Contractor

Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

Project

FORTH REPLACEMENT CROSSING

Document title

CONSTRUCTION NOISE MONITORING REPORT: NOVEMBER 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 November 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 November 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 November 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 November 2015
M1	Whinny Hill	Network	• Earth Works/Fill Placement • New Ferrytoll Road • FT03 & FT04 Bridge Works • FT09 Works • FT19 Works • Roadworks
M3	Tigh-Na-Grian	Crossing	• Central Tower rebar, formwork, concreting works, deck lifting & stay cable installation works • North Tower rebar, formwork, concreting works,deck lifting and stay cable installation works • Pier N1 rebar formwork & concrete works • AVN works • North Tower deck section lifts and stay cable installation
M4	North Leg	Crossing	• Central Tower rebar, formwork, concreting works stay cable installation works • North Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works. • Pier N1 rebar formwork & concrete works • North Tower deck section lifts and stay cable installation
M6	Port Edgar	• Crossing	• Central Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works • South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works. • Pier S2 rebar, formwork & concrete works • Pier S1 rebar, formwork & concrete works
M7	Butlaw Fisheries	Crossing	• Pier S1,rebar,formwork & concrete works • Pier S2 rebar,formwork and concrete work • Central Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works • South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works
M10	Inchgarvie Lodge	Crossing	• AVS ,Scaffolding,shuttering and reinforcement to deck • Pier S1, rebar, formwork & concrete works. • Central Tower rebar, formwork, concreting works ,deck section lifts and stay cable installation works. • South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works. • South Tower Deck Section Lifts

			• Main carriageway earthworks
M11	Linn Mill	Network (close proximity to Crossing)	• AVS scaffolding, shuttering and reinforcement to deck • No night time or Sunday construction in the vicinity • Main carriageway roadworks
M13	Clufflat Brae	Crossing / Network	• AVS scaffolding, shuttering and reinforcement to deck • No night time or Sunday construction in the vicinity • Main carriageway roadworks
M14	Springfield	Network	• AVS scaffolding, shuttering and reinforcement to deck • No night time or Sunday construction in the vicinity • Main carriageway roadworks
M15	Echline	Network	• AVS scaffolding, shuttering and reinforcement to deck • No night time or Sunday construction in the vicinity • Main carriageway roadworks
M16	Scotstoun	Network	Footpath works • Utility works • B800 Piling 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). • B800 Bridge Demolition • SB bus link
M17	Dundas Home Farm	Network	• Utility works • B800 piling works • B800 South road works including bridge works etc… • Main carriageway works • B800 Bridge Demolition • SB bus link
M18	Newton	Network	• 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-time, during which construction works were conducted. Results for the North leg were unavailable during this reported period due to accessibility.

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 November 2015. For evening and night time periods, there were no exceedances of monthly average construction noise during November, with the exception of Butlaw during the night-time periods. There are no exceedances of Sunday averages, with the exception of Butlaw during the night.

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 adverse 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 this month, 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 November it was noted that there was construction related noise at Linn Mill. The exceedances on the 10th, 12th, 14th 17th and 30th November during the day seemed 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 were two construction related exceedances at Tigh-Na-Grain. An exceedance occurred during the night of the 3rd, this was caused by hammering. A brief was given to site staff about keeping quiet at night. The exceedance on the 20th occurred at night and was due to the barge banging. This was a one off incident caused by the weather that night.

3.8 The majority of exceedances at all locations were caused by various noise sources, 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. Ongoing residential building works at Inchgarvie Lodge accounts for the majority of the exceedances at this location.

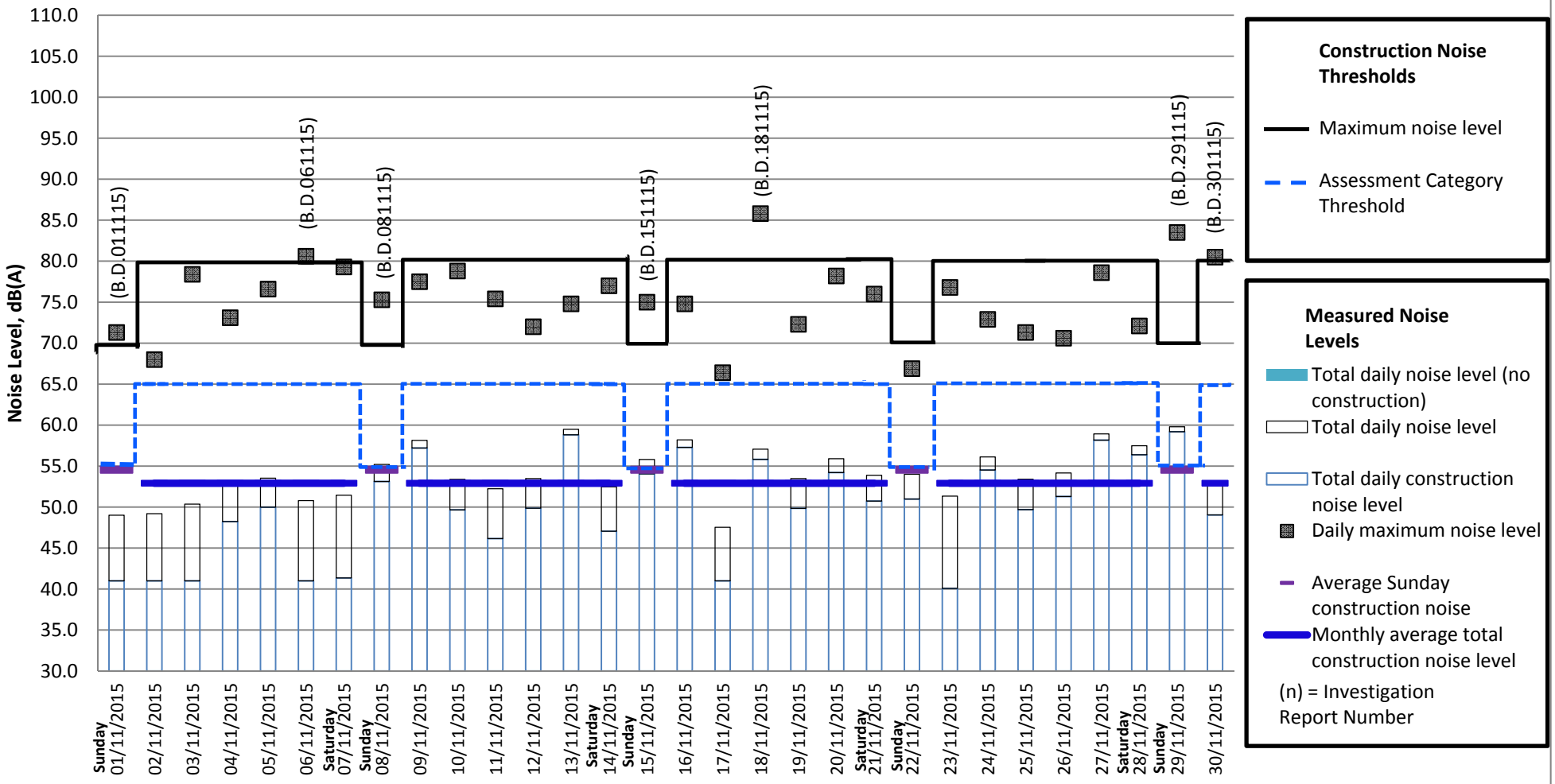
3.9 A summary of the findings for exceedances occurring at each of the locations can be found in Table 2.

Table 2: Summary of Exceedances at Monitoring Locations

Monitoring Location	Summary of Exceedance Details
Butlaw Fisheries	During November the maximum noise threshold was exceeded on 43 occasions (7 day time, 8 evening and 28 night time). Exceedances were attributed to non-construction factors notably birds, traffic, waves and fireworks.
Clufflat Brae	During November the maximum noise threshold was exceeded on 50 occasions (14 daytime, 14 evening and 22 night time). No exceedances were found to be due to construction works. Exceedances were found to be due to birds, residential activity, planes, high winds and fireworks.
Inchgarvie Lodge	During November the maximum noise threshold was exceeded on 39 occasions (12 day time, 11 evening and 16 night time). No exceedances were attributed to construction works. Fireworks and high winds were found to be the main contributing factors to the exceedances in this location. Other factors included birds and vehicle movements.
Linn Mill	During November the maximum noise threshold was exceeded on 45 occasions (16 daytime, 11 evening and 18 night time). The majority of exceedances at this location were due to birds, residents and fireworks. There were 5 instances of construction noise exceeding the threshold (see 3.7)
Tigh-Na-Grian	During November the maximum noise threshold was exceeded on 35 occasions (14 daytime, 2 evening and 19 night time). Exceedances were mainly due to birds. There were 2 instances of construction noise exceeding the threshold (see 3.7)
Dundas Home Farm	During November the maximum noise threshold was exceeded on 17 occasions. The main exceedances were due to residents and birds.
Echline	During November 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, wind and fireworks.
Springfield	During November the maximum noise threshold was exceeded on 16 occasions. These exceedances were due to local residents their pet dog, as well as birds. The monitor is situated within a garden with a dog next door.
Scotstoun	During November the maximum noise threshold was exceeded on 30 occasions. The majority of exceedances were attributed to vehicles passing (including Sundays) on the adjacent road.
Whinny Hill	During November the maximum noise threshold was exceeded on 13 occasions. Exceedances were not due to construction activities. Mostly, exceedances were due to birds, planes, residents and wind.
North Leg	No data is reported in this report is due to accessibility. Recordings taken for data record purposes
Port Edgar	Recordings taken for data record purposes
Newton	Recordings taken for data record purposes

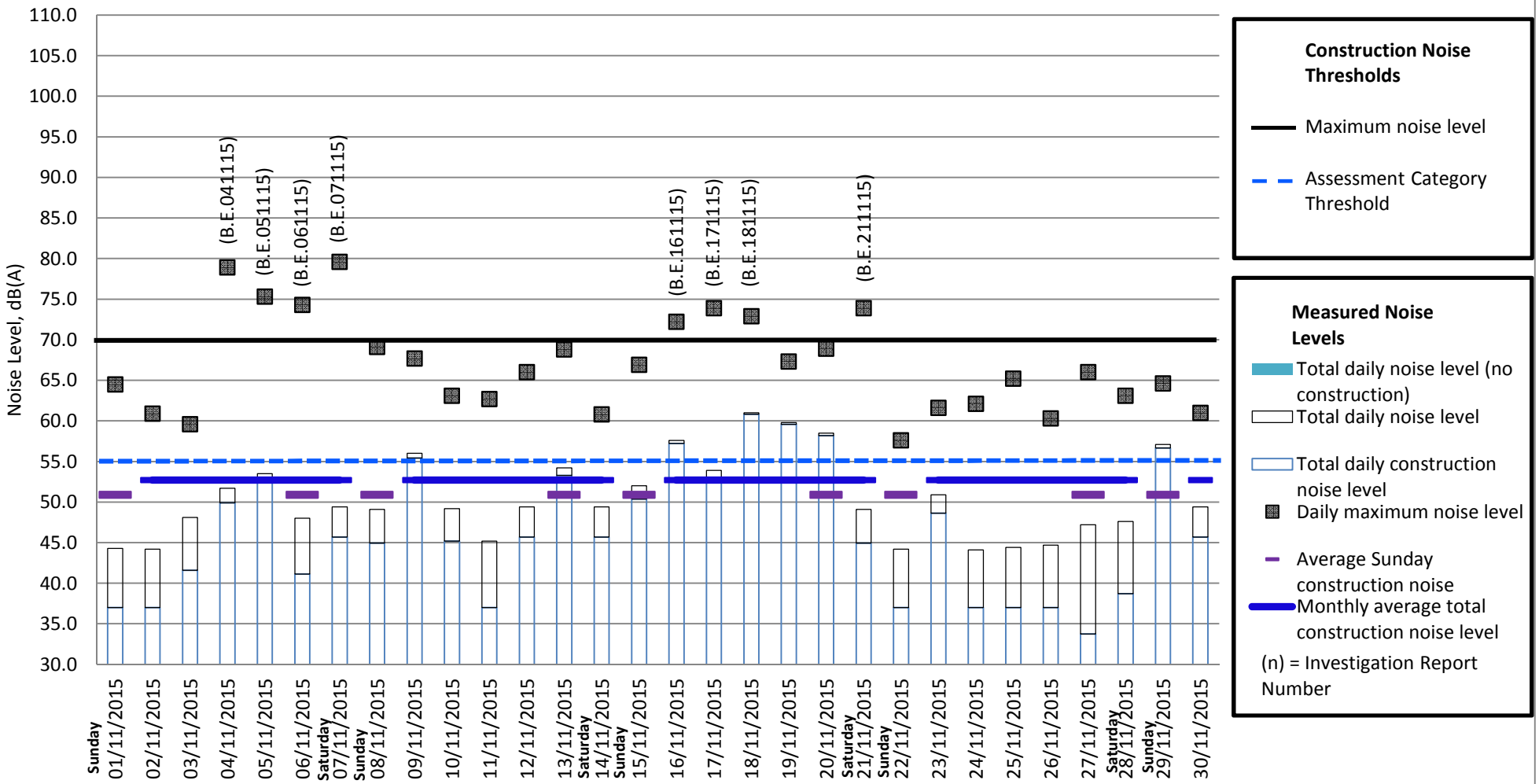
APPENDIX A

Measured Daytime Noise Levels at Butlaw Fisheries
Measurement period: November2015



