



Contractor



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
 American Bridge International
 DRAGADOS
 Morrison Construction

Project

FORTH REPLACEMENT CROSSING

Document title

**CONSTRUCTION NOISE MONITORING
 REPORT: JANUARY 2015**

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Contents

- 1. Introduction**
- 2. Noise Monitoring Locations**
- 3. Noise Monitoring Results**

1 Introduction

- 1.1** Monitoring of construction noise is being undertaken by FCBC during the construction of the new Forth Crossing and the associated road network. This report covers the month of January 2015. The objective of this report is to detail the monitoring that was undertaken across the site during this reporting period and to present the construction noise monitoring results.
- 1.2** Monitoring of construction noise has been undertaken in accordance with the Code of Construction Practice (CoCP) and the Noise and Vibration Management Plan (NVMP).

2 Noise Monitoring Locations

- 2.1** During January 2015, construction noise was monitored using permanent, continuous noise monitoring devices (01 db DUOs) at locations listed in **Table 1**. These monitors were installed during November and December 2011, with additional monitors installed at Scotstoun Park (Arup's Office) and Newton during March 2012, a further sound level meter was installed at Whinny Hill during March 2012.
- 2.2** Weather stations accompany the noise monitors at Echline Field, Tigh-Na-Grian, Clufflat Brae, Dundas Home Farm, Butlaw Fisheries, Linn Mill and Whinny Hill.
- 2.3** Various construction works were undertaken across the site during January 2015. **Table 1** outlines the main construction activities in the location of each monitor.

Table 1: Monitoring Locations

Ref.	Monitoring Location	Crossing or Network	Main Construction Activities During January 2015
M1	Whinny Hill	Network	<ul style="list-style-type: none"> • Rock excavation • CMC works • FT01 Beam lifts
M3	Tigh-Na-Grian	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • North Tower rebar, formwork, concreting works deck table installation works • Pier N1 rebar formwork & concrete works
M4	North Leg	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • North Tower rebar, formwork, concreting works deck table installation works • Pier N1 rebar formwork & concrete works
M6	Port Edgar	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works • Pier S1 foundation work • Pier S2 excavation • Pier S3 rebar, formwork & concreting.
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works • Pier S1 foundation work • Pier S2 excavation • Pier S3 rebars formwork & concreting.
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works • Pier S1 foundation works • Pier S2 excavation • Pier S3 rebar, formwork & concreting • Launch – install plates to props, Painting works, cast concrete and curing
M11	Linn Mill	Network (close proximity to Crossing)	<ul style="list-style-type: none"> • Launch – install plates to props, painting works, cast concrete and curing • Bearing fitting at Piers S5N.B. No night time or Sunday daytime construction in vicinity.
M13	Clufflat Brae	Crossing	<ul style="list-style-type: none"> • Launch – install plates to props, painting works, cast concrete and curing • N.B. No night time or Sunday daytime construction in vicinity.

M14	Springfield	Network	<ul style="list-style-type: none"> • Launch – install plates to props, painting works, cast concrete and curing N.B. No night time or Sunday daytime construction in vicinity.
M15	Echline Field	Network	<ul style="list-style-type: none"> • Launch – install plates to props, painting works, cast concrete and curing • A904 tie in road works, including verge fill, kerbing and placing/trimming of type 1 sub-base for footpath
M16	Scotstoun	Network	<ul style="list-style-type: none"> • Utilities works • Structure works • ESQ04 Construction • B800 North road works including bridge works etc...
M17	Dundas Home Farm	Network	<ul style="list-style-type: none"> • Utility works • Fill south bund/landscape • BP Speciality works • ESQ04 Construction • B800 North road works including bridge works etc...
M18	Newton	Network	<ul style="list-style-type: none"> • No works

3 Noise Monitoring Results

Overview

- 3.1 Noise monitoring results are presented in graphs (**Appendix A**) using the template provided in the *Construction Noise Monitoring Information Note* (www.transportscotland.gov.uk).
- 3.2 Weather during the period was predominantly bad during January 2015 with wind speeds reaching over 50 km/h this had an adverse effect on noise results with a number of exceedances coming from high wind related noise (including tree rustling and waves).
- 3.3 With regard to the noise monitoring graphs, the following should be noted:
- All locations are considered as either 'Main Crossing' or 'Network Connections', as set out in **Table 1**.
 - Main Crossing works are undertaken during the day, evening and night time periods. Network connection works are undertaken during the daytime only.
 - Linn Mill is considered as a network location which has the potential to receive noise from the marine works near the south shore. As a result, evening and night time data has been included for this location.
 - Noise data for day, evening and night on which no construction works were conducted have been excluded from the monthly average results presented in the graph. L_{AFmax} exceedances during these periods would have been caused by non-construction related factors and do not require investigation. Noise results (L_{Aeq} and L_{AFmax}) for any day, evening and night on which no construction works have been conducted have been presented in the graphs in greyed out areas.
 - An average for Sunday construction noise data has been included where applicable; in locations where no Sunday works were conducted no average is shown.
 - As set out in the CoCP, the assessment time for evening, nights and Sunday daytime is in one hour periods. To present the construction noise results for these periods, therefore, the maximum L_{AFmax} (fast time response) and maximum L_{Aeq} within the overall evening/night time period has been taken. It should be noted, therefore, that the average shown for these periods is an average of only the highest L_{Aeq} results.

- It has been indicated on the graphs where noise data is missing for day, evening or night during which construction works were conducted. Results for the North leg are unavailable due to inaccessibility of the monitor location in January 2015.

Results

- 3.4** Results demonstrate that the monthly average total construction noise results for daytime are within the threshold levels for all monitoring locations during January 2015, with the exception of Scotstoun. The monthly average evening construction noise levels at all monitoring locations are within the threshold levels. The night time average level was exceeded at Inchgarvie, Linn Mill and Tigh-Na Grain. With regard to the Sunday averages (for applicable monitoring locations), there are no exceedances of Sunday averages.
- 3.5** The exceedances recorded are not thought to have been caused by increased noise levels due to construction. In locations that exceedances were noted audio demonstrates that the increased levels were caused by various factors at Butlaw Fisheries, Linn Mill, Inchgarvie and Tigh-Na Grain. It should be noted that averages reported for evening, night time and Sunday periods, are based only on the highest L_{Aeq} levels for one hour periods which can affect the average.
- 3.6** The exceedance of the daytime averages at Scotstoun is due to increased background noise levels due to the location of the meter directly adjacent to the road. The average for January 2015 is consistent with levels for previous months.
- 3.7** During January 2015, some exceedances of the maximum noise thresholds occurred. Each exceedance of the threshold was investigated using triggered audio recordings, records of construction works (i.e. site programmes and diaries and daily marine reports) and analysis of weather station data, where required. A Noise and Vibration Investigative Report (NVIR) spread sheet has been produced detailing the results of the investigation for each exceedance. Where the exceedances are due to construction works, a detailed NVIR has been completed which details the results of the investigation in addition to any additional mitigation measures required.

- 3.8** The majority of exceedances at all locations were caused by factors including periods of localised noises at nearby properties such as traffic, residential noise and birds. At some locations, notably Scotstoun and Echline, existing traffic noise had an effect on maximum noise levels during the period covered in this report. Butlaw Fisheries also records a high number of waves against the shore during times of bad weather and high tides.
- 3.9** A summary of the findings for exceedances occurring at each of the locations can be found in Table 2.

Table 2: Summary of Exceedances at Monitoring Locations

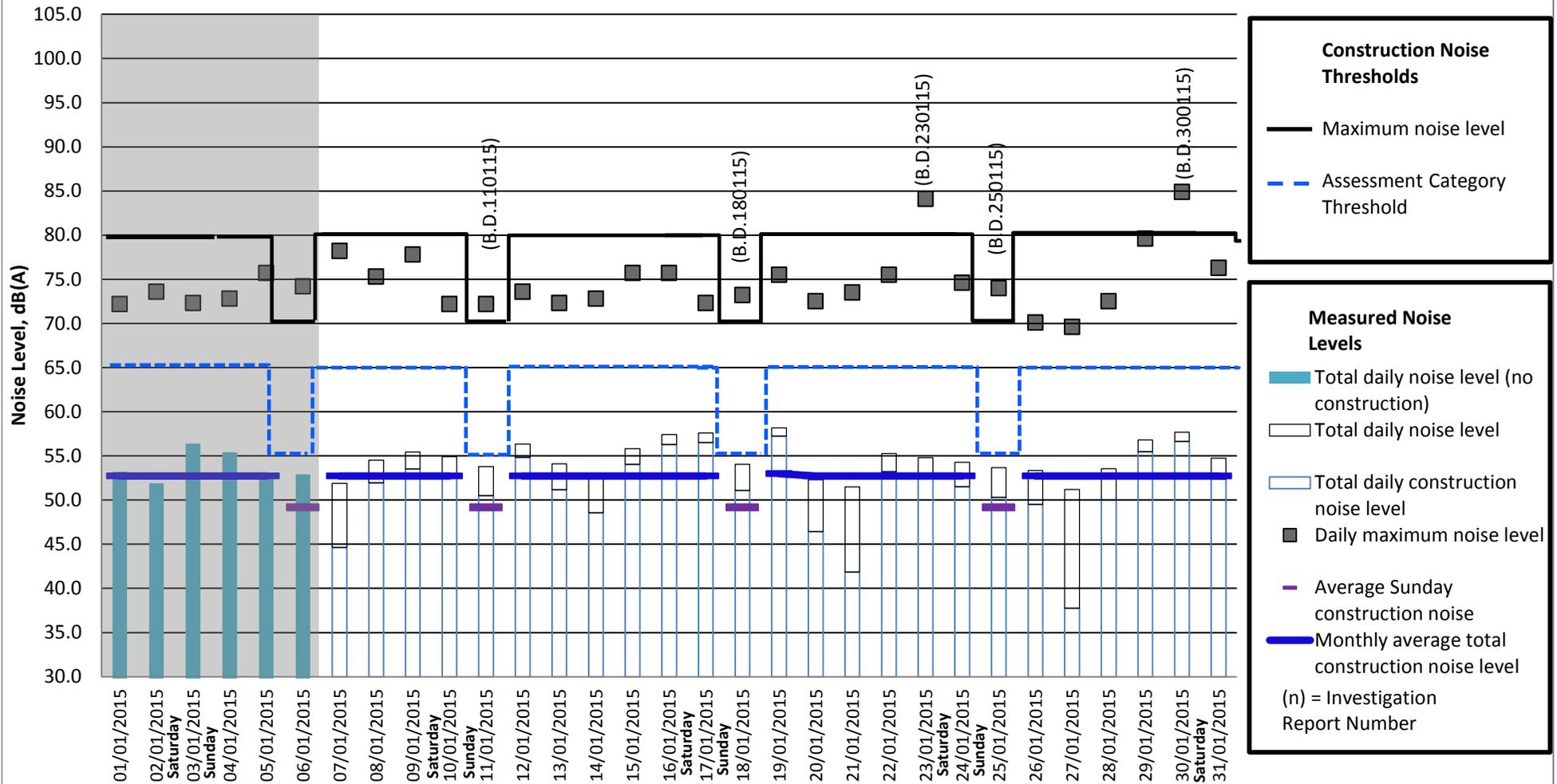
Monitoring Location	Summary of Exceedance Details
Butlaw Fisheries	During January the maximum noise threshold was exceeded on 27 occasions (five day time, five evening and 17 night time). No exceedances were related to construction works. Exceedances were attributed to non-construction factors, including waves, adverse weather, planes and birds.
Clufflat Brae	During January the maximum noise threshold was exceeded on 16 occasions (five daytime, three evening and eight night time). No exceedances were found to be due to construction works. Exceedances were found to be largely due to weather.
Inchgarvie Lodge	During January the maximum noise threshold was exceeded on 15 occasions (six day time, one evening and eight night time). No exceedances were attributed to construction works. Investigations found residents at the property, planes and adverse weather to be the main contributing factors to the exceedances at this location.
Linn Mill	During January the maximum noise threshold was exceeded on 28 occasions (seven daytime, two evening and 19 night time). Two construction related exceedances were recorded at this location during the day time both from operatives talking/shouting near the monitor. The majority of exceedances at this location were largely due to adverse weather.
Tigh-Na-Grian	During January the maximum noise threshold was exceeded on 15 occasions (three daytime, no evening and 12 night time). Exceedances were due to non-construction factors, notably wind, with some caused by birds and aircraft.
Dundas Home Farm	During January the maximum noise threshold was exceeded on 4 occasions. These exceedances were not caused by the works. The exceedances were due to monitor maintenance, birds and residents.
Echline	During January the maximum noise threshold was exceeded on 24 occasions. No exceedances at this location were due to construction activities. All exceedances were attributed to vehicles passing by on the adjacent roads.
Springfield	During January the maximum noise threshold was exceeded on 11 occasions. The exceedances were not caused by construction works the majority of exceedances at this location were found to be due to local

