



Contractor



DRAGADOS | AMERICAN BRIDGE INTERNATIONAL  
HOCHTIEF | MORRISON CONSTRUCTION

Project **FORTH REPLACEMENT CROSSING**

Document title

**CONSTRUCTION NOISE MONITORING REPORT: JANUARY 2016**

Rev	Rev. Date	Purpose of revision	Made	Checked	Approved
00	08/02/2016	First Revision	SWR	MRN	MRN

Document status

**FOR REVIEW**

Made by: Steven Westwater	Checked By: Michael Richardson
Initials: SWR	Initials: MRN

Document number	Rev
<b>REP-00268</b>	<b>00</b>

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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 January 2016. 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 2016, 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, Linn Mill and Whinny Hill.
- 2.3 Various construction works were undertaken across the site during January 2016. **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 2016
M1	Whinny Hill	Network	<ul style="list-style-type: none"> <li>• Earth Works/Fill Placement</li> <li>• New Ferrytoll Road</li> <li>• FT03 &amp; FT04 Bridge Works</li> <li>• FT09 Works</li> <li>• FT19 Works</li> <li>• FT07 Bridge demolition</li> <li>• Roadworks</li> </ul>
M3	Tigh-Na-Grian	Crossing	<ul style="list-style-type: none"> <li>• Central Tower rebar, formwork, concreting works, deck lifting &amp; stay cable installation works</li> <li>• North Tower rebar, formwork, concreting works, deck lifting and stay cable installation works</li> <li>• Pier N1 &amp; N2 bearing works</li> <li>• AVN works</li> </ul>
M6	Port Edgar	• Crossing	<ul style="list-style-type: none"> <li>• Central Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works</li> <li>• South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works.</li> <li>• Pier S2 rebar, formwork &amp; concrete works</li> <li>• Pier S1 rebar, formwork &amp; concrete works</li> </ul>
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> <li>• Pier S1, rebar, formwork &amp; concrete works</li> <li>• Pier S2 rebar, formwork and concrete work</li> <li>• Central Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works</li> <li>• South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works</li> </ul>
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> <li>• AVS rebar &amp; concrete works</li> <li>• Pier S1, rebar, formwork &amp; concrete works.</li> <li>• Central Tower rebar, formwork, concreting works , deck section lifts and stay cable installation works.</li> <li>• South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works.</li> <li>• South Tower Deck Section Lifts</li> <li>• Main carriageway earthworks</li> </ul>
M11	Linn Mill	Network (close proximity to Crossing)	<ul style="list-style-type: none"> <li>• AVS rebar &amp; concrete works</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway earthworks</li> </ul>

M13	Clufflat Brae	Crossing / Network	<ul style="list-style-type: none"> <li>• AVS rebar and concrete works</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway earthworks</li> </ul>
M14	Springfield	Network	<ul style="list-style-type: none"> <li>• AVS rebar and concrete works</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway earthworks</li> </ul>
M15	Echline	Network	<ul style="list-style-type: none"> <li>• AVS scaffolding, shuttering and reinforcement to deck</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway earthworks</li> </ul>
M16	Scotstoun	Network	<ul style="list-style-type: none"> <li>• Footpath works</li> <li>• Utility works</li> <li>• B800 Piling works</li> <li>• B800 North road works including bridge works (these works are directly in the location of the meter which now sits within the construction boundary).</li> <li>• Mainline NB merge works</li> </ul>
M17	Dundas Home Farm	Network	<ul style="list-style-type: none"> <li>• Utility works</li> <li>• B800 piling works</li> <li>• B800 South road works including bridge works etc...</li> <li>• Main carriageway works</li> <li>• Mainline NB merge works</li> </ul>
M18	Newton	Network	<ul style="list-style-type: none"> <li>• No works</li> </ul>

### 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](http://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 as 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.
  - There were no construction works carried out between 24<sup>th</sup> December 2015 and 4<sup>th</sup> January 2016 due to the Christmas shutdown period

