



Contractor



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
 American Bridge International
 DRAGADOS
 Morrison Construction

Project

FORTH REPLACEMENT CROSSING

Document title

**CONSTRUCTION NOISE MONITORING
 REPORT: FEBRUARY 2015**

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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 February 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 February 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 February 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 February 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/airlifting • 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/airlifting • Pier S3 rebar, 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/airlifting • Pier S3 rebar, formwork & concreting • Launch – install plates to props, Painting works.
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. • 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 February 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 February 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 February 2015, with the exception of Scotstoun. The monthly average evening and night time construction noise levels at all monitoring locations are within the threshold levels there are no exceedances of Sunday averages.
- 3.5** 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 and on-going traffic management works facing the monitor. The average for February 2015 is consistent with levels for previous months.
- 3.6** During February 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. No exceedances this month are due to construction works.
- 3.7** 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.
- 3.8** 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

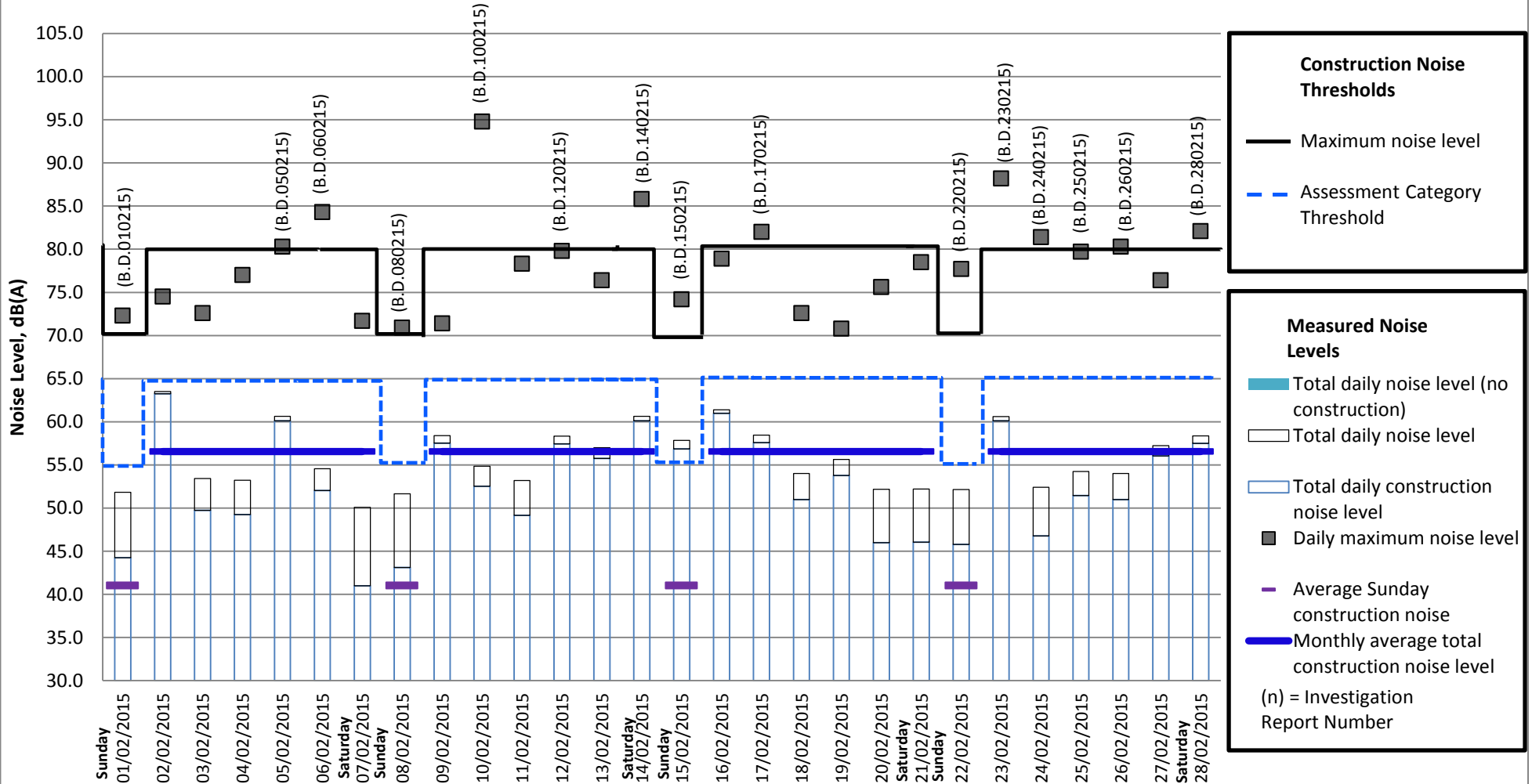
Monitoring Location	Summary of Exceedance Details
Butlaw Fisheries	During February the maximum noise threshold was exceeded on 41 occasions (15 day time, six evening and 20 night time). No exceedances were related to construction works. Exceedances were attributed to non-construction factors notably wind, waves, planes and birds.
Clufflat Brae	During February the maximum noise threshold was exceeded on 39 occasions (13 daytime, seven evening and 19 night time). No exceedances were found to be due to construction works. Exceedances were found to be largely due to weather.
Inchgarvie Lodge	During February the maximum noise threshold was exceeded on 37 occasions (11 day time, five evening and 21 night time). No exceedances were attributed to construction works. Investigations found residents at the property and adverse weather to be the main contributing factors to the exceedances at this location.
Linn Mill	During February the maximum noise threshold was exceeded on 49 occasions (12 daytime, nine evening and 28 night time). The majority of exceedances at this location were largely due to adverse weather and bird songs.
Tigh-Na-Grian	During February the maximum noise threshold was exceeded on 29 occasions (nine daytime, no evening and 20 night time). Exceedances were due to non-construction factors, notably wind, with some caused by birds and aircraft.
Dundas Home Farm	During February the maximum noise threshold was exceeded on five occasions. These exceedances were not caused by the works. The exceedances were due to monitor maintenance, birds and the residents.
Echline	During February 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 February the maximum noise threshold was exceeded on 17 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 February the maximum noise threshold was exceeded on 23 occasions. No exceedances were due to construction, all exceedances were largely attributed to vehicles passing by on the adjacent road (some of these may have been construction vehicles using the road).
Whinny Hill	During February the maximum noise threshold was exceeded on 11 occasions. Exceedances were not due to construction activities. Exceedances were due to a range of factors such as aircraft, residents and birds.



APPENDIX A

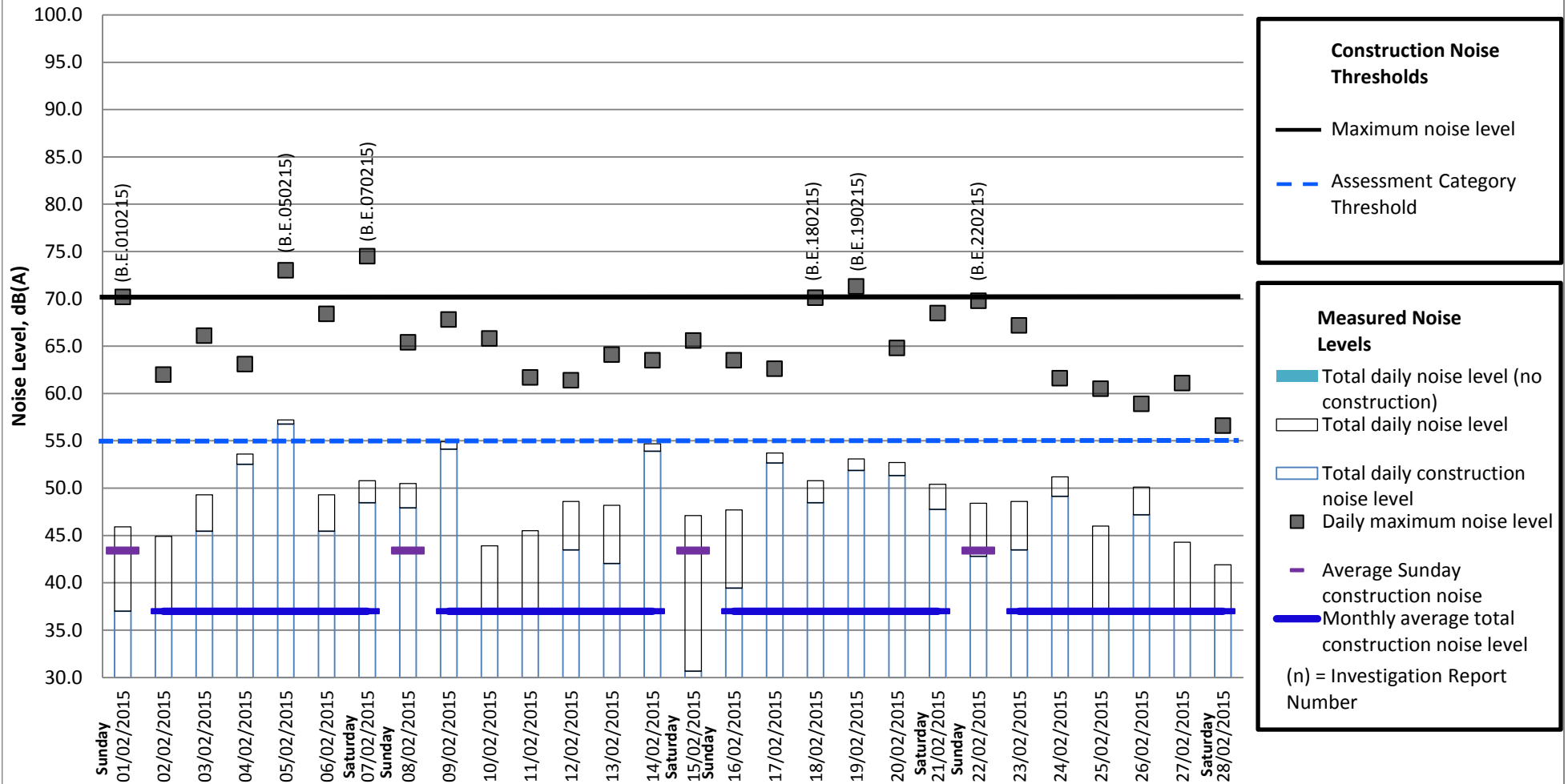
Measured Daytime Noise Levels at Butlaw Fisheries

