



Contractor



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

Project **FORTH REPLACEMENT CROSSING**

Document title

CONSTRUCTION NOISE MONITORING REPORT: AUGUST 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 August 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 August 2015, construction noise was monitored using permanent, continuous noise monitoring devices (01db 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 April 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 August 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 August 2015
M1	Whinny Hill	Network	<ul style="list-style-type: none"> • Earth Works/Fill Placement • New Ferrytoll Road • FT03 & FT04 Bridge Works • FT09 Works • FT19 Works • Roadworks
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 • AVN 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 S2 foundation work • Pier S1 rebar, formwork & concrete works
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> • Pier S1, rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • Pier S1, rebar, formwork & concrete works • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works. • Main carriageway earthworks

M11	Linn Mill	Network (close proximity to Crossing)	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M13	Clufflat Brae	Crossing / Network	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M14	Springfield	Network	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M15	Echline	Network	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M16	Scotstoun	Network	<p>Footpath works</p> <ul style="list-style-type: none"> • Utility works • Evening and Night beam painting works • B800 North road works including bridge works (these works are directly in the location of the meter which now sits within the construction boundary).
M17	Dundas Home Farm	Network	<ul style="list-style-type: none"> • Utility works • Evening and night painting works B800 South road works including bridge works etc... • Main carriageway works
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 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 were unavailable until 11th August due to inaccessibility of the monitor location in August2015.

Results

- 3.3** Results demonstrate that the monthly average total of construction noise results for daytime are within the threshold levels for all monitoring locations during August 2015 with the exception of Newton. For the night time periods, there were no exceedances of monthly average construction noise during August. There are no exceedances of Sunday averages, with the exception of Tigh-na-Grian and these occurred on Sunday daytime only.
- 3.4** The rises in daytime exceedances at Scotstoun are likely to be due to the very close proximity of construction to the monitoring location. The works are very similar to previous works in the vicinity and construction noise levels at residential receptors were unlikely to be higher than before. No complaints were received from any of the residents in the location of the works during this period.
- 3.5** The exceedances noted are not thought to have been caused by increased noise levels due to construction. Each exceedance was found to be affected by increased noise levels due to periods of weather, traffic, residential noise or bird noise. Audio demonstrates that the increased levels were caused by waves and birds at Butlaw Fisheries, birds and resident activity at Inchgarvie and birds at Tigh-na-Grian (With regard to the averages reported for evening and night time periods, it should be noted that these averages are based only on the highest L_{Aeq} levels for 1 hour periods which can affect the averages).
- 3.6** During August 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 for these investigations. A Noise and Vibration Investigative Report (NVIR) spread sheet has been produced detailing the results of the investigation for each construction exceedance. There were some exceedances this month that were due to construction work (See 3.7).
- 3.7** During the month of August it was noted that there was construction related noise at Linn Mill. The exceedance at Linn Mill on the 3rd August occurred during the night. The 14th, 17th and 27th exceedances occurred during the day and seem to be coming from the Scaffold/Timber storage area which is near the noise monitor. The Environmental team have contacted the relevant site agent and asked that staff be reminded to keep noise to a minimum, the environmental team will continue to monitor the situation closely. There was also construction related exceedances at Scotstoun (see 3.4).

- 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. Residential building works at Inchgarvie Lodge accounts for the majority of the exceedances at this location.
- 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 August the maximum noise threshold was exceeded on 57 occasions (19 day time, 10 evening and 28 night time). No exceedances were related to construction works. Exceedances were attributed to non-construction factors notably birds, traffic, waves and residents.
Clufflat Brae	During August the maximum noise threshold was exceeded on 28 occasions (10 daytime, 5 evening and 13 night time). No exceedances were found to be due to construction works. Exceedances were found to be largely due to birds and residential activity.
Inchgarvie Lodge	During August the maximum noise threshold was exceeded on 74 occasions (26 day time, 20 evening and 28 night time). No exceedances were attributed to construction works. Investigations found residential building works and vehicle movements the main contributing factors to the exceedances in this location. Other factors included birds and monitor maintenance.
Linn Mill	During August the maximum noise threshold was exceeded on 35 occasions (9 daytime, 8 evening and 18 night time). The majority of exceedances at this location were due to birds and residents. There were 4 instances of construction noise exceeding the threshold (see 3.7)
Tigh-Na-Grian	During August the maximum noise threshold was exceeded on 27 occasions (11 daytime, 2 evening and 14 night time). Exceedances were mainly due to birds.
Dundas Home Farm	During August the maximum noise threshold was exceeded on 9 occasions. These exceedances were not caused by construction works. The exceedances were due to residents and birds.
Echline	During August the maximum noise threshold was exceeded on 30 occasions. No exceedances at this location were due to construction activities. Most exceedances were attributed to vehicles passing by on the adjacent roads. Other exceedances were attributed to grass in area being cut and monitor maintenance
Springfield	During August the maximum noise threshold was exceeded on 13 occasions. These exceedances were due to, local residents and their pet (dog). The monitor is situated within a garden with a dog next door.
Scotstoun	During August the maximum noise threshold was exceeded on 27 occasions. The majority of these exceedances were due to construction; this is due to the location of the current meter being in the immediate vicinity of on-going works on the B800. However a number of exceedances were attributed to vehicles passing (including Sundays) on the adjacent road
Whinny Hill	During August the maximum noise threshold was exceeded on 14 occasions. Exceedances were not due to construction activities. Mostly, exceedances were due to birds, residents and vehicles.
North Leg	No data is reported before 11 th August limited accessibility to this device. Recordings taken for data record purposes
Port Edgar	No data is reported in this report due to an error with the monitor.
Newton	Recordings taken for data record purposes



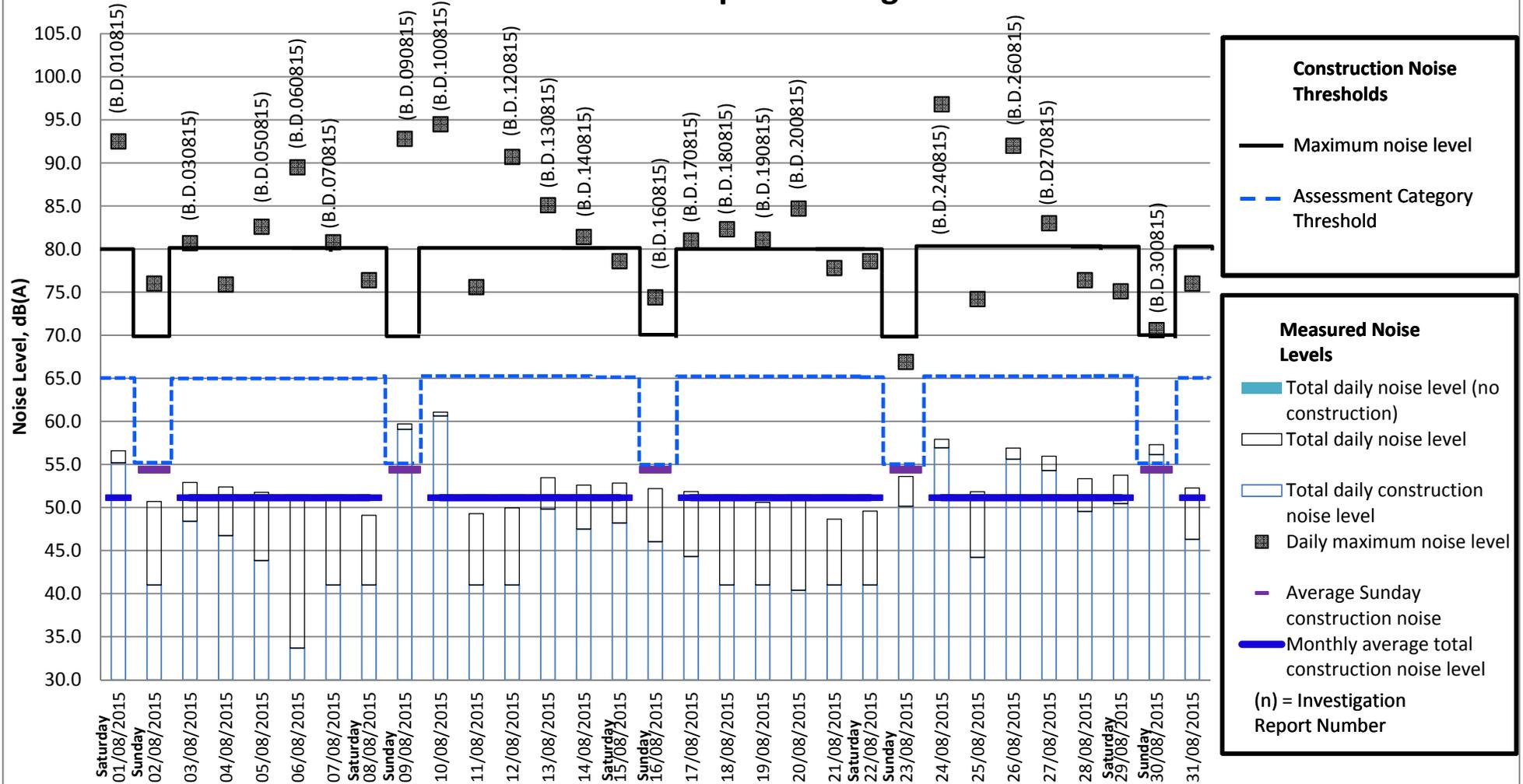
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APPENDIX A

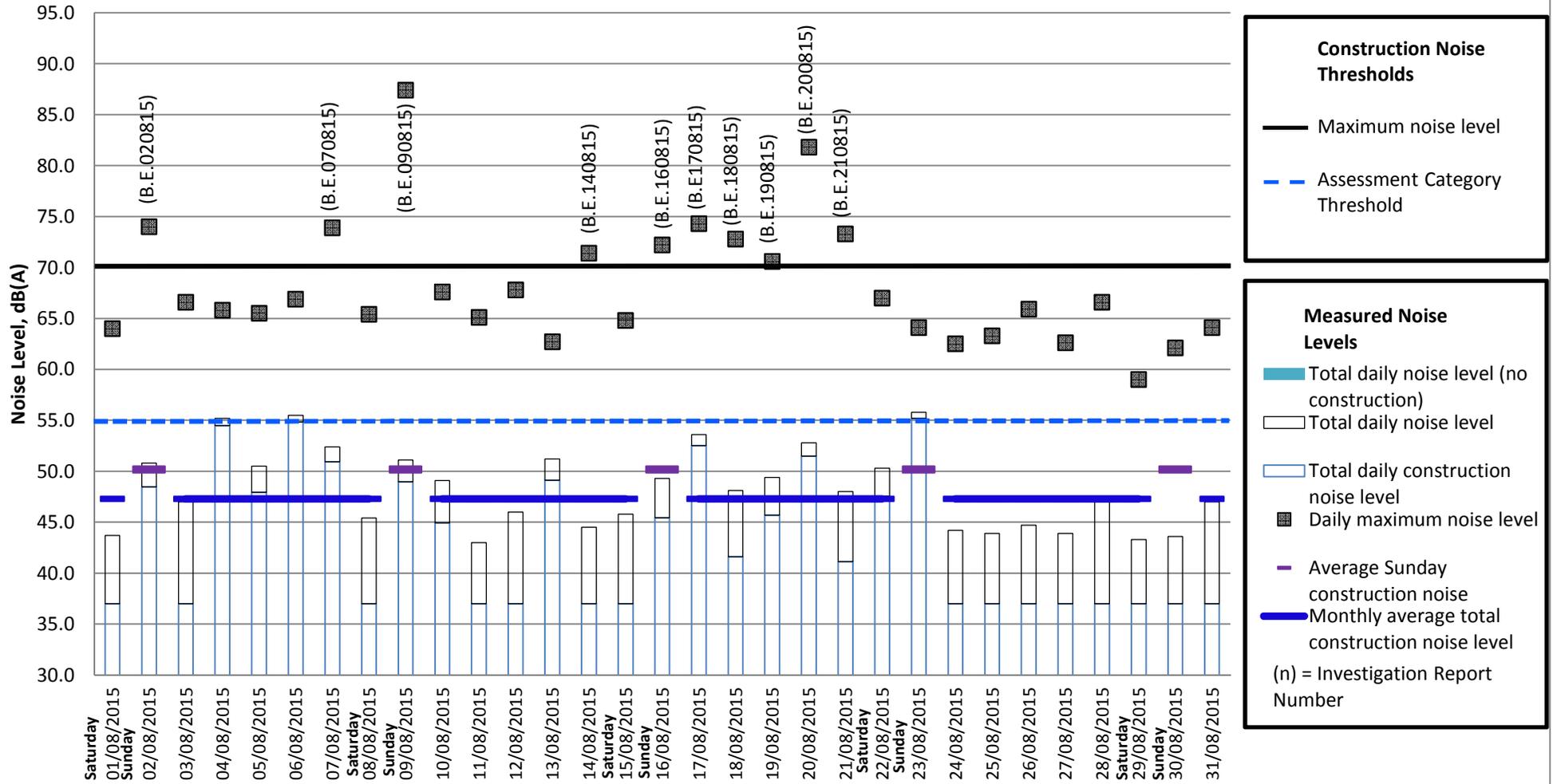
Measured Daytime Noise Levels at Butlaw Fisheries