## 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 January 2016. For evening and night time periods, there were no exceedances of monthly average noise during January, with the exception of Butlaw, Clufflat and Tigh-Na-Grian during the night-time period. There are no exceedances of Sunday averages, with the exception of Clufflat, Linn Mill and Tigh-Na-Grian during the night and Inchgarvie during the day.
- 3.4** Most 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 recordings demonstrate 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.
- 3.5** 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, 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 construction exceedance. There were some exceedances this month that were due to construction work (See 3.6).
- 3.6** During the month of January it was noted that there was construction related noise at Linn Mill. The  $L_{AFmax}$  exceedances on the 6<sup>th</sup> and 8<sup>th</sup> January occurred during the day and 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. The exceedance on the 22<sup>nd</sup> January during the night time period was caused by a large vehicle driving down the access track before normal working hours. The relevant site agent was emailed regarding this and staff were reminded about normal working hours.

- 3.7** 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 recorded a high number of waves breaking against the shore. Ongoing residential building works at Inchgarvie Lodge accounts for the majority of the exceedances at this location.
- 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 January the maximum noise threshold was exceeded on 43 occasions (13 day time, 11 evening and 19 night time). Exceedances were attributed to non-construction factors notably waves and wind.
Clufflat Brae	During January the maximum noise threshold was exceeded on 43 occasions (13 daytime, 12 evening and 18 night time). No exceedances were attributed to construction works. Exceedances were found to be due to birds and high winds.
Inchgarvie Lodge	During January the maximum noise threshold was exceeded on 32 occasions (19 day time, 3 evening and 10 night time). No exceedances were attributed to construction works. Residential work to the property was found to be the main contributing factors to the exceedances in this location. Other factors included High winds and birds.
Linn Mill	During January the maximum noise threshold was exceeded on 36 occasions (15 daytime, 6 evening and 15 night time). The majority of exceedances at this location were due to birds, residents and wind. There were 3 instances of construction noise exceeding the threshold (see 3.6)
Tigh-Na-Grian	During January the maximum noise threshold was exceeded on 32 occasions (9 daytime, 2 evening and 21 night time). Exceedances were mainly due to birds and wind
Dundas Home Farm	During January the maximum noise threshold was exceeded on 7 occasions. The main exceedances were due to residents and birds.
Echline	During January the maximum noise threshold was exceeded on 22 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 January the maximum noise threshold was exceeded on 6 occasions. These exceedances were due to local residents.
Scotstoun	During January the maximum noise threshold was exceeded on 27 occasions. These exceedances were attributed to general traffic on the adjacent road.
Whinny Hill	During January the maximum noise threshold was exceeded on 14 occasions. No exceedances at this location were due to construction activities. Most exceedances were due to birds and wind.
Port Edgar	Recordings taken for data record purposes
Newton	Recordings taken for data record purposes