	residents and their pets (dogs).
Scotstoun	During January the maximum noise threshold was exceeded on 21 occasions. No exceedances were due to construction, all exceedances were largely attributed to vehicles passing by on the adjacent road.
Whinny Hill	During January the maximum noise threshold was exceeded on five occasions. Exceedances were not due to construction activities. Exceedances were due to a range of factors such as aircraft, residents and birds.

APPENDIX A

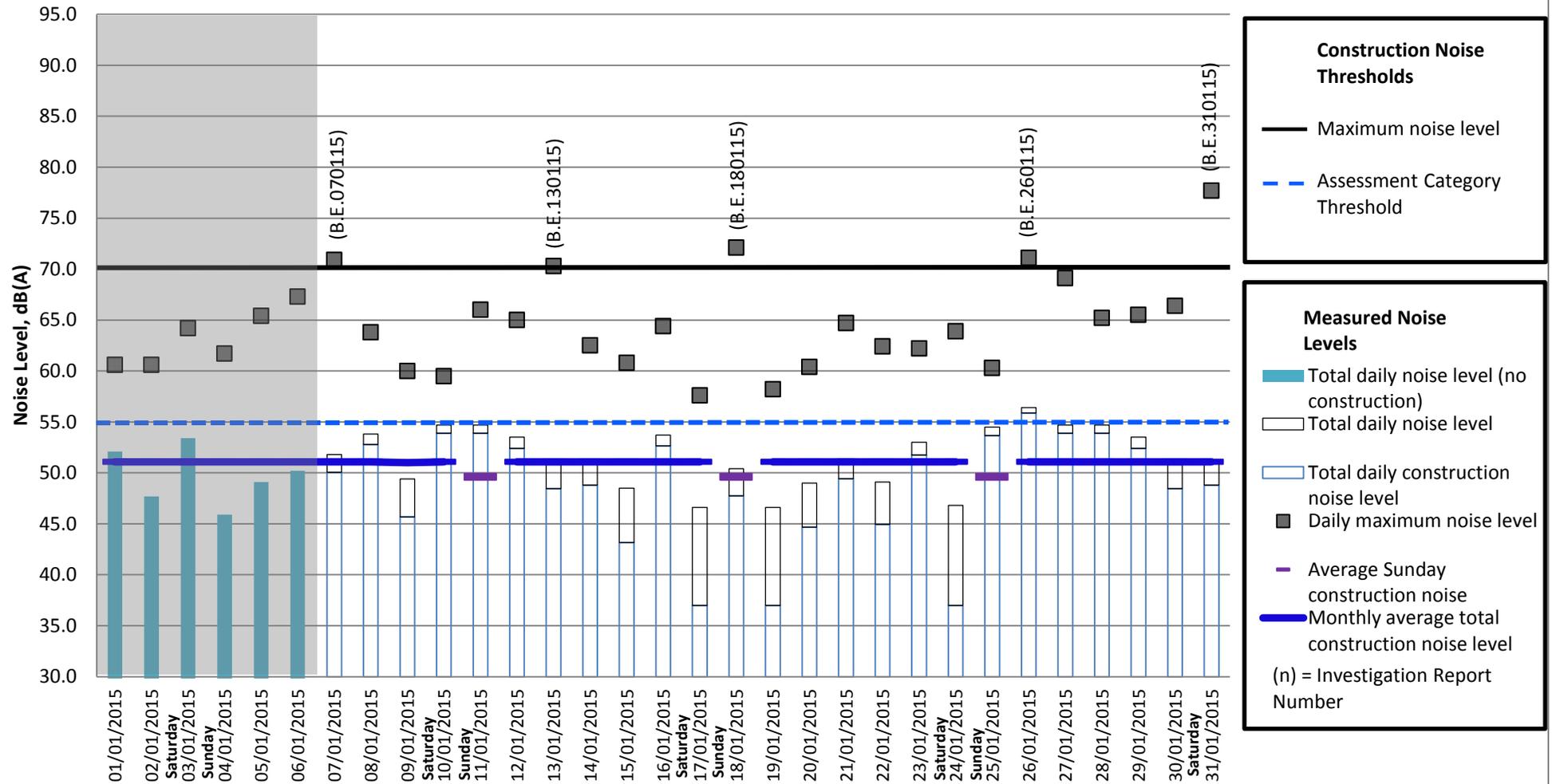
Measured Daytime Noise Levels at Butlaw Fisheries

Measurement period: January 2015



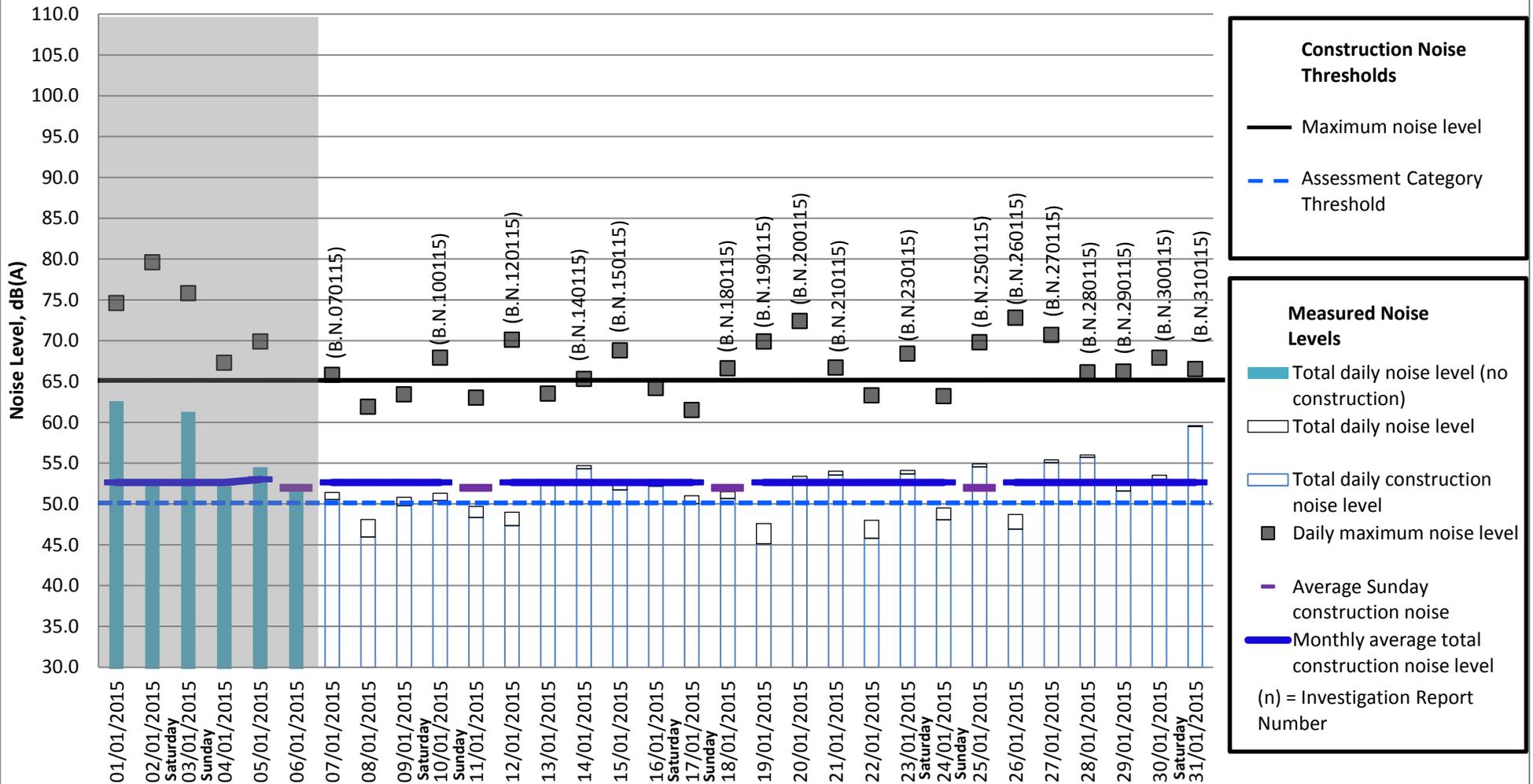
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Evening Noise Levels at Butlaw Fisheries Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted.

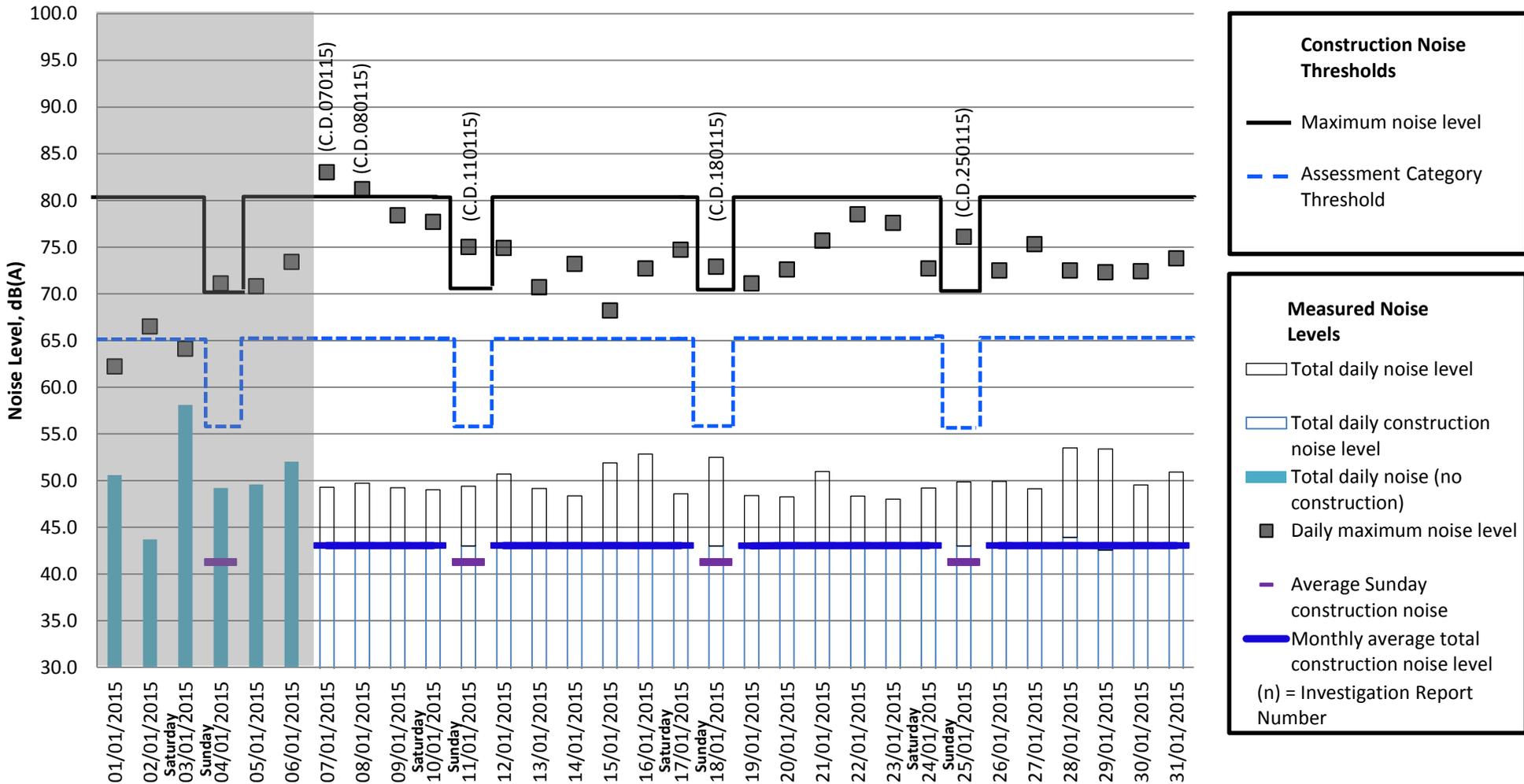
Measured Night time Noise Levels at Butlaw Fisheries Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Daytime Noise Levels at Clufflat Brae