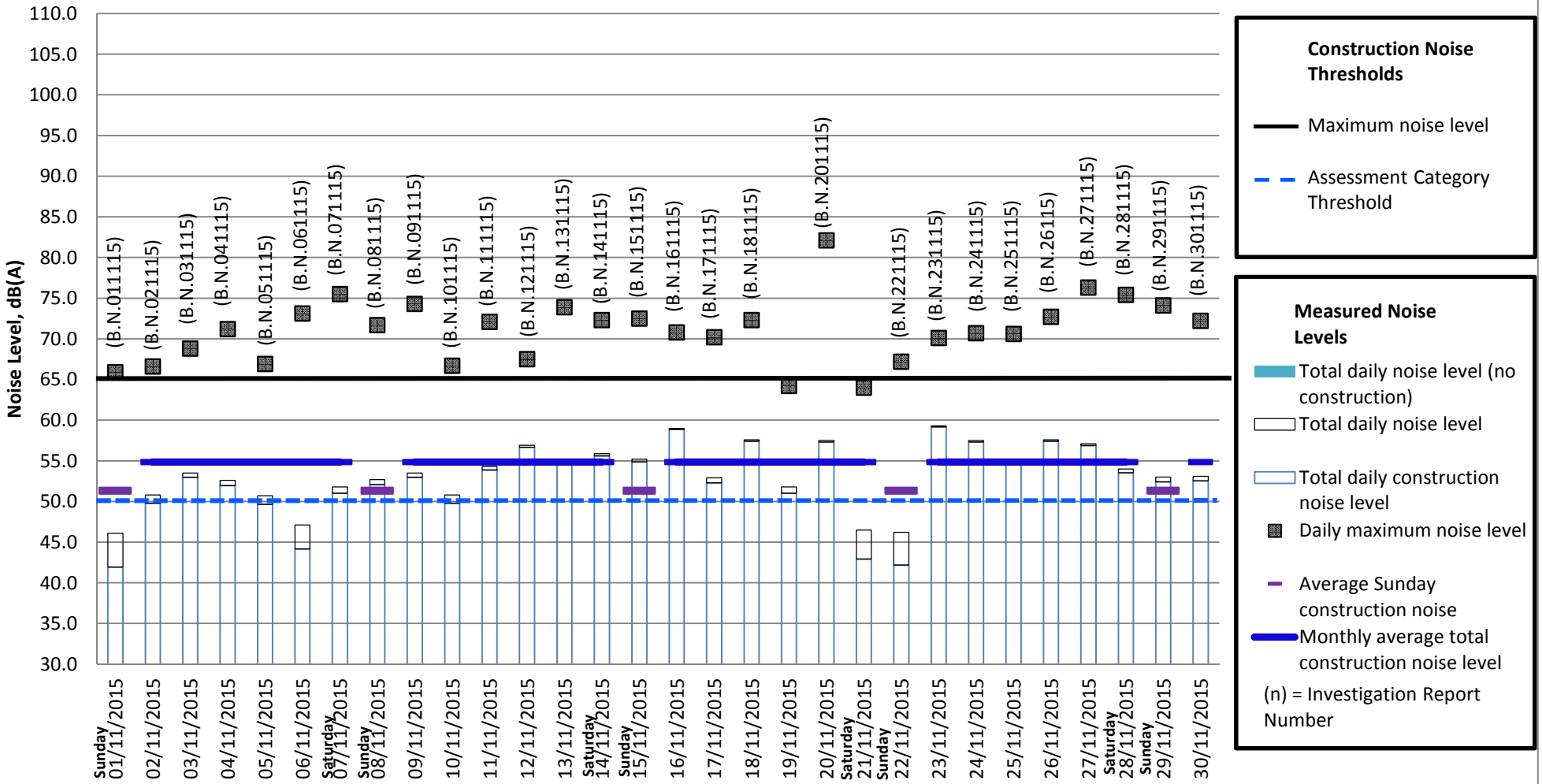
Note:

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



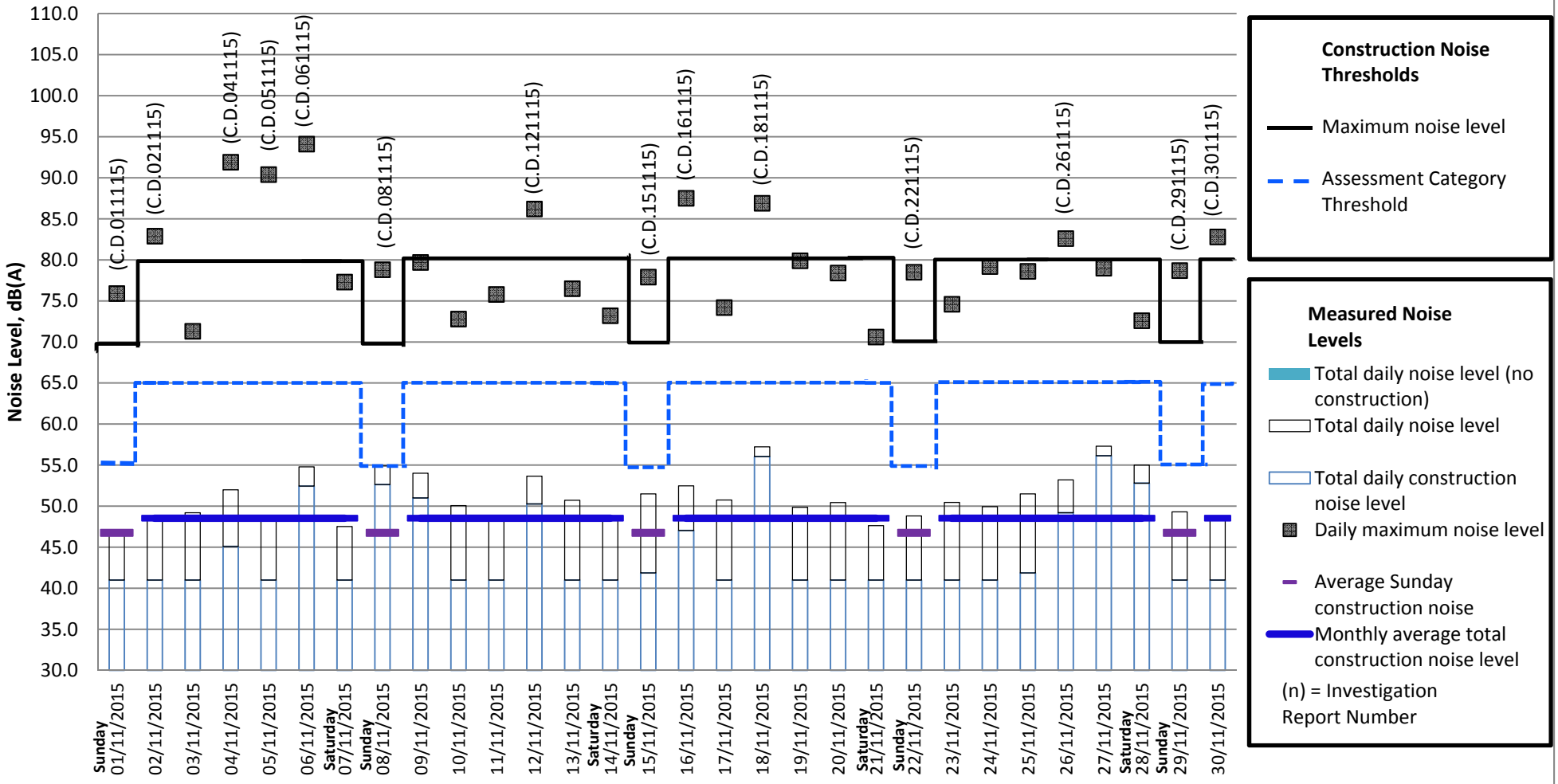
Note: **After investigation, it was concluded that the exceedances of the LAeq ' Total Daily Construction' through the month were caused by wind and waves.**

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



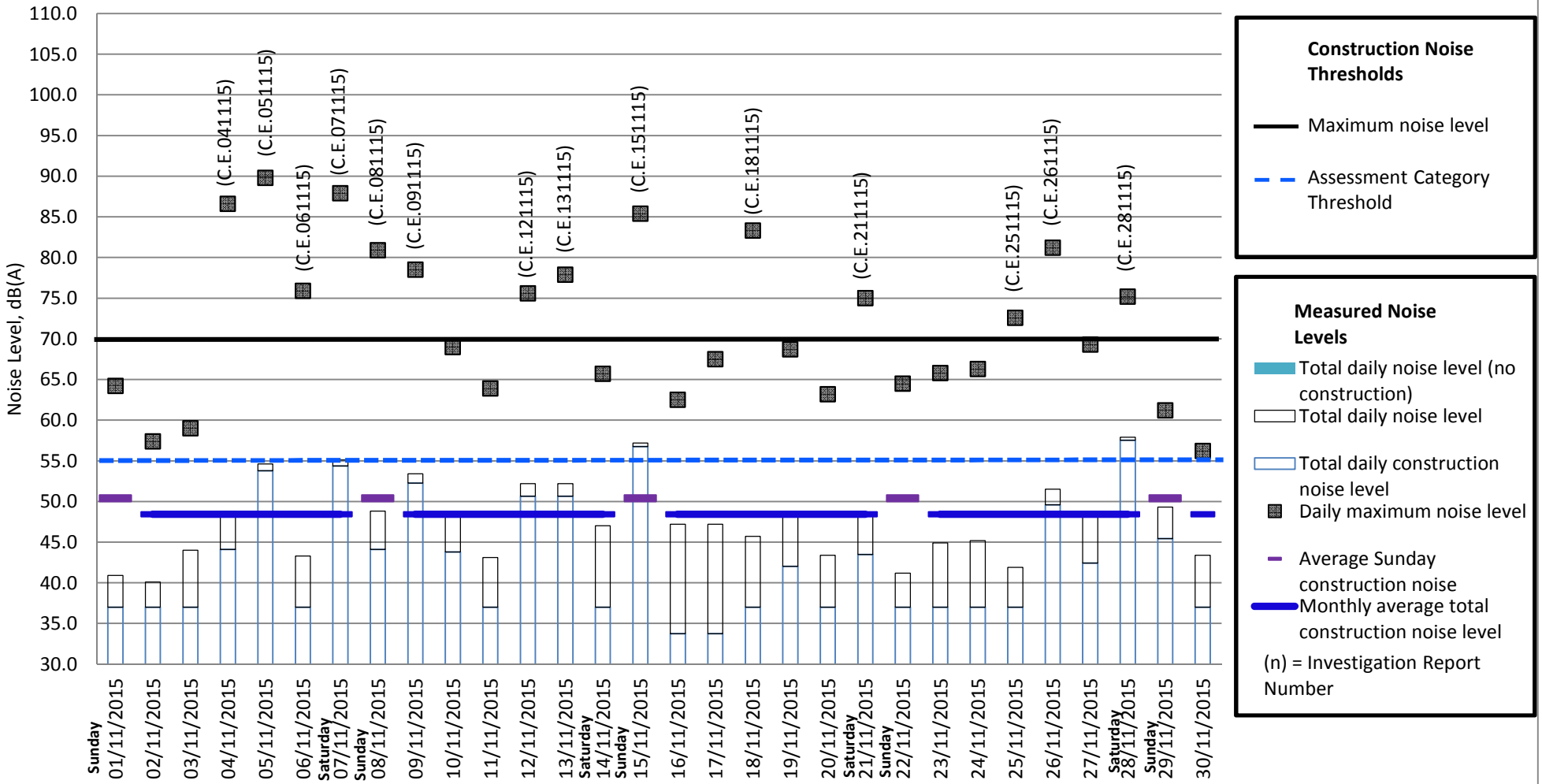
Note: After investigation, it was concluded that the exceedances of the LAeq ' Total Daily Construction' through the month were caused by wind and waves.

Measured Daytime Noise Levels at Clufflat
Measurement period: November2015



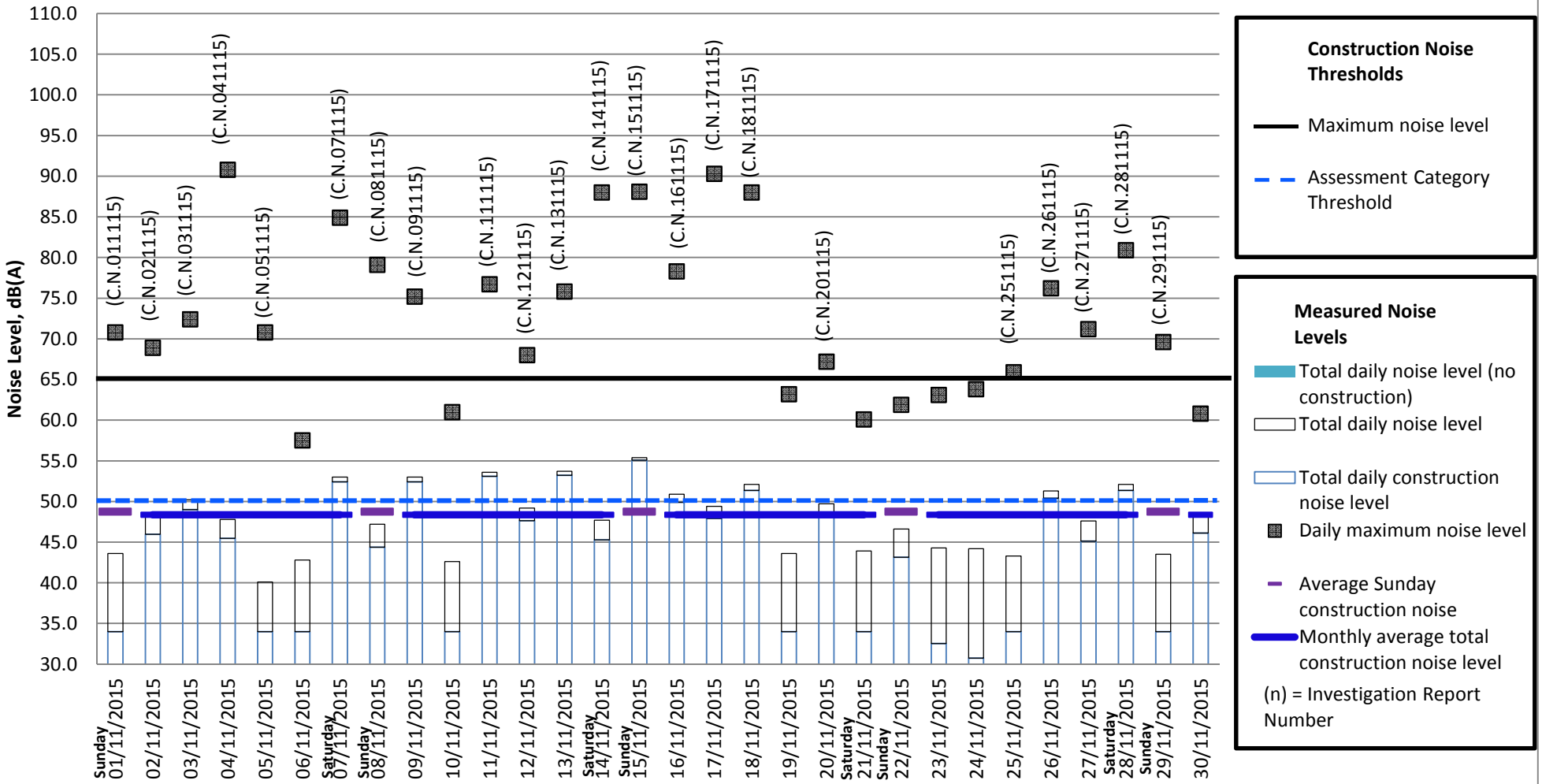
Note:

Measured Evening Noise Levels at Clufflat
Measurement period: November 2015



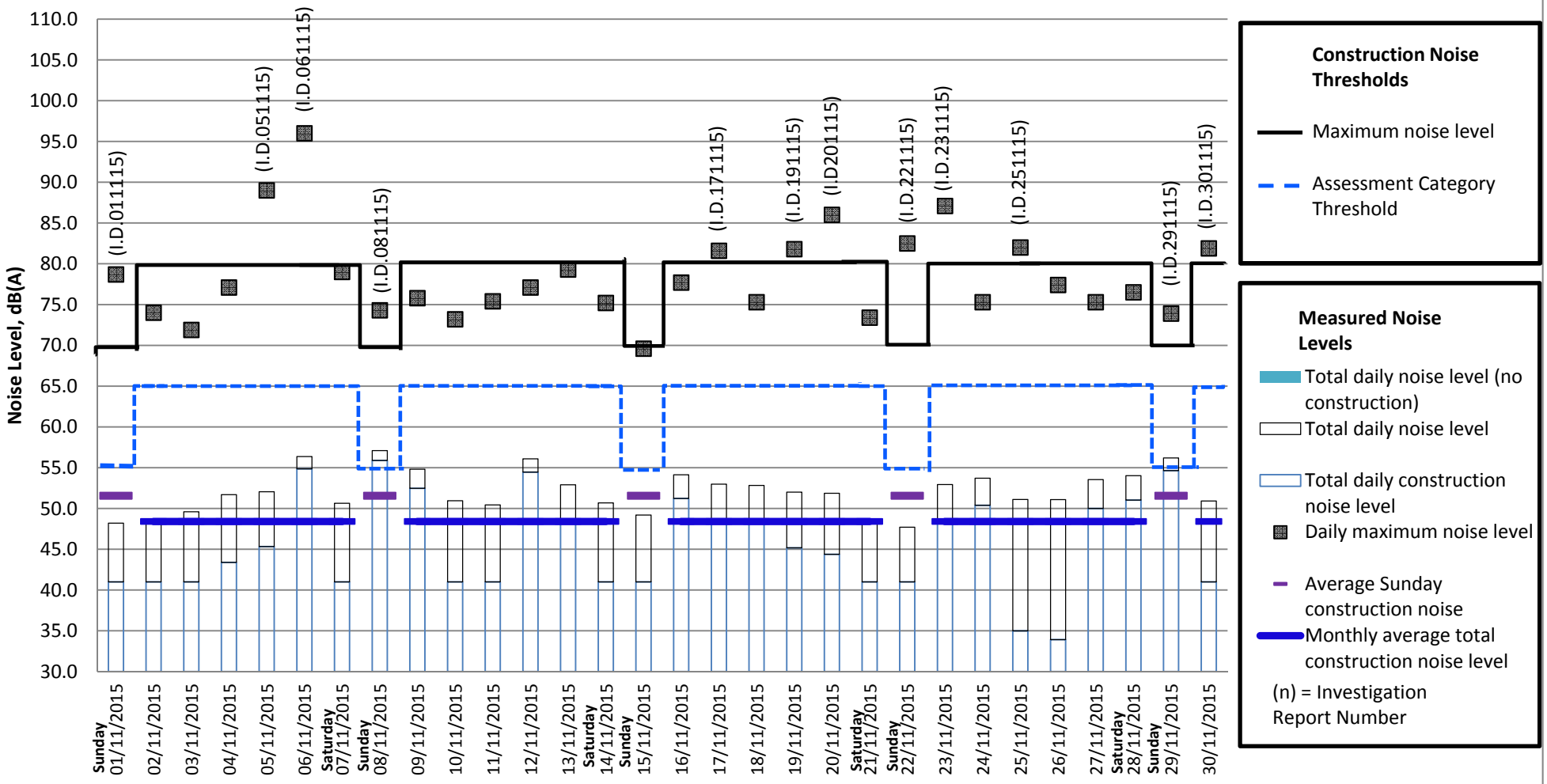
Note:

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



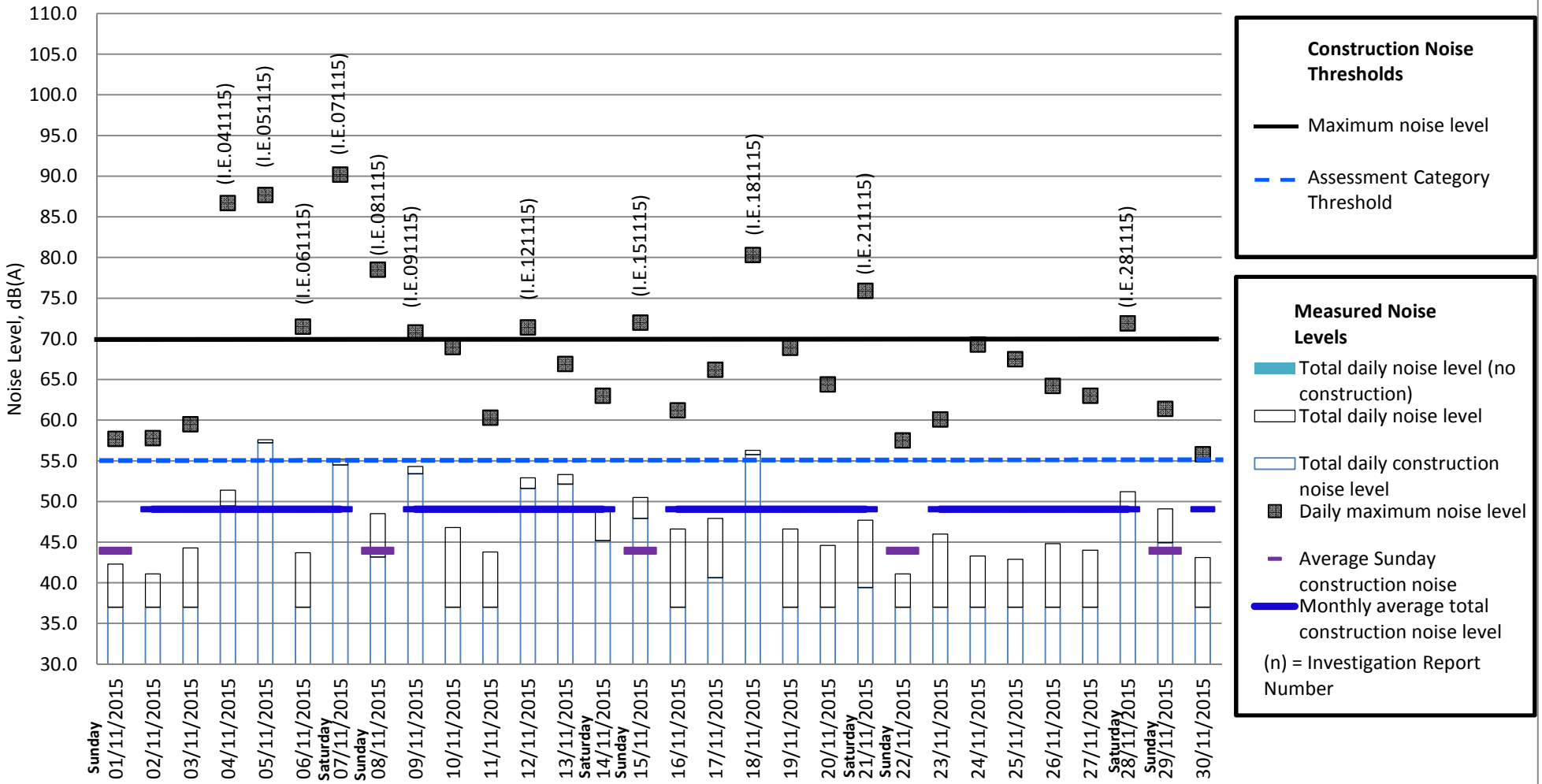
Note:

Measured Daytime Noise Levels at Inchgarvie
Measurement period: November2015



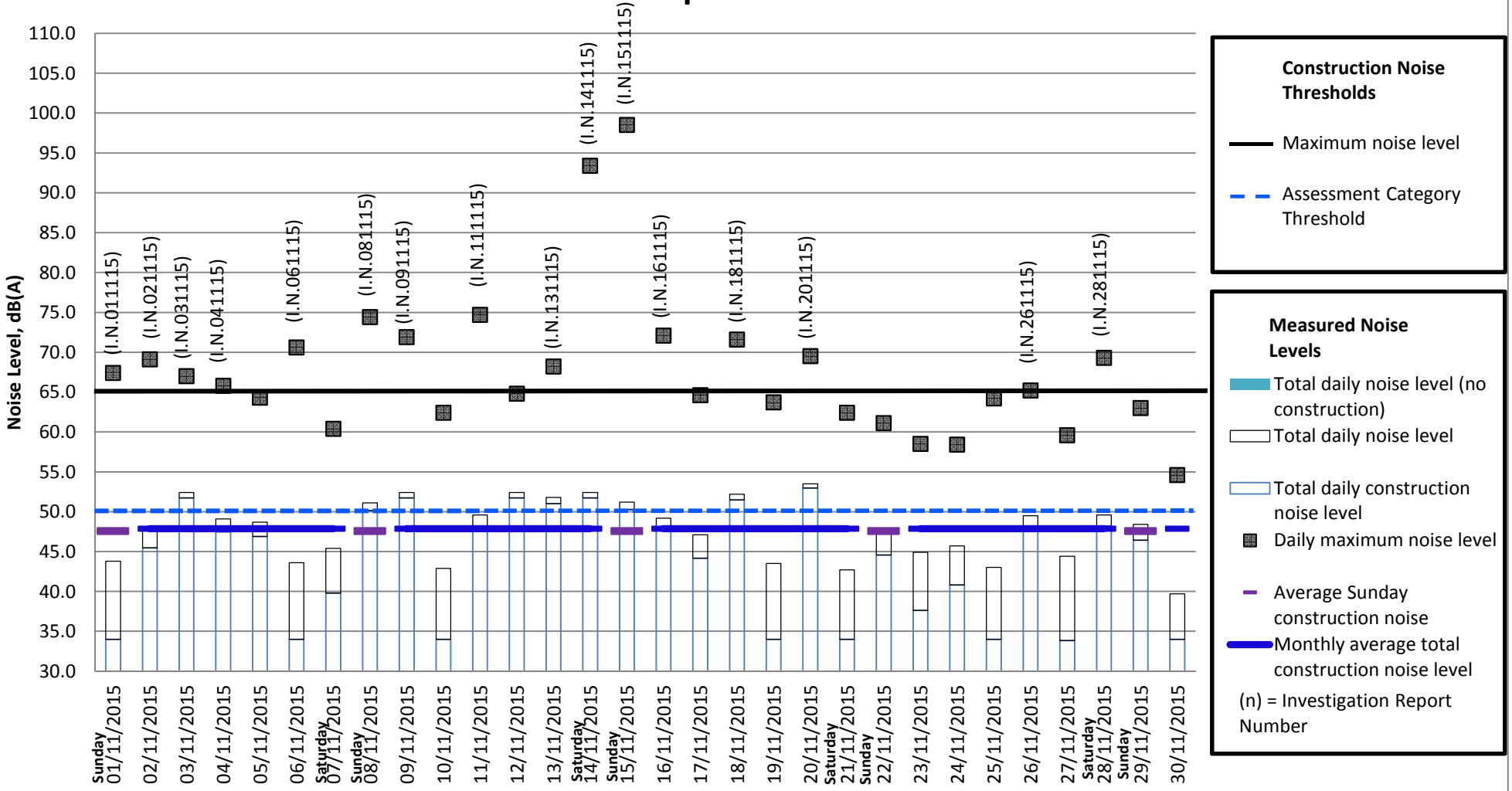
Note:

Measured Evening Noise Levels at Inchgarvie
Measurement period: November 2015



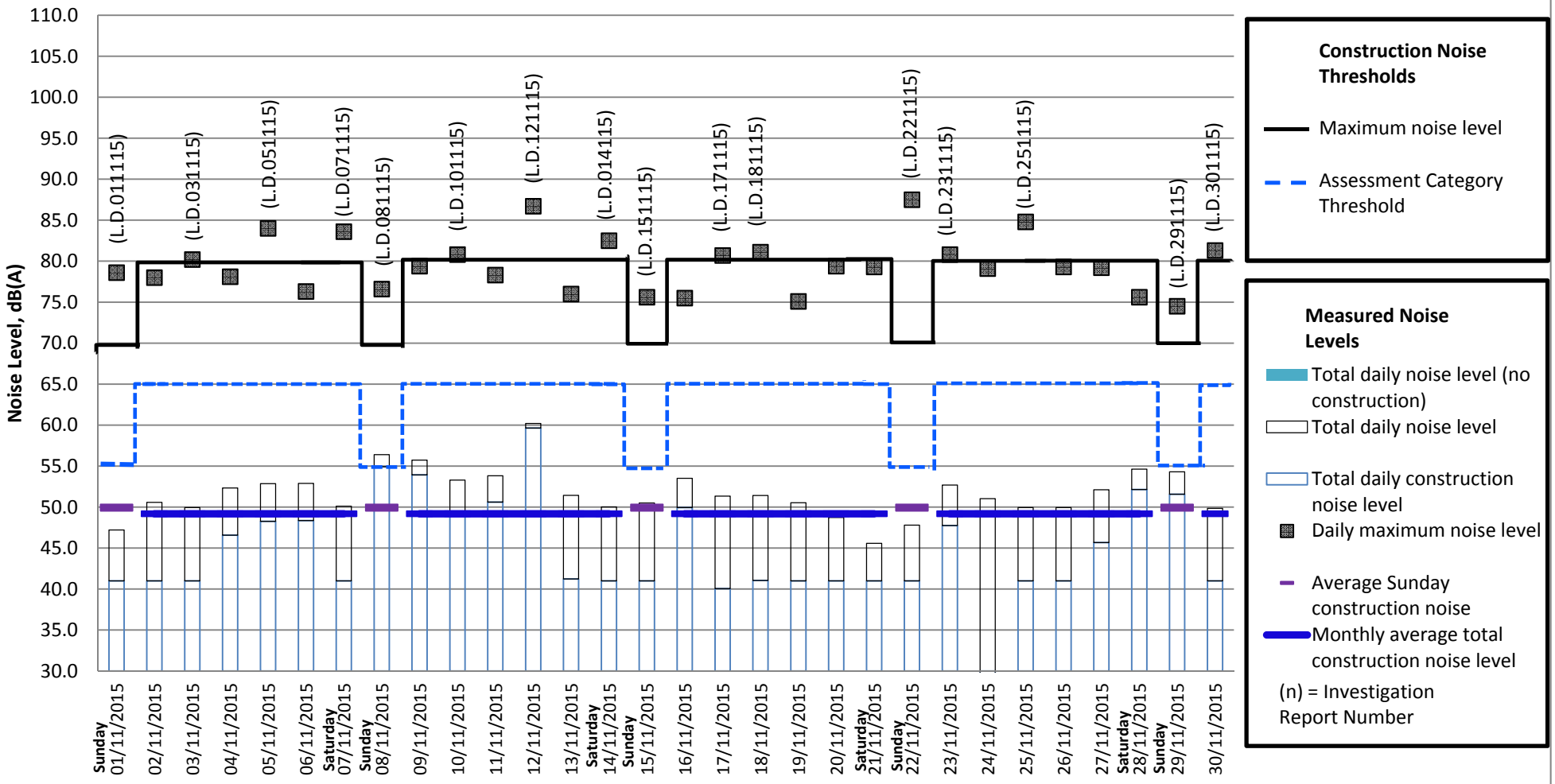
Note:

Measured Night time Noise Levels at Inchgarvie
Measurement period: November 2015



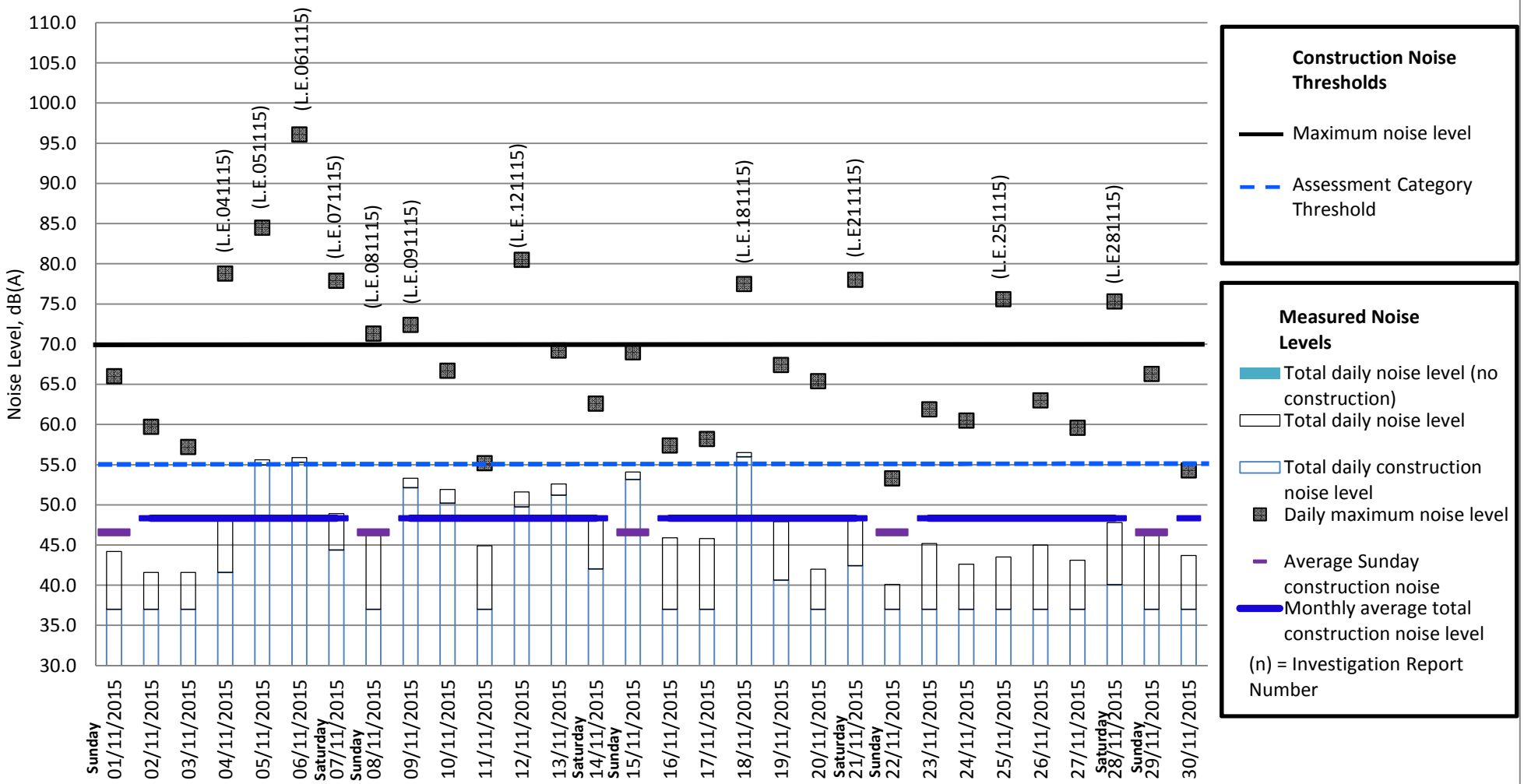
Note:

Measured Daytime Noise Levels at Linn Mill
Measurement period: November2015



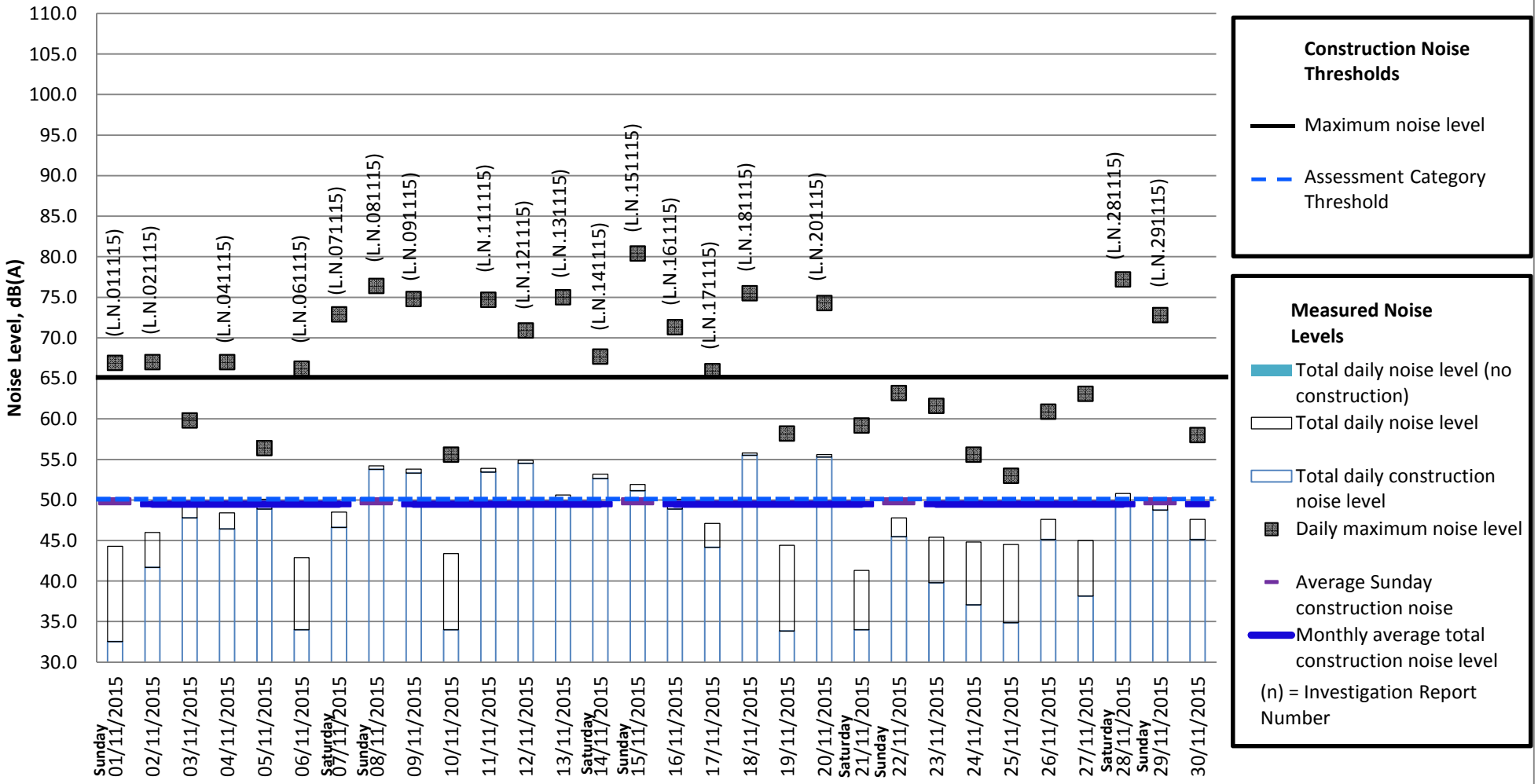
Note:

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



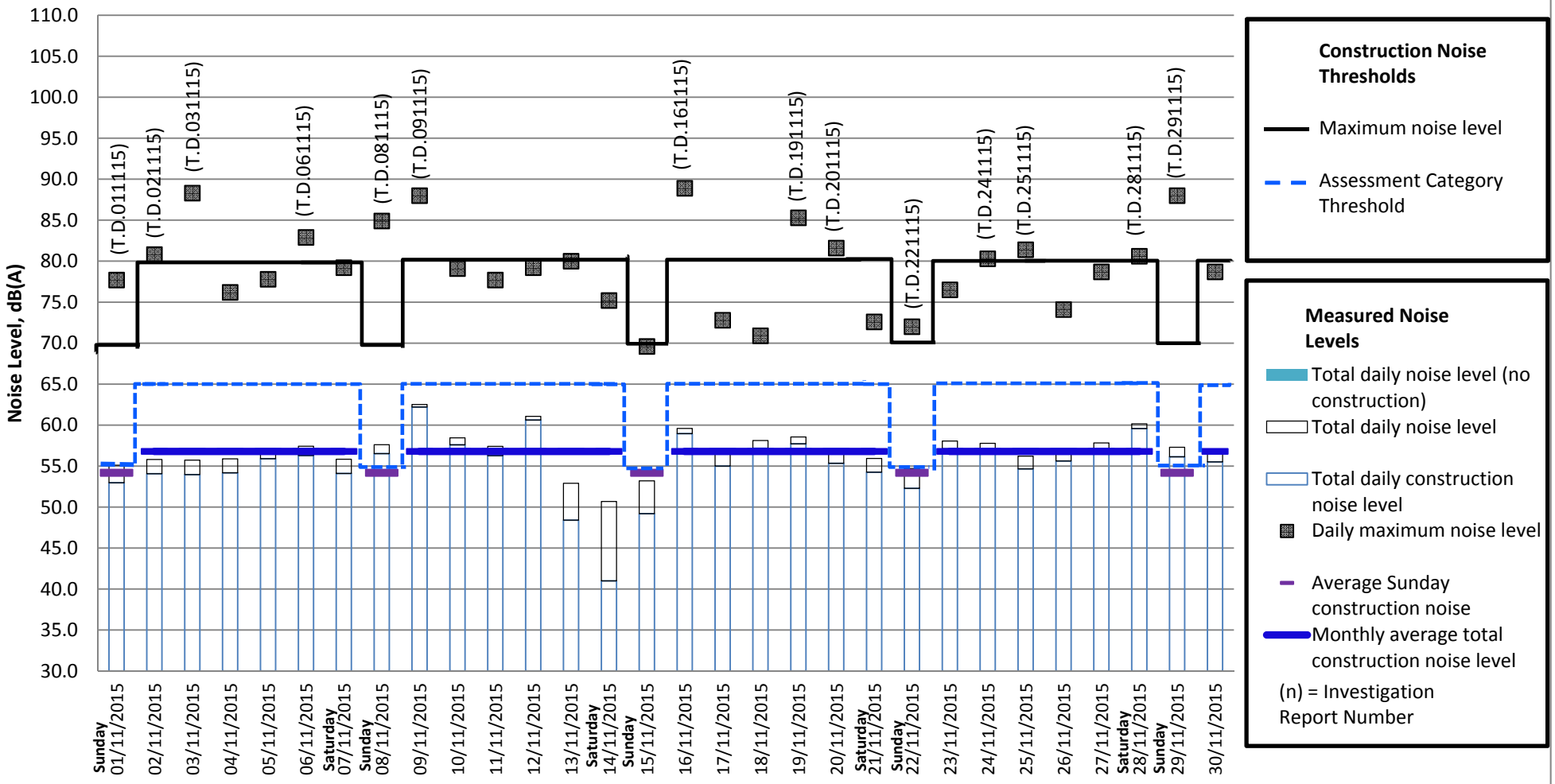
Note:

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



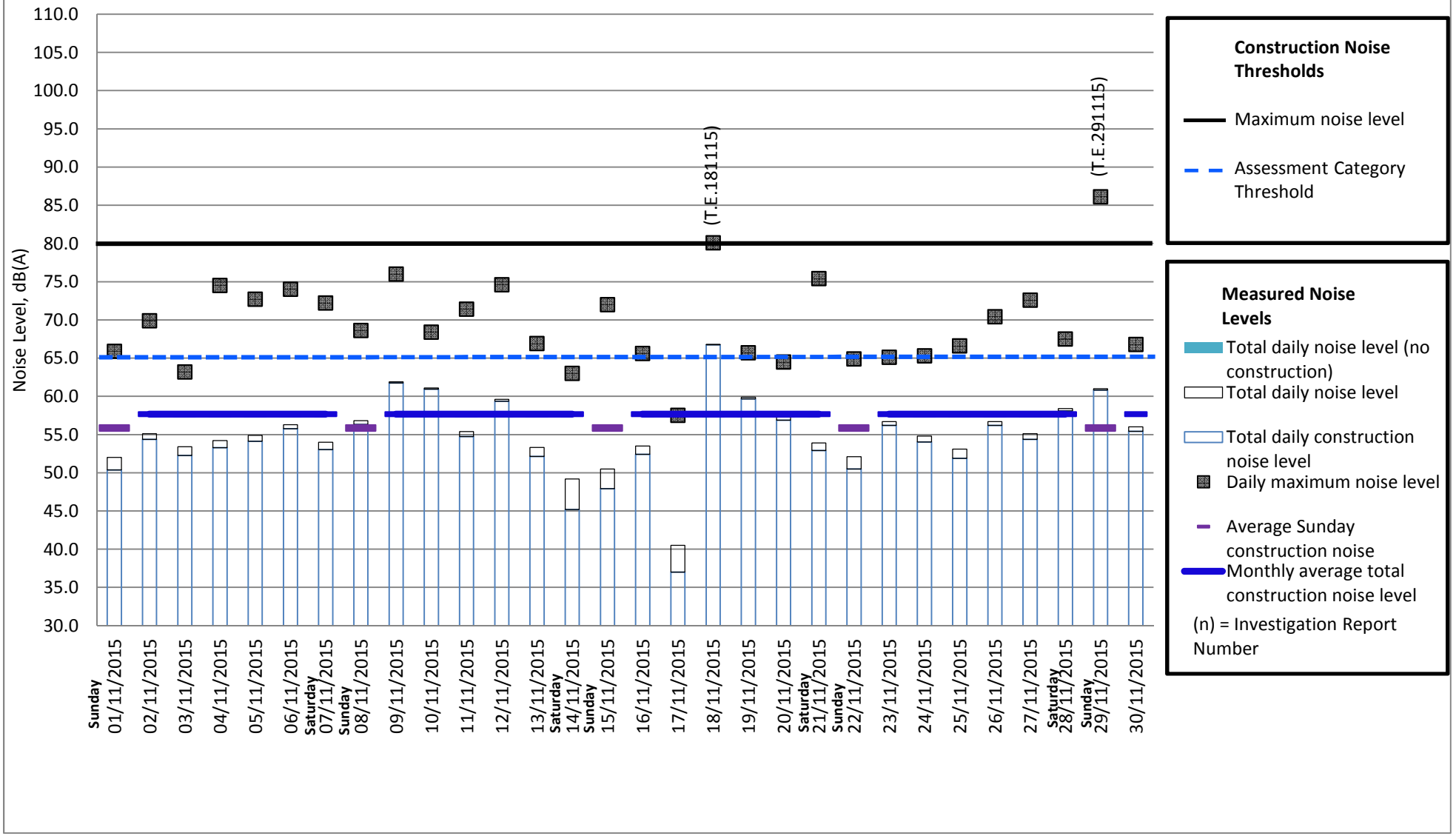
Note: **After investigation, it was concluded that the exceedances of the LAeq ' Total Daily Construction' through the month were caused by wind.**

Measured Daytime Noise Levels at Tigh-Na-Grian
Measurement period: November2015

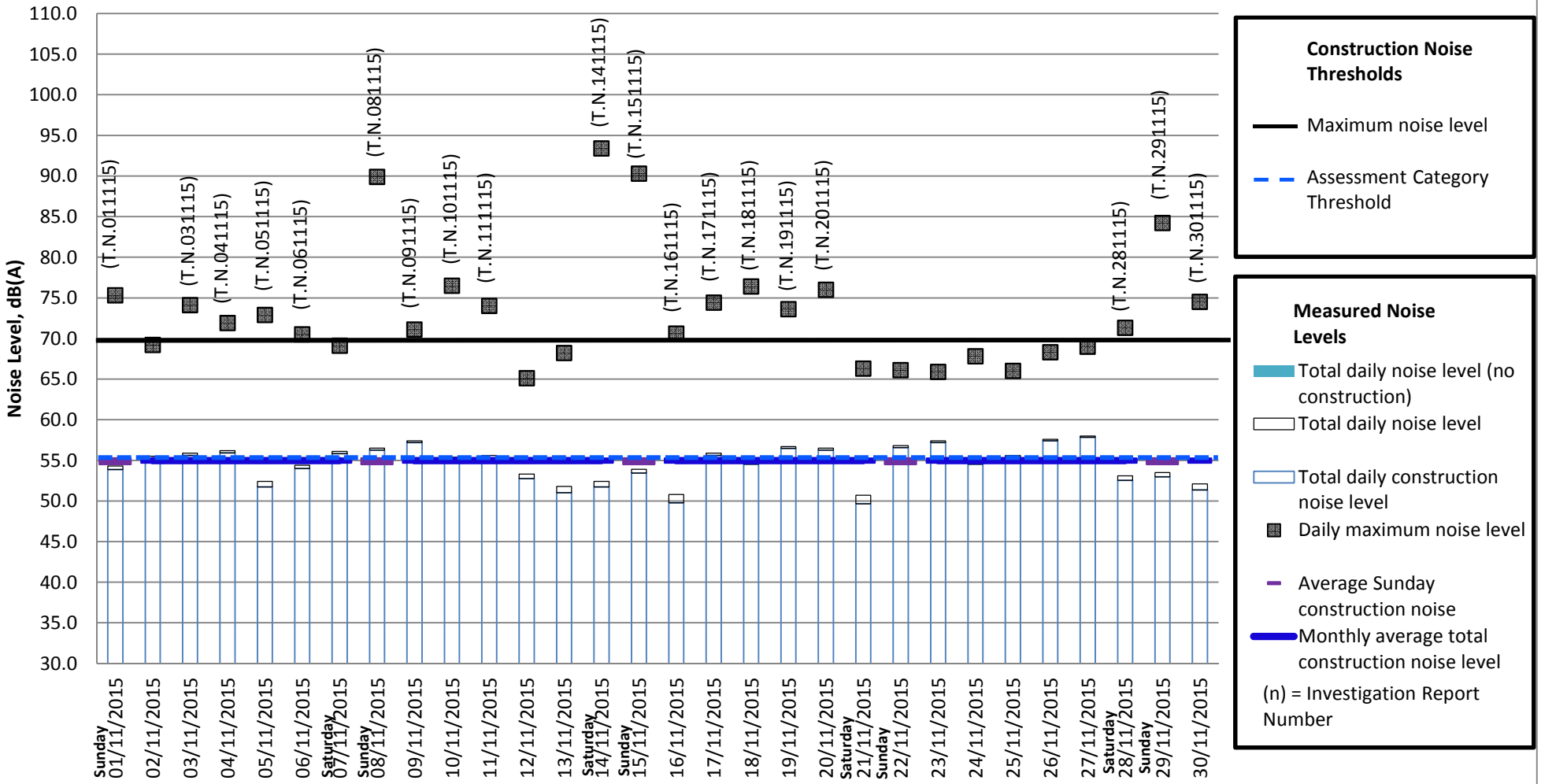


Note:

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

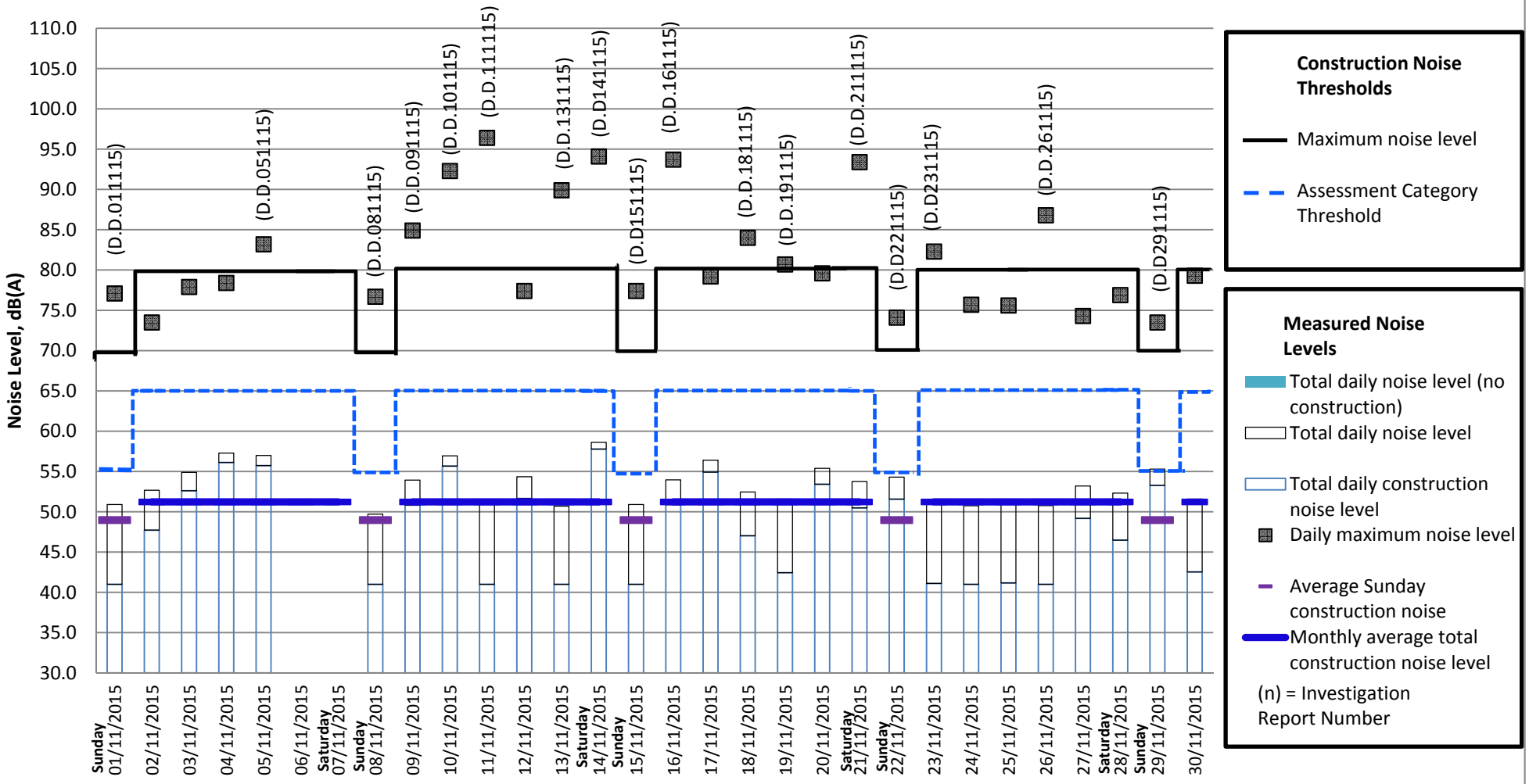


Measured Night time Noise Levels at Tigh-Na-Grian
Measurement period: November 2015



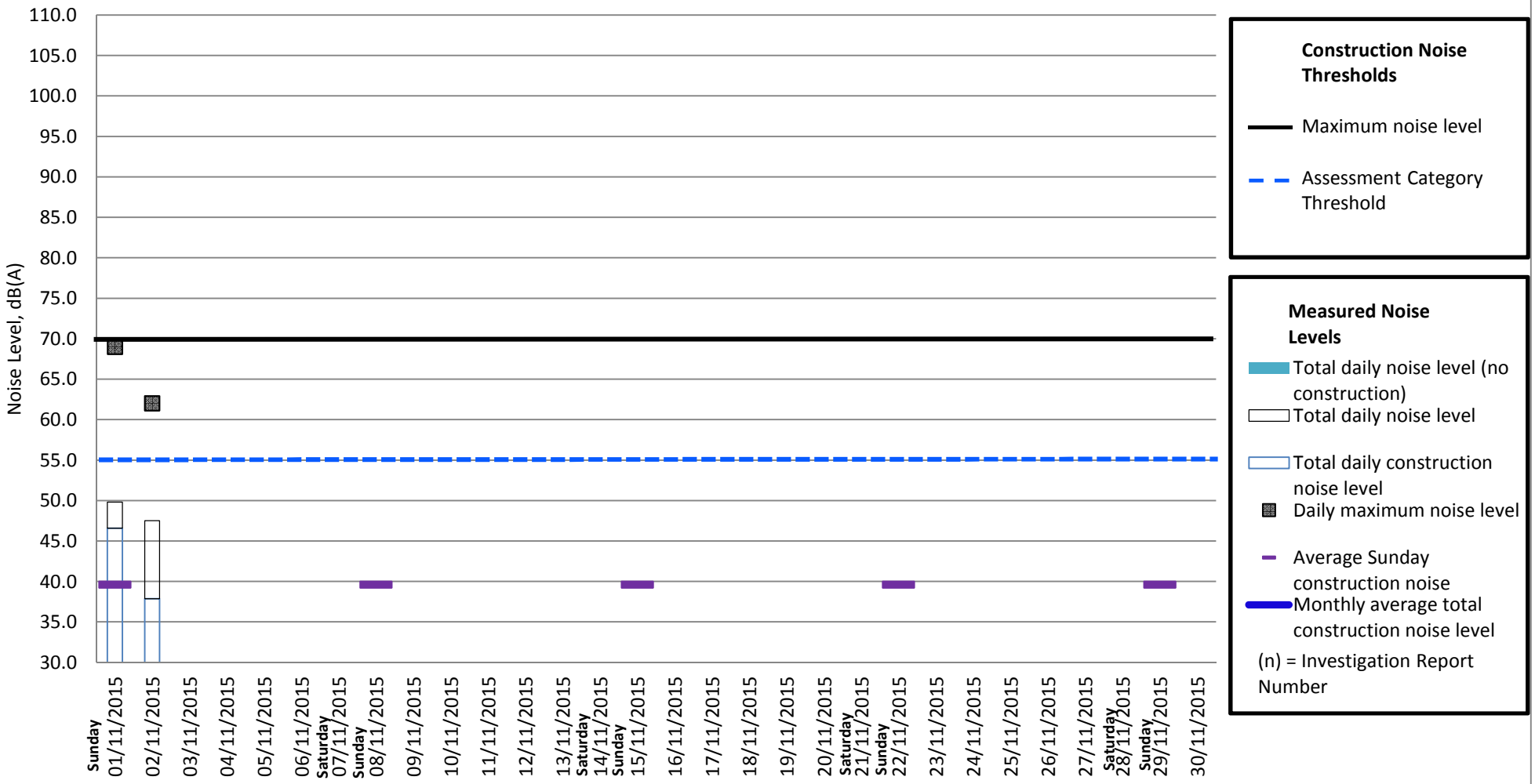
Note: After investigation, it was concluded that the exceedances of the LAeq ' Total Daily Construction' through the month were caused by wind and birds

Measured Daytime Noise Levels at Dundas Home Farm
Measurement period: November2015