Measurement period: February 2015



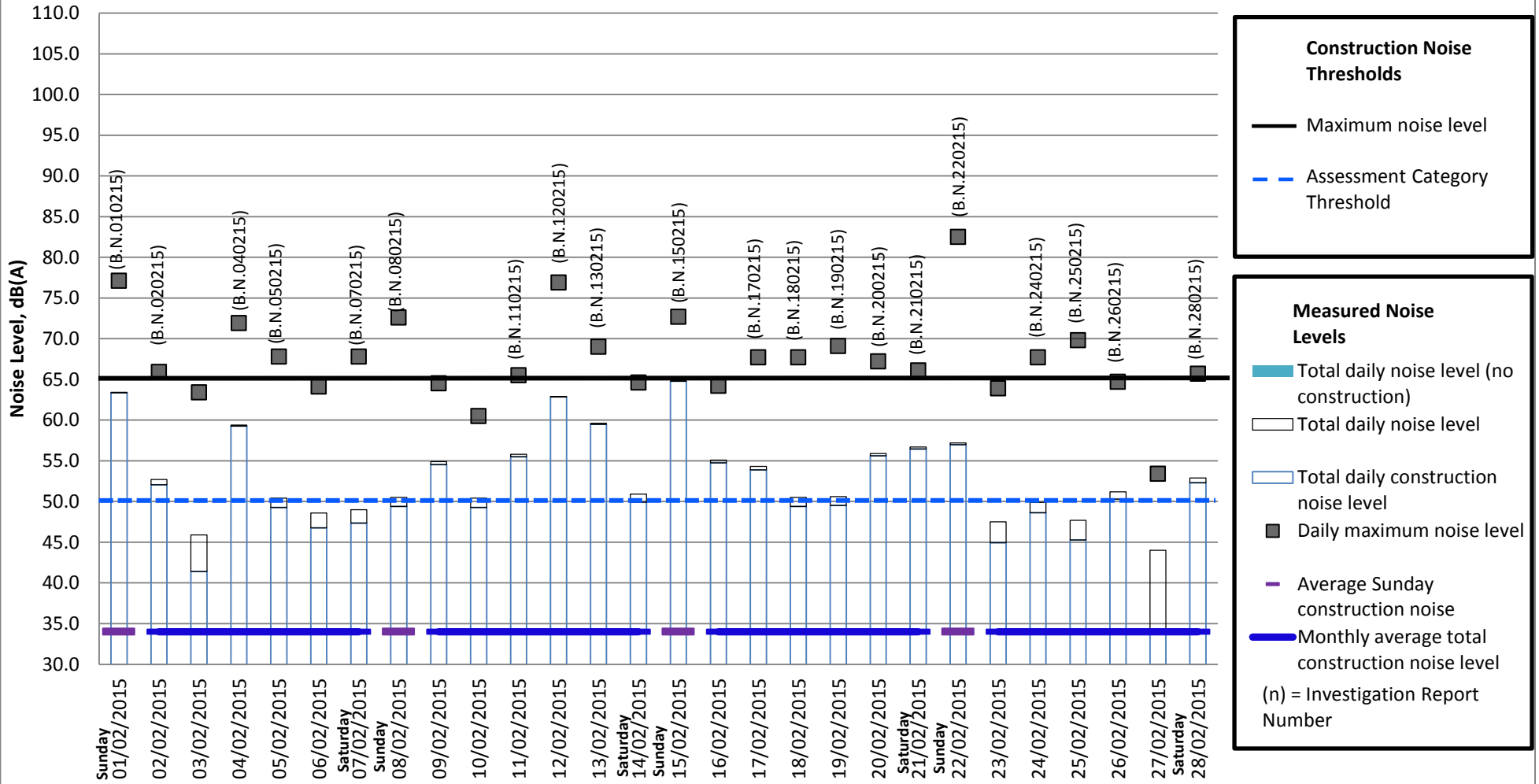
Measured Evening Noise Levels at Butlaw Fisheries

Measurement period: February 2015



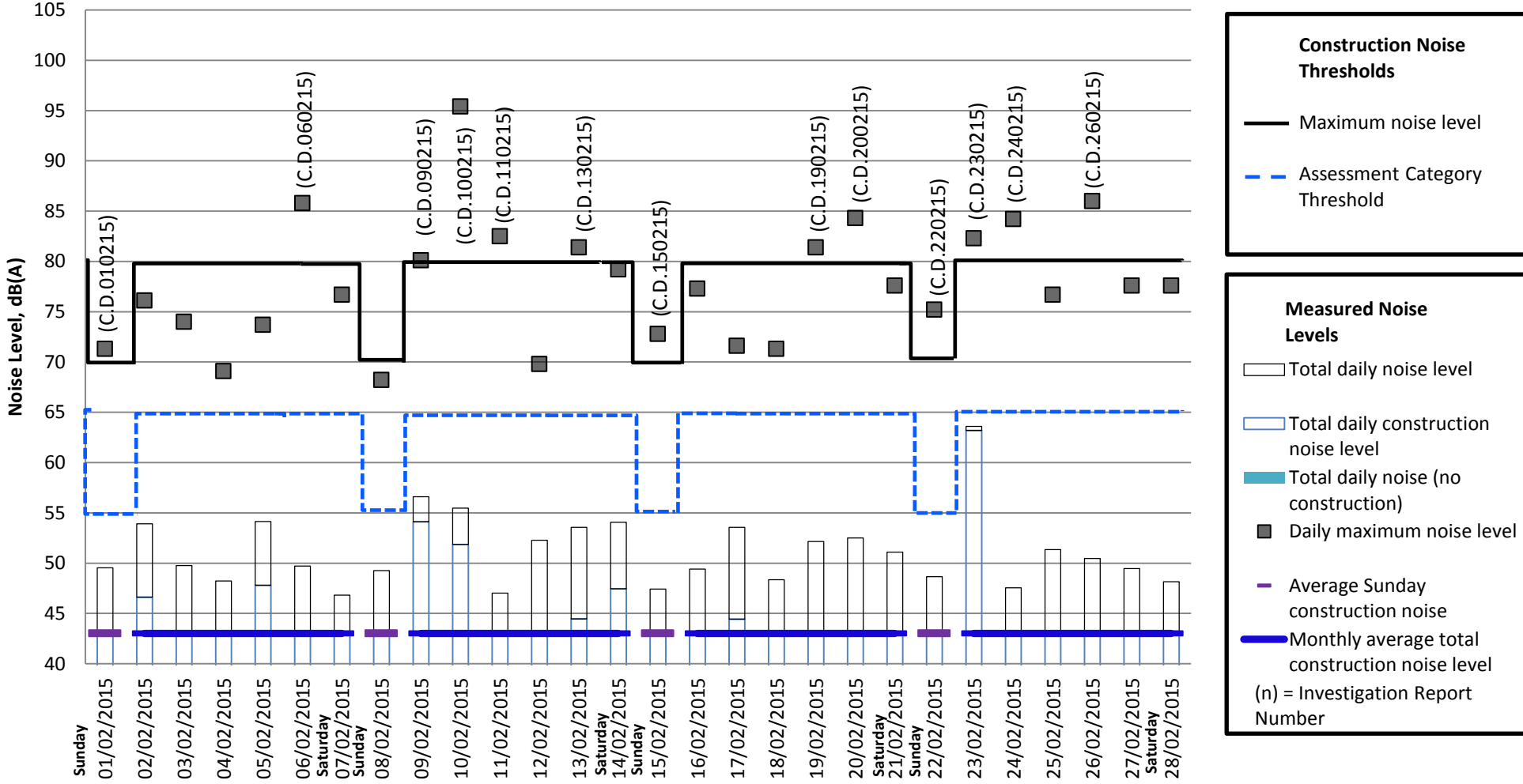
Measured Night time Noise Levels at Butlaw Fisheries