Measurement period: January 2015



Construction Noise Thresholds

- Maximum noise level
- - - Assessment Category Threshold

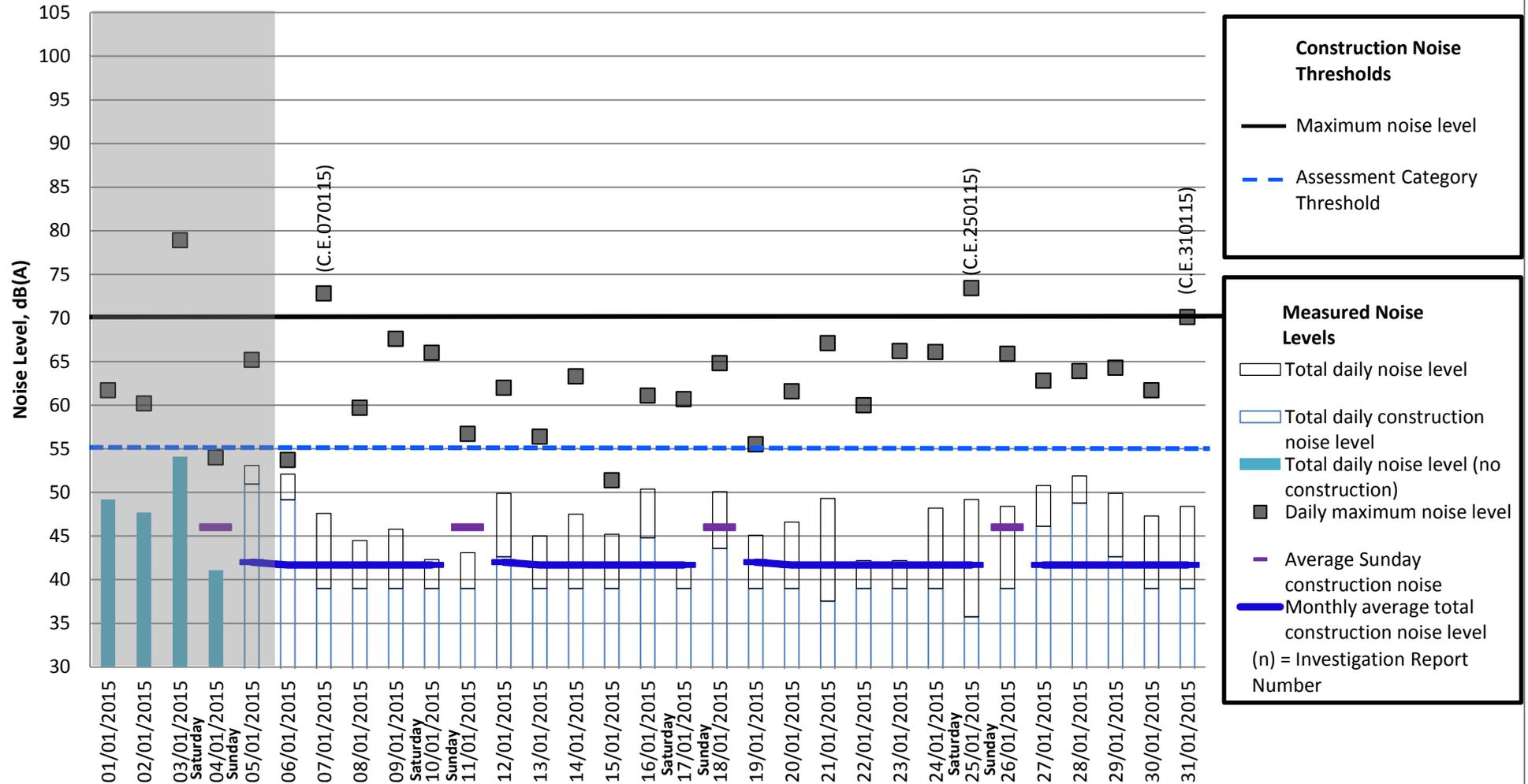
Measured Noise Levels

- Total daily noise level
- Total daily construction noise level
- Total daily noise (no construction)
- Daily maximum noise level
- Average Sunday construction noise
- Monthly average total construction noise level

(n) = Investigation Report Number

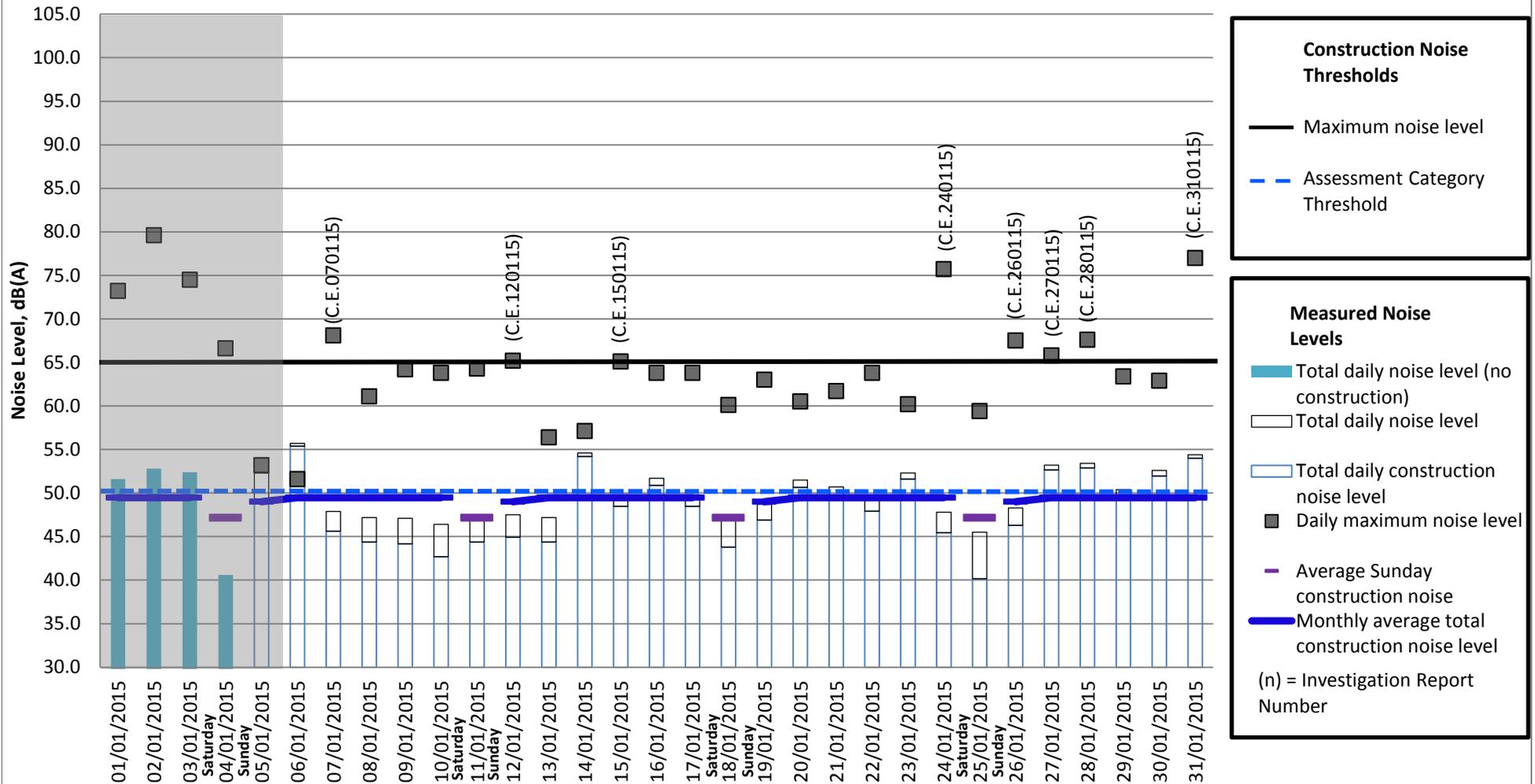
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Evening Noise Levels at Clufflat Brae Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted.