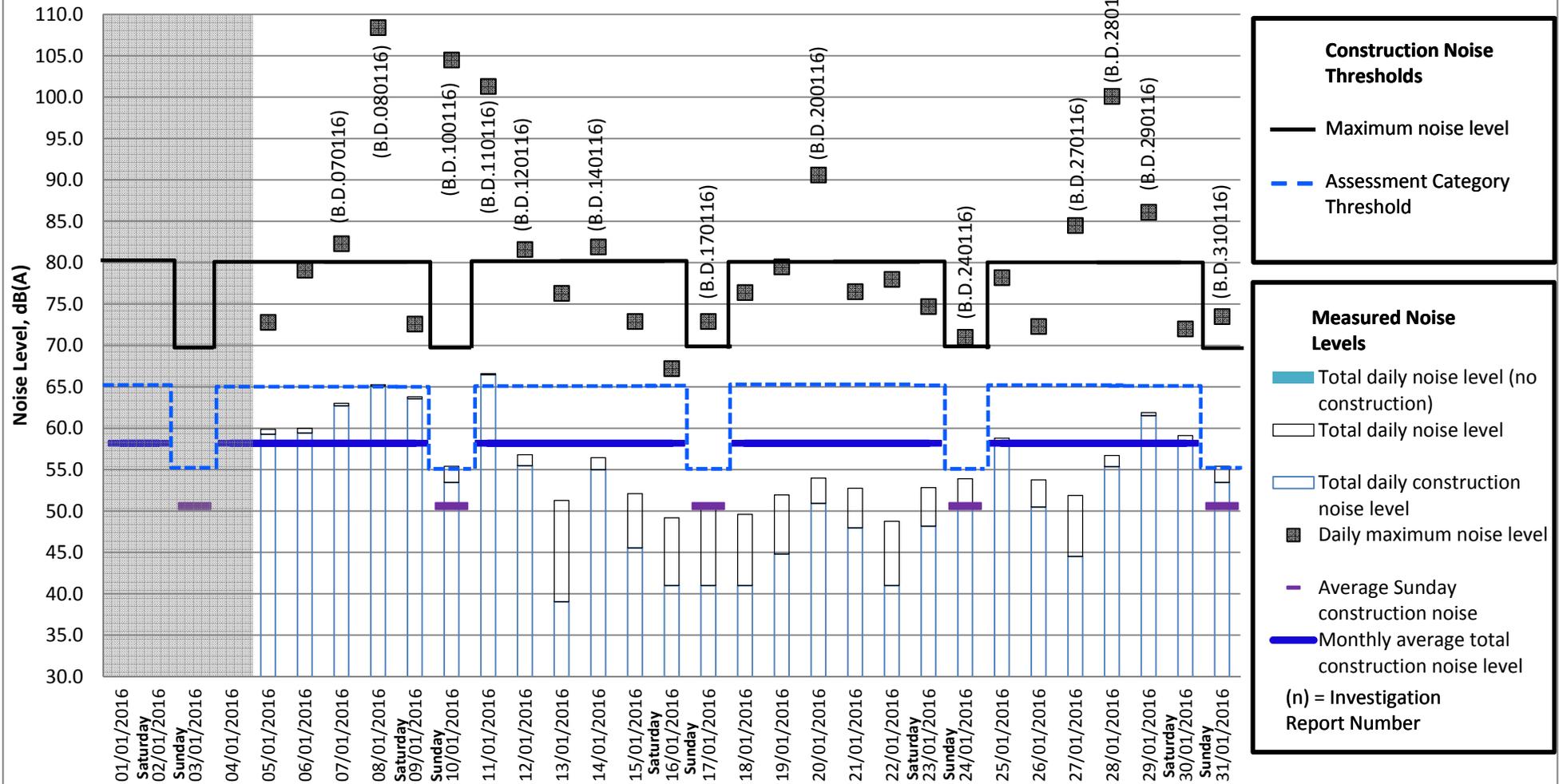
**Forth Crossing** Bridge Constructors

| HOCHTIEF Solutions  
| American Bridge International  
| DRAGADOS  
| Morrison Construction