Measurement period: February 2015

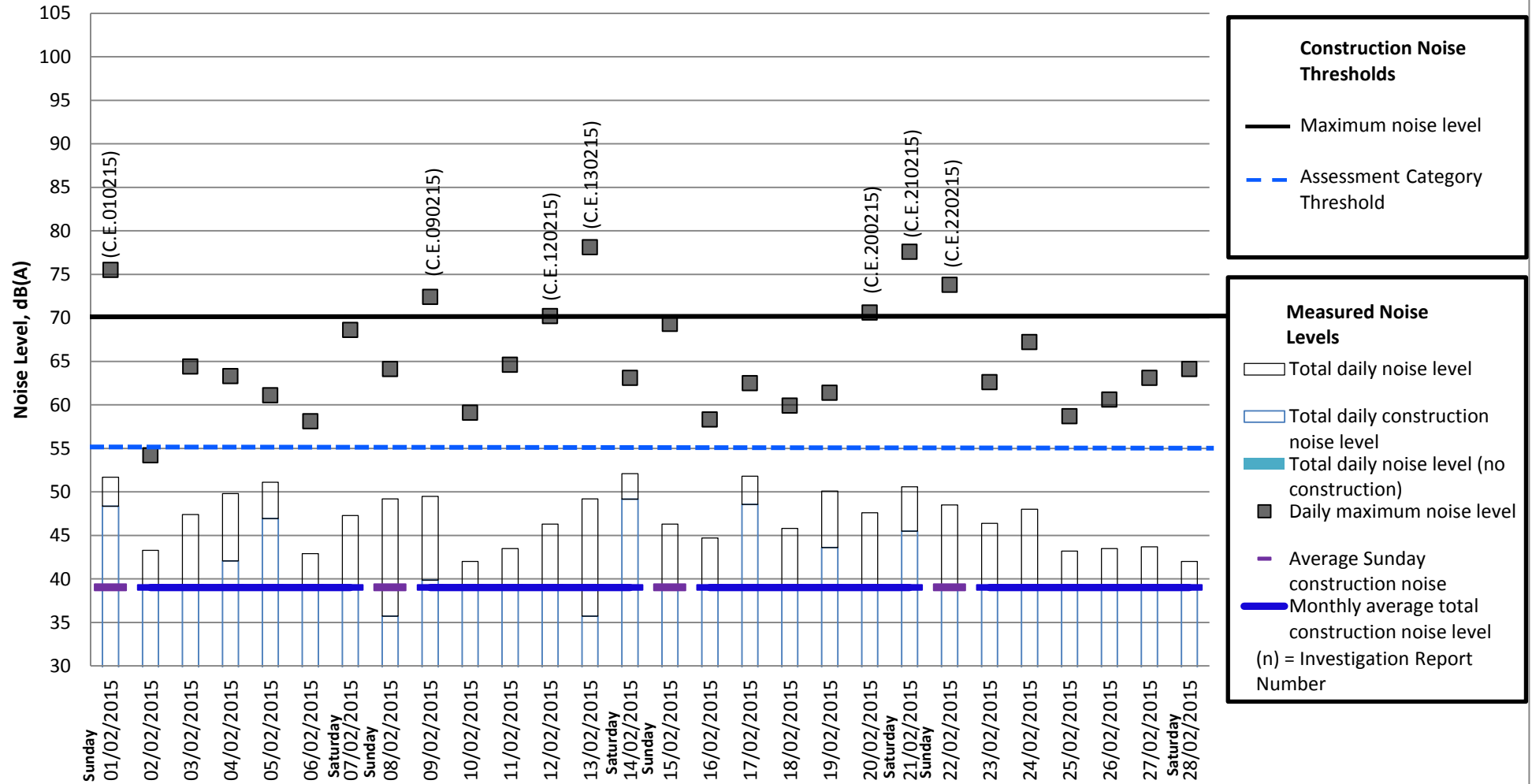


Measured Daytime Noise Levels at Clufflat Brae

Measurement period: February 2015

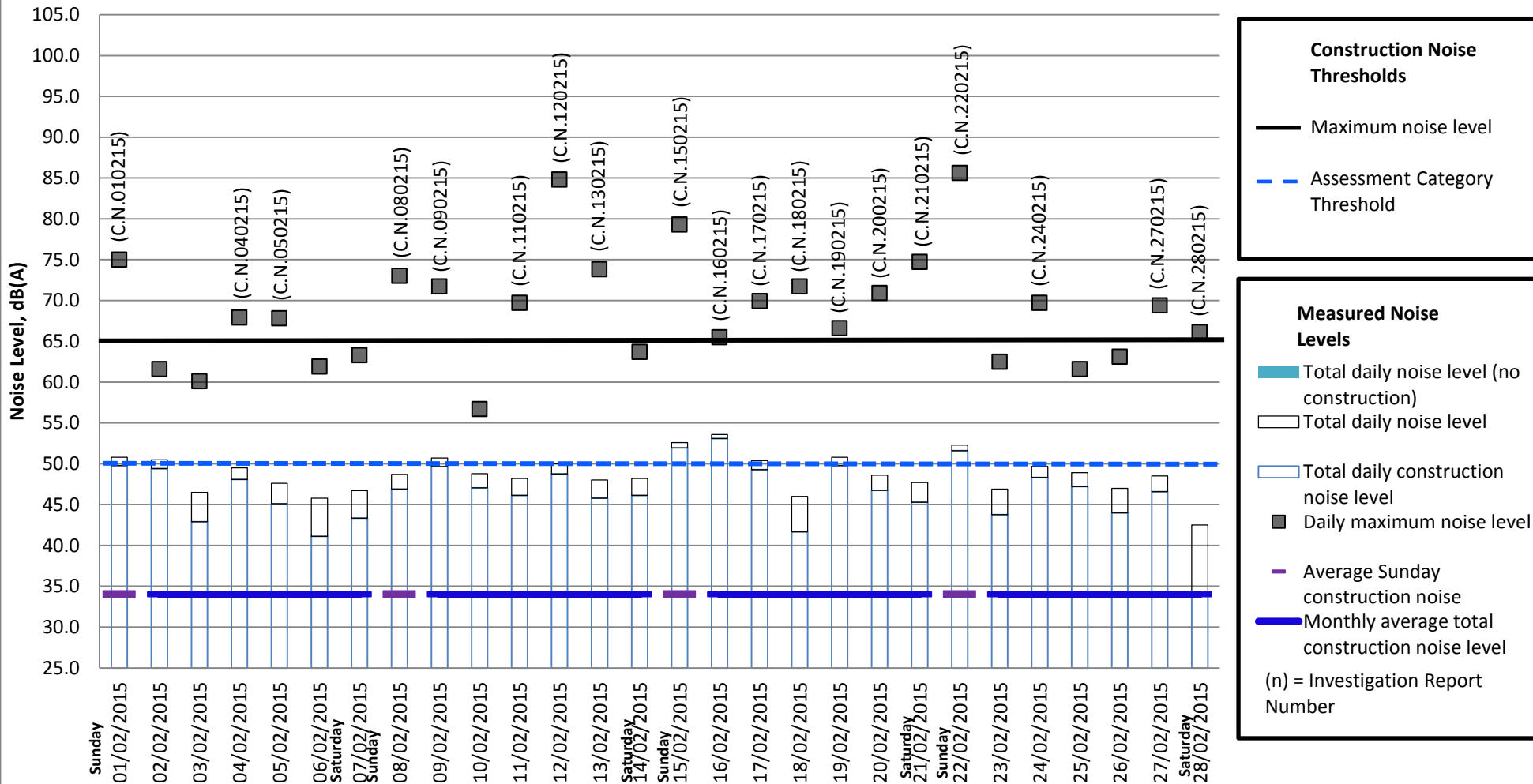


Measured Evening Noise Levels at Clufflat Brae Measurement period: February 2015



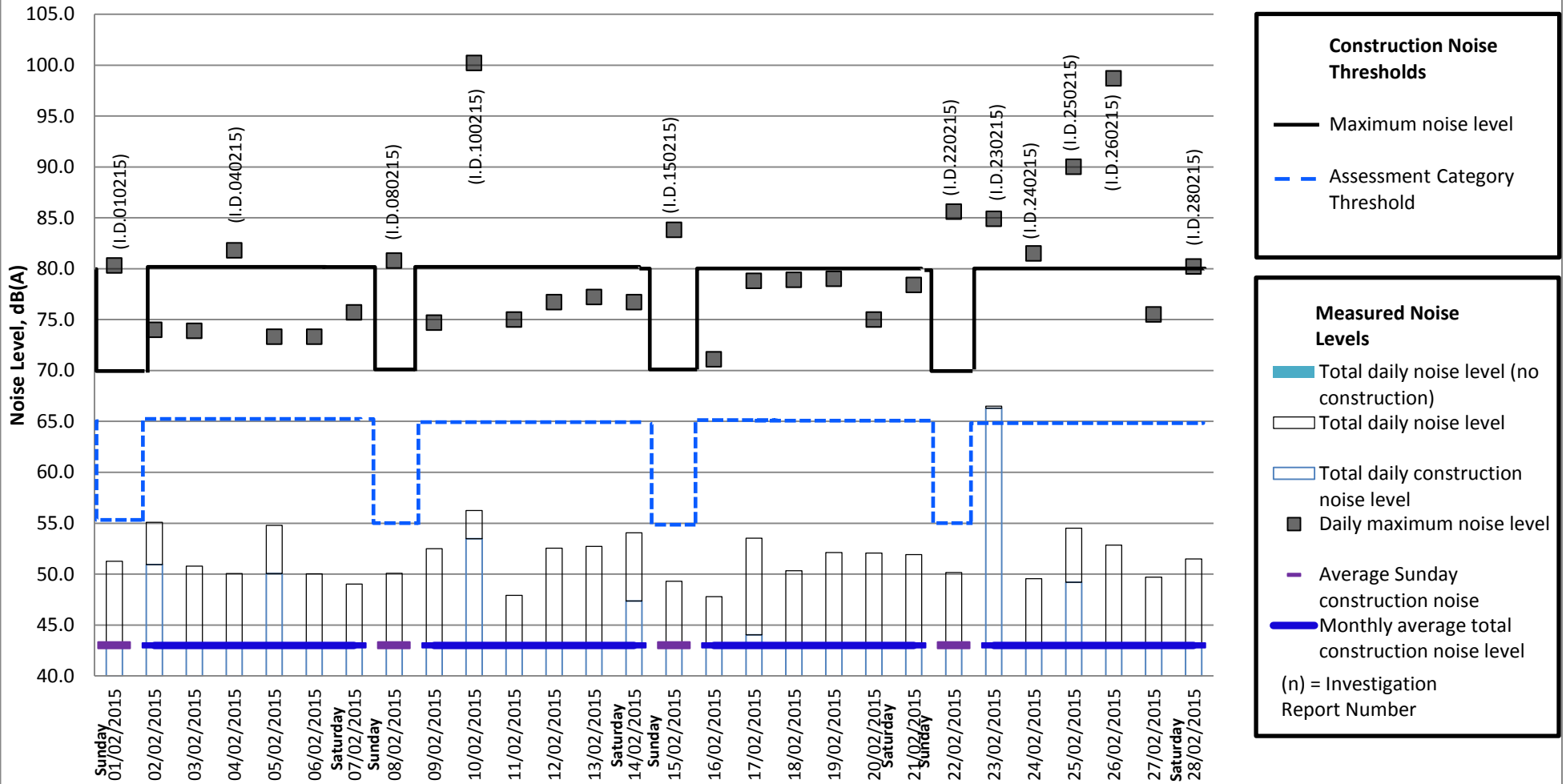
Measured Night-time Noise Levels at Clufflat Brae