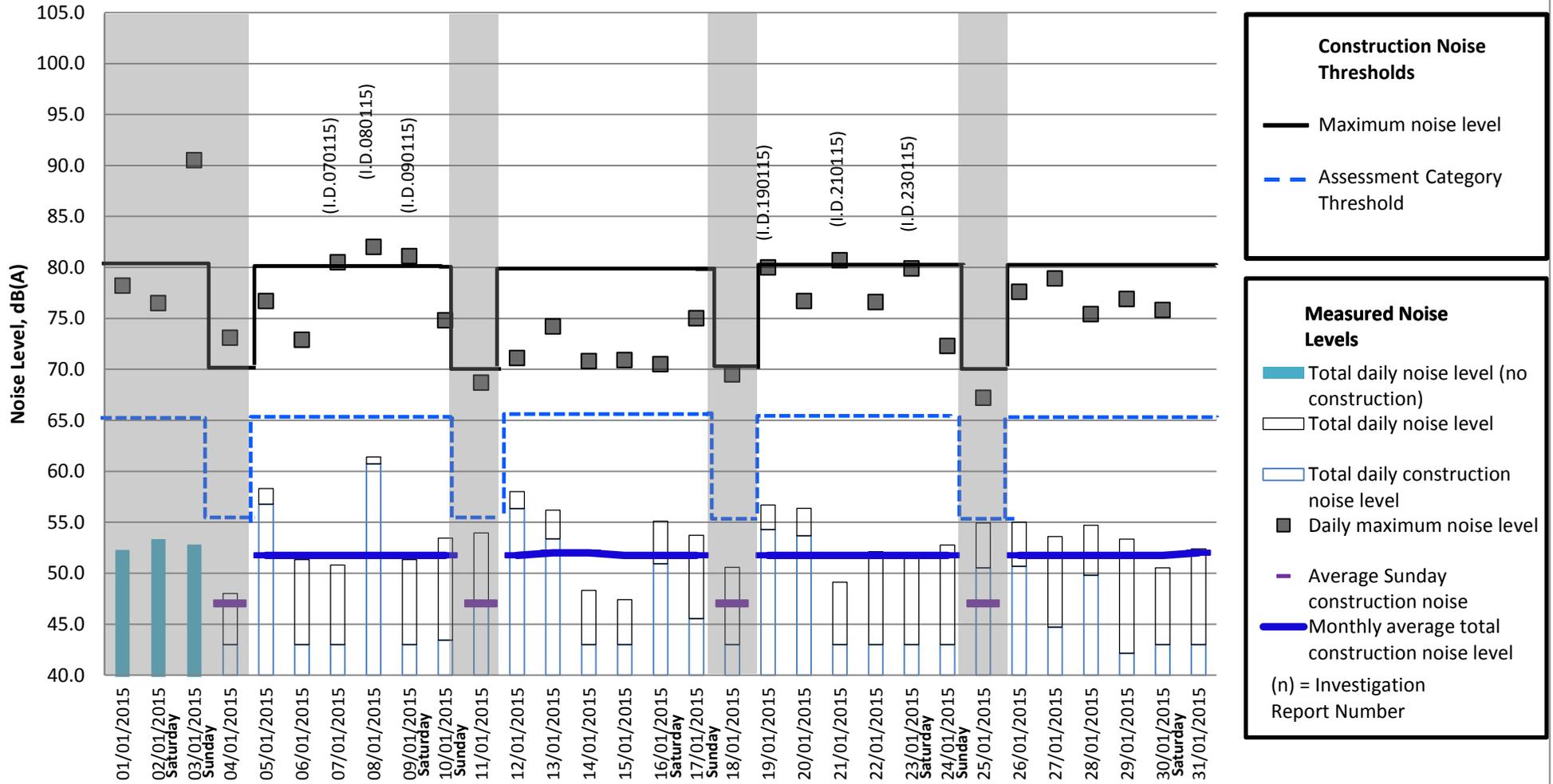
Measured Night-time Noise Levels at Clufflat Brae Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted.

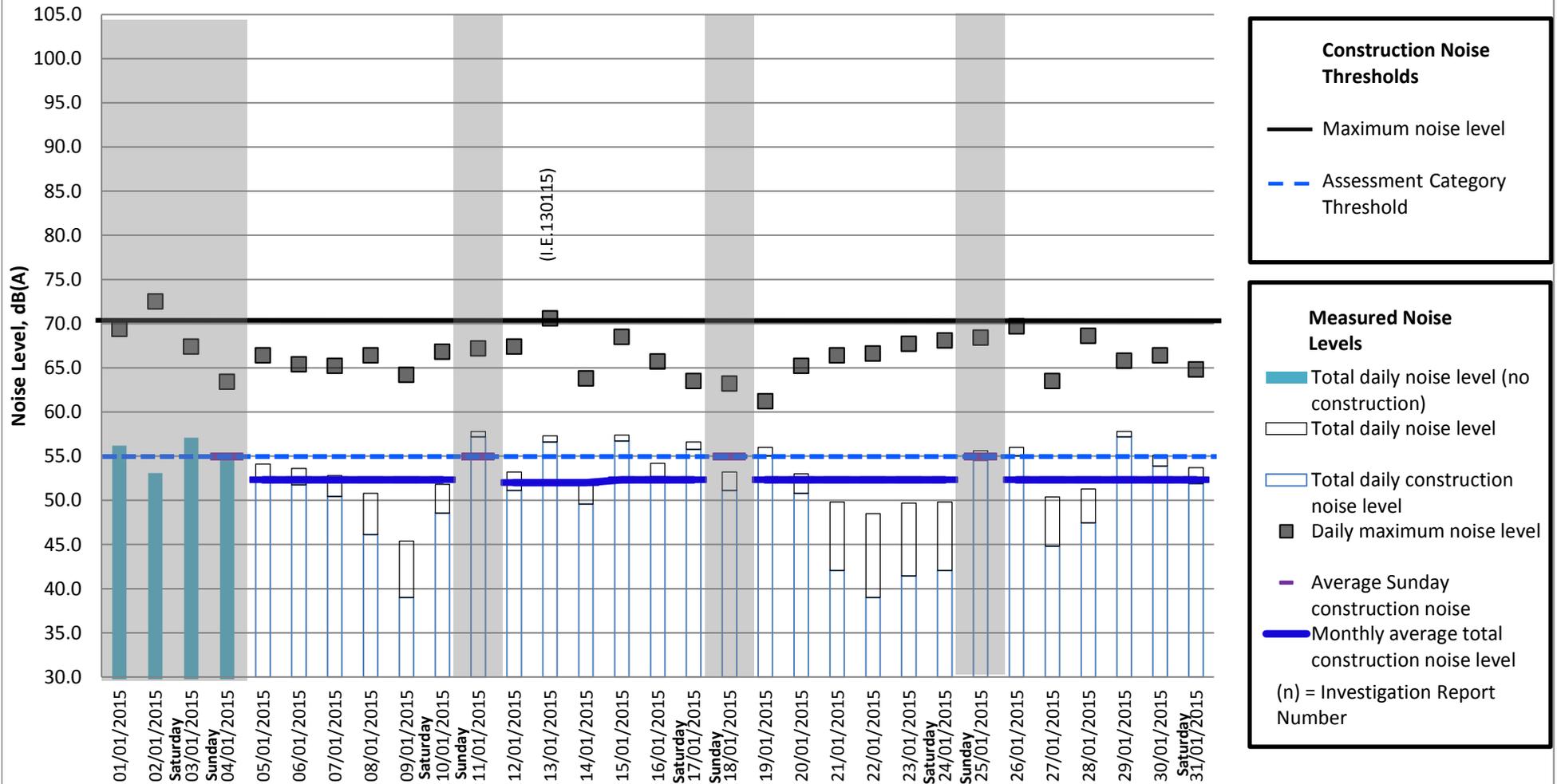
Measured Daytime Noise Levels at Inchgarvie

Measurement period: January 2015



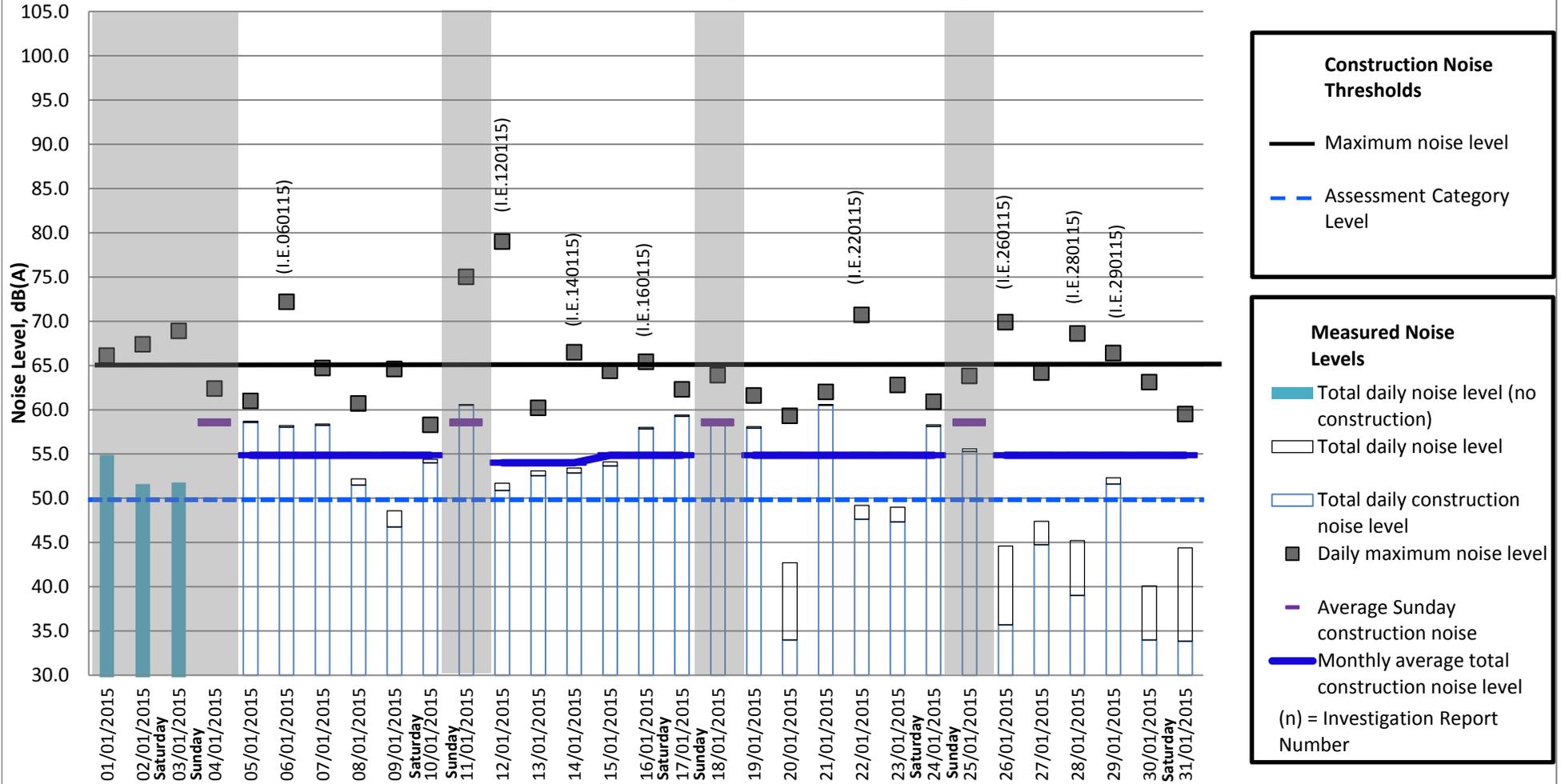
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Evening Noise Levels at Inchgarvie Measurement period: January 2015