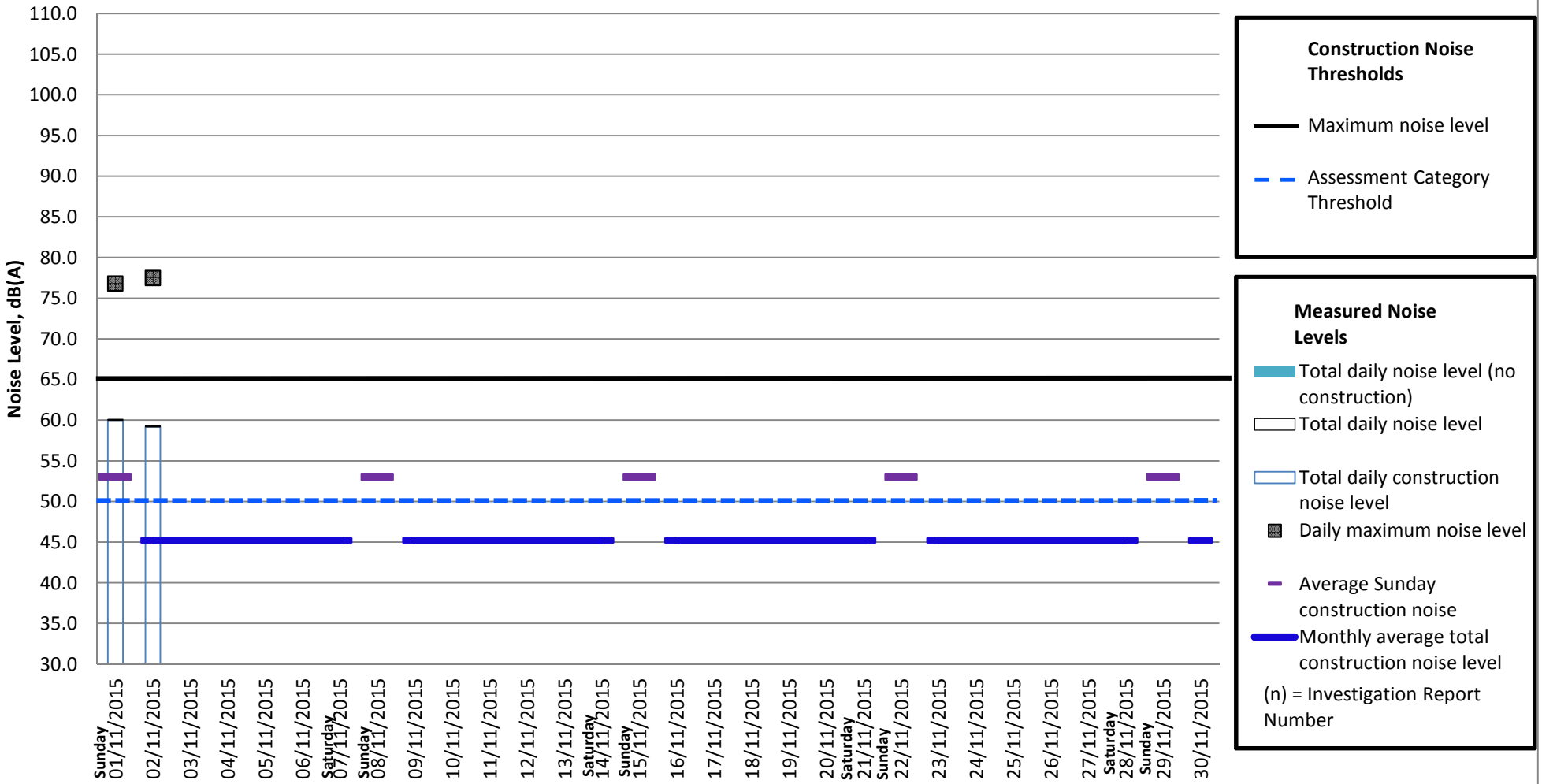
Note: There is not data on the 6th and 7th of November due to an error with the monitor.

Measured Evening Noise Levels at Dundas Home Farm
Measurement period: November 2015



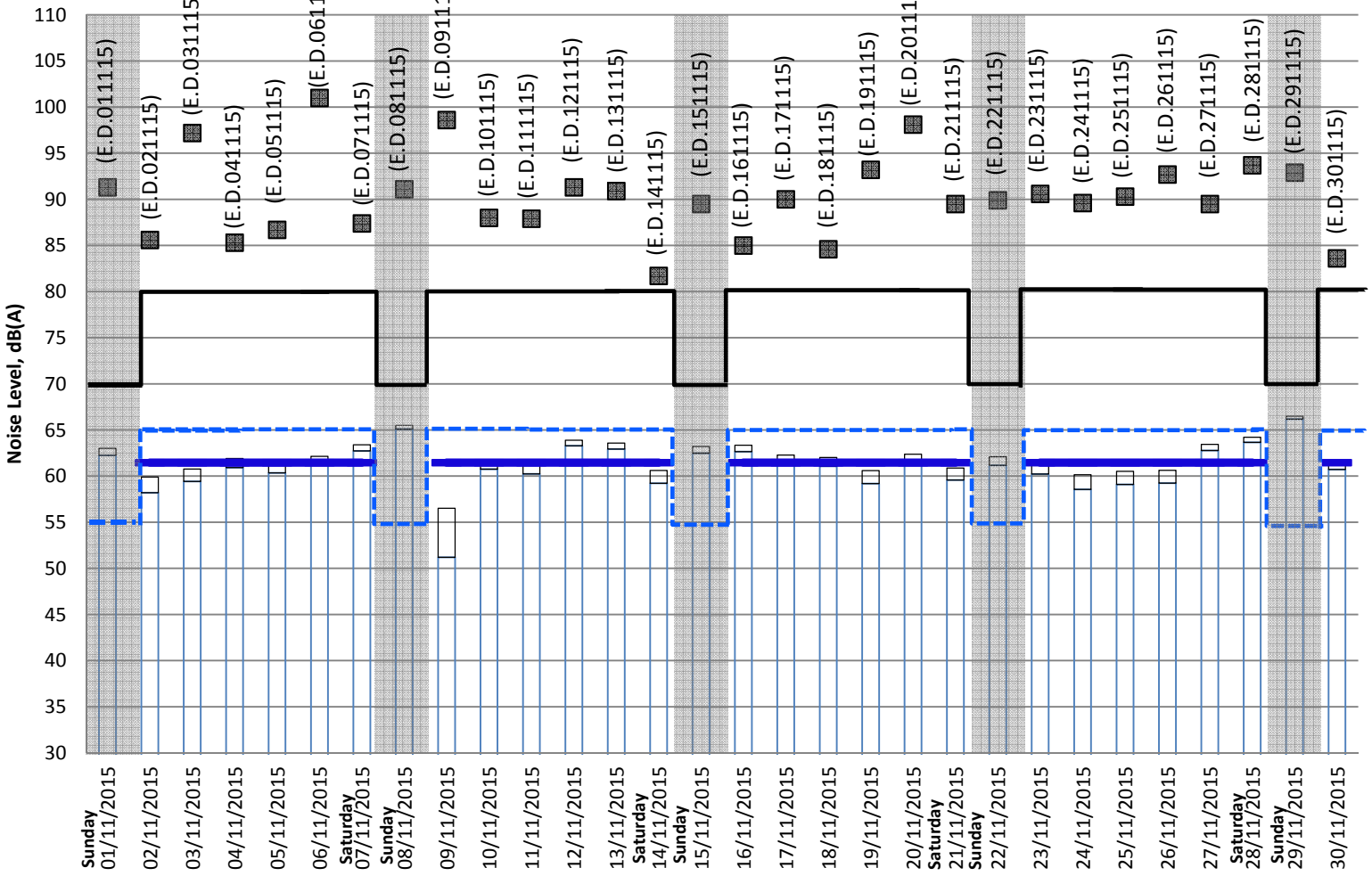
Note: Note; The B800 bridge demolition took place over from 31/10/2015 at 22:00 until 02/11/2015 at 07:00. Noise levels have been included ifor this month

Measured Night time Noise Levels at Dundas Home Farm
Measurement period: November 2015



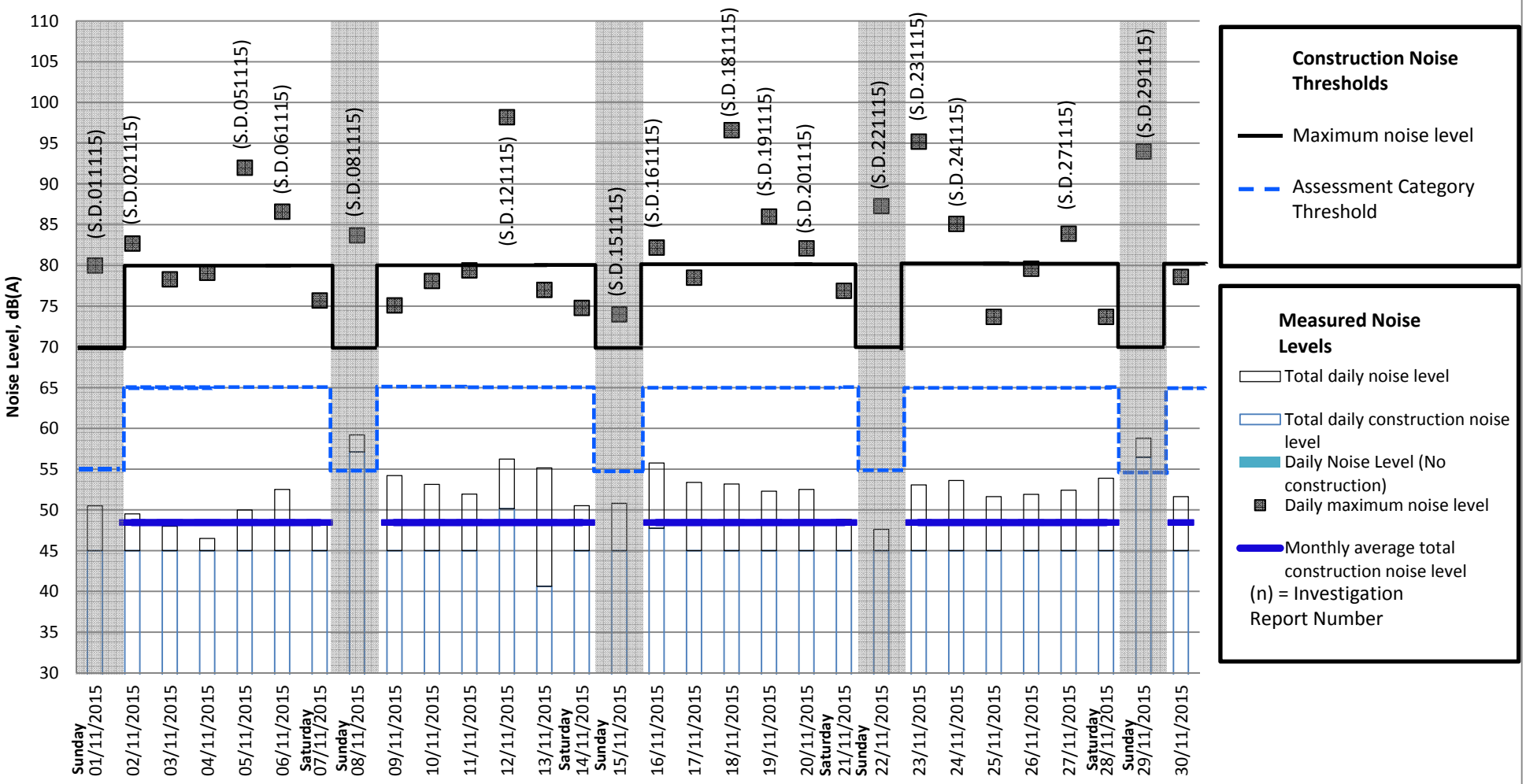
Note: Note; The B800 bridge demolition took place over from 31/10/2015 at 22:00 until 02/11/2015 at 07:00. Noise levels have been included ifor this month

Measured Daytime Noise Levels at Echline
Measurement period: November 2015



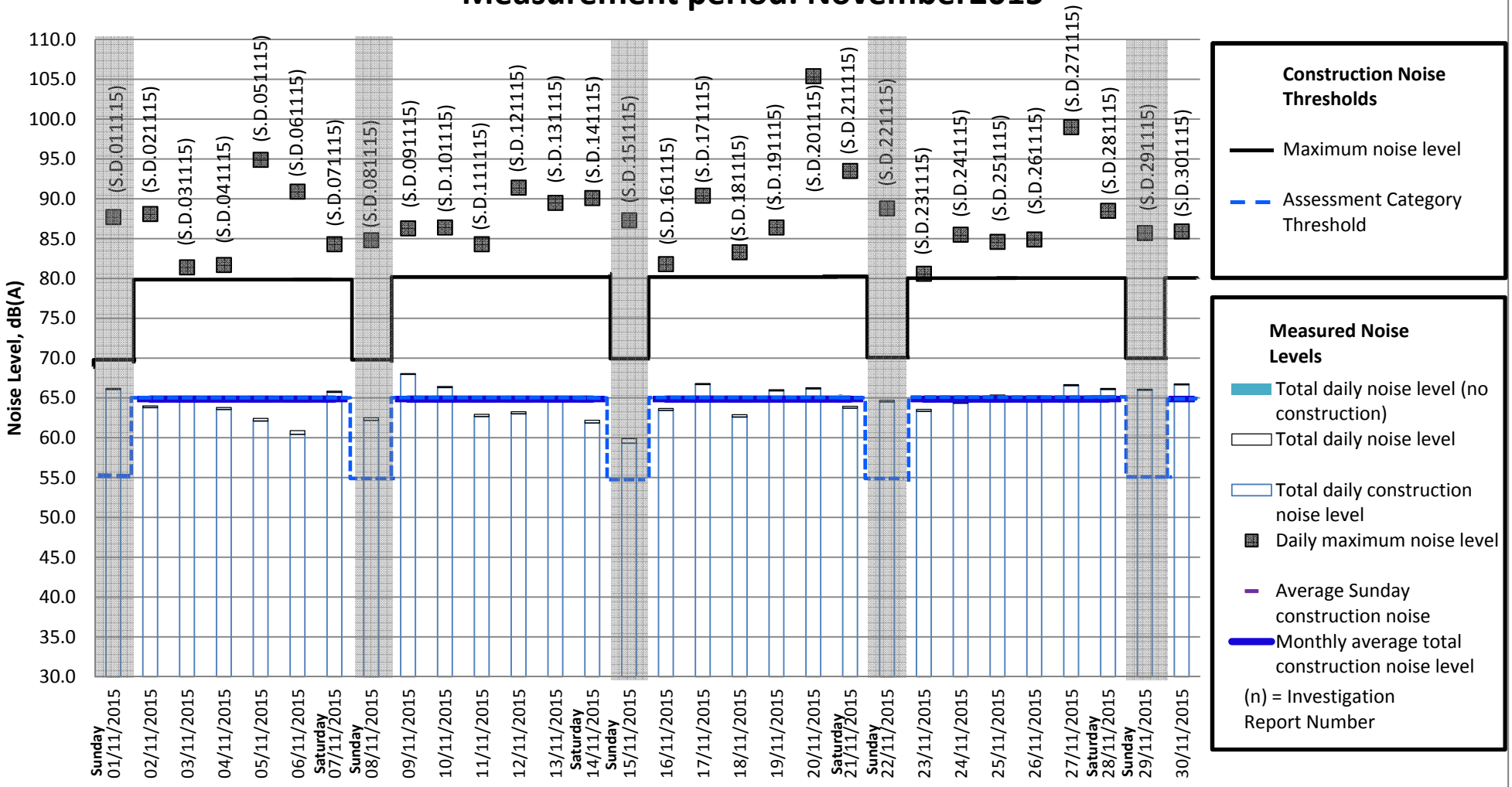
Note: The grey areas of the chart represent days on which no construction works have been undertaken at this location; no Sunday works have been undertaken at this location