Measurement period: February 2015

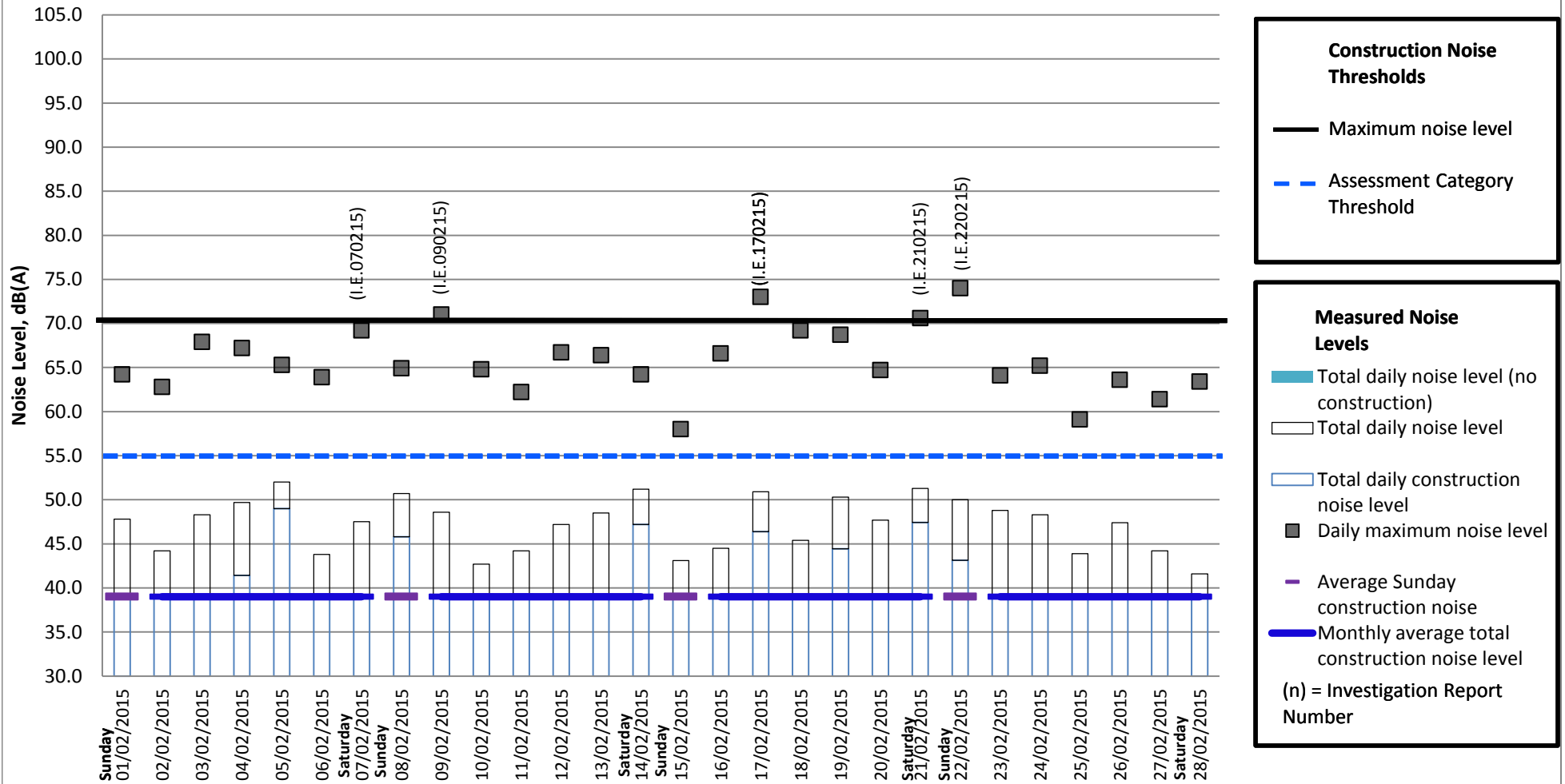


Measured Daytime Noise Levels at Inchgarvie

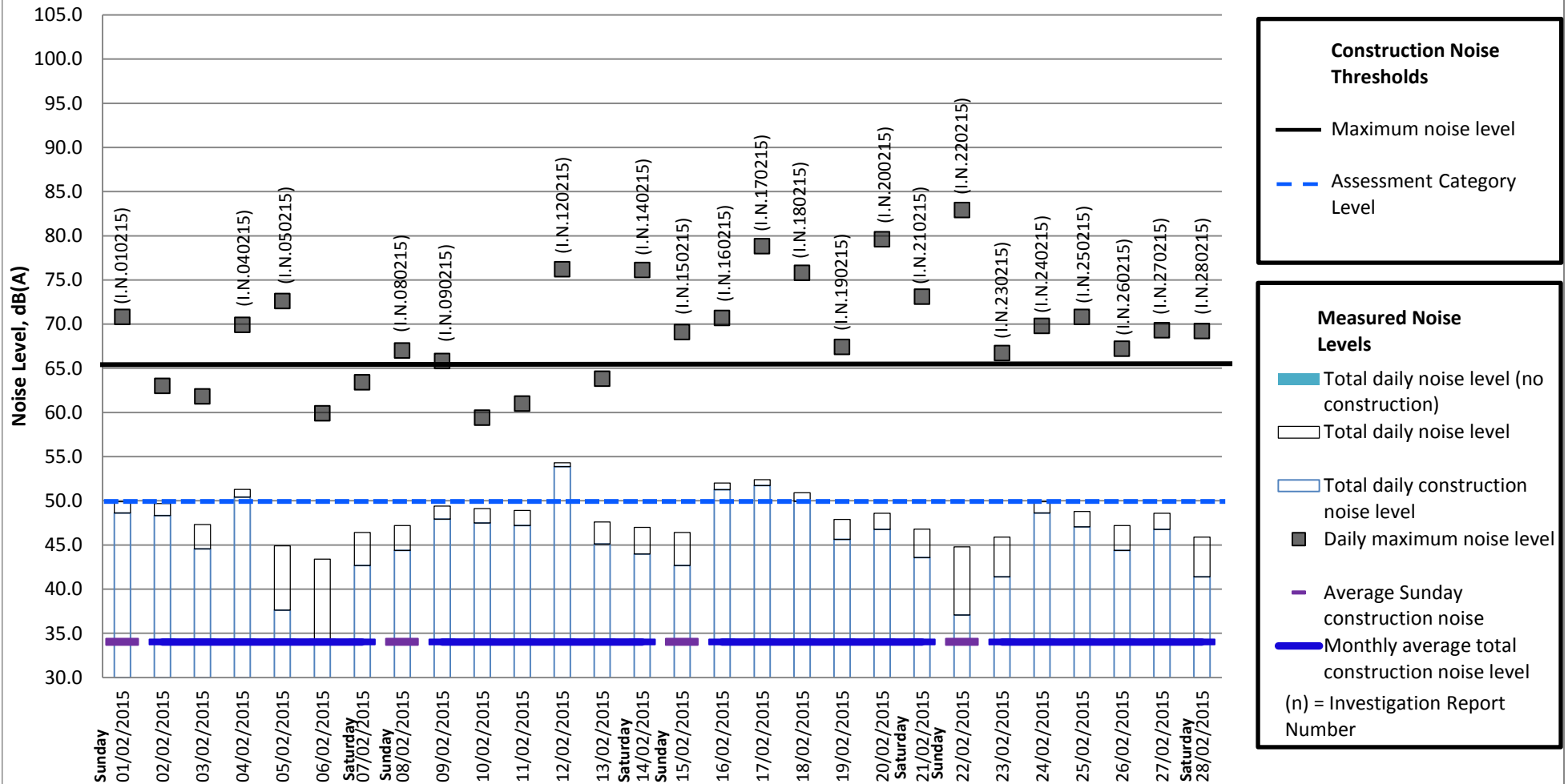
Measurement period: February 2015



Measured Evening Noise Levels at Inchgarvie Measurement period: February 2015

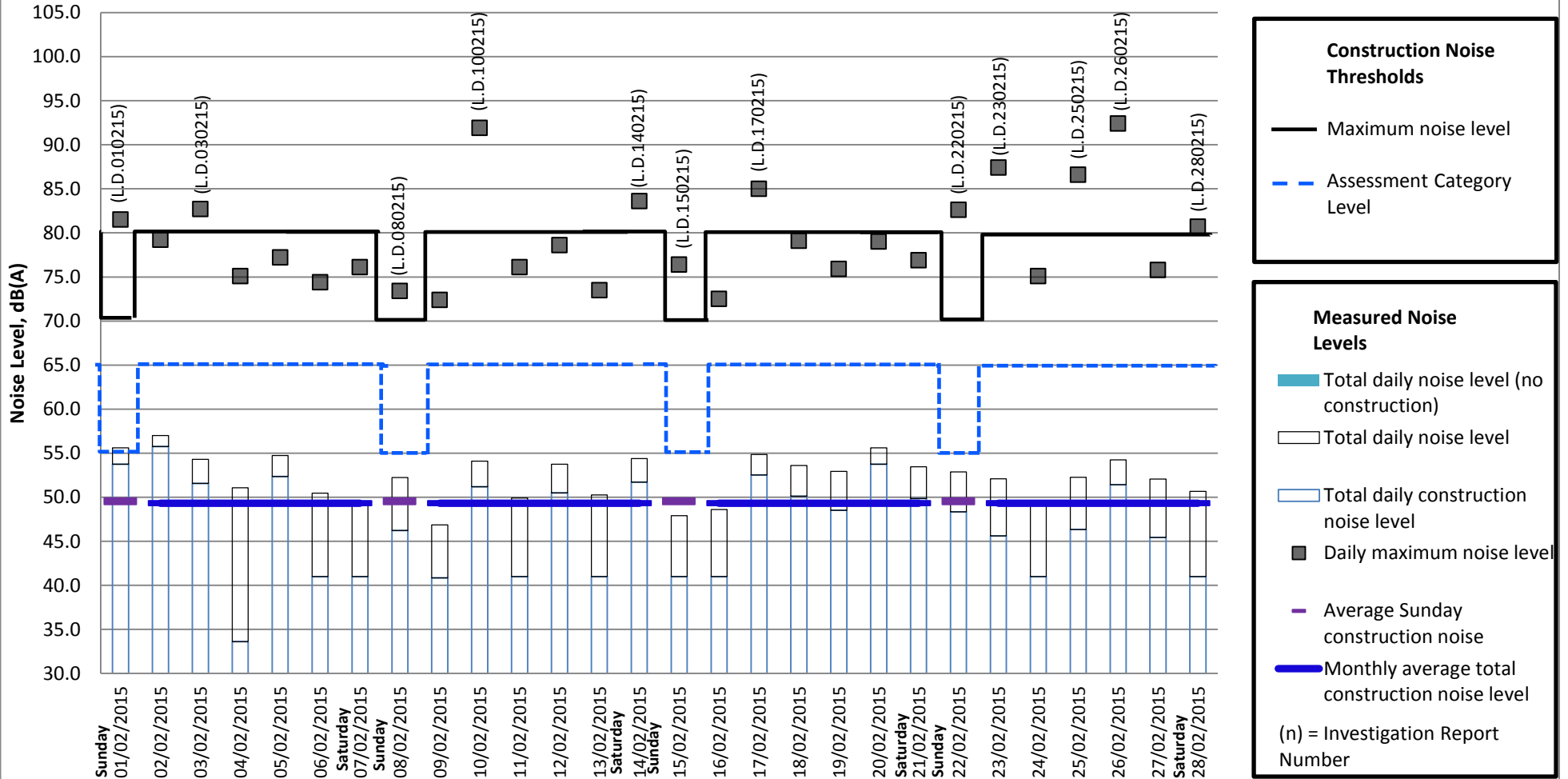