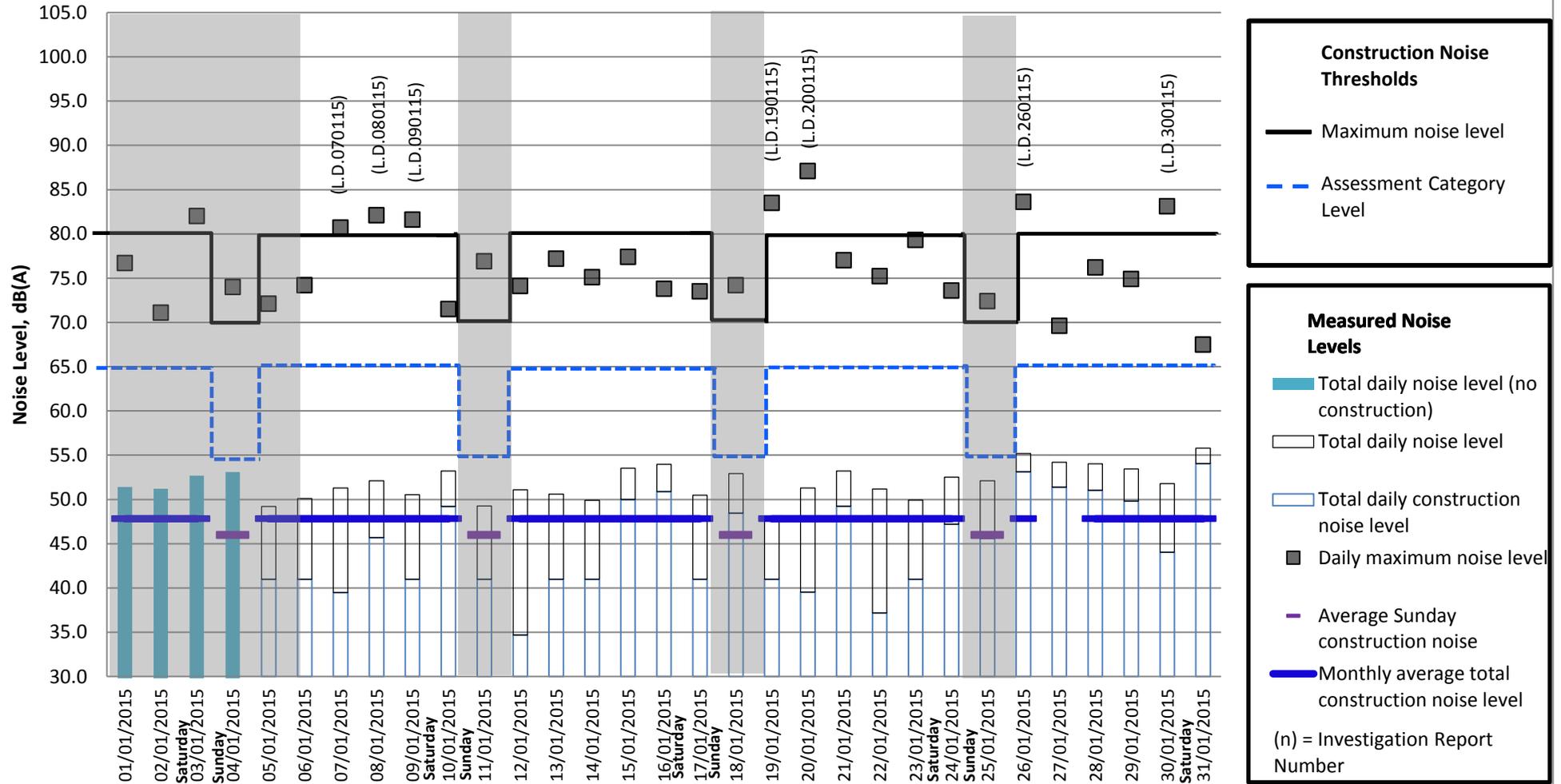
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Night-time Noise Levels at Inchgarvie Measurement period: January 2015



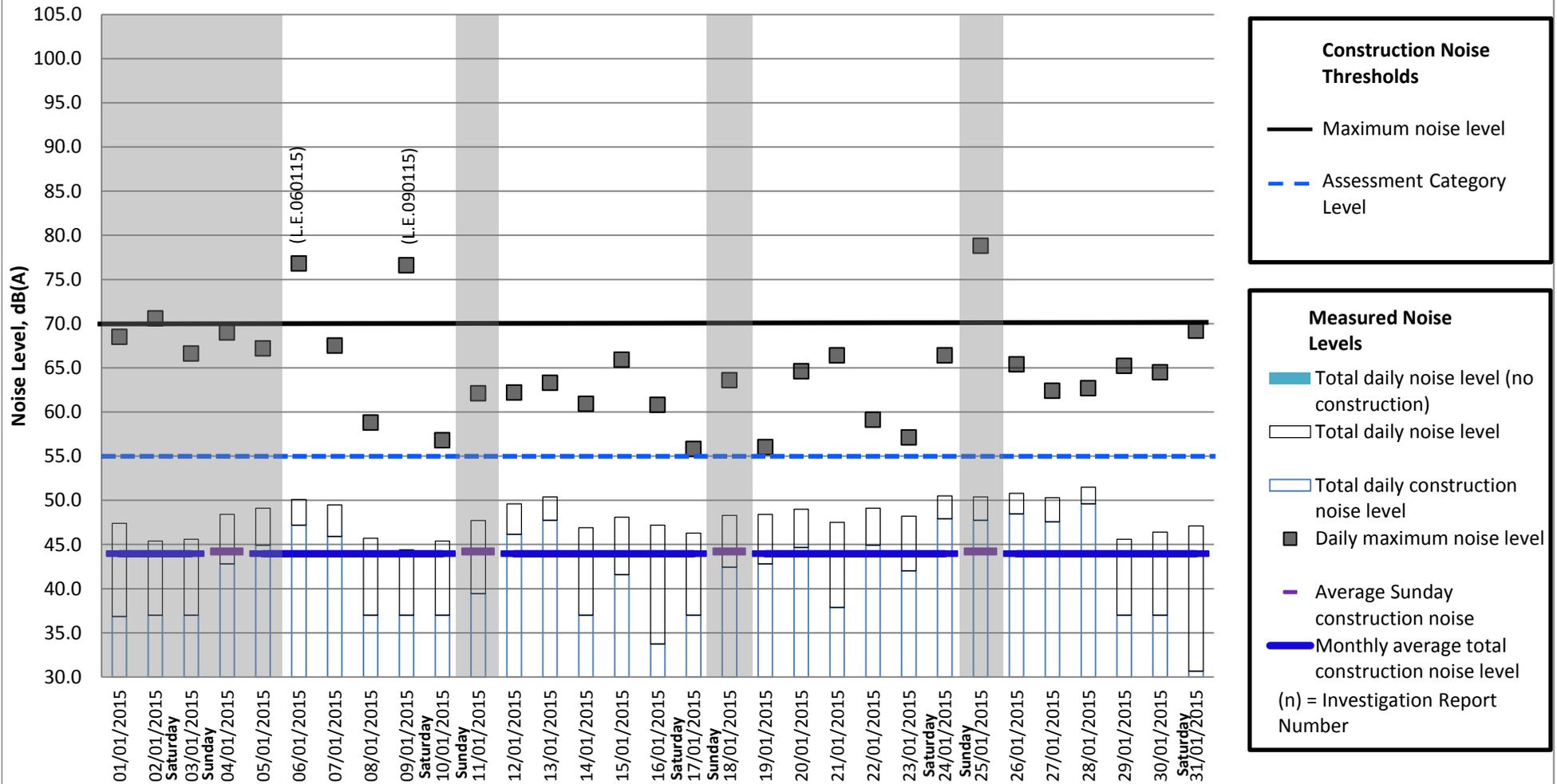
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Daytime Noise levels at Linn Mill Measurement period: January 2015



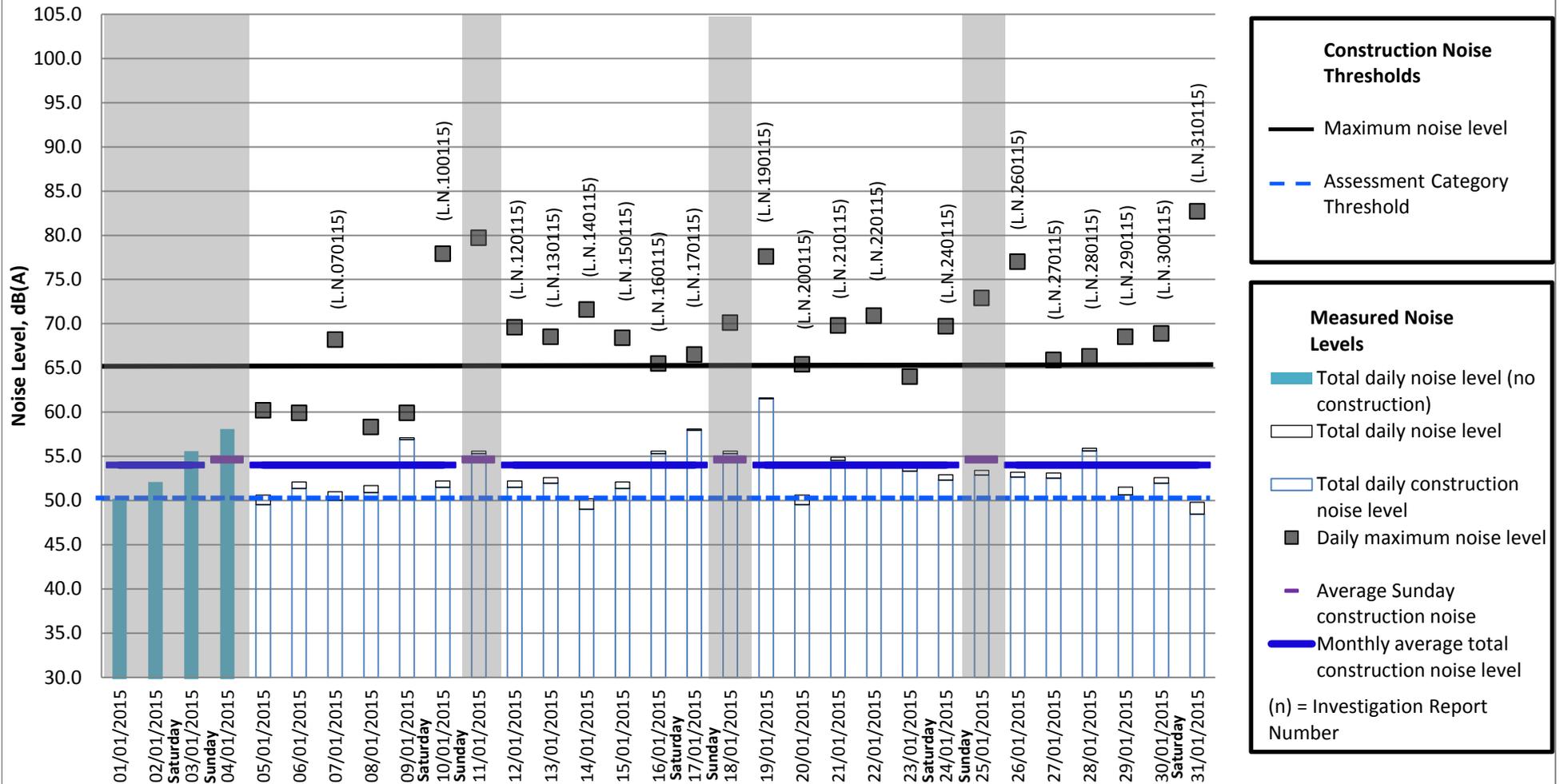
Note: . The grey areas of the chart represent days on which no construction works have been conducted