Measured Daytime Noise Levels at Springfield
Measurement period: November 2015



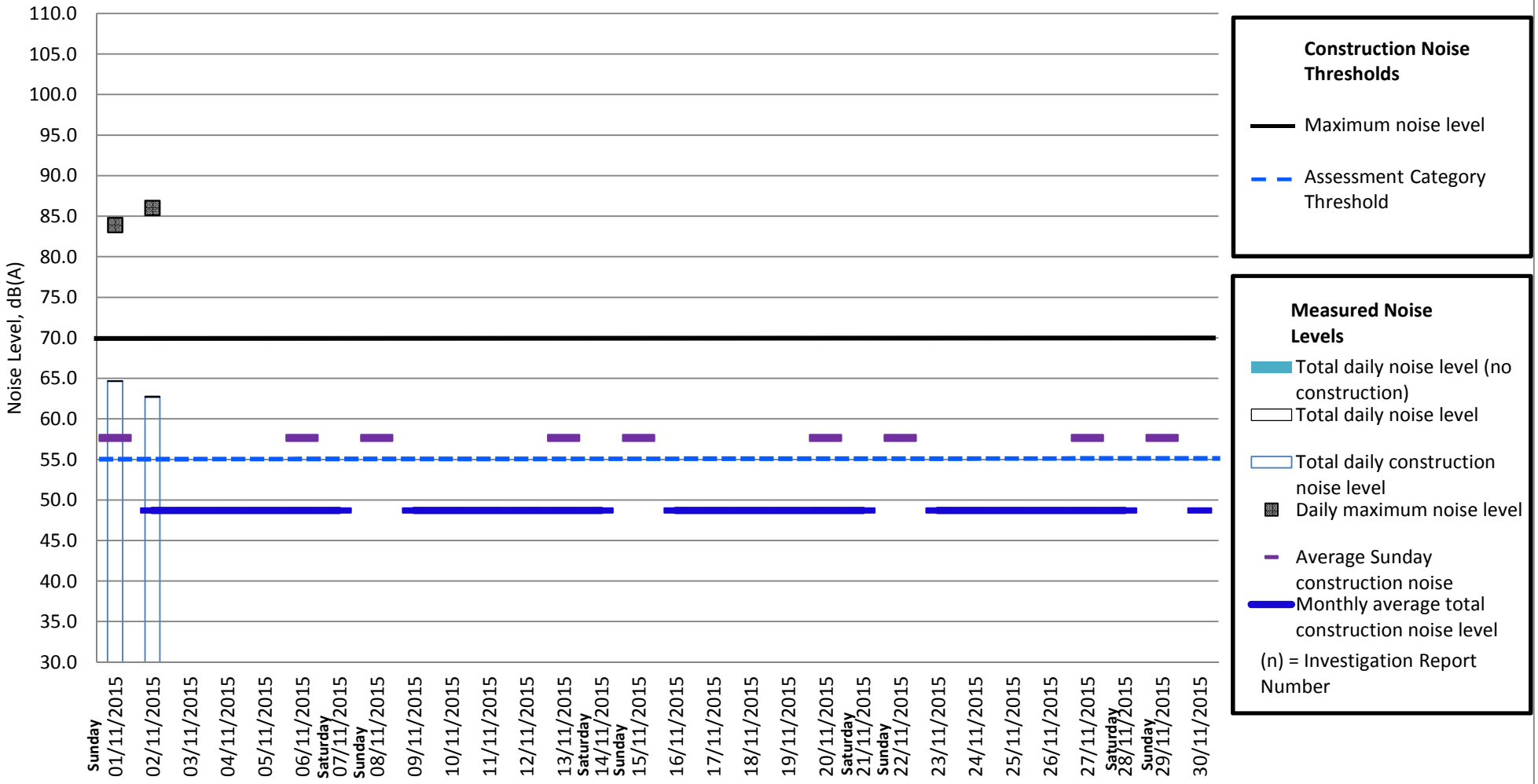
Note: The grey areas of the chart represent days on which no construction works have been undertaken at this location; no Sunday works have been undertaken at this location

Measured Daytime Noise Levels at Scotstoun
Measurement period: November2015



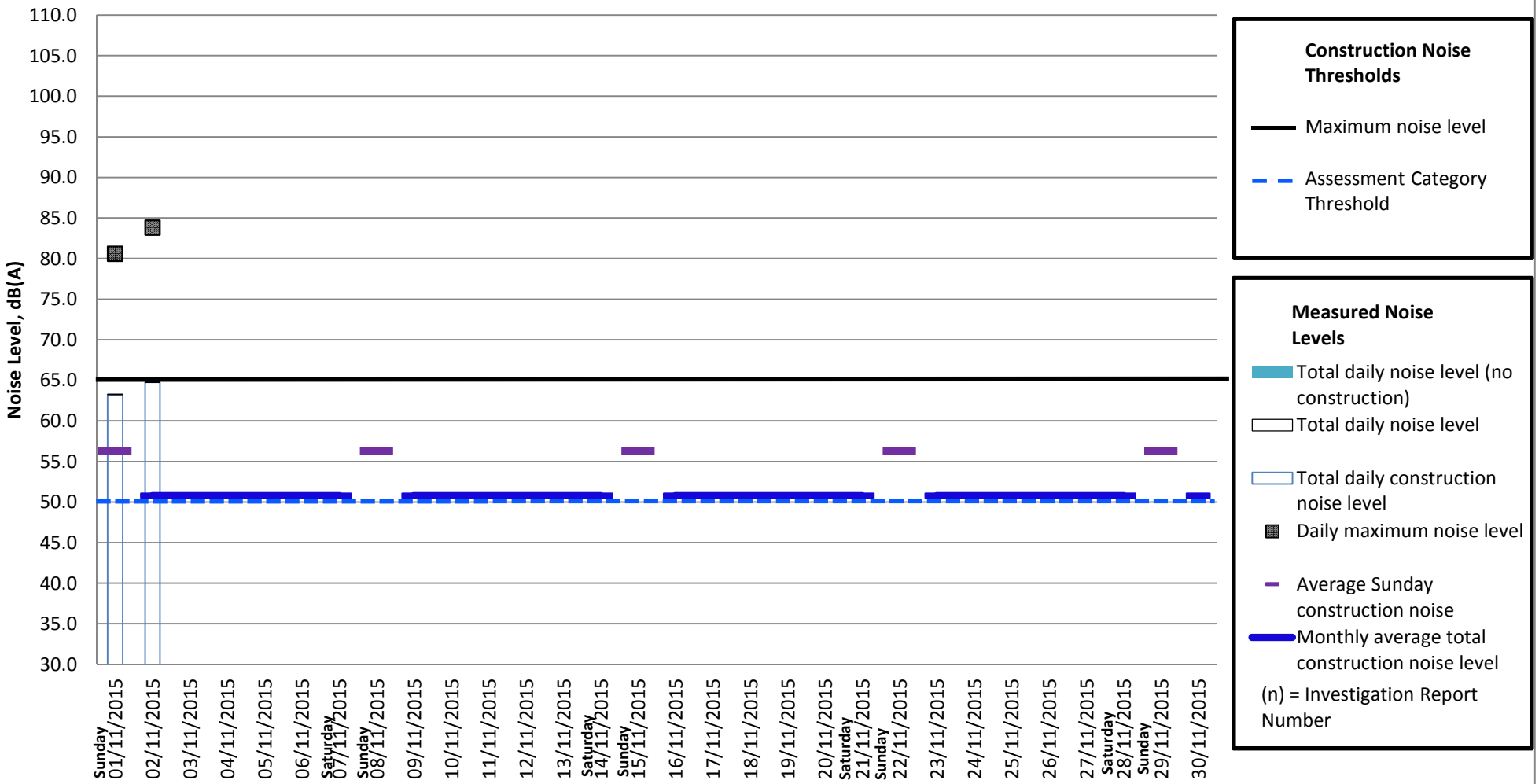
Note:

Measured Evening Noise Levels at Scotstoun
Measurement period: November 2015



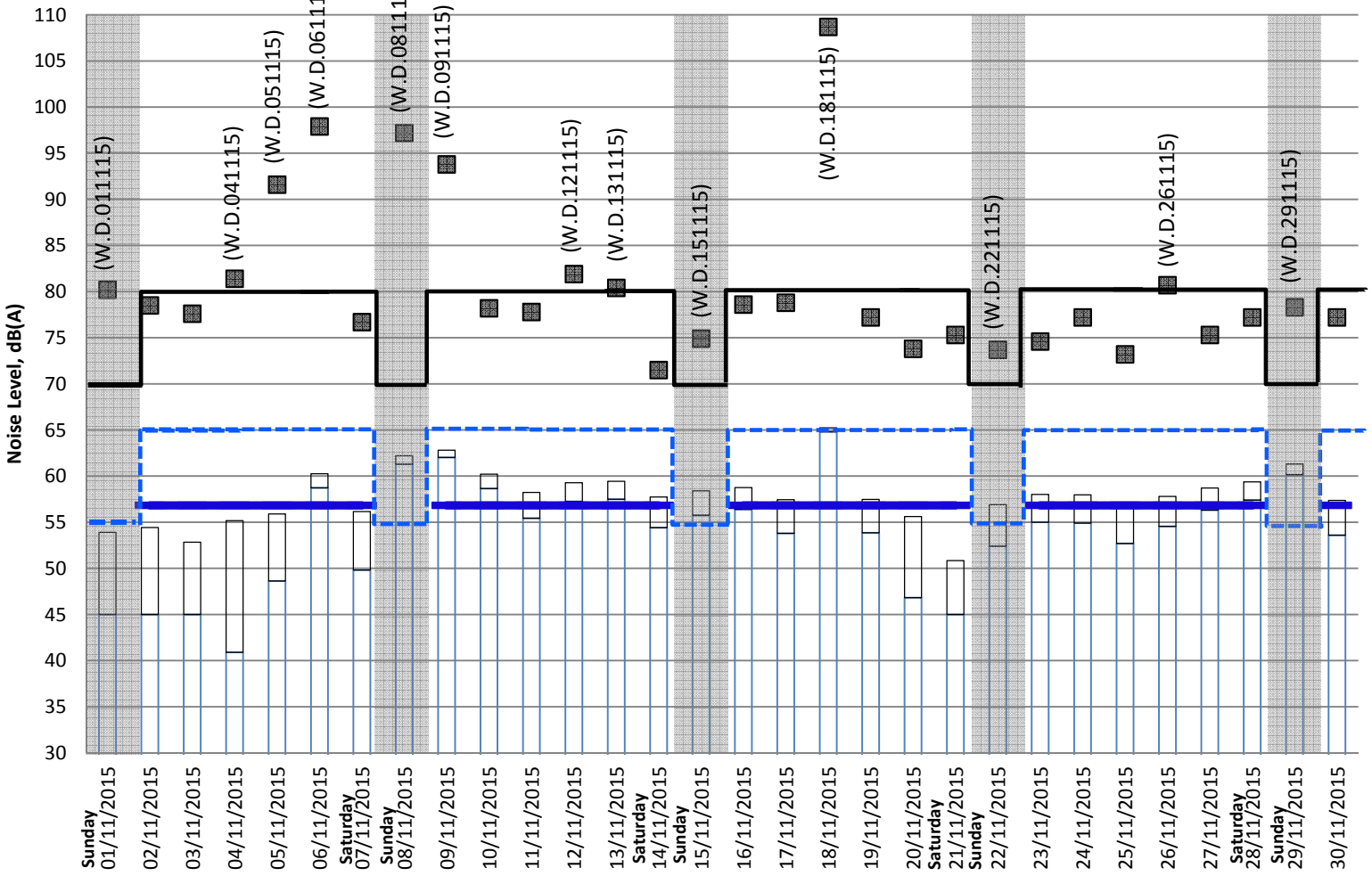
Note: Note; The B800 bridge demolition took place over from 31/10/2015 at 22:00 until 02/11/2015 at 07:00. Noise levels have been included ifor this month

Measured Night time Noise Levels at Scotstoun
Measurement period: November 2015



Note: Note; The B800 bridge demolition took place over from 31/10/2015 at 22:00 until 02/11/2015 at 07:00. Noise levels have been included ifor this month