Measurement period: August 2015



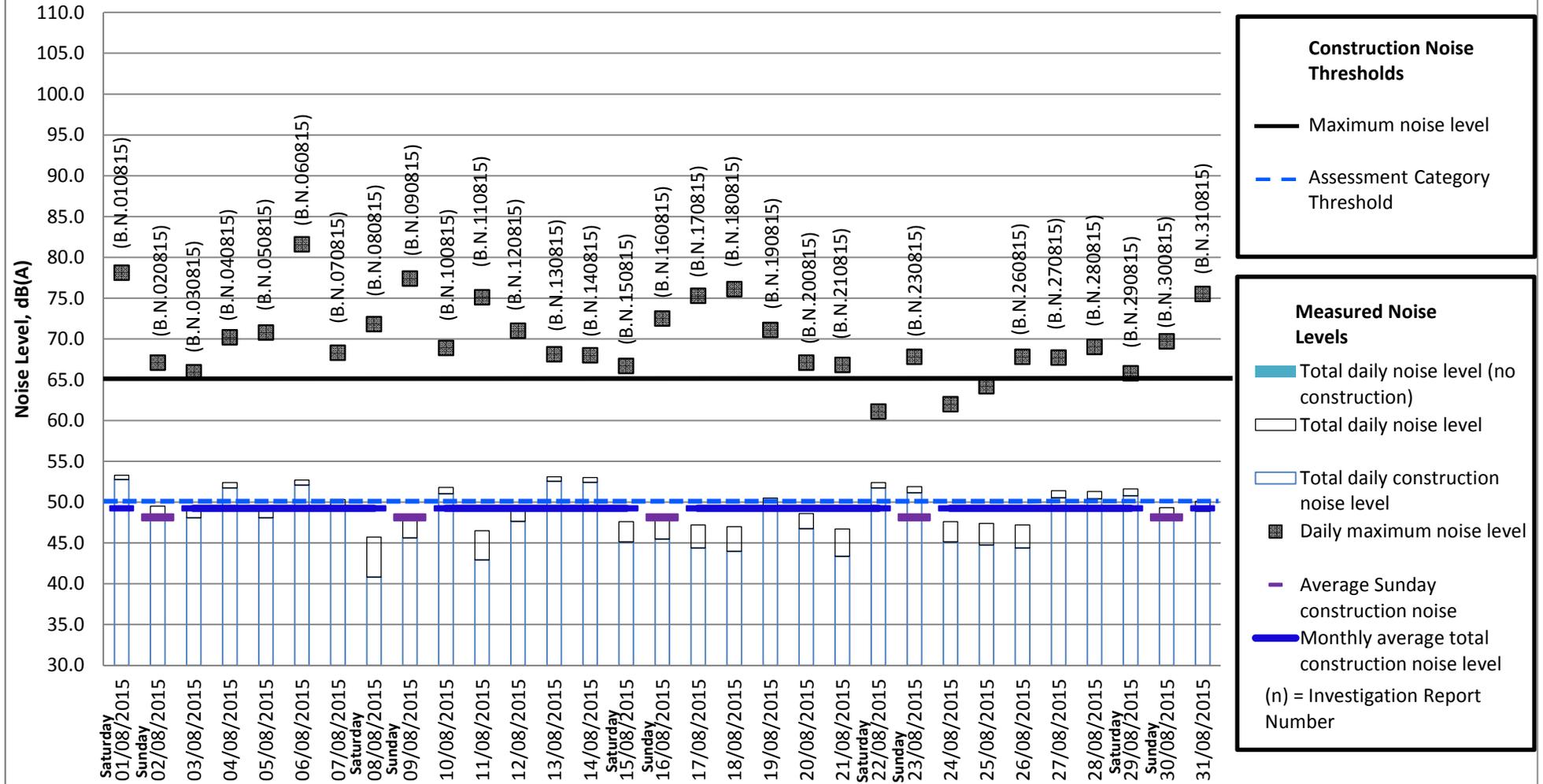
Measured Evening Noise Levels at Butlaw Fisheries

Measurement period: August 2015



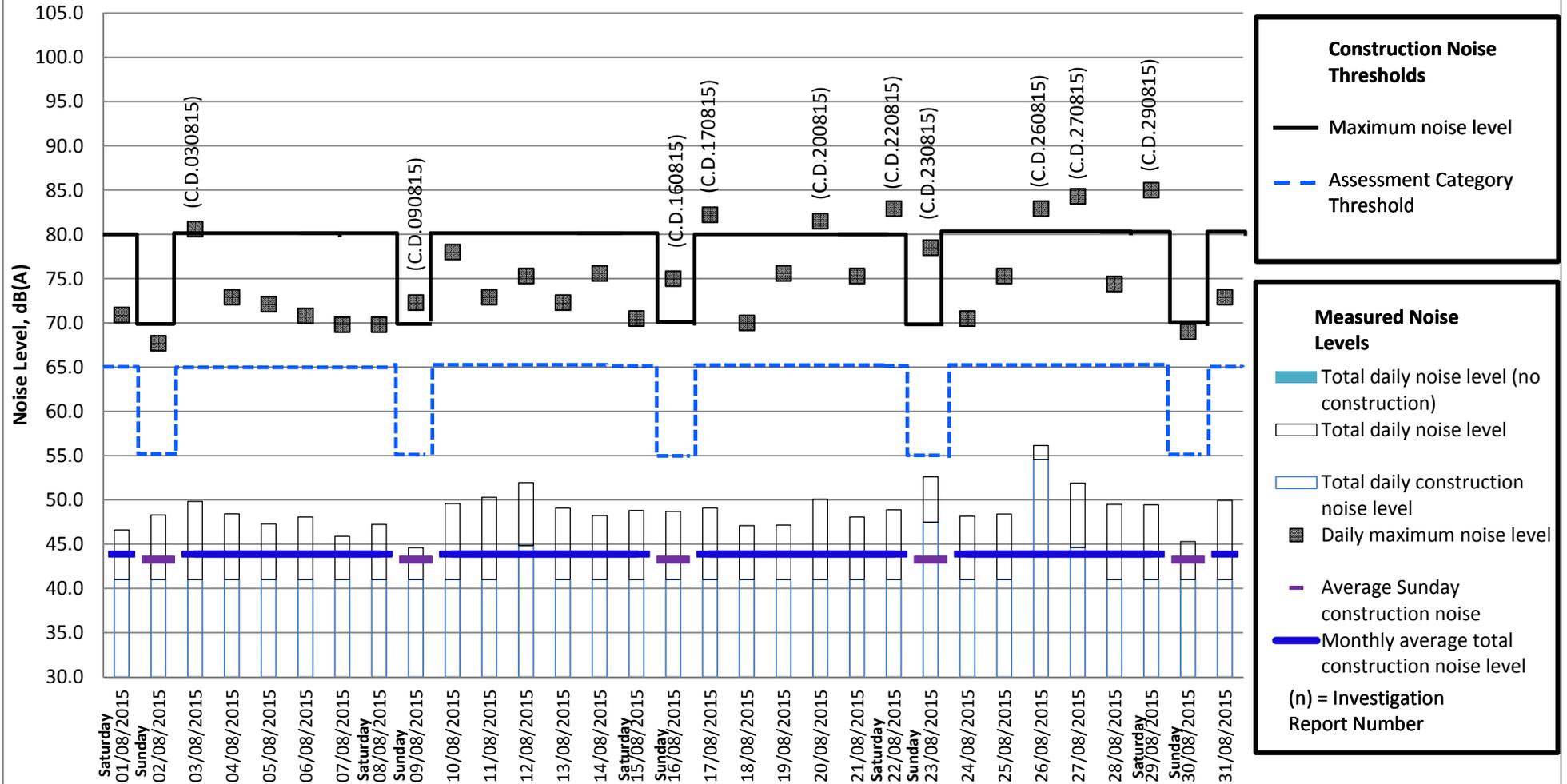
Measured Night time Noise Levels at Butlaw Fisheries

Measurement period: August 2015



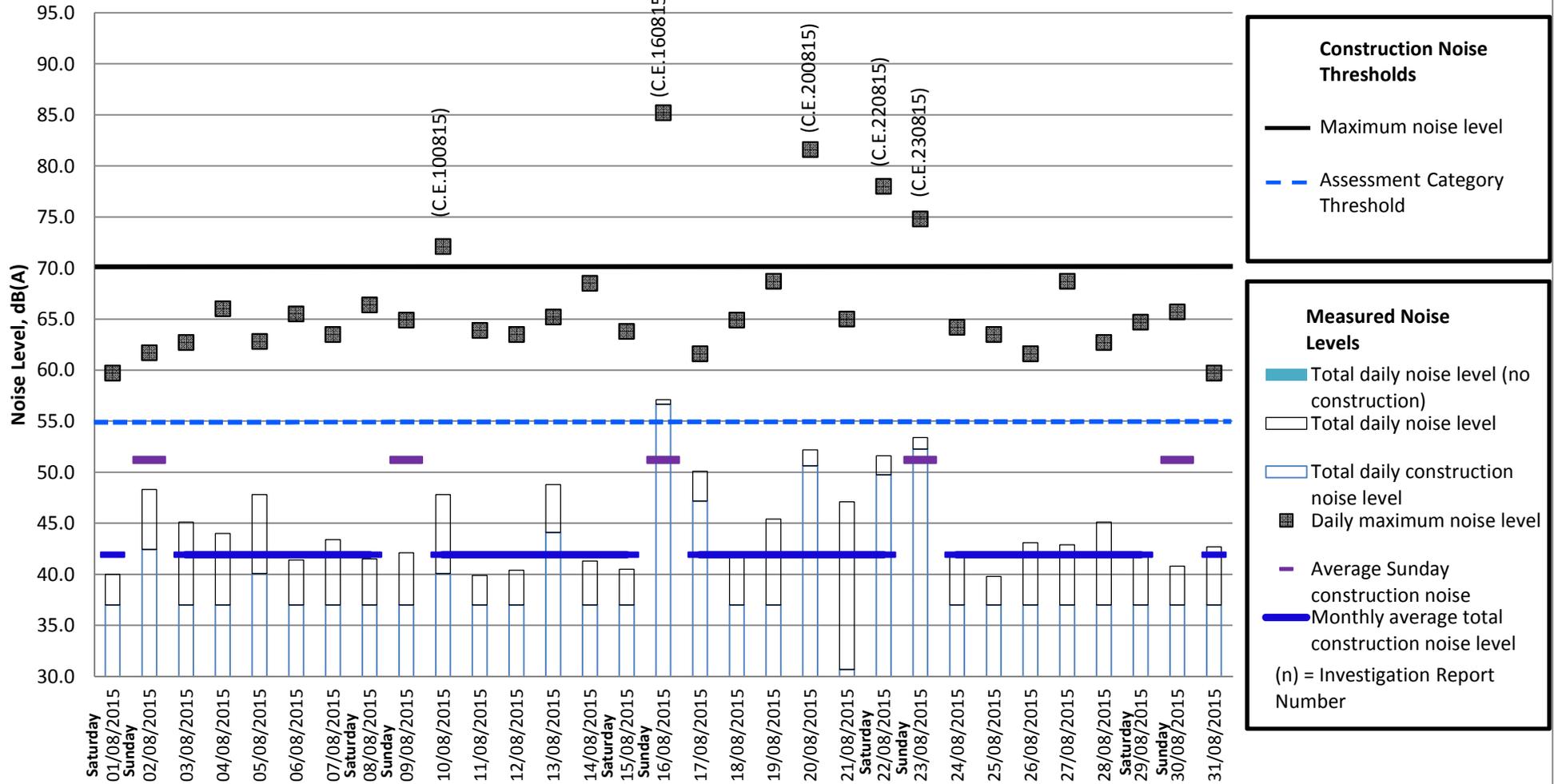
Measured Daytime Noise Levels at Clufflat