## **APPENDIX A**

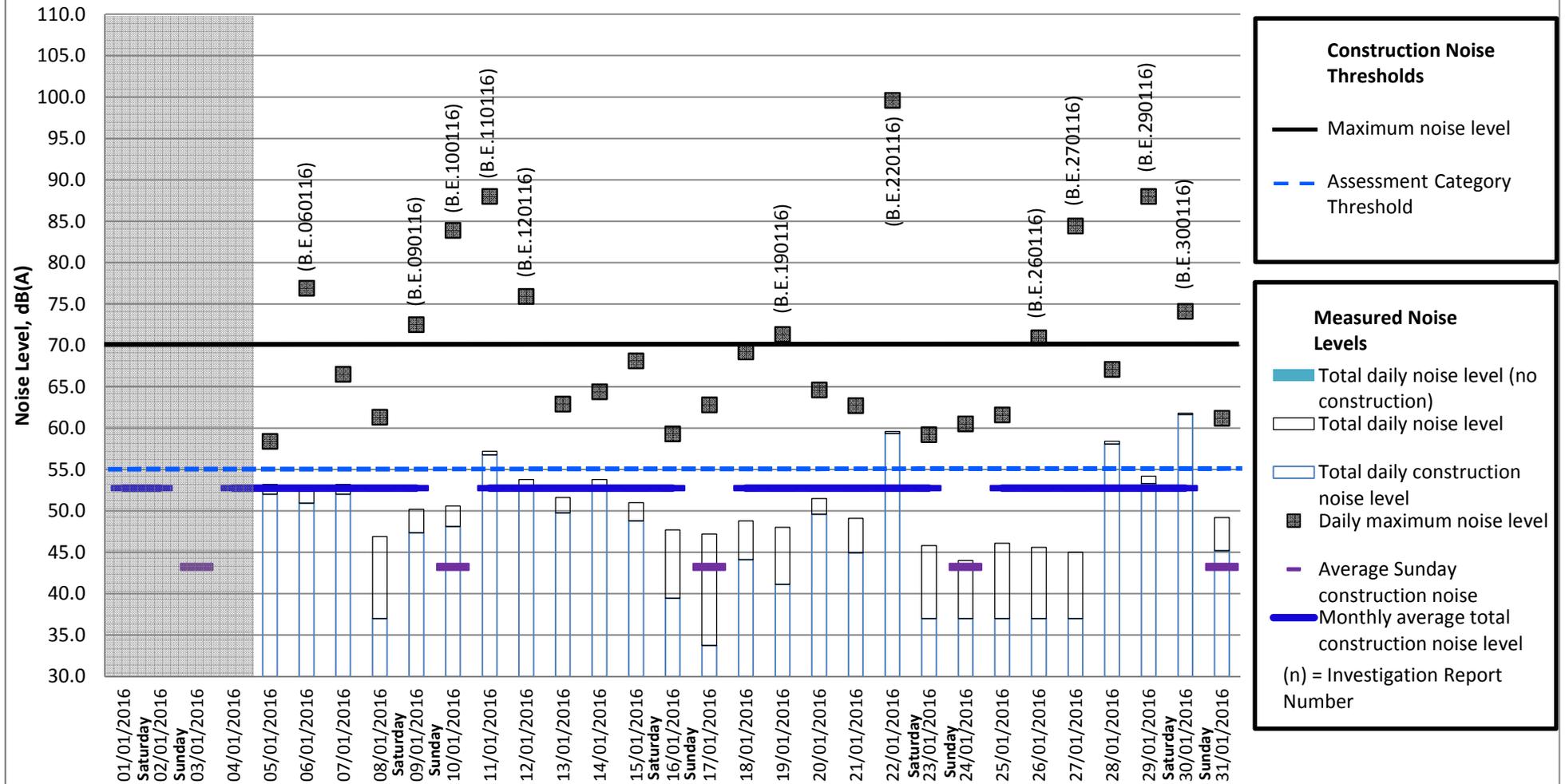
## Measured Daytime Noise Levels at Butlaw Fisheries