Measured Evening Noise Levels at Linn Mill Measurement period: January 2015



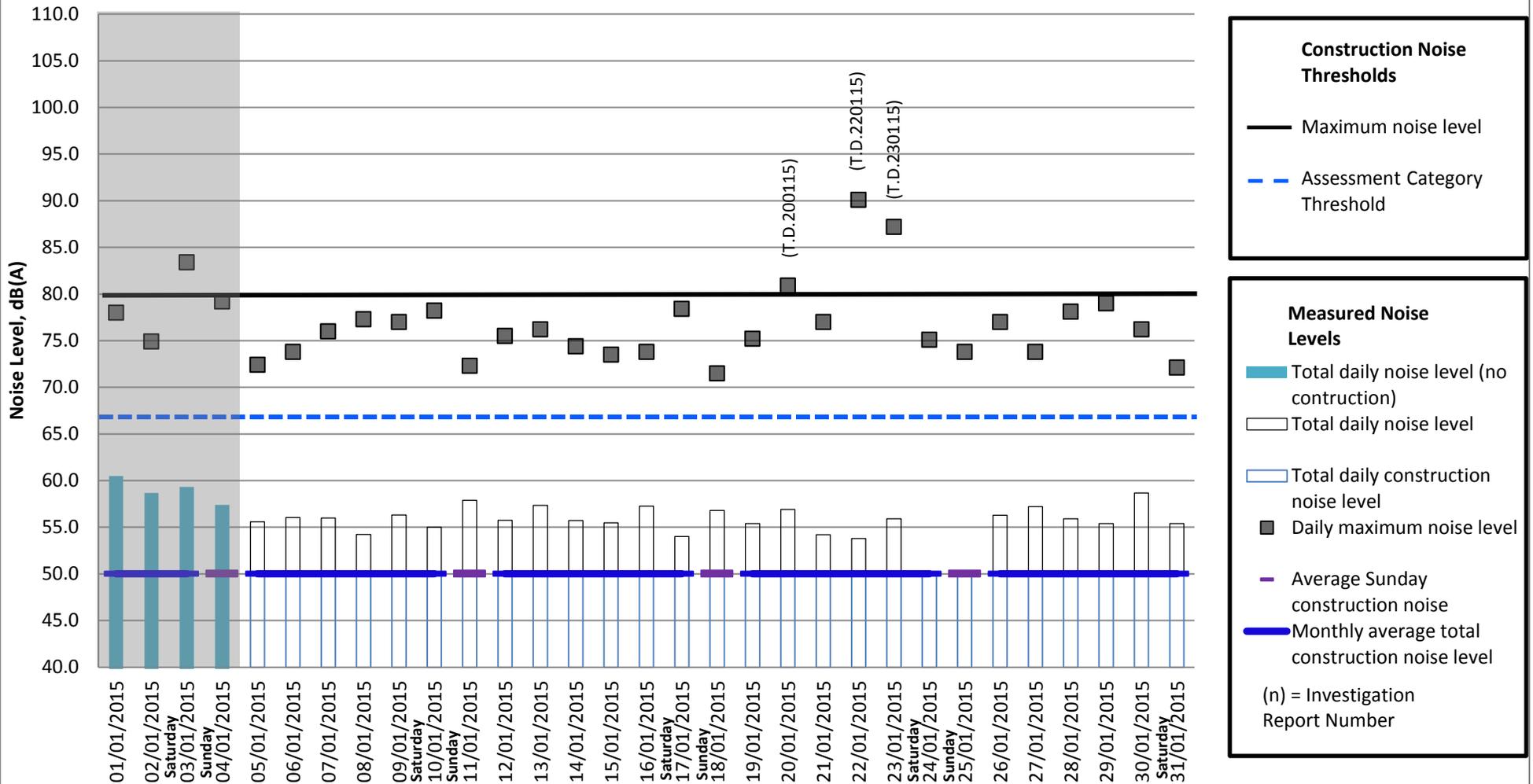
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Night-time Noise Levels at Linn Mill Measurement period: January 2015



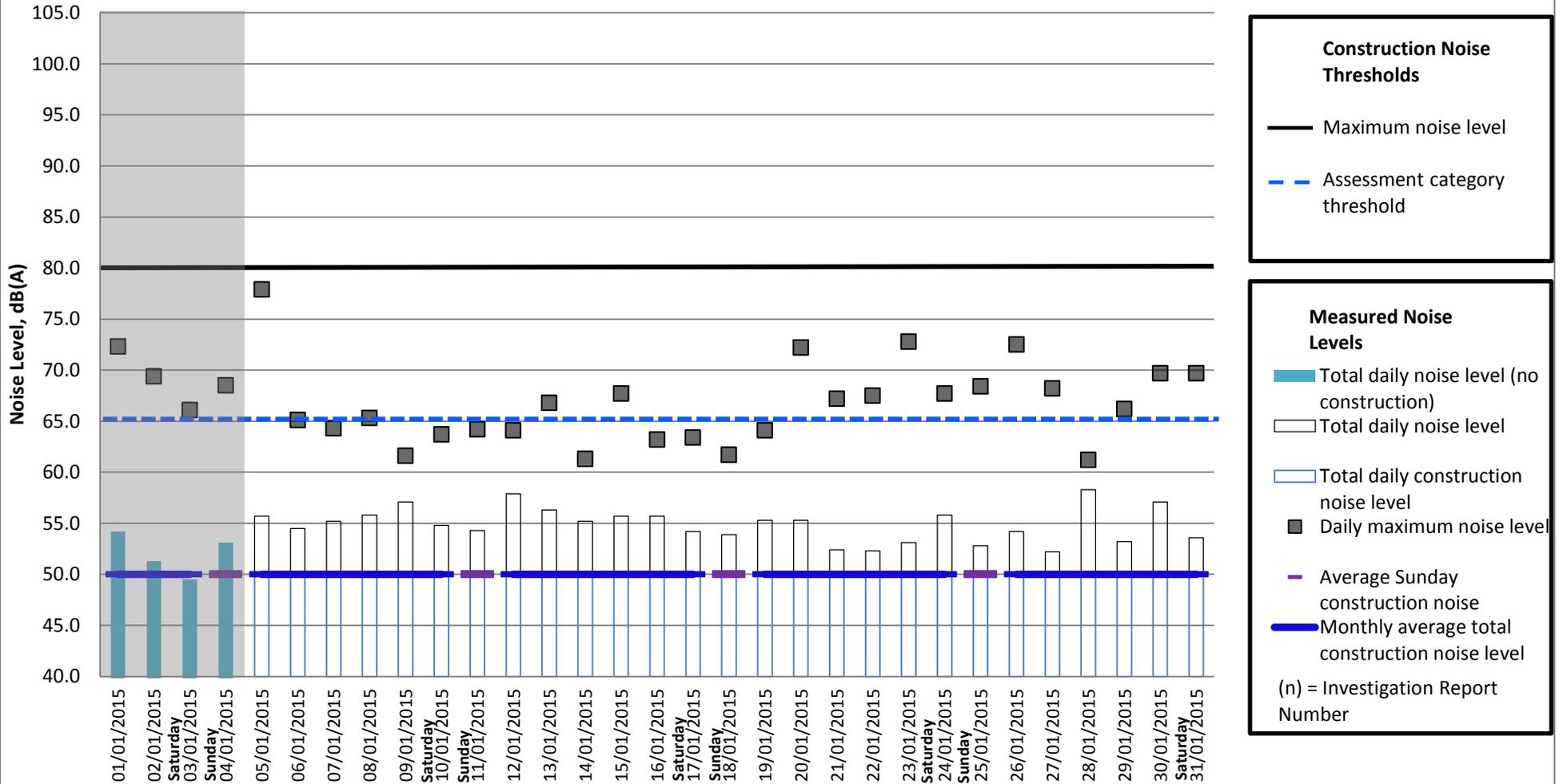
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Daytime Noise Levels at Tigh-Na-Grian Measurement period: January 2015



Note:

Measured Evening Noise Levels at Tigh-Na-Grian Measurement period: January 2015

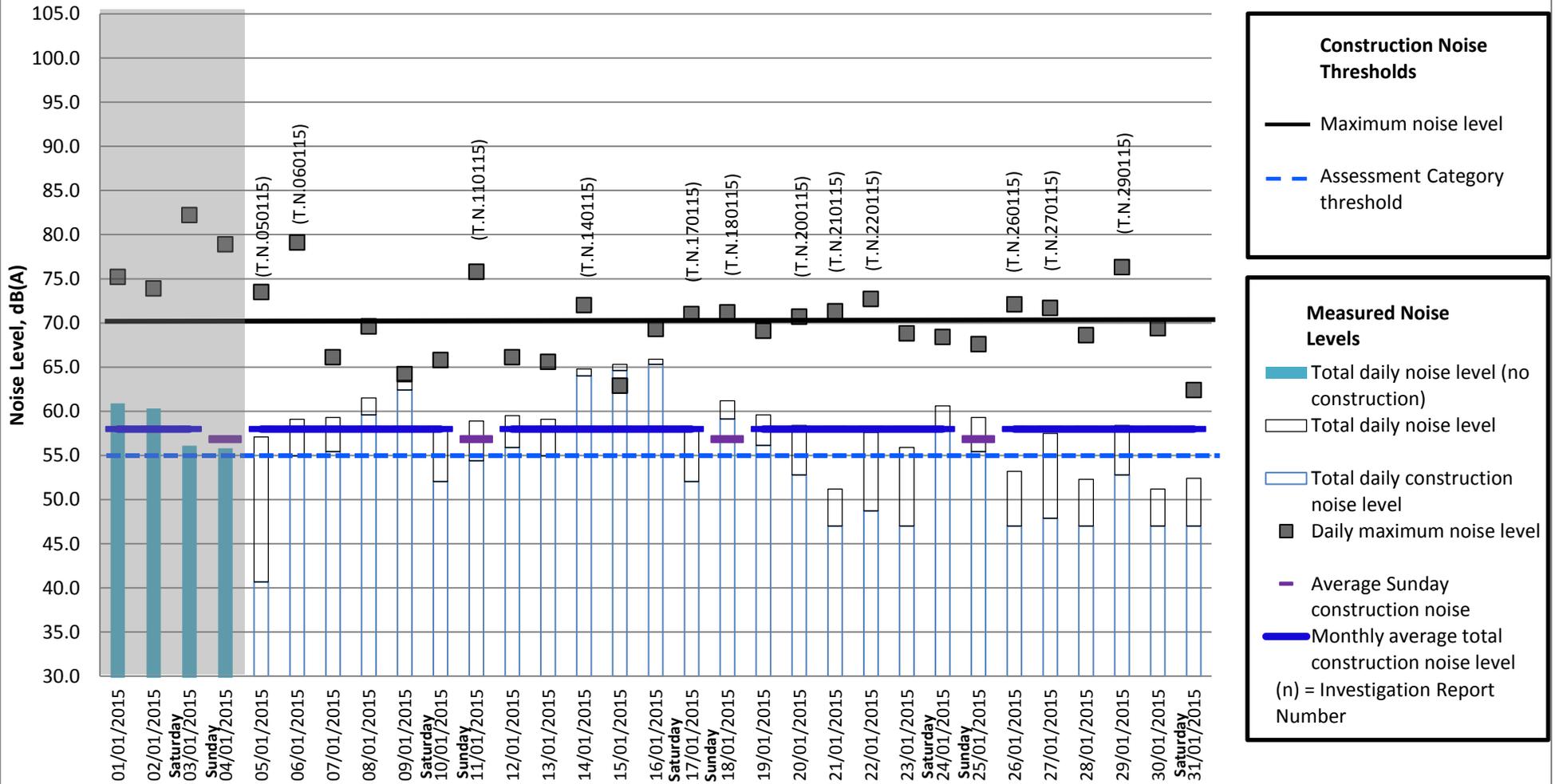


Notes:

(n) = Investigation Report Number

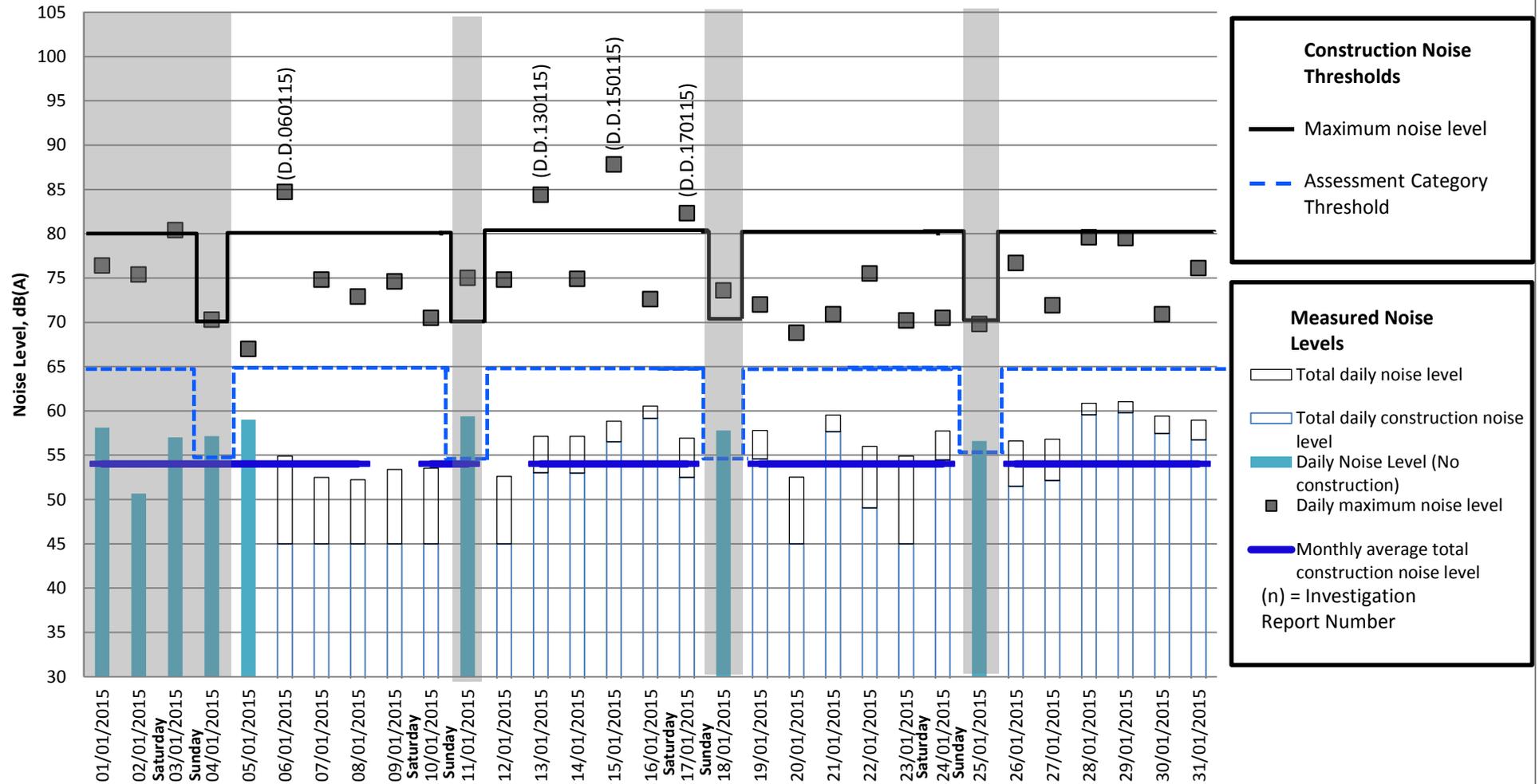
Measured Night-time Noise Levels at Tigh-Na-Grian

Measurement period: January 2015



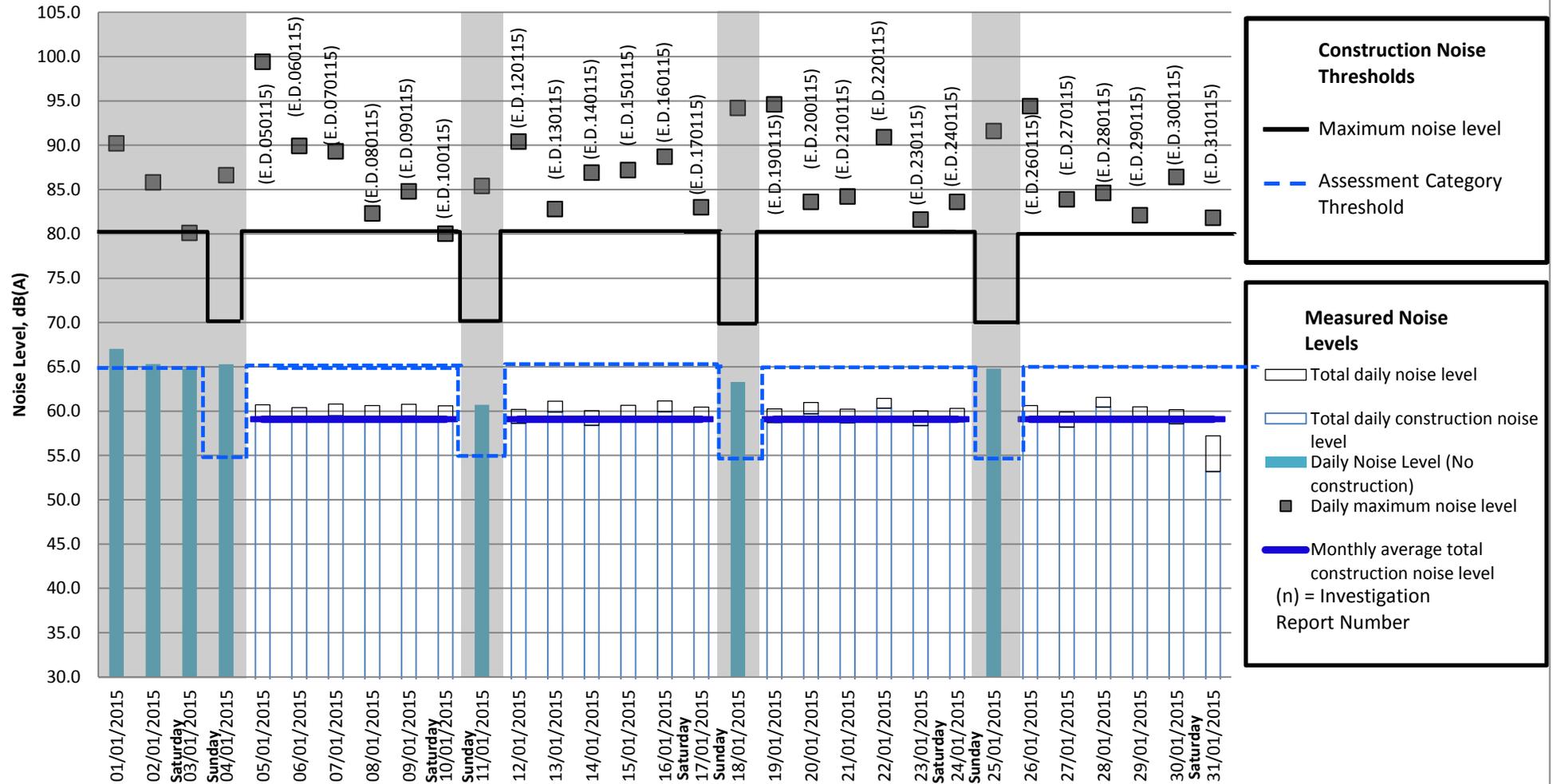
Note:

Measured Daytime Noise Levels at Dundas Home Farm Measurement period: January 2015



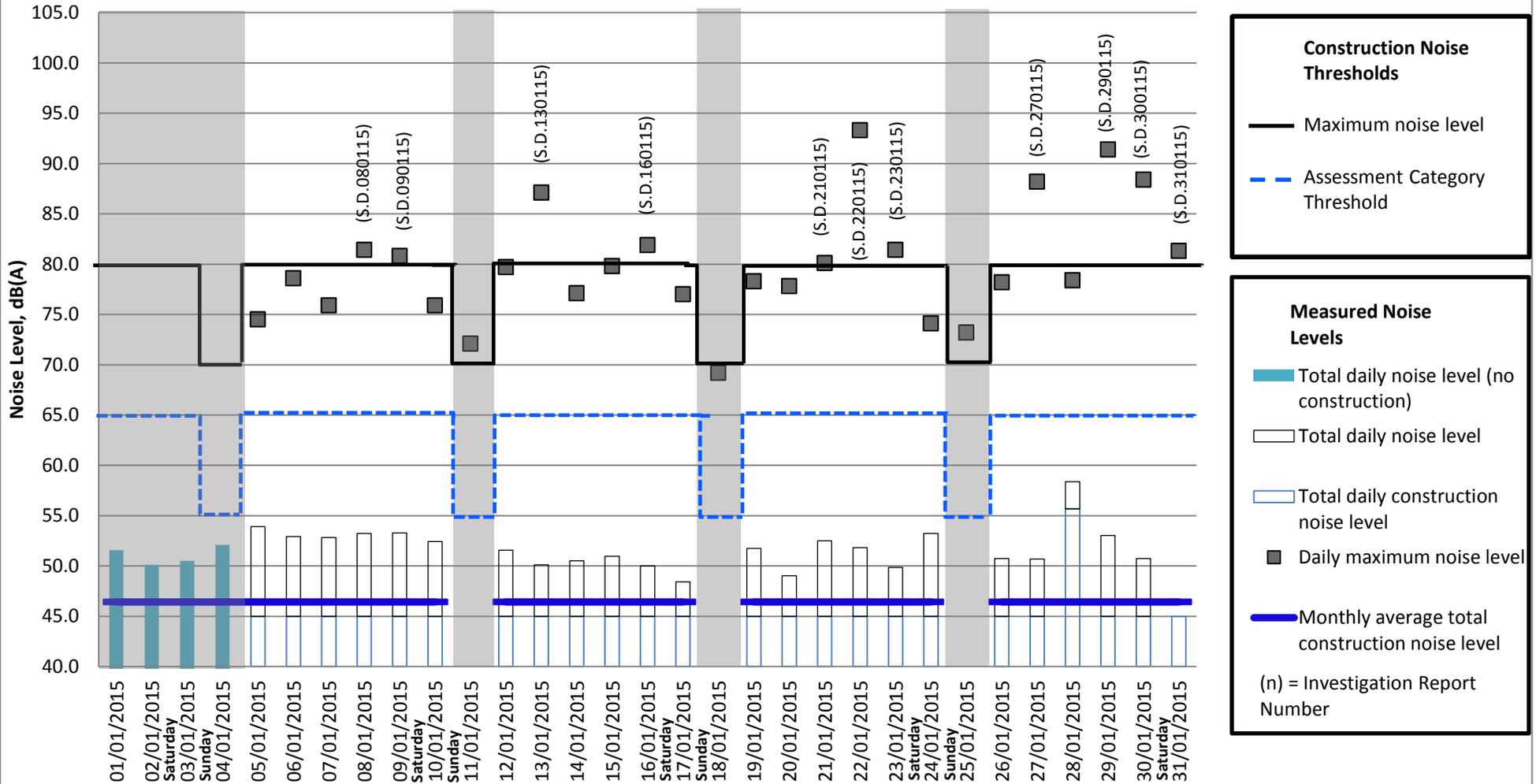
Note: The grey areas of the chart represent days on which no construction works have been conducted. The Sunday average has not been included as no Sunday works have been conducted at this location.