Measured Night-time Noise Levels at Inchgarvie Measurement period: February 2015



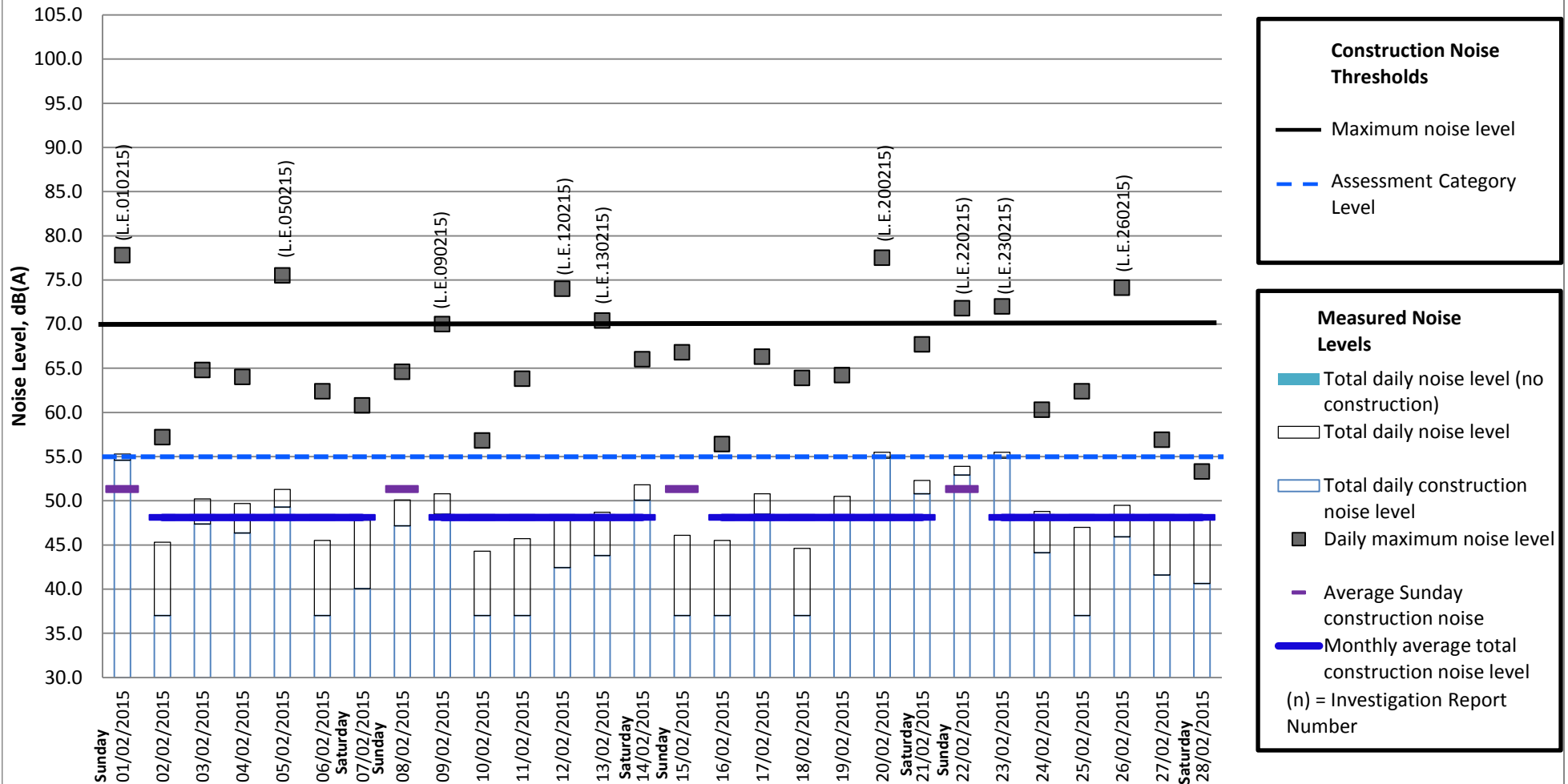
Measured Daytime Noise levels at Linn Mill

Measurement period: February 2015



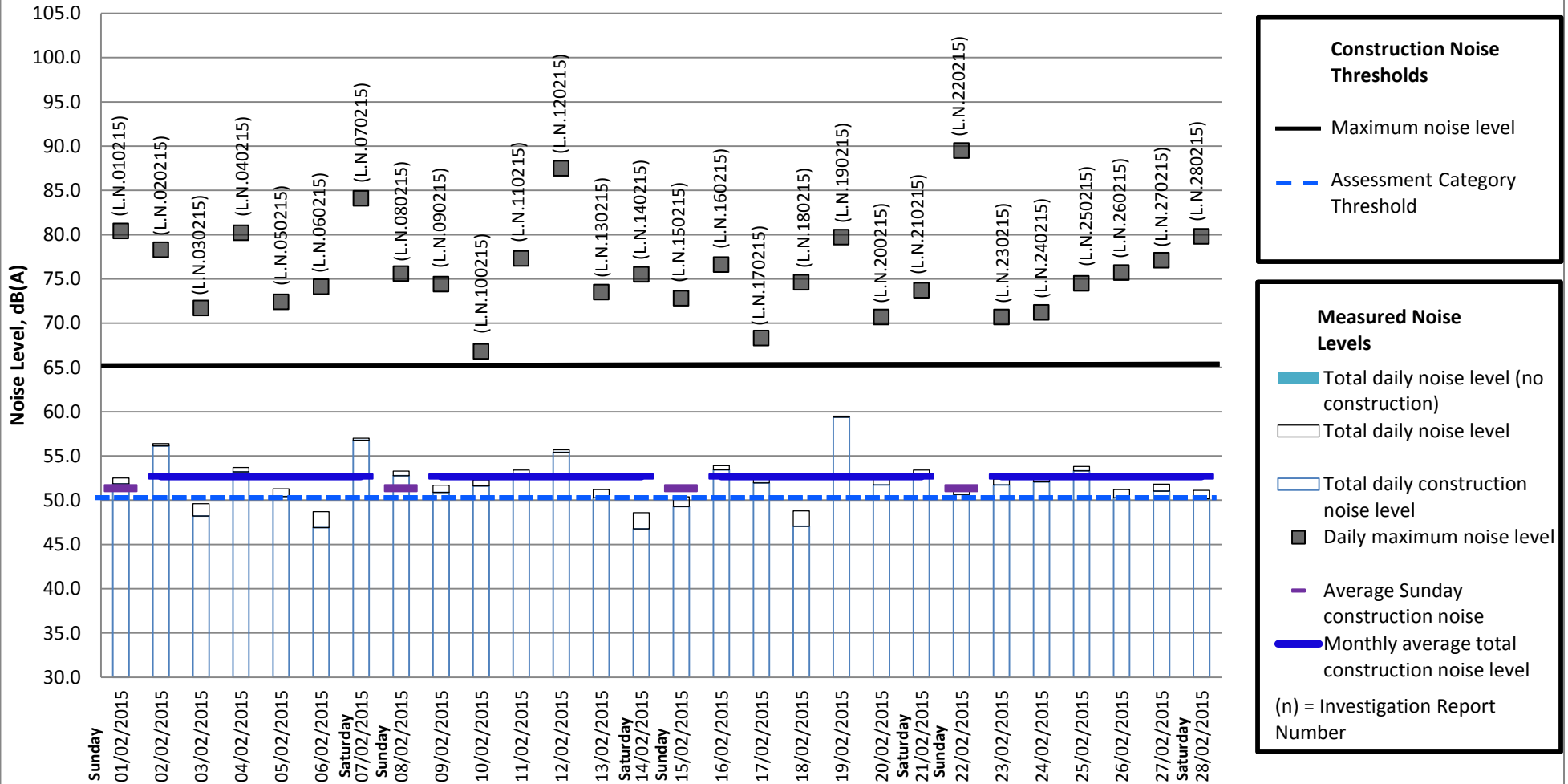
Measured Evening Noise Levels at Linn Mill