### Measurement period: January 2016



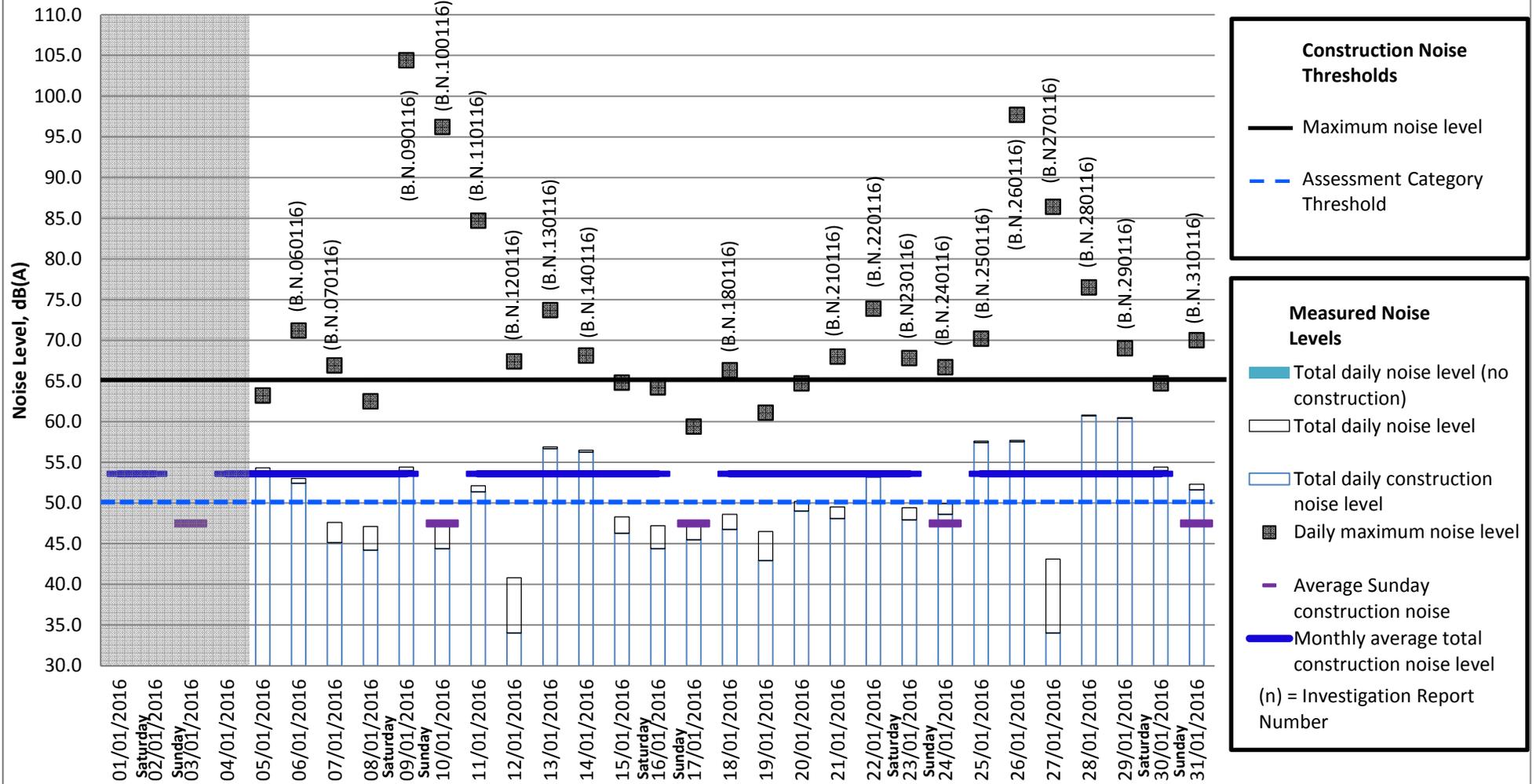
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Evening Noise Levels at Butlaw Fisheries Measurement period: January 2016