Measurement period: August 2015

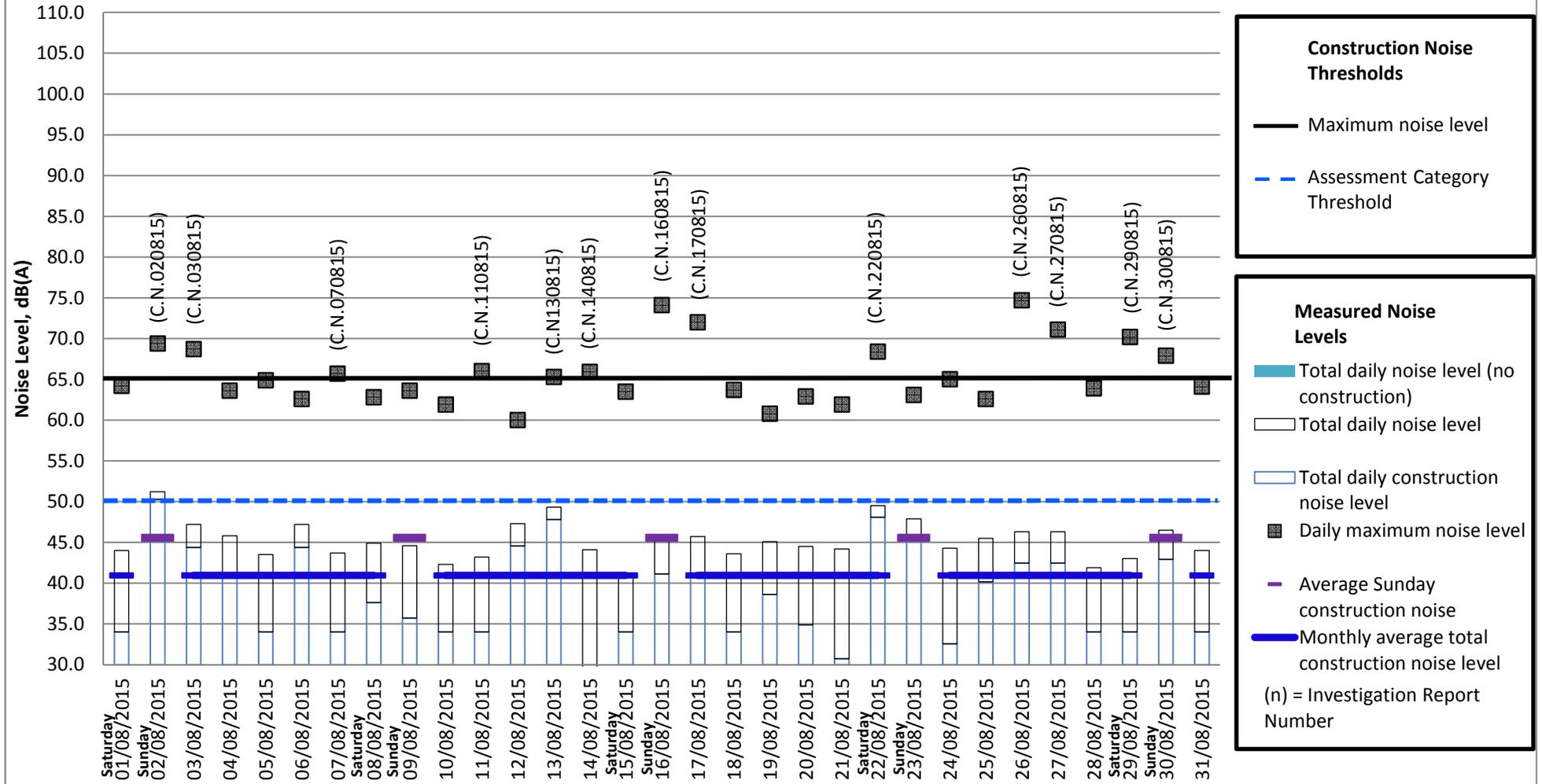


Measured Evening Noise Levels at Clufflat

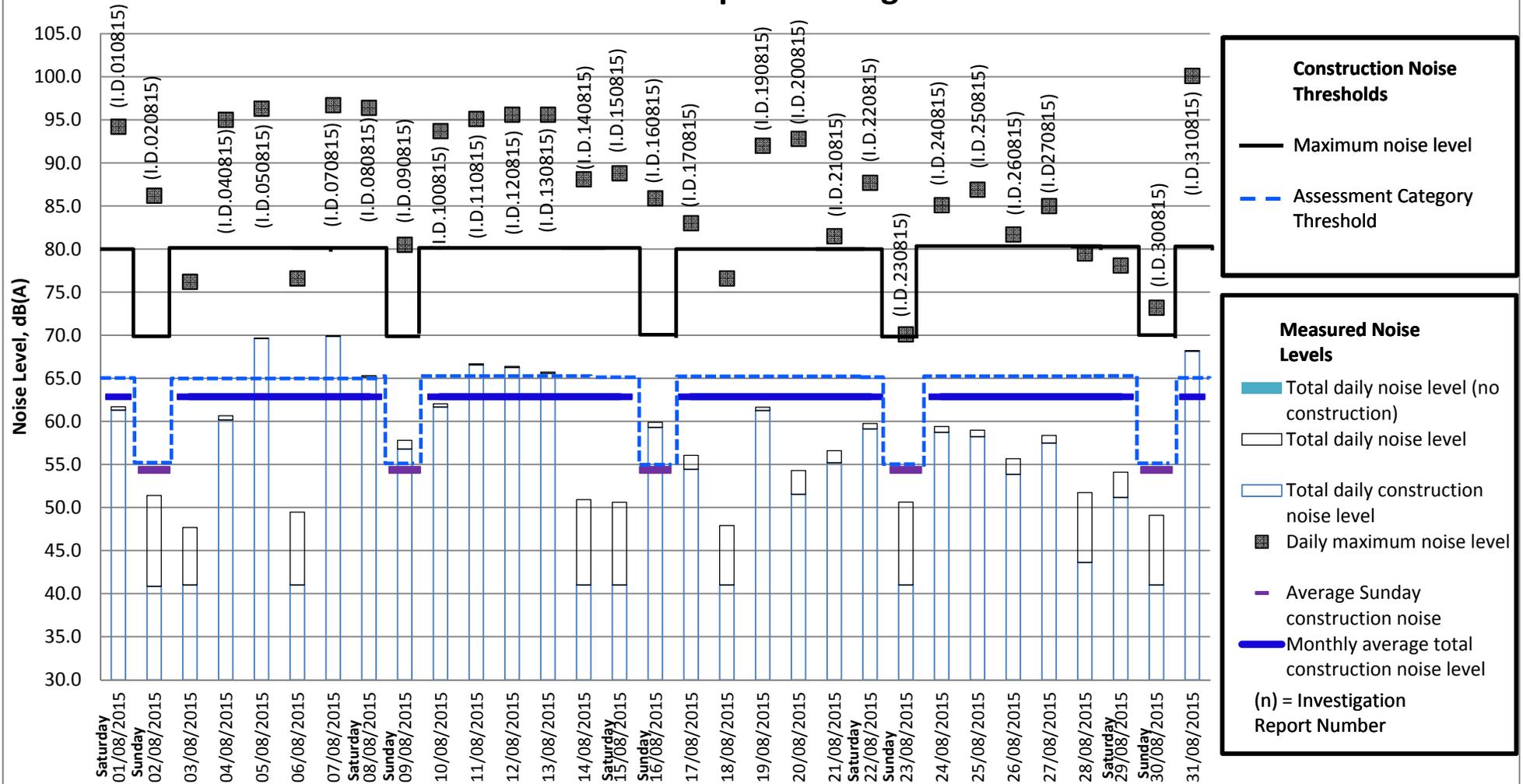
Measurement period: August 2015



Measured Night time Noise Levels at Clufflat Measurement period: August 2015

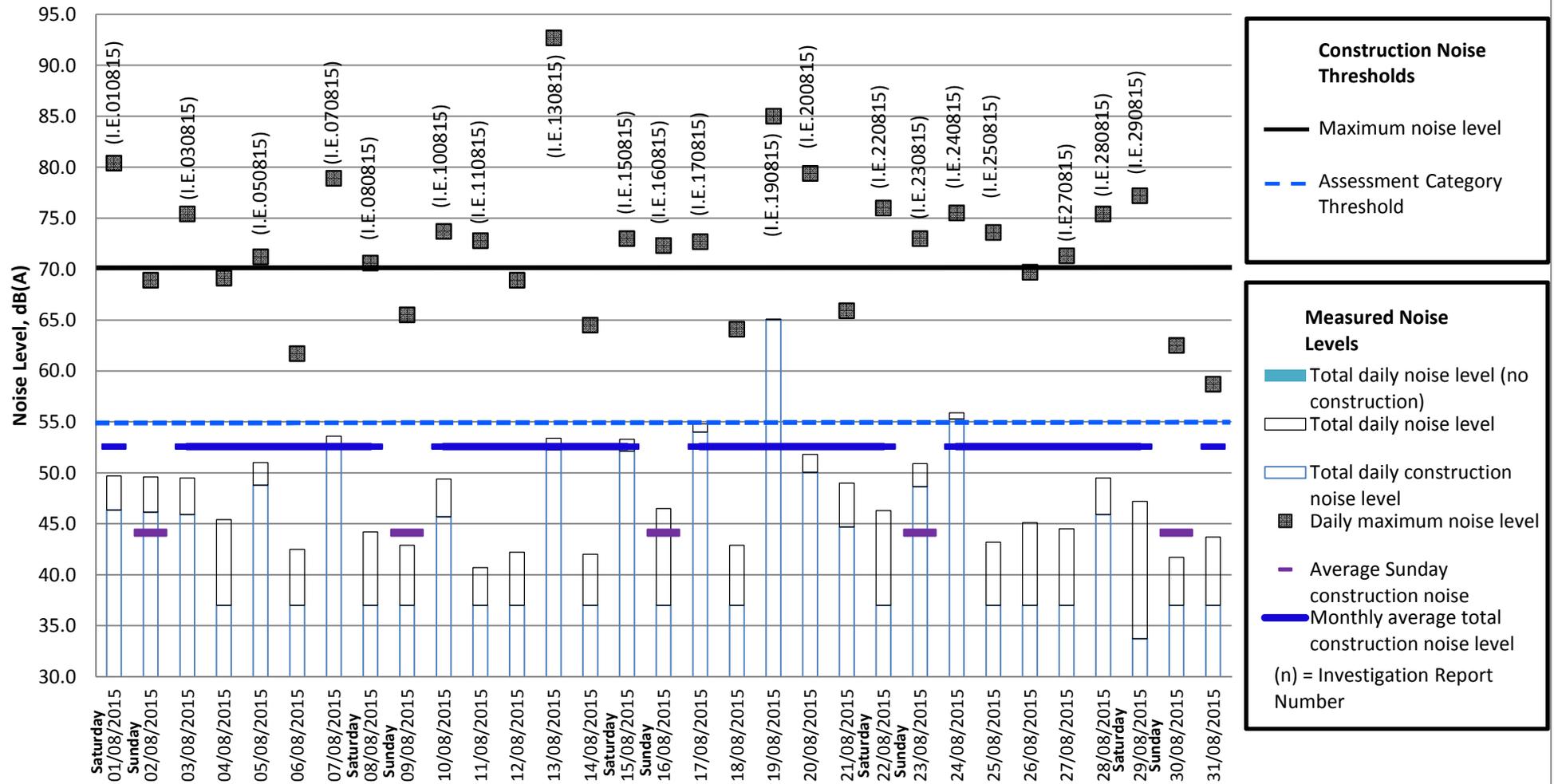


Measured Daytime Noise Levels at Inchgarvie Measurement period: August 2015



Note: After investigation, it was concluded that the exceedances of the LAeq ' Total at Inchgarvie Lodge on the 5th, 7th and 31st August were caused by residential building works

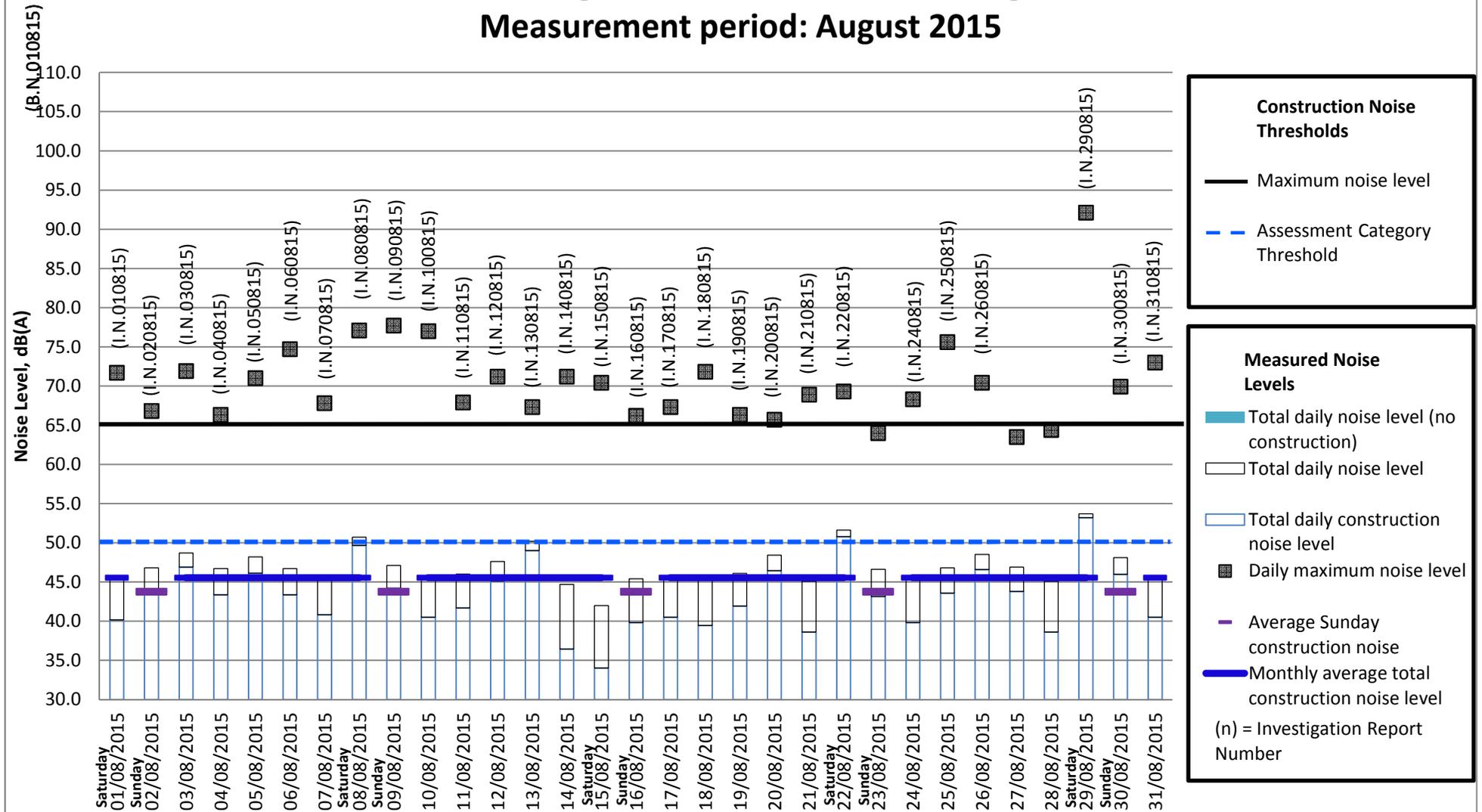
Measured Evening Noise Levels at Inchgarvie Measurement period: August 2015



Note: After investigation, it was concluded that the exceedances of the LAeq 'Total Daily Construction' on the 19th August were caused by residential building works

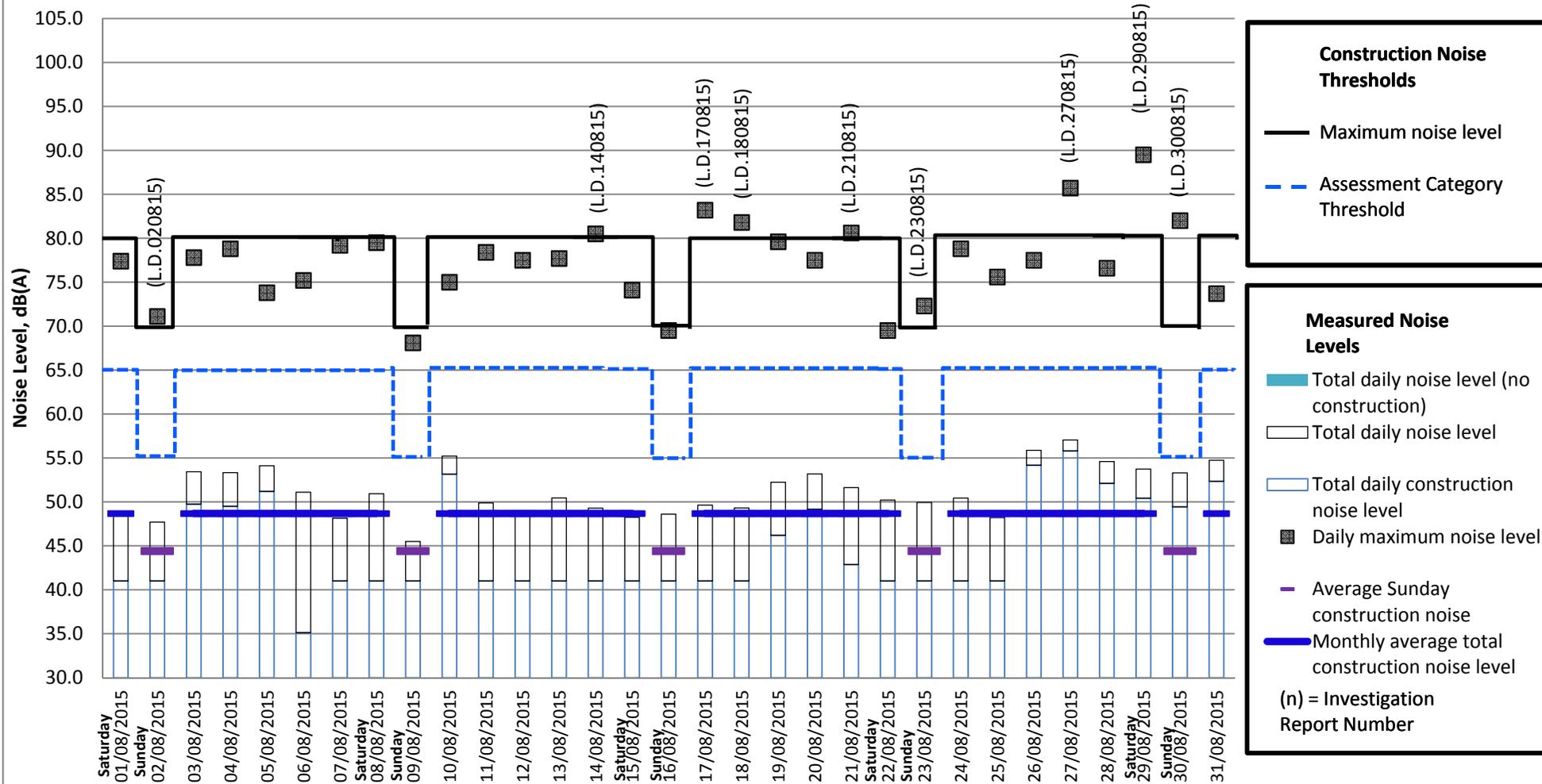
Measured Night time Noise Levels at Inchgarvie