Measured Daytime Noise Levels at Echline Measurement period: January 2015



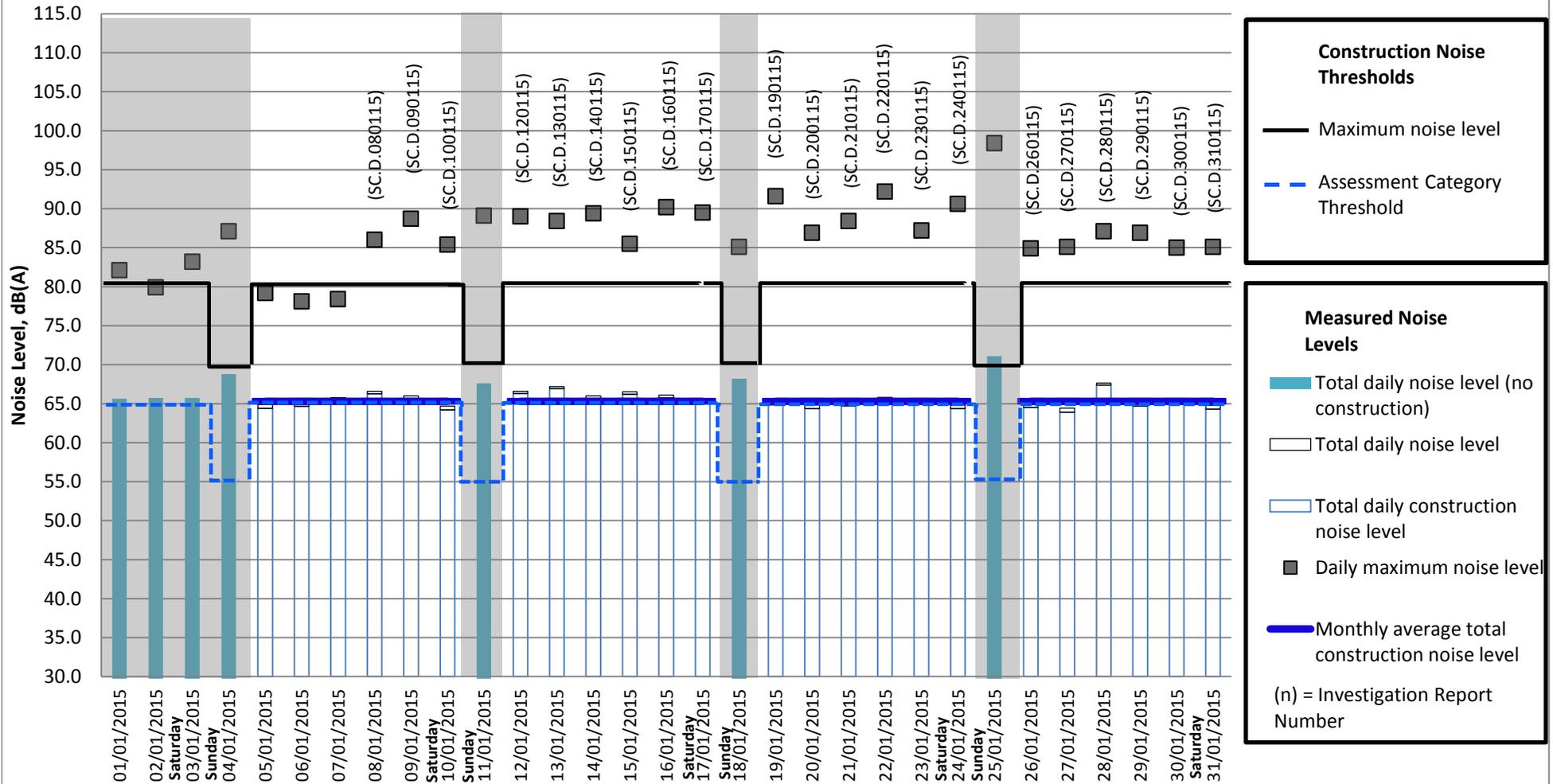
Note: The grey areas of the chart represent days on which no construction works have been conducted. The Sunday average has not been included as no Sunday works have been conducted at this location.

Measured Daytime Noise Levels at Springfield Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted. The monthly average construction noise for Sunday has not been included as no Sunday works have been conducted at this location.

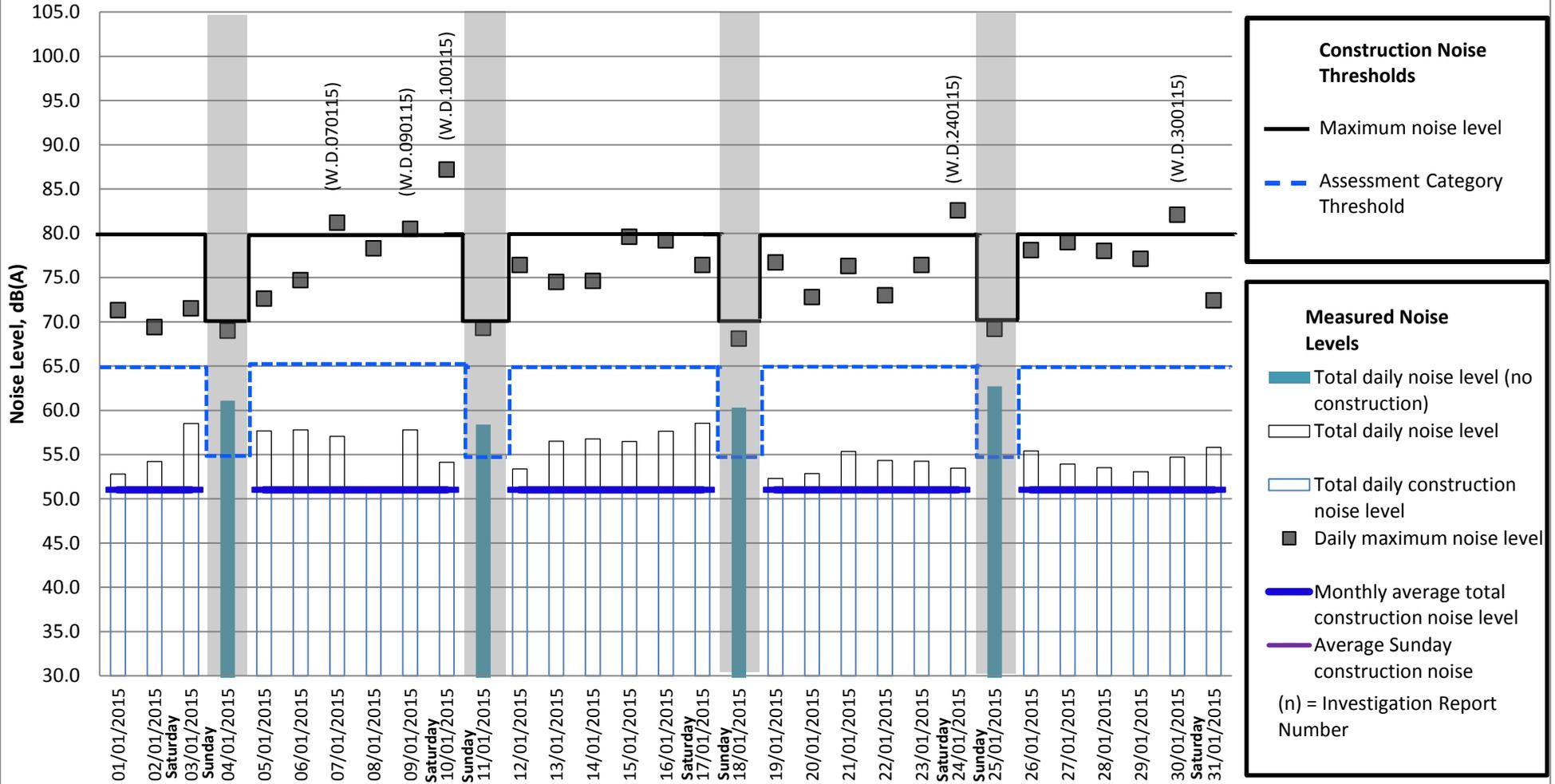
Measured Daytime Noise Levels at Scotstoun Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted. The monthly average construction noise for Sunday has not been included as no Sunday works have been conducted at this location .

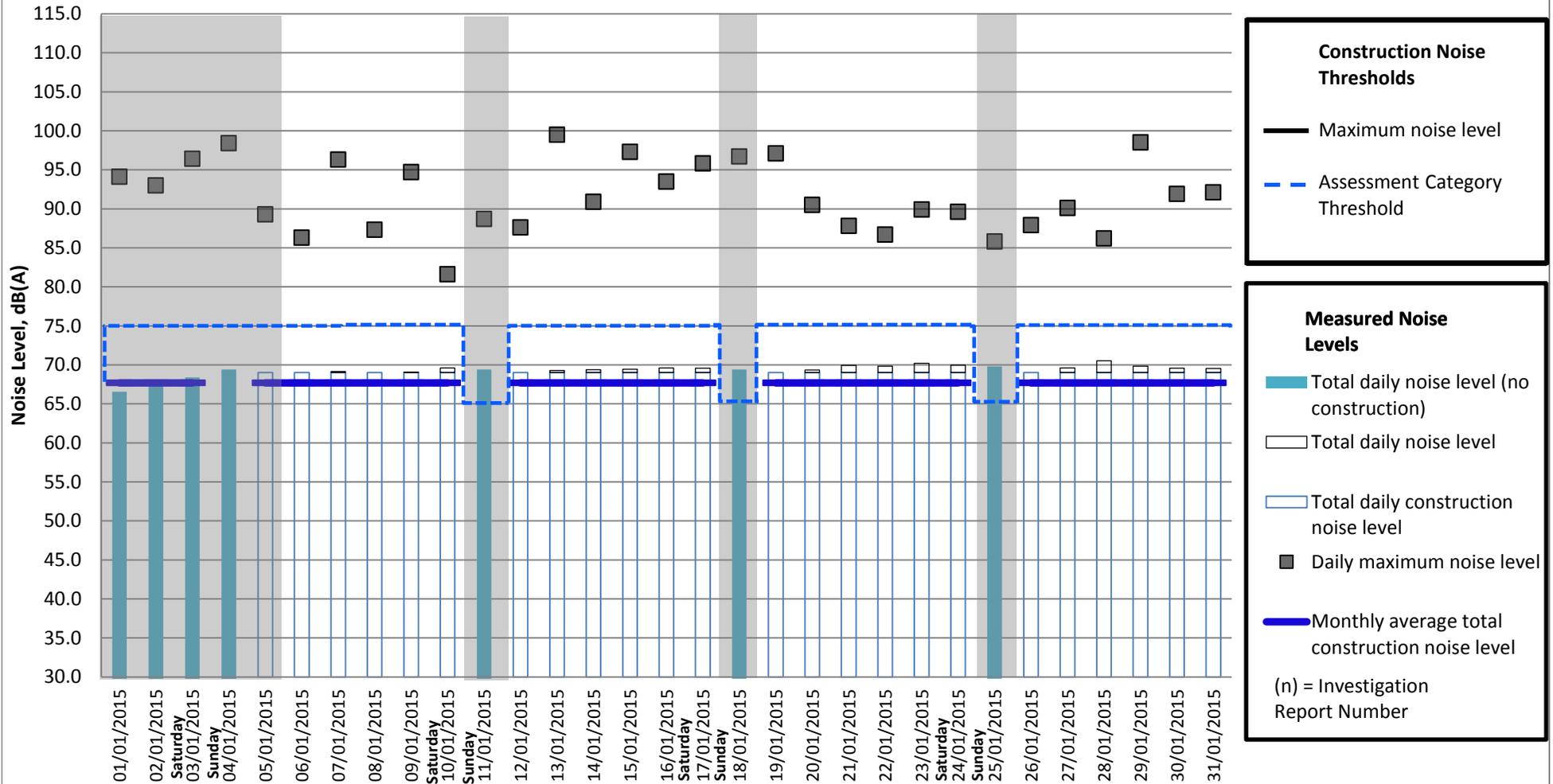
Measured Daytime Noise Levels at Whinny Hill

Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Daytime Noise Levels at Newton Measurement period: January 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted. It should be noted that the measured noise levels Mon - Fri can not be attributed to construction works due to the considerable distance (1.75 kilometers) between this monitoring location and the closest construction works.