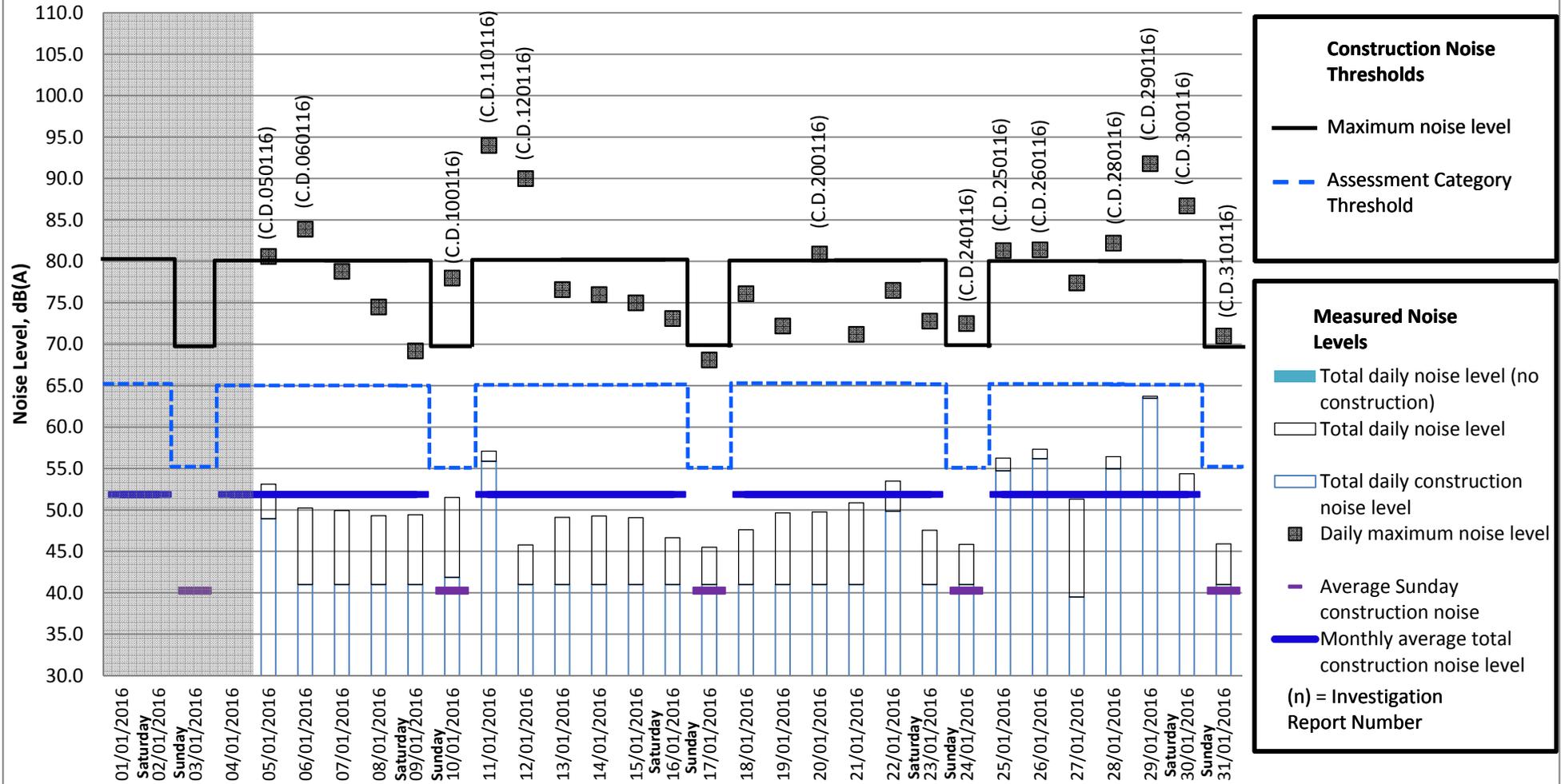
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 11th 22nd, 28th and 30th January were caused by wind