Measured Daytime Noise Levels at Whinnyhill
Measurement period: November 2015



Construction Noise Thresholds

- Maximum noise level
- Assessment Category Threshold

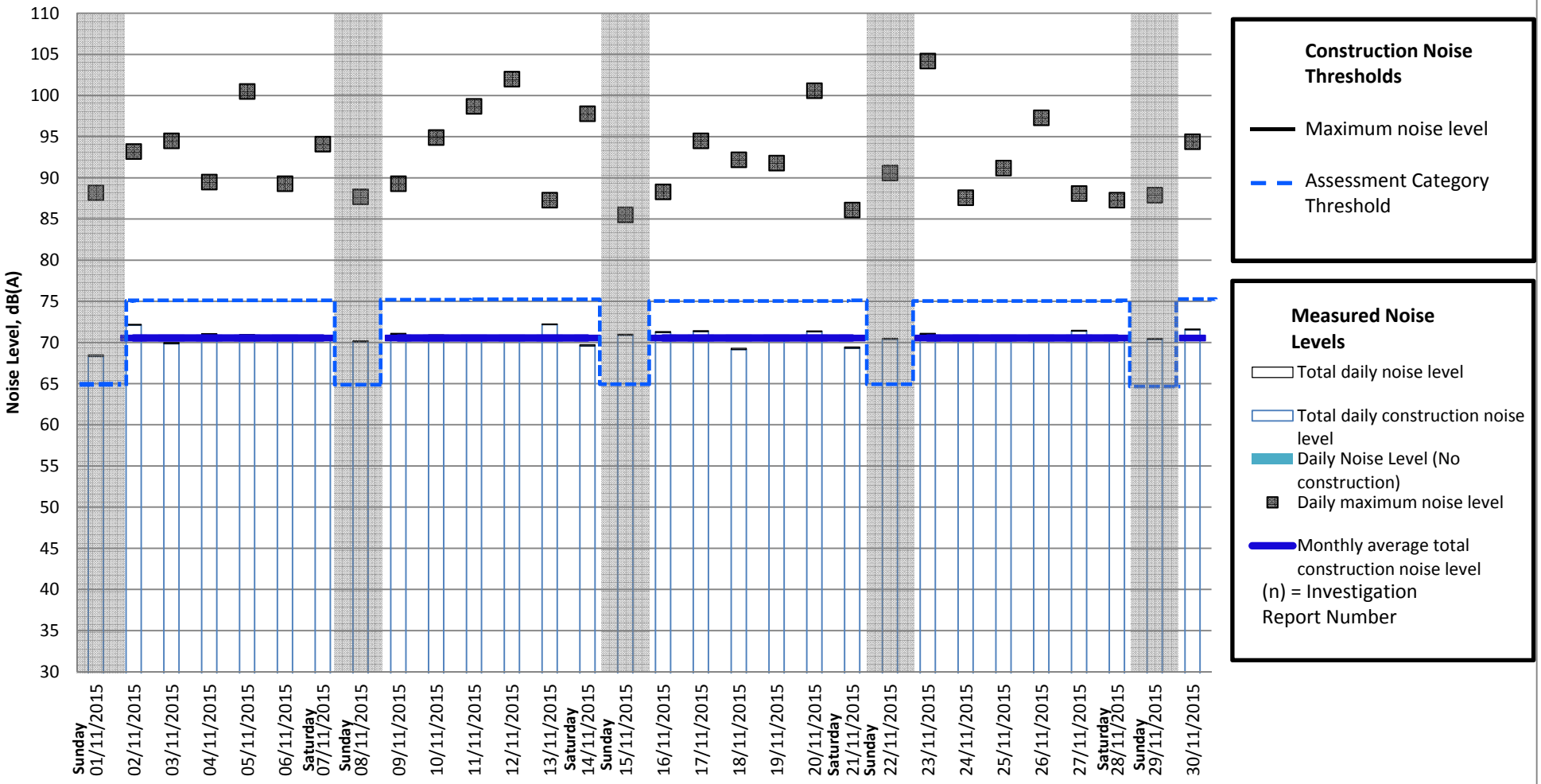
Measured Noise Levels

- 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

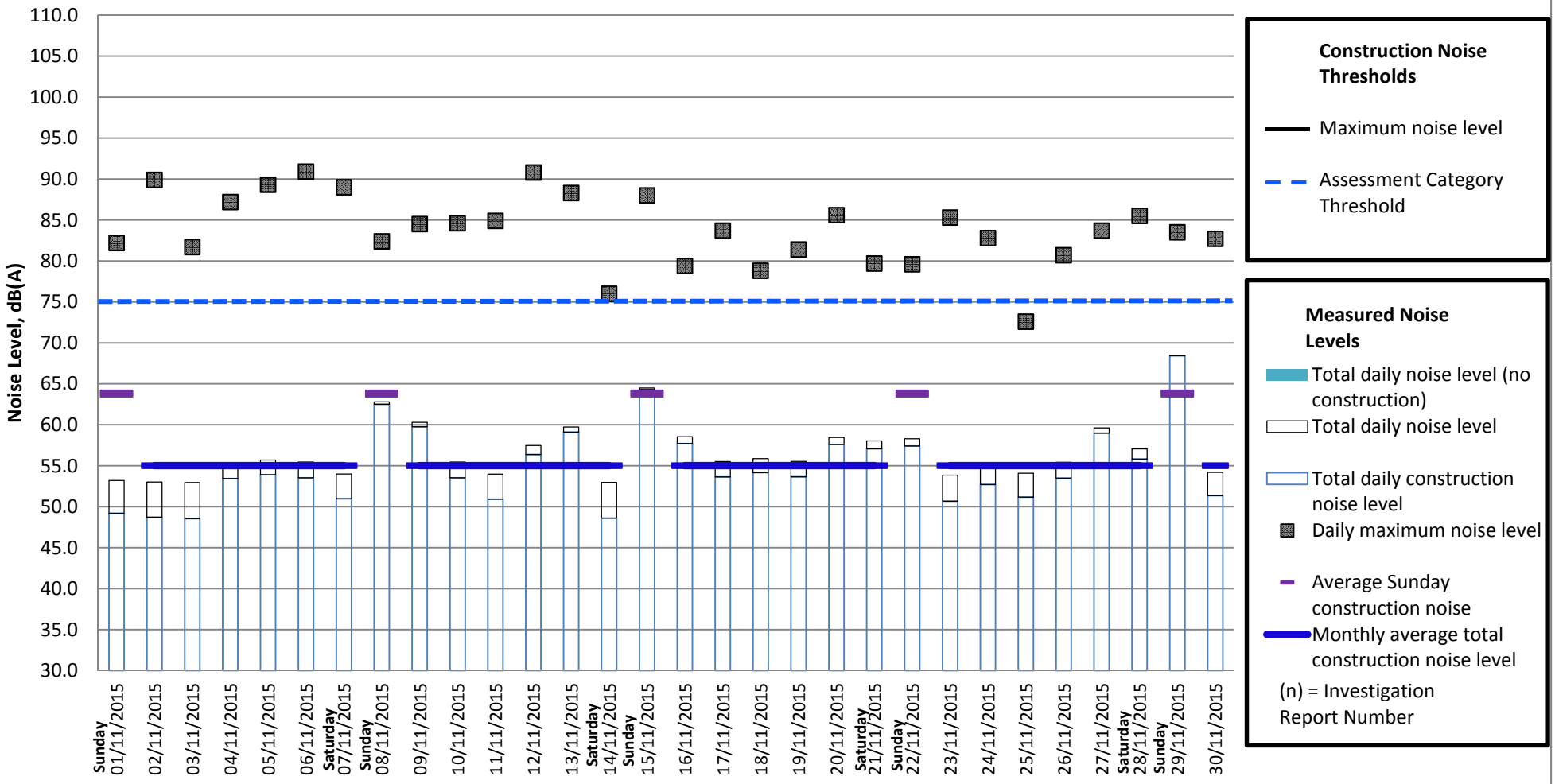
Note: The grey areas of the chart represent days on which no construction works have been undertaken at this location; no Sunday works have been undertaken at this location

Measured Daytime Noise Levels at Newton
Measurement period: November 2015



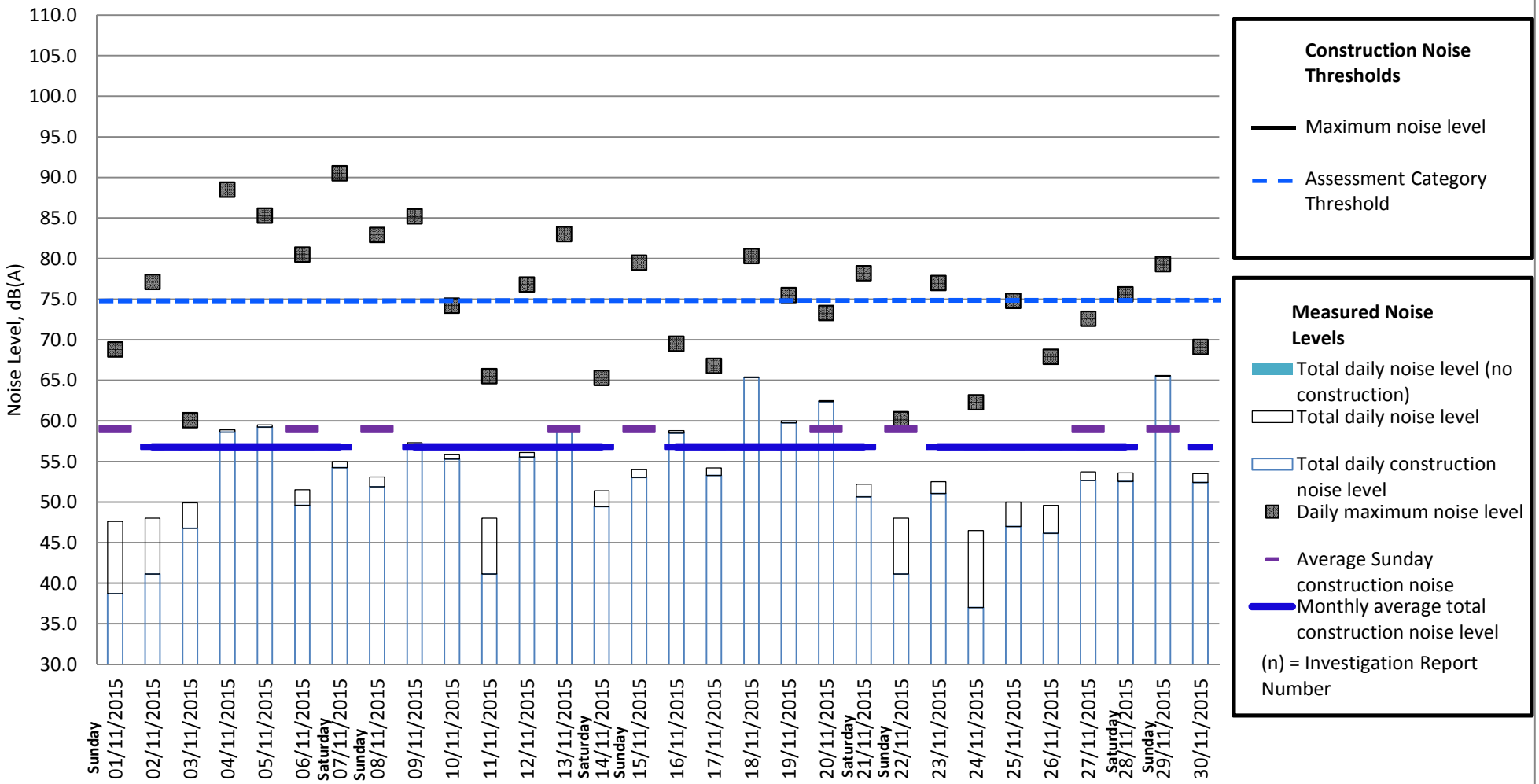
Note: The grey areas of the chart represent days on which no construction works have been conducted. It should be noted that the measured noise levels Mon - Fri can not be attributed to construction works due to the considerable distance (1.75 kilometers) between this monitoring location and the closest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

Measured Daytime Noise Levels at Port Edgar
Measurement period: November2015



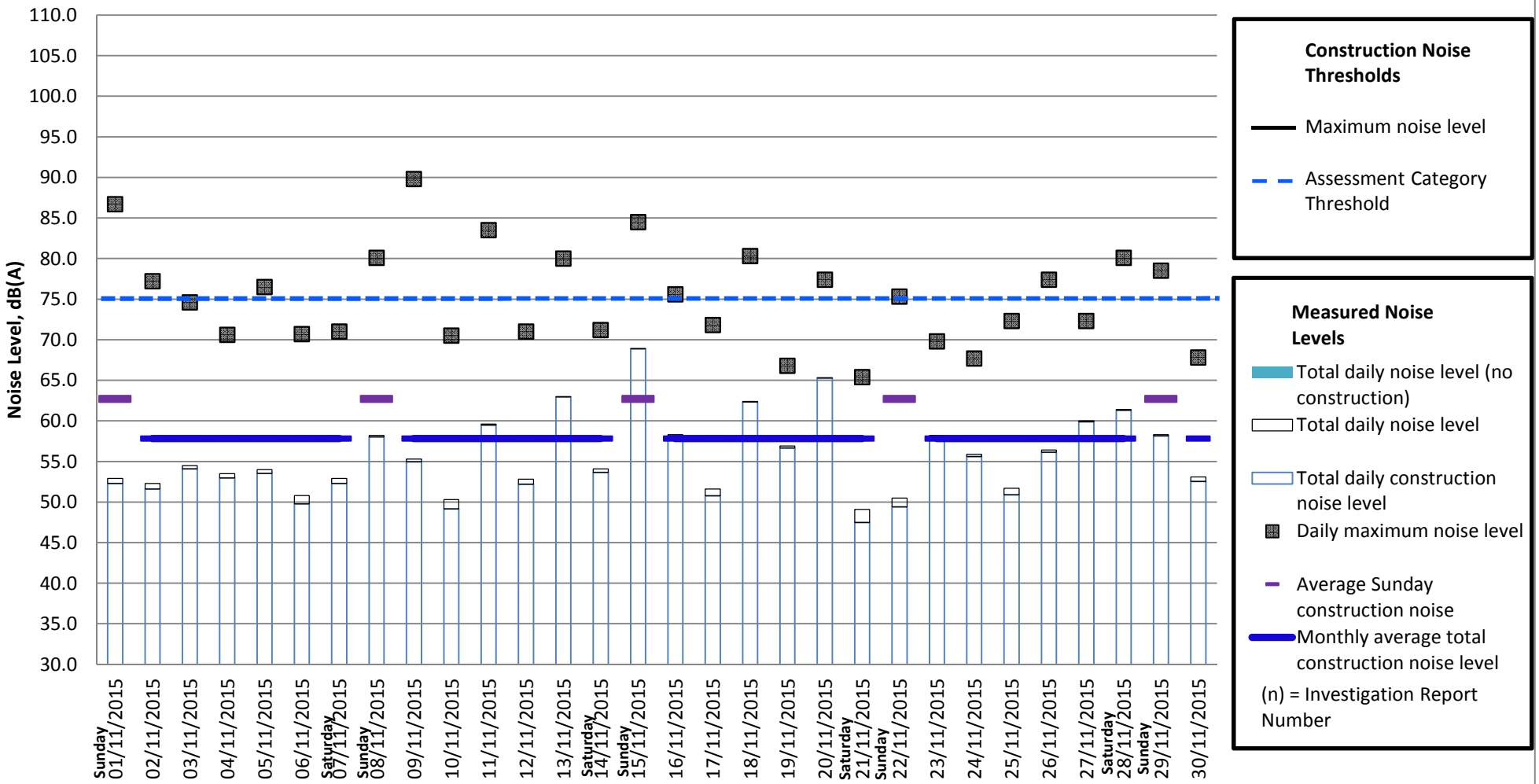
Note:

Measured Evening Noise Levels at Port Edgar
Measurement period: November 2015



Note:

Measured Night time Noise Levels at Port Edgar
Measurement period: November 2015



Note: