hardstandings (19,			
<u> </u>	110, 111)	DC 5330 CO 47	100	
	Borrow pit	BS 5228 C9.17	100	1
Excavator mounted	Borrow pit	BS 5228 C9.12	100	2
Drilling rig	Porrow pit		100	1
Drilling rig	Borrow pit	BS 5228 C9.3	100	1
ROCK Crusher	Borrow pit	BS 5228 C9.15	100	1
	Substation	BS 5228 C6.21	100	1
Water pump	Batching plant	BS 5228 C4.88	100	1
Cement truck	Batching plant	BS 5228 C4.20	100	1
truck Ltruck		BS 5228 C4. 32	100	4
TUCK + TUCK	(14, 10, 17, 18)			
numn + boom arm				
	Substation	BC 5228 CA 45	100	1
Sconario 6	Month 11	D3 3228 C4.43	100	Ţ
Generator for	Construction	BS 5228 CA 84	100	2
cahins	compounds	05 5220 C4.04	100	2
Generator for	Construction	BS 5228 C4 86	100	2
lighting	compounds	05 5220 C4.00	100	2
Wheeled Excavator	Construction	BS 5228 C4 10	100	3
	compounds	05 5220 04.10	100	5
	substation			
Dumper	Substation	BS 5228 C4.3	100	1
Lorry	Substation	BS 5228 C6.21	100	1
Concrete mixer	Turbine foundations	BS 5228 C4. 32	100	3
truck + truck	(T9, T10, T11)			-
mounted concrete	(,)			
pump + boom arm				
Crane	Turbines (T1. T2. T3.	BS 5228 C4.45	100	10
	T5), met mast,			
	substation			
)	+	1	4	+

Scenario 7	Month 13			
Generator for	Construction	BS 5228 C4.84	100	2
cabins	compounds			
Generator for	Construction	BS 5228 C4.86	100	2
lighting	compounds			
Wheeled Excavator	Construction	BS 5228 C4.10	100	2
	compounds			
Lorry	Substation	BS 5228 C6.21	100	1
Crane	Turbines (T9, T10,	BS 5228 C4.45	100	6
	T11)			
Night	Night-time			
Generator for	Construction	BS 5228 C4.84	100	2
cabins	compounds			
Generator for	Construction	BS 5228 C4.86	100	3
lighting	compounds,			
	batching plant			
Water pump	Batching plant	BS 5228 C4.88	100	1

Noise Source Library – Sound Power Levels

Name	BS5228 Reference	31.5	63	125	250	500	1k	2k	4k	8	٩	lin	Source
Harvester	-					103					103	106	Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment
Forwarder	1					101					101	104	Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment
Skidder	-					108					108	111	Noise Hazards in Forestry Operations and Selection of Personal Protective Equipment
Tracked Excavator	C2. 14	28	113	106	105	105	101	66	96	91	107	115	BS 5228- 1:2009+A1:2014
Dump Truck (empty)	C2. 31	28	114	107	107	107	107	112	97	88	115	118	BS 5228- 1:2009+A1:2014
Dumper	C4. 3	28	112	109	102	101	100	96	89	81	104	115	BS 5228- 1:2009+A1:2014
Wheeled Excavator	C4. 10	28	92	88	91	92	06	85	79	73	94	98	BS 5228- 1:2009+A1:2014
Concrete mixer truck	C4. 20	28	111	102	94	97	98	106	88	83	108	113	BS 5228- 1:2009+A1:2014

Noise Source Library – Sound Power Levels

Name	BS5228 Reference	31.5	63	125	250	500	1k	2k	4k	8k	۷	lin	Source
Concrete mixer truck + truck mounted concrete pump + boom arm	C4. 32	28	101	101	105	104	100	86	93	06	106	110	BS 5228- 1:2009+A1:2014
Mobile telescopic crane	C4. 45	28	118	109	106	102	105	104	97	68	109	119	BS 5228- 1:2009+A1:2014
Diesel generator	C4. 84	28	103	100	104	86	97	93	84	75	102	108	BS 5228- 1:2009+A1:2014
Diesel generator	C4. 86	28	106	66	94	06	87	83	84	77	94	107	BS 5228- 1:2009+A1:2014
Water pump (diesel)	C4. 88	28	98	93	94	92	92	91	84	74	97	102	BS 5228- 1:2009+A1:2014
Vibratory roller	C5. 20	28	118	110	101	100	98	93	87	82	103	119	BS 5228- 1:2009+A1:2014
Road lorry (full)	C6. 21	28	124	110	102	101	105	100	66	92	109	124	BS 5228- 1:2009+A1:2014
Tracked mobile drilling rig	C9. 3	28	105	111	110	112	113	113	112	107	119	120	BS 5228- 1:2009+A1:2014
Excavator mounted rock breaker	C9. 12	28	119	117	113	117	115	115	112	108	121	125	BS 5228- 1:2009+A1:2014
Tracked semi-mobile crusher	C9. 15	28	119	119	116	115	113	111	106	96	118	124	BS 5228- 1:2009+A1:2014

Noise Source Library – Sound Power Levels

Name	BS5228 Reference	31.5	63	125	250	500	1k	2k	4k	8k	А	lin	Source
Rigid dump truck	C9. 17	28	114	117	116	116	114	111	104	98	119	123	BS 5228- 1:2009+A1:2014
Lorry	C11. 14	28	121	107	104	102	101	100	97	94	107	121	BS 5228- 1:2009+A1:2014
Dozer	C2.12		113	102	104	101	100	106	06	84	109	115	BS 5228- 1:2009+A1:2014