## Measured Night time Noise Levels at Butlaw Fisheries Measurement period: January 2016



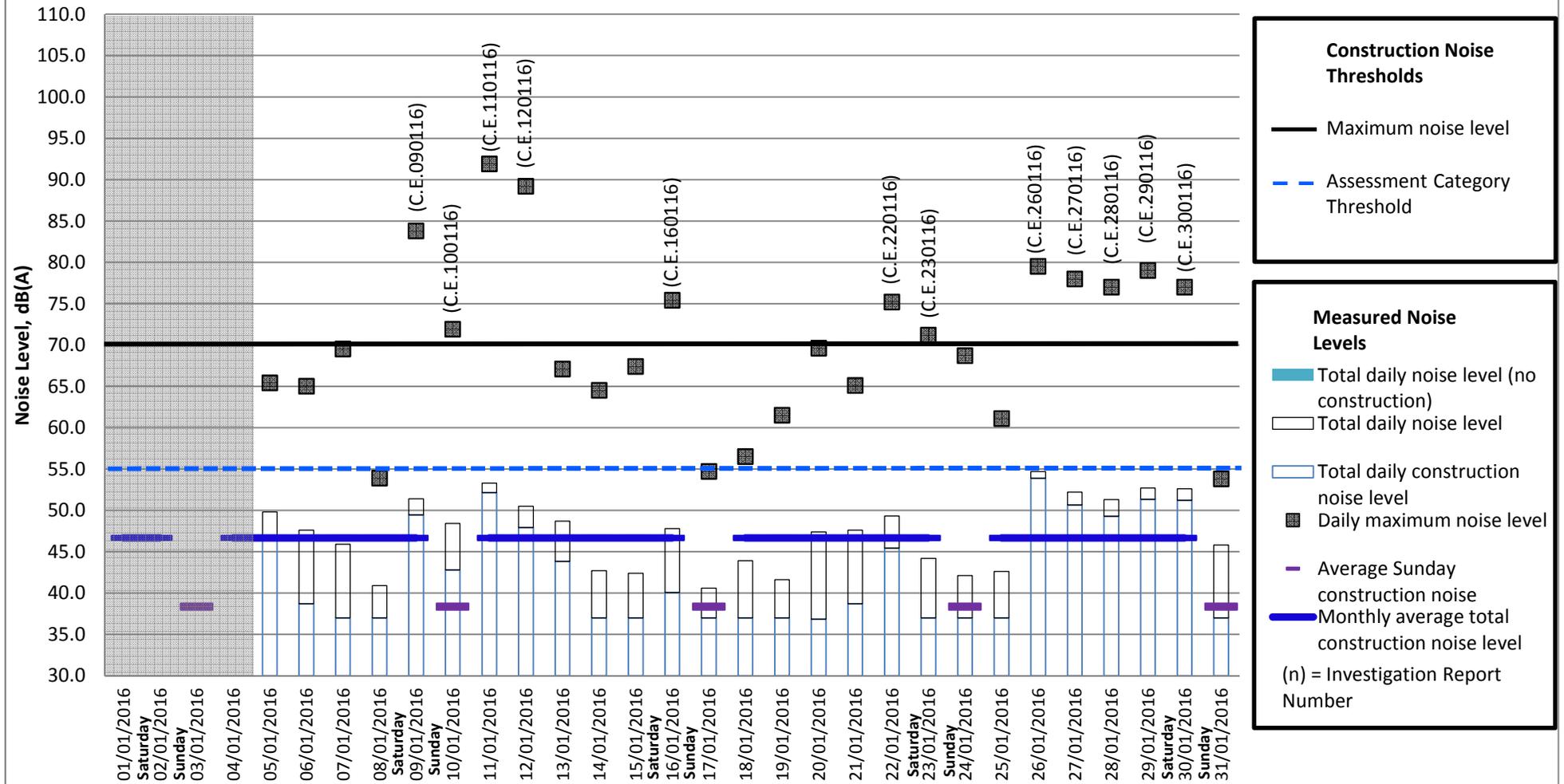
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedances of the LAeq 'Total Daily Construction' through the month were caused by wind and waves.