Measurement period: February 2015

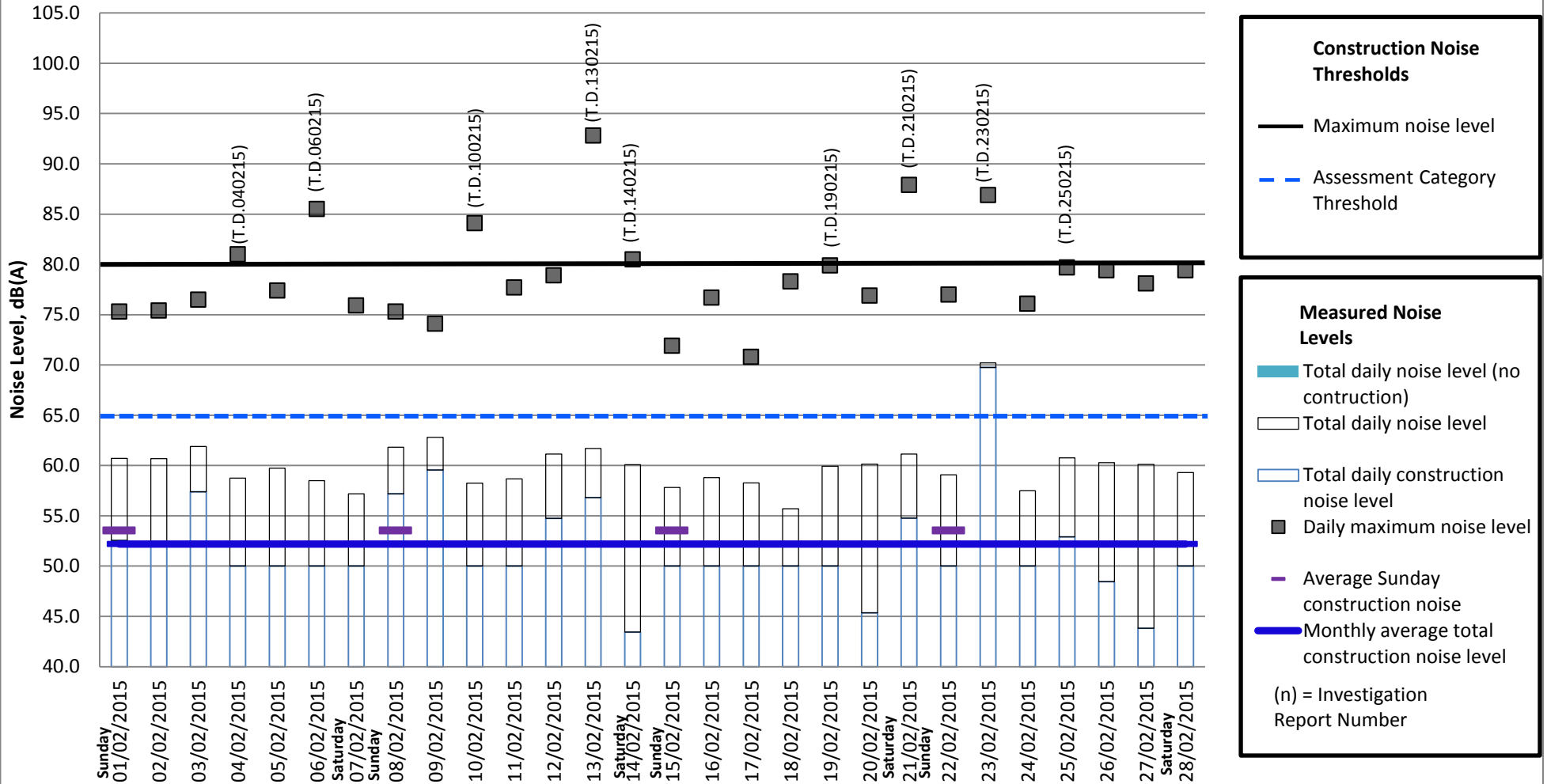


Measured Night-time Noise Levels at Linn Mill

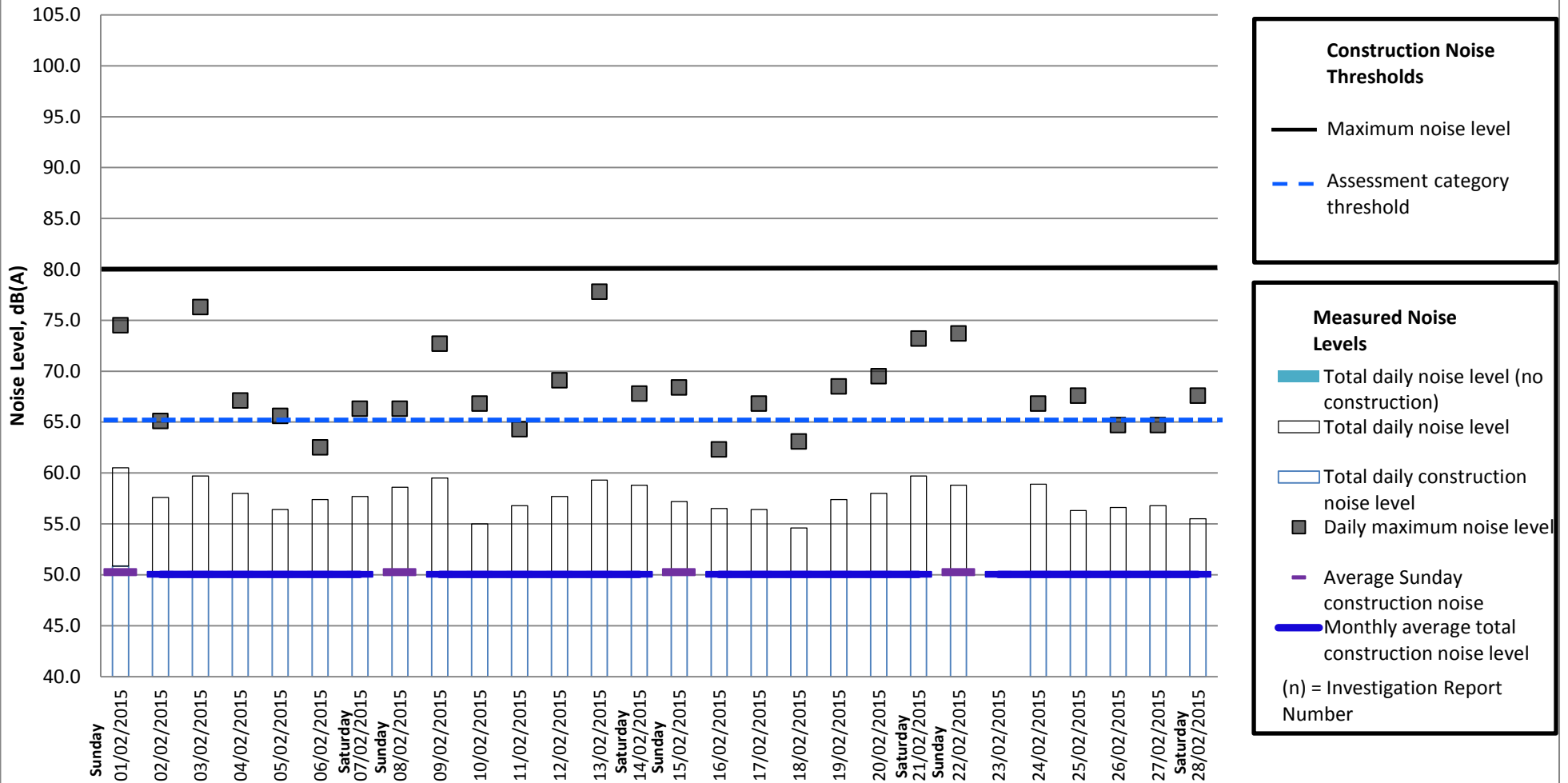
Measurement period: February 2015



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



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



Construction Noise Thresholds

- Maximum noise level
- Assessment category threshold

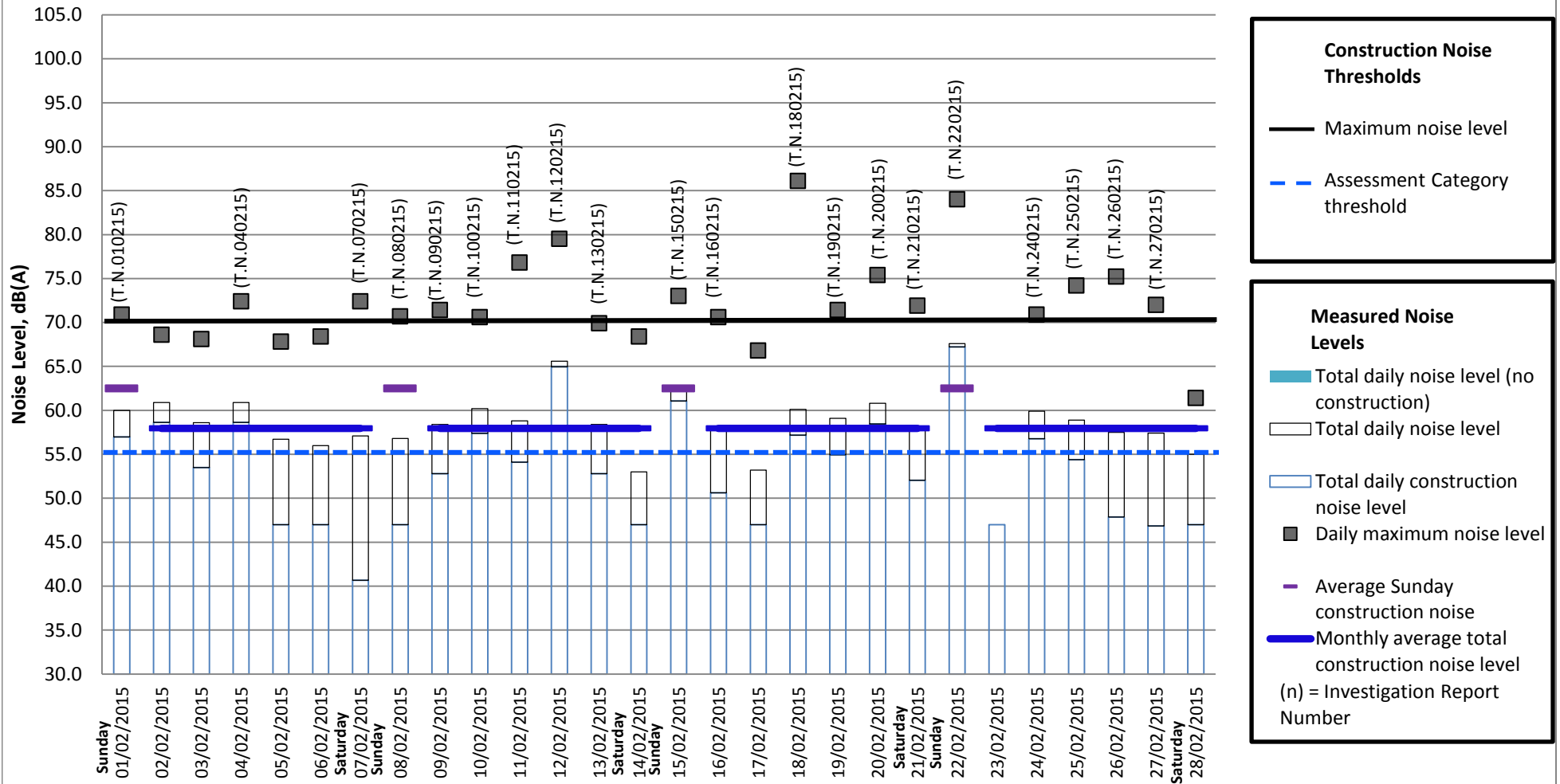