Measurement period: August 2015

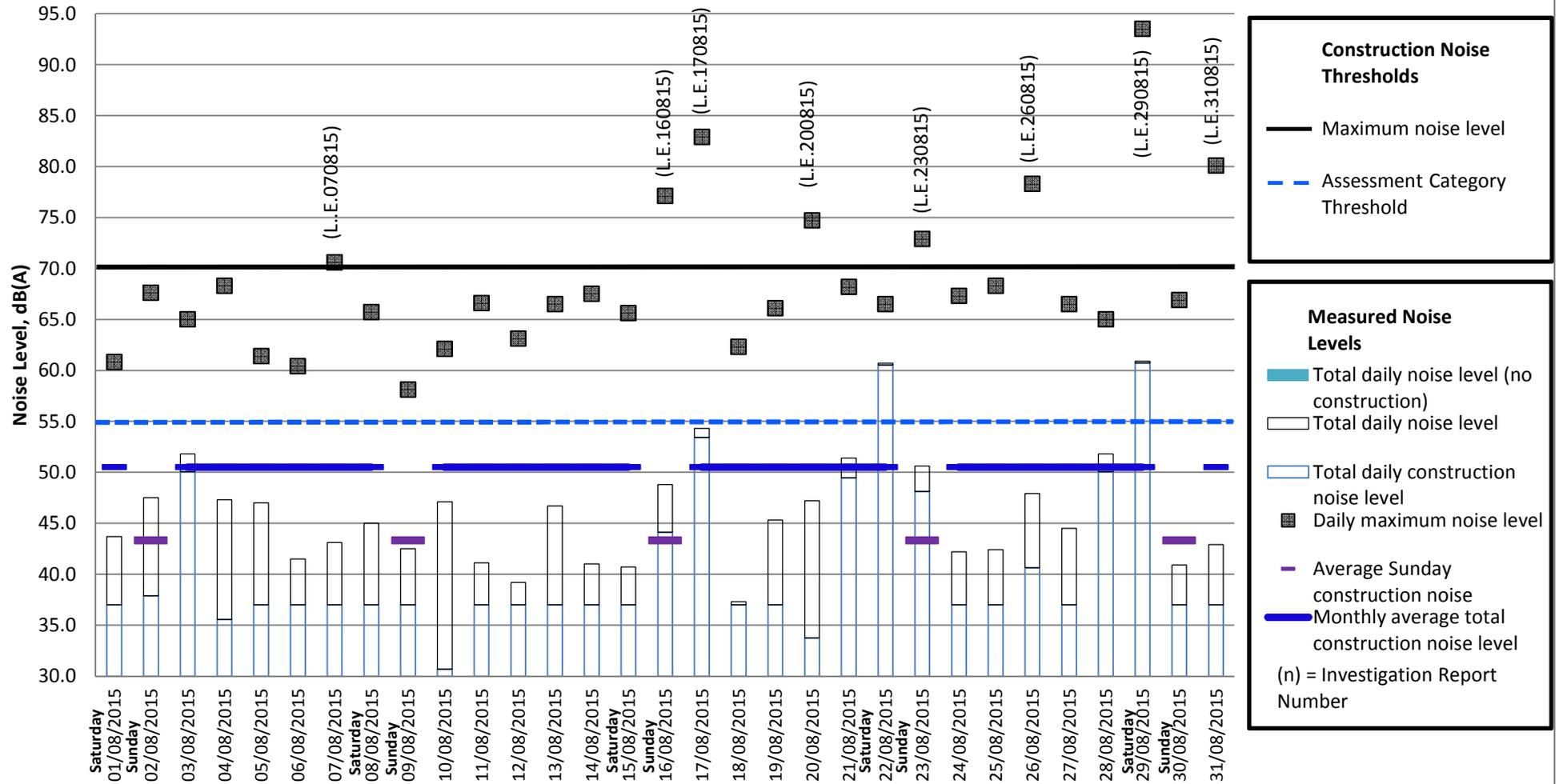


Measured Daytime Noise Levels at Linn Mill

Measurement period: August 2015



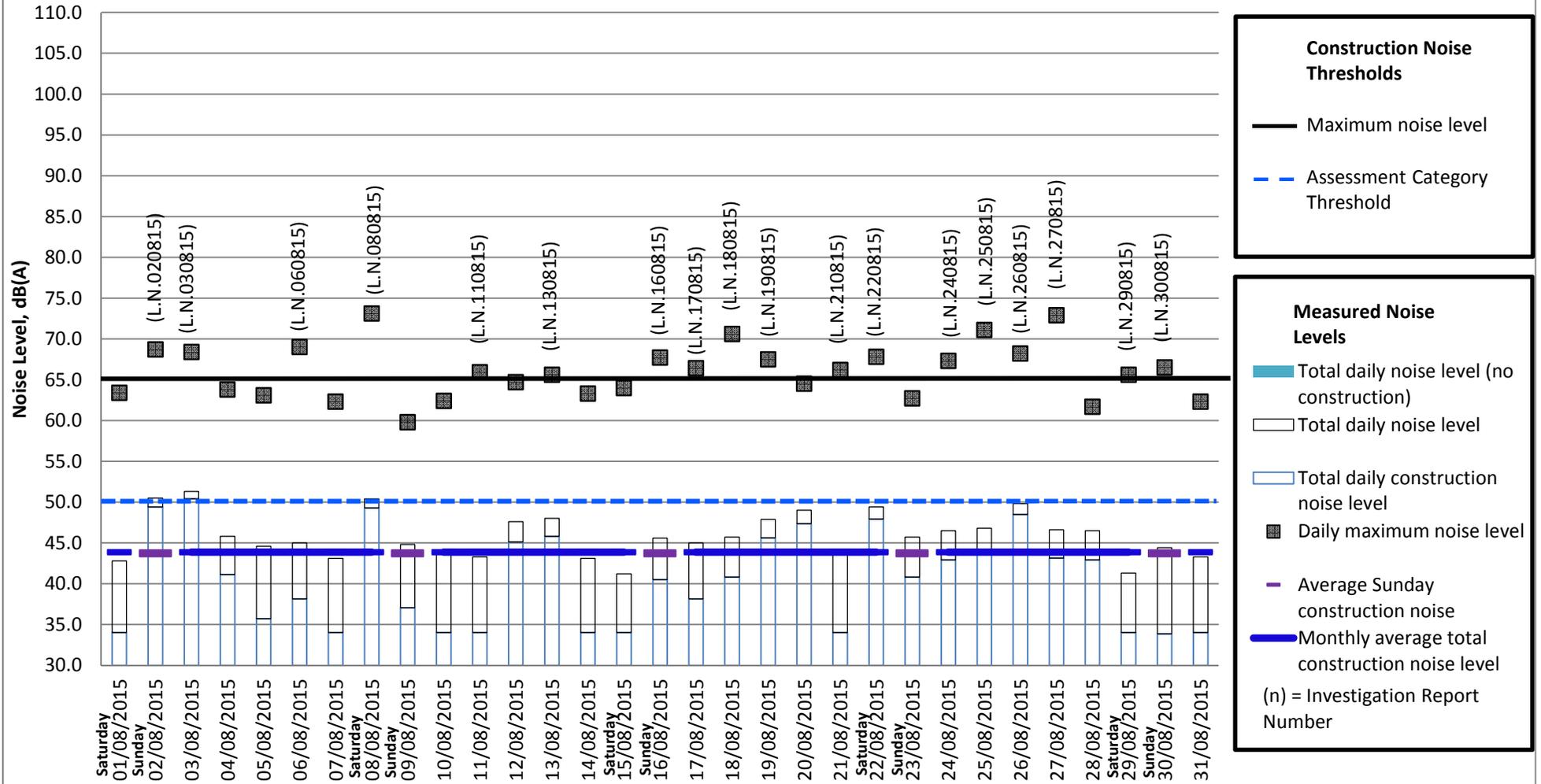
Measured Evening Noise Levels at Linn Mill Measurement period: August 2015



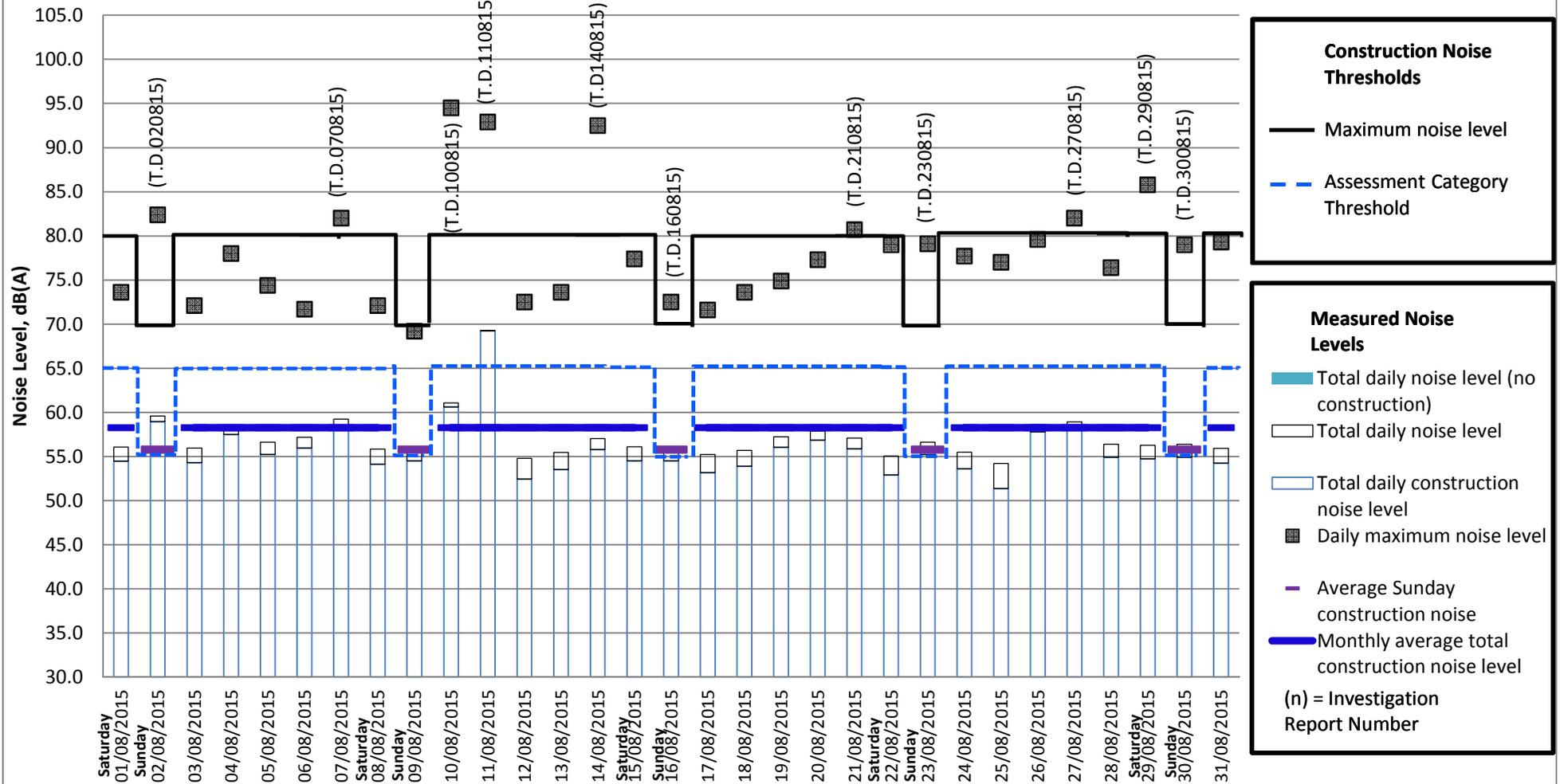
Note: With regards to the exceedances of the LAeq 'Total Daily Construction' on the 22nd August, it was concluded that there was no construction work being carried out in the area at this time. Exceedances of the LAeq 'Total Daily Construction' on the 29th August were caused by residents

Measured Night time Noise Levels at Linn Mill

Measurement period: August 2015



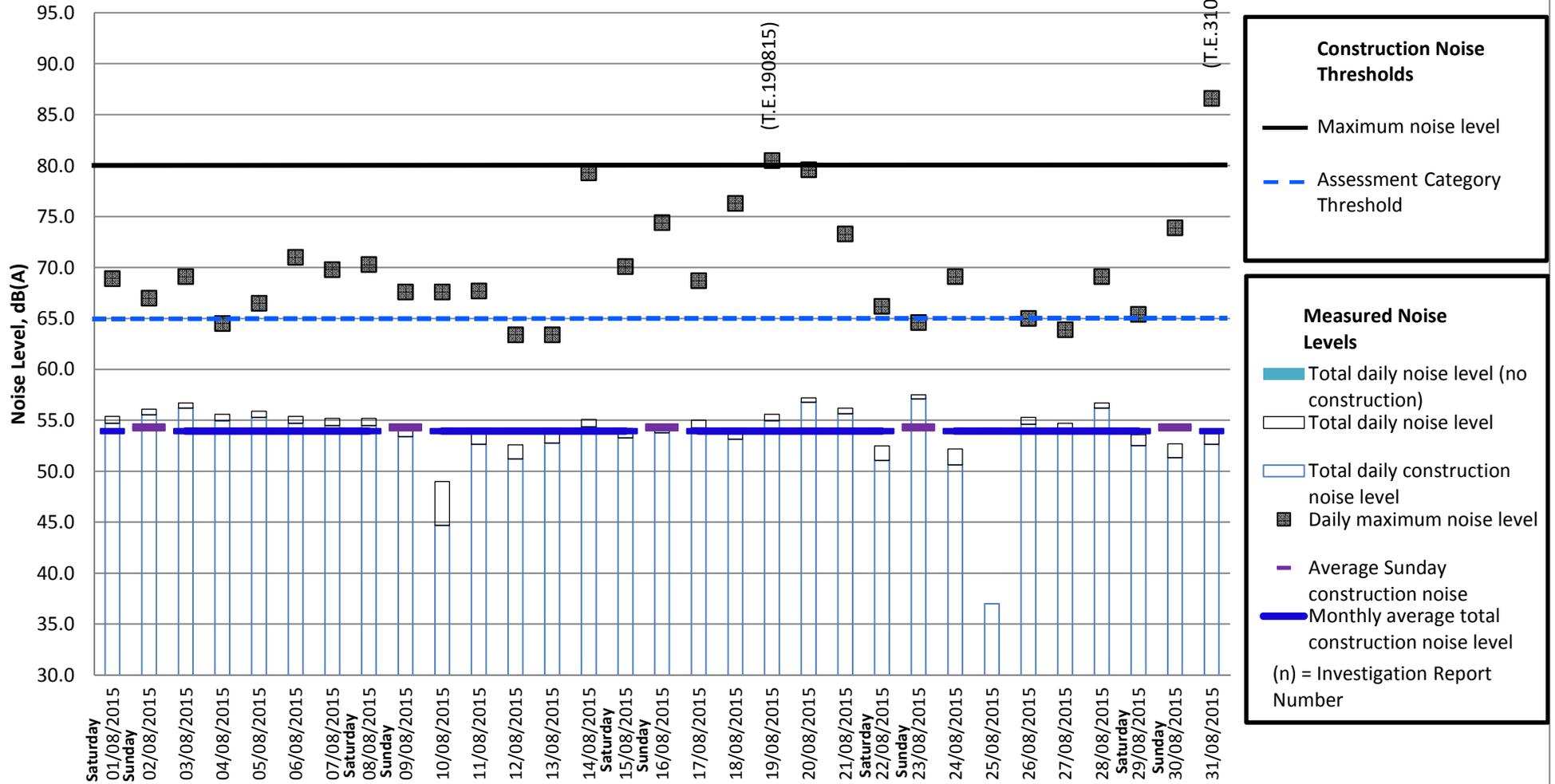
Measured Daytime Noise Levels at Tigh-Na Grian Measurement period: August 2015



Note: After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 11th August was caused by birds.

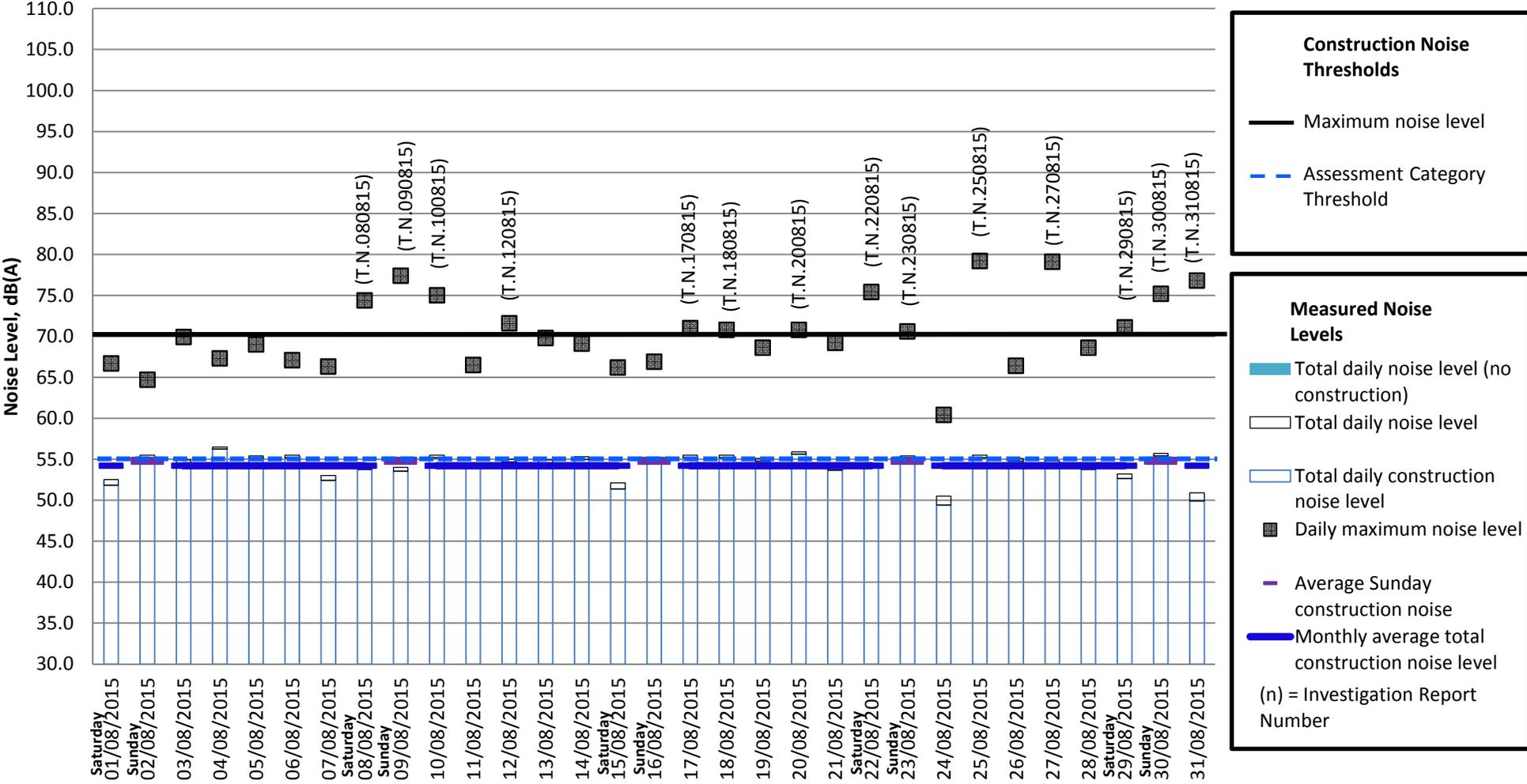
Measured Evening Noise Levels at Tigh-Na Grian

Measurement period: August 2015



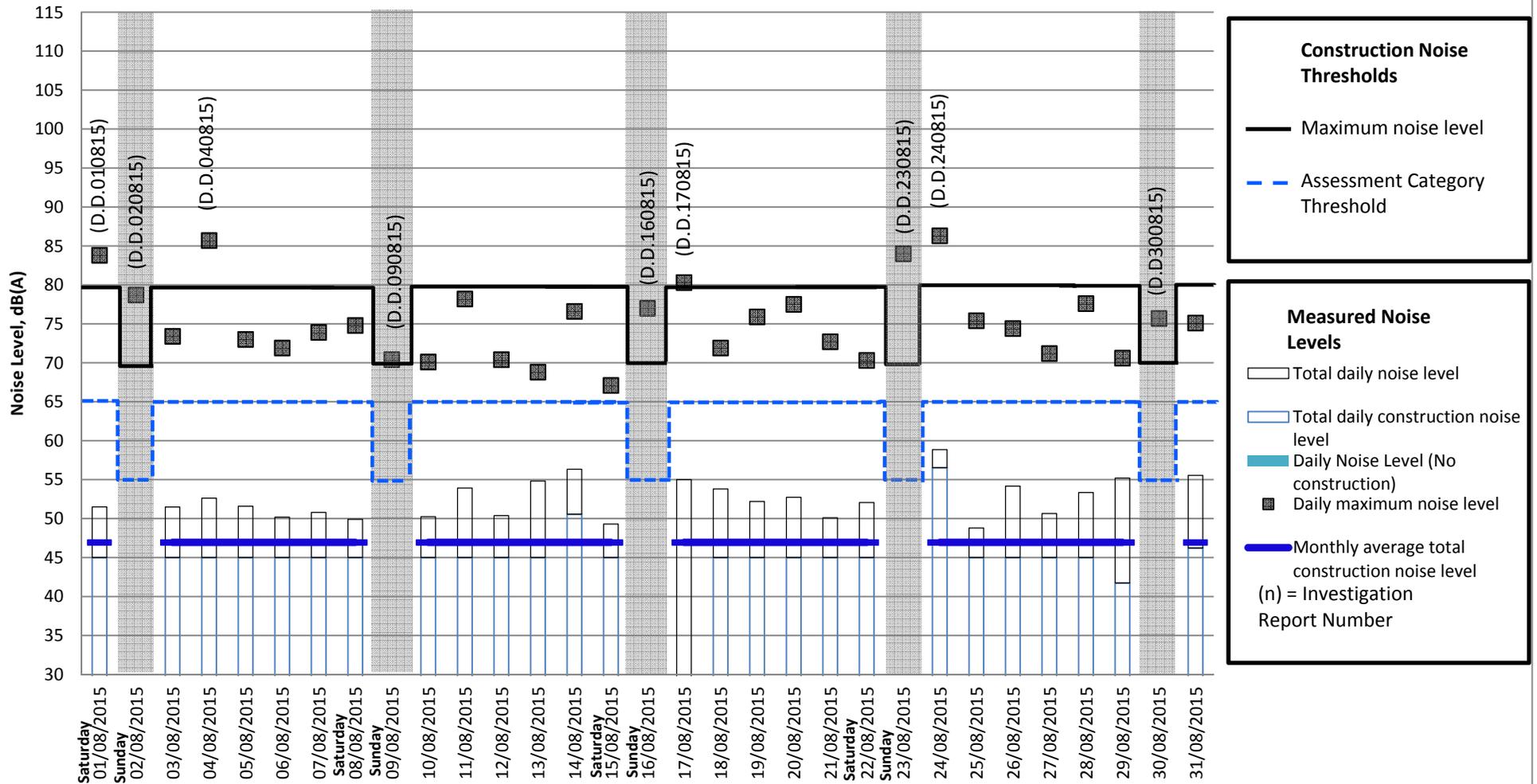
Measured Night time Noise Levels at Tigh-Na Grian

Measurement period: August 2015



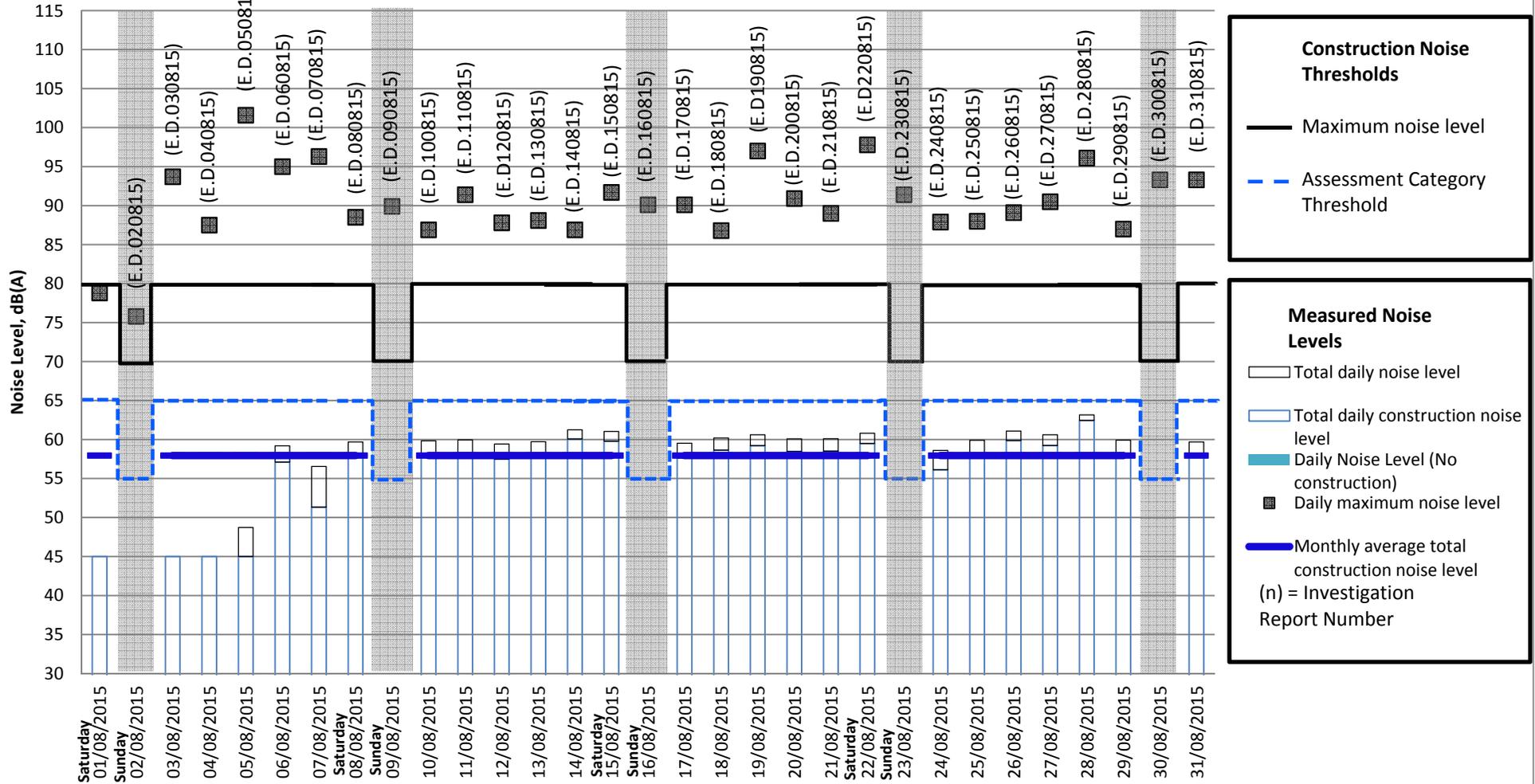
Measured Daytime Noise Levels at Dundas Home Farm

Measurement period: August 2015



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

Measured Daytime Noise Levels at Echline Measurement period: August 2015



Construction Noise Thresholds

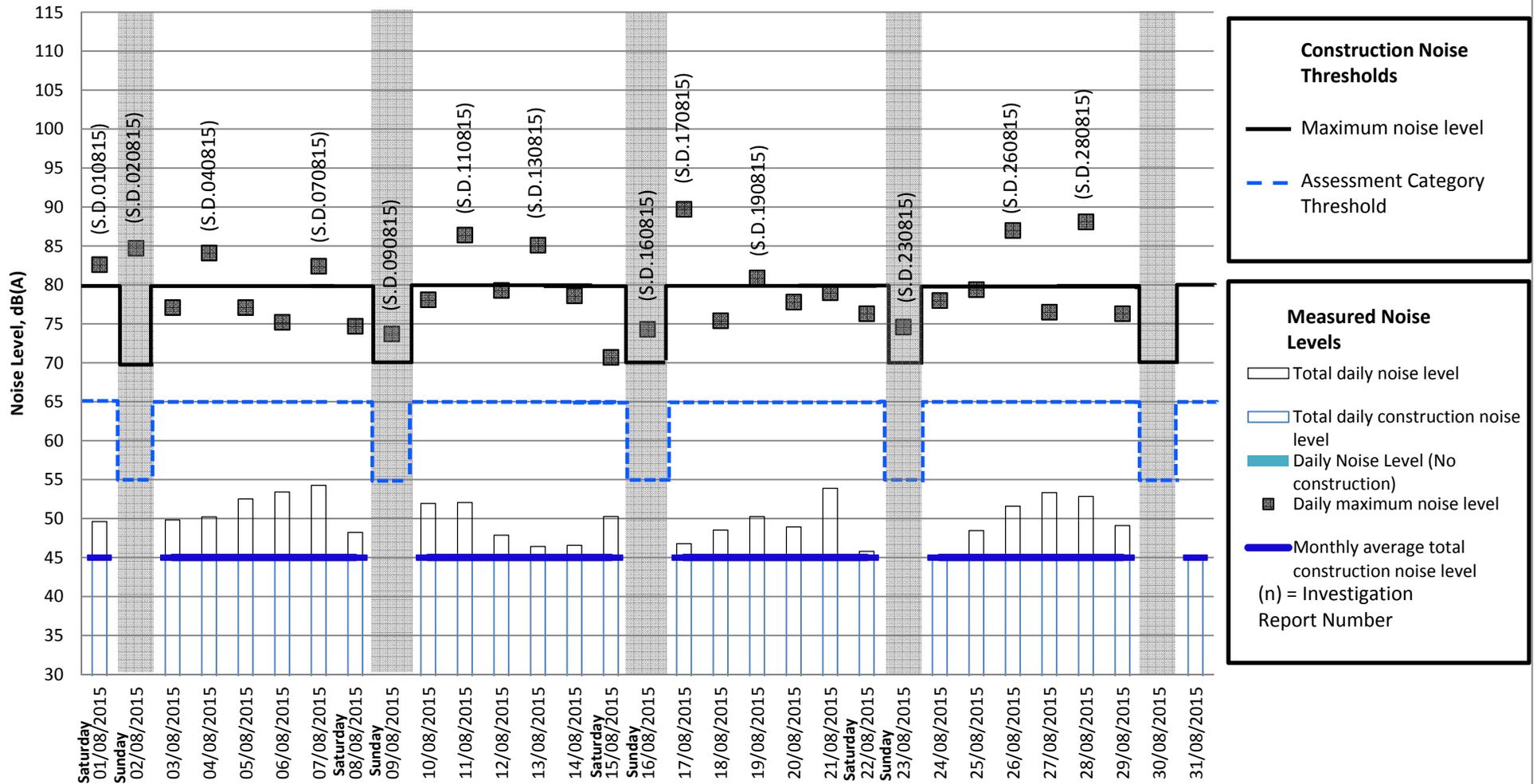
- Maximum noise level
- Assessment Category Threshold

Measured Noise Levels

- Total daily noise level
- Total daily construction noise level
- Daily Noise Level (No construction)
- Daily maximum noise level
- 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.

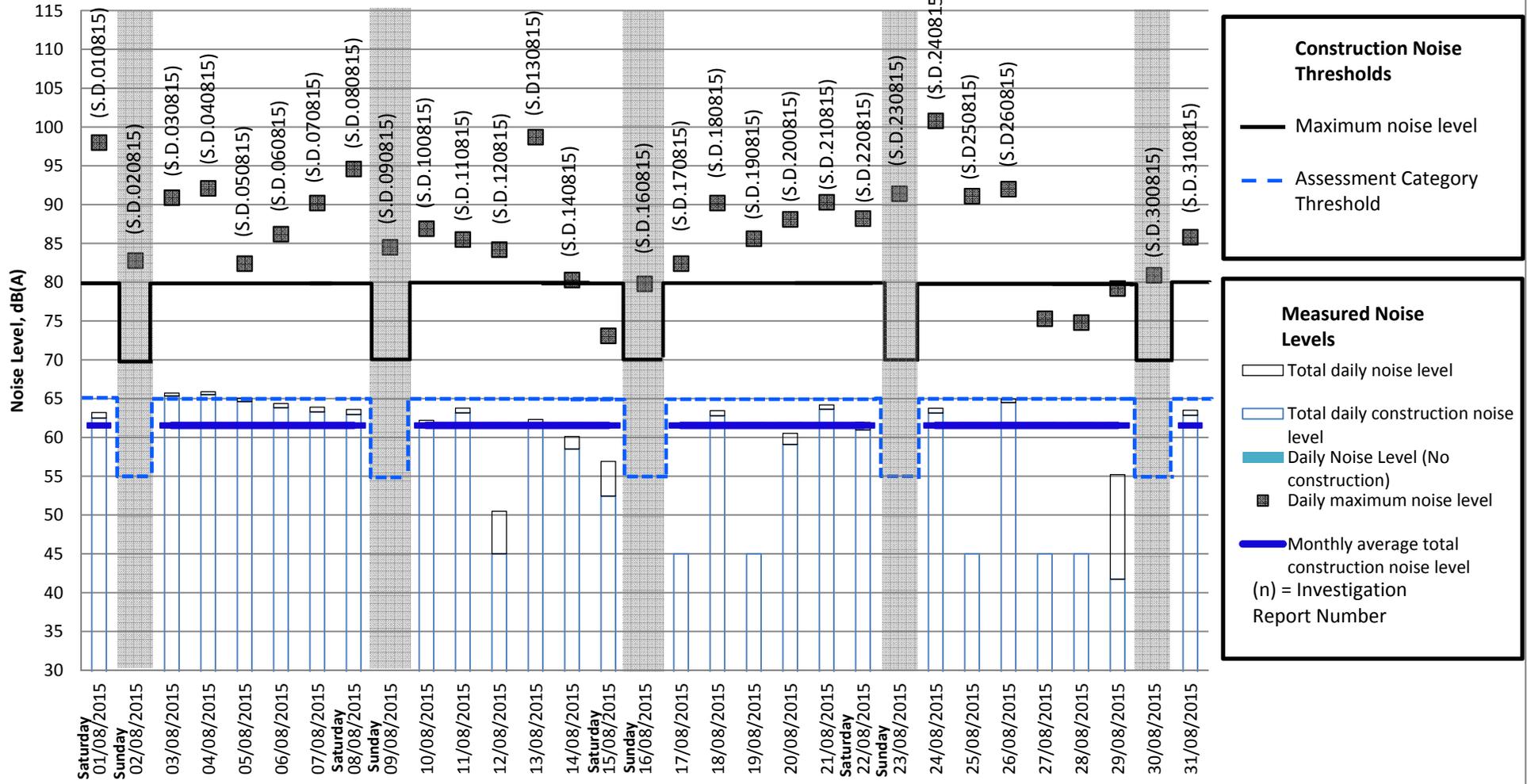
Measured Daytime Noise Levels at Springfield Measurement period: August 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted. There is no data on the 30th and 31st of August due to a problem with the noise monitor

Measured Daytime Noise Levels at Scotstoun

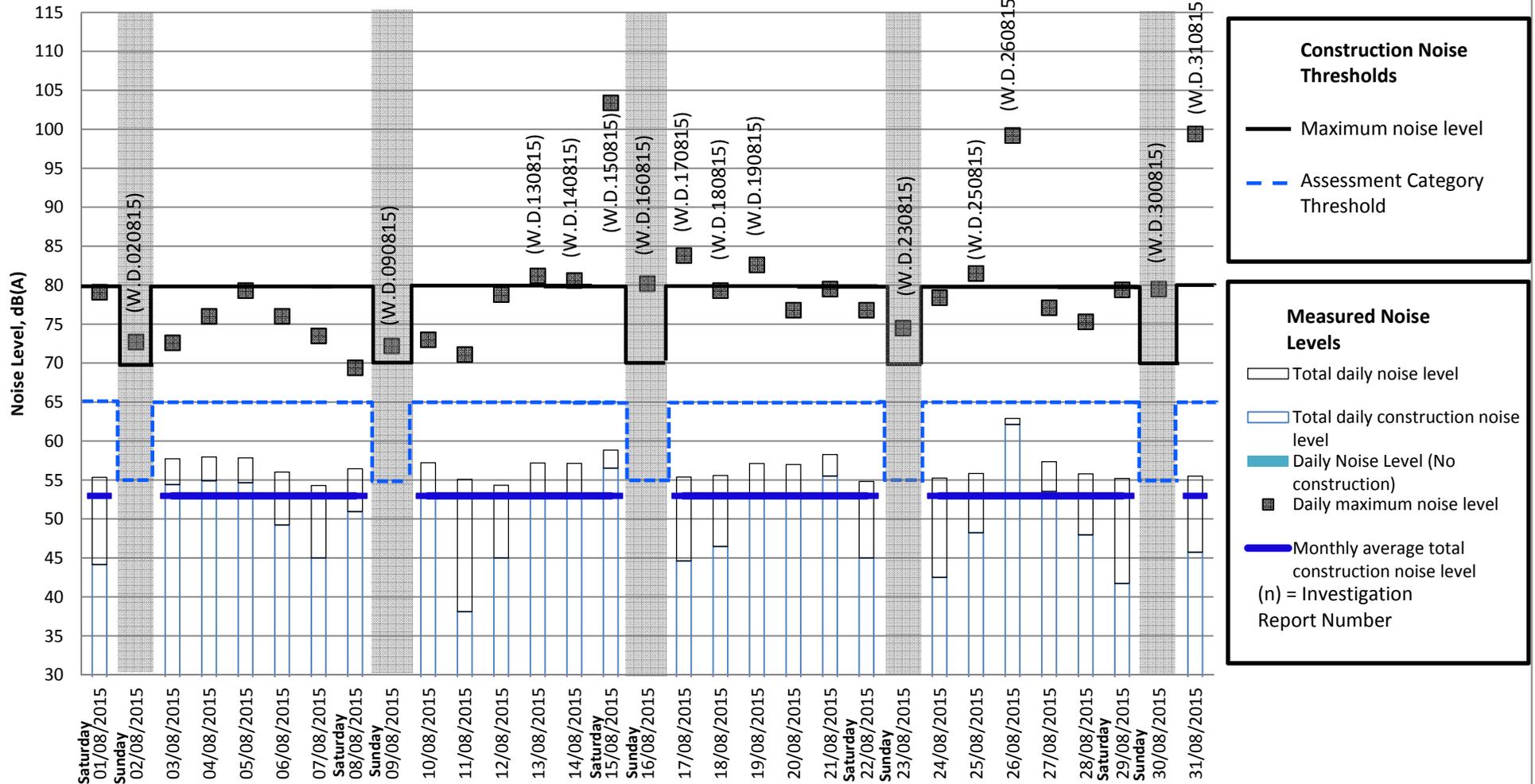
Measurement period: August 2015



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

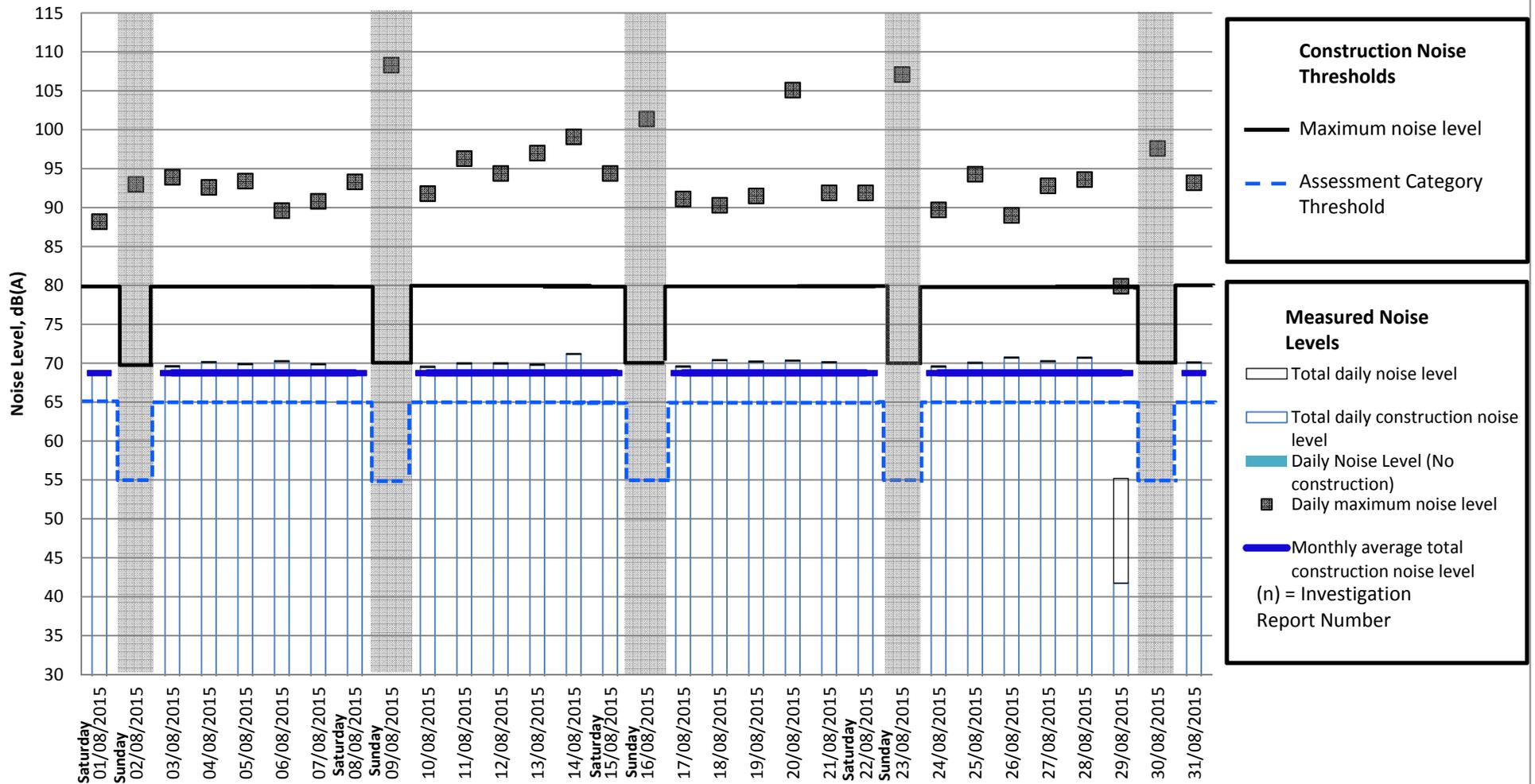
Measured Daytime Noise Levels at Whinnyhill

Measurement period: August 2015



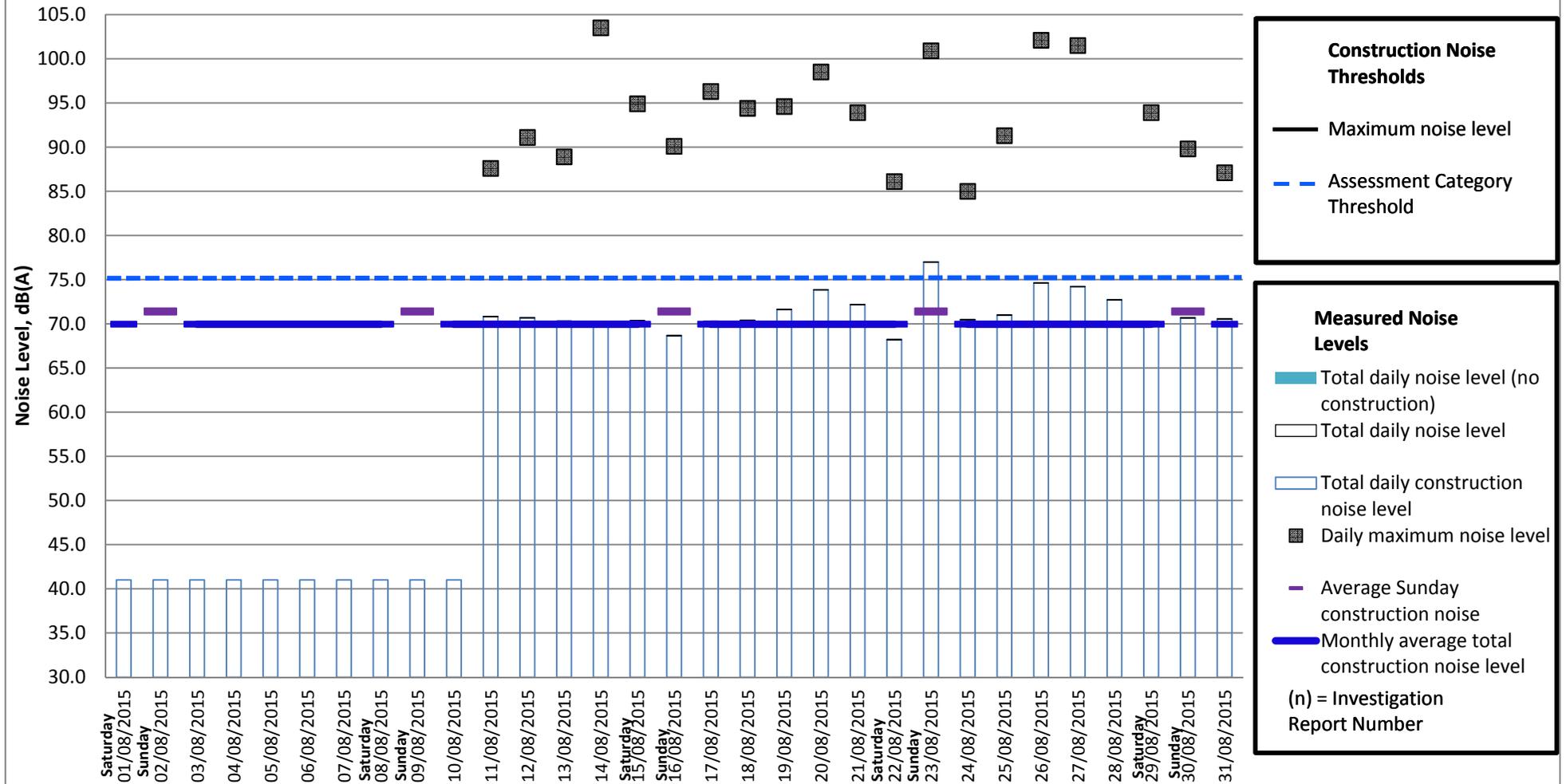
Note: The grey areas of the chart represent days on which no construction works have been conducted.

Measured Daytime Noise Levels at Newton Measurement period: August 2015



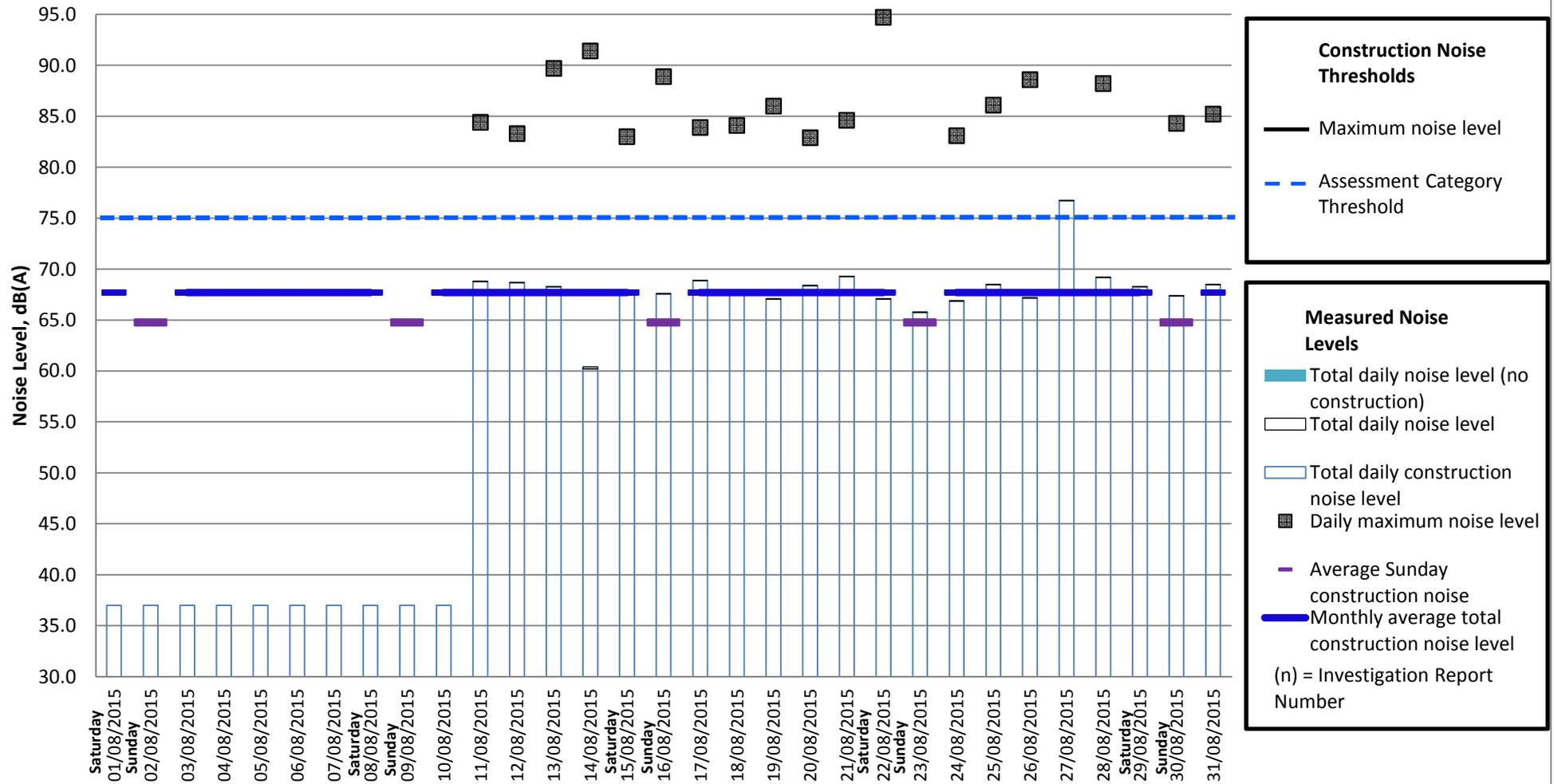
Note: The grey areas of the chart represent days on which no construction works have been conducted. It should be noted that the measured noise levels Mon - Fri can not be attributed to construction works due to the considerable distance (1.75 kilometers) between this monitoring location and the closest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

Measured Daytime Noise Levels at North Leg Measurement period: August 2015



Note: Communication with the monitor was repaired on the 11th August

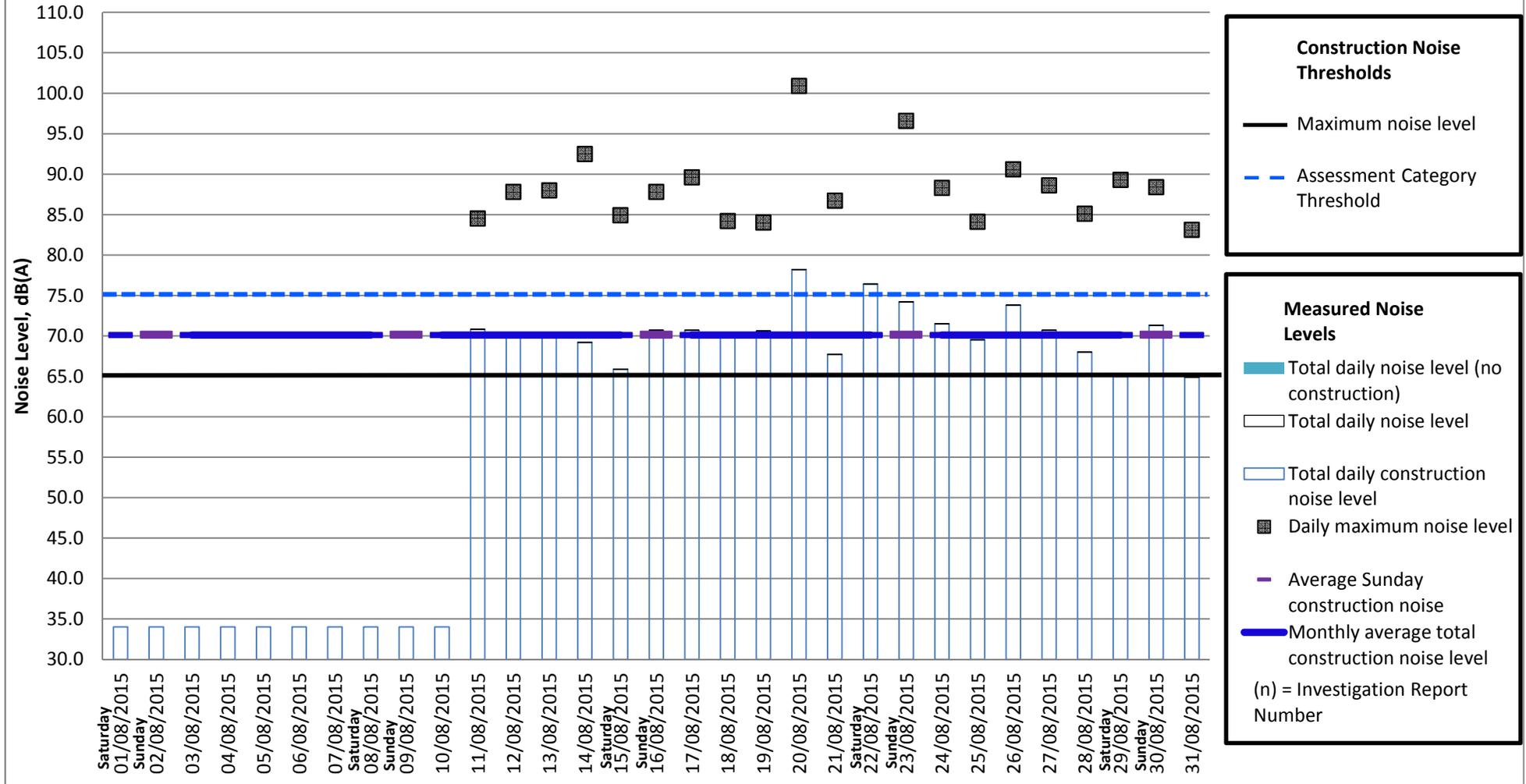
Measured Evening Noise Levels at North Leg Measurement period: August 2015



Note: Communication with the monitor was repaired on the 11th August

Measured Night time Noise Levels at North Leg

Measurement period: August 2015



Note: Communication with the monitor was repaired on the 11th August