Measured Noise Levels

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

(n) = Investigation Report Number

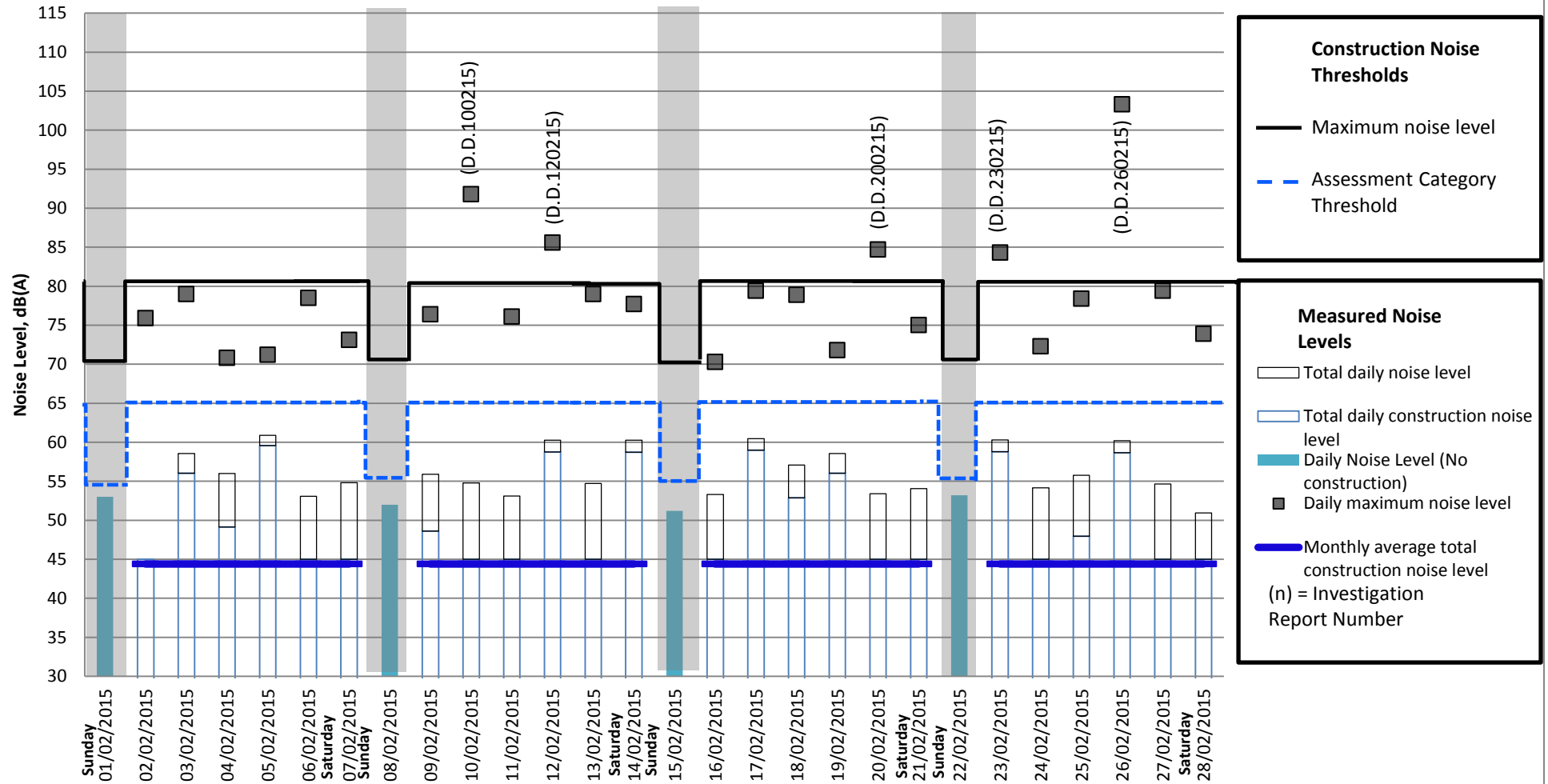
Note: Due to adverse weather conditions, data is missing for 23/02/15.

Measured Night-time Noise Levels at Tigh-Na-Grian Measurement period: February 2015



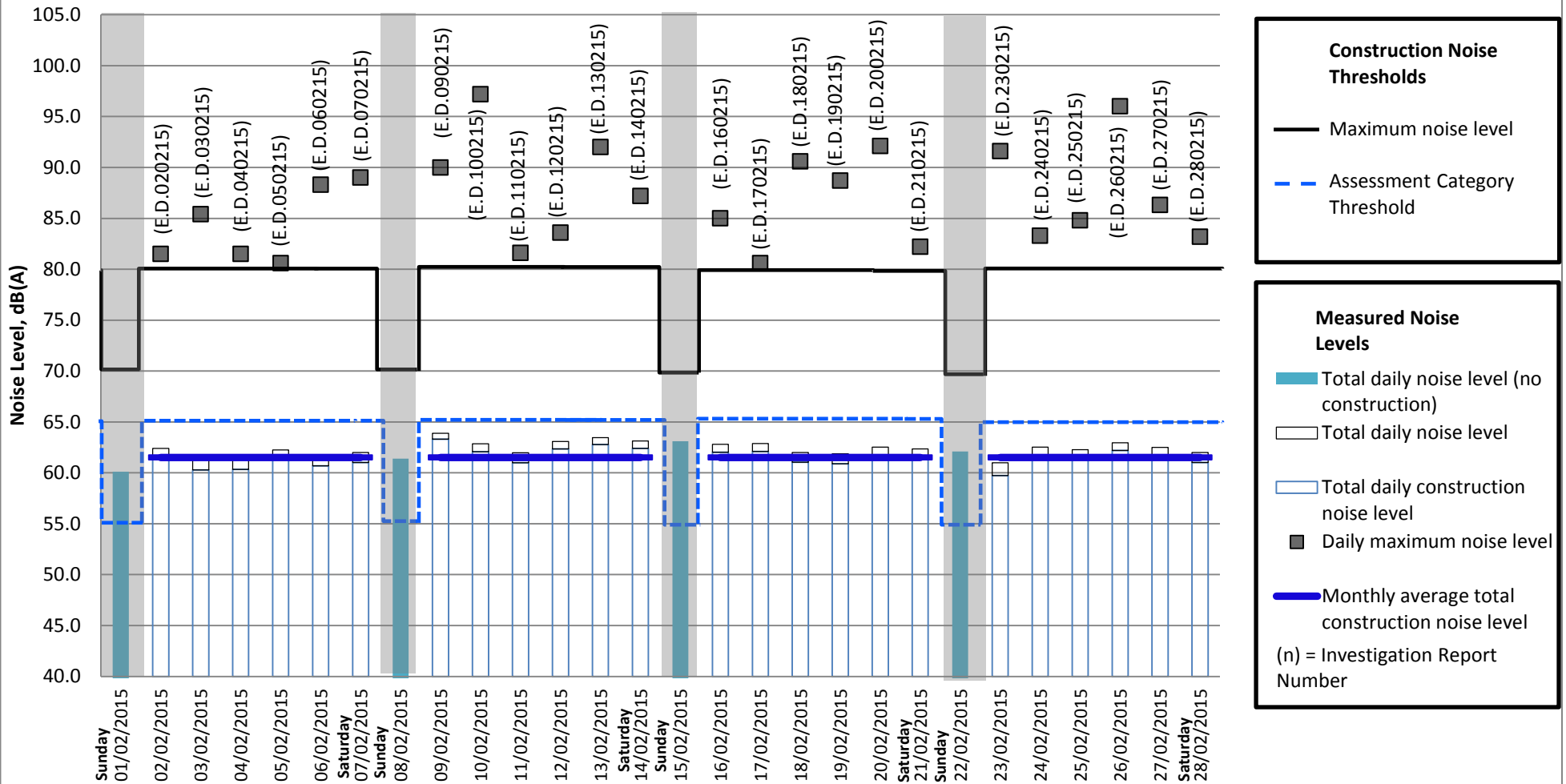
Note: Due to adverse weather conditions, data is missing for 23/02/15.

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



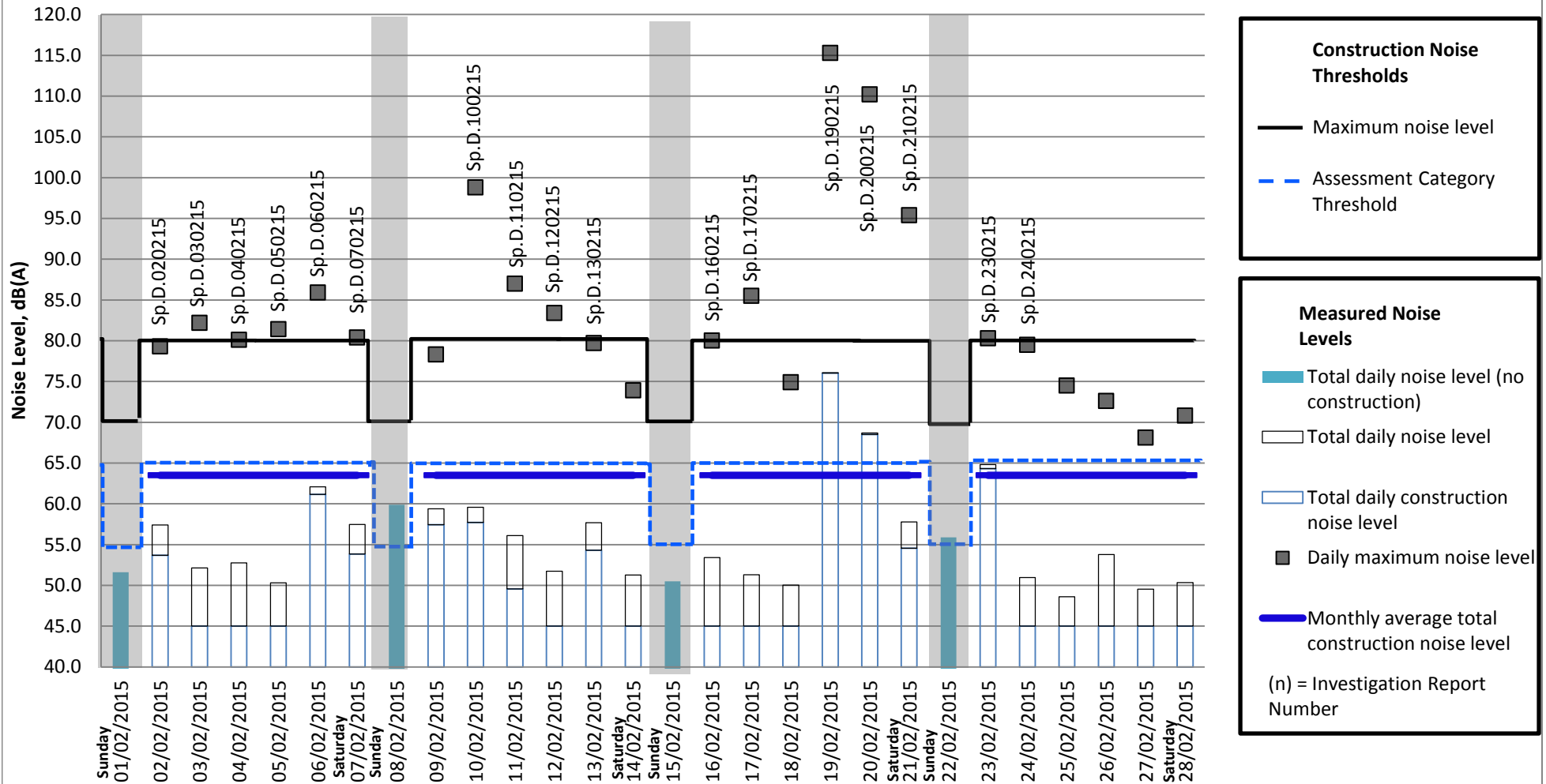
Note: The grey areas of the chart represent days on which no construction works have been undertaken at this location. A Sunday average has not been included for this location as no Sunday works have been undertaken.

Measured Daytime Noise Levels at Echline Field Measurement period: February 2015



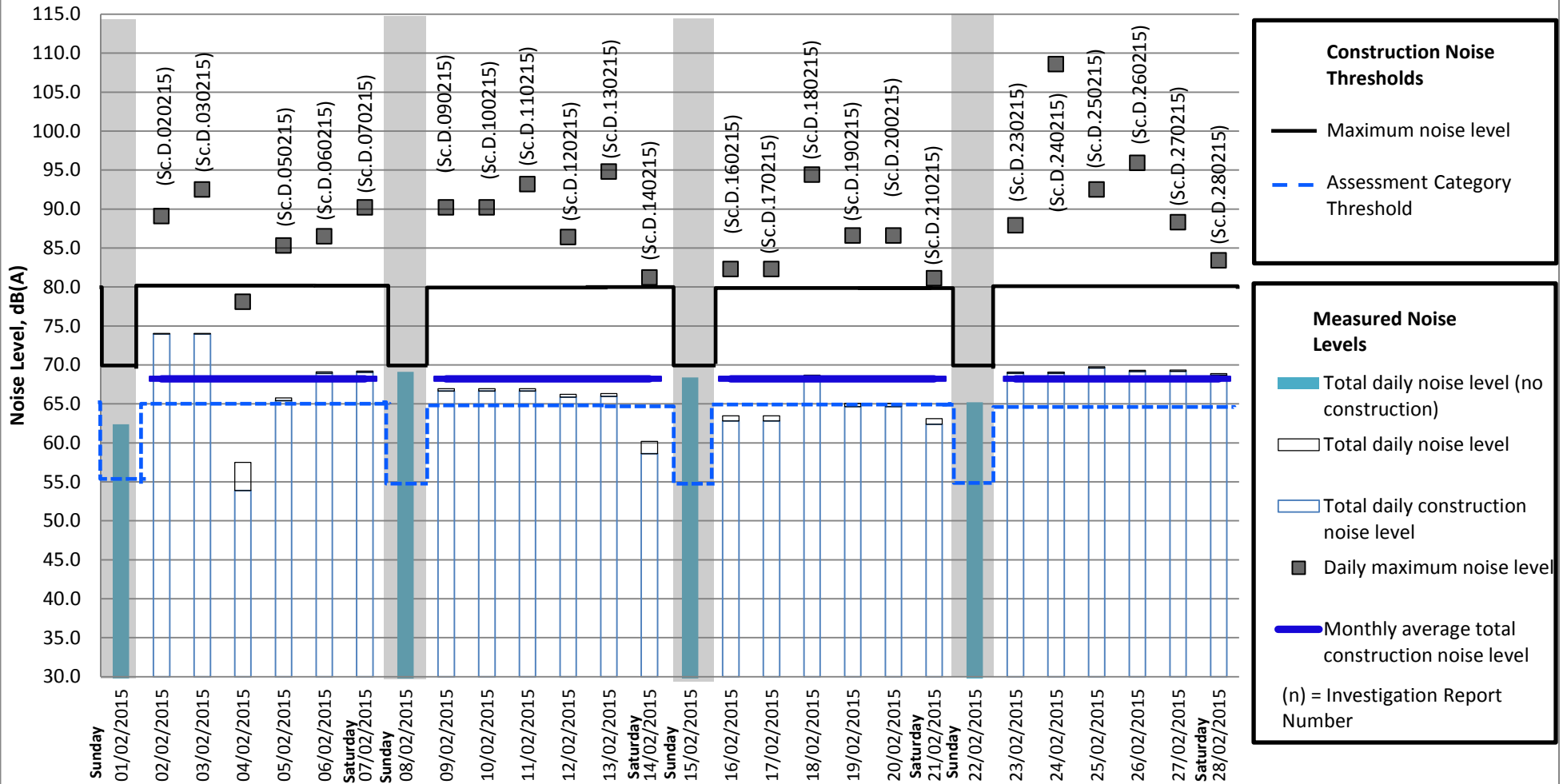
Note: The grey areas of the chart represent days on which no construction works have been conducted. A Sunday average has not been included on the graph as no Sunday works have been undertaken at this location.

Measured Daytime Noise Levels at Springfield Measurement period: February 2015



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

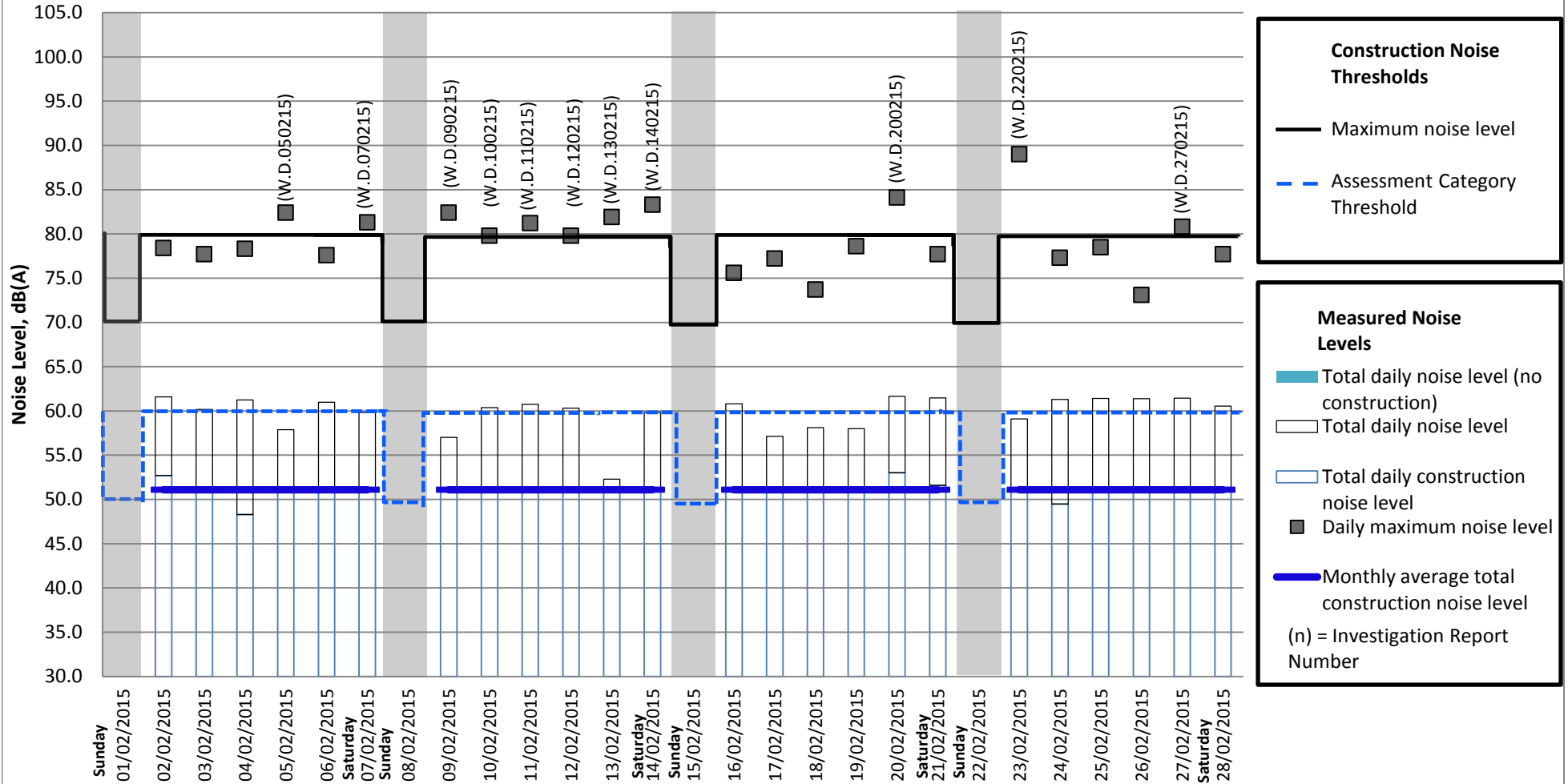
Measured Daytime Noise Levels at Scotstoun Measurement period: February 2015



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: February 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 during this period.