## Measured Daytime Noise Levels at Clufflat Measurement period: January 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Evening Noise Levels at Clufflat Measurement period: January 2016



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

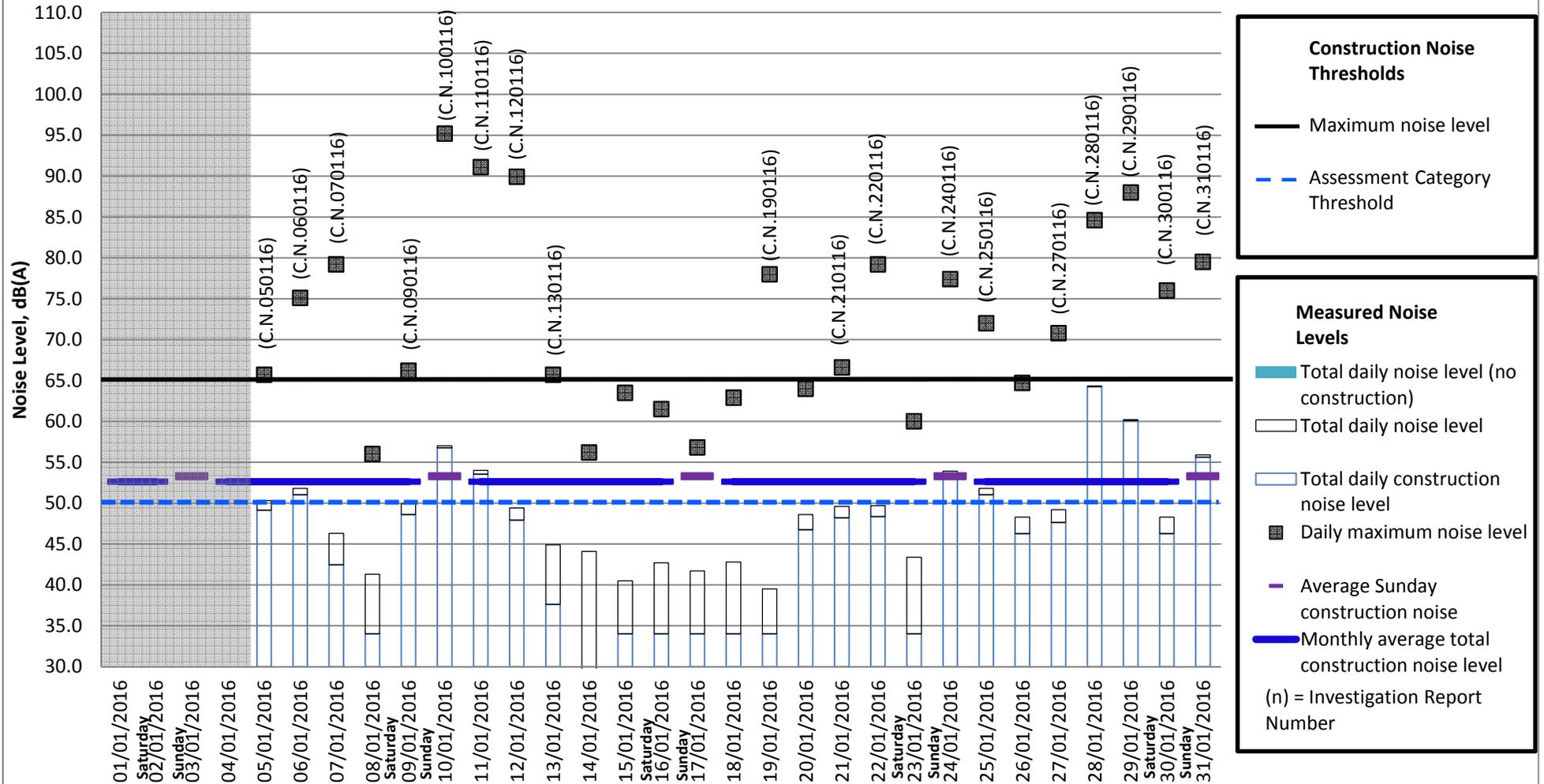
**Measured Noise Levels**

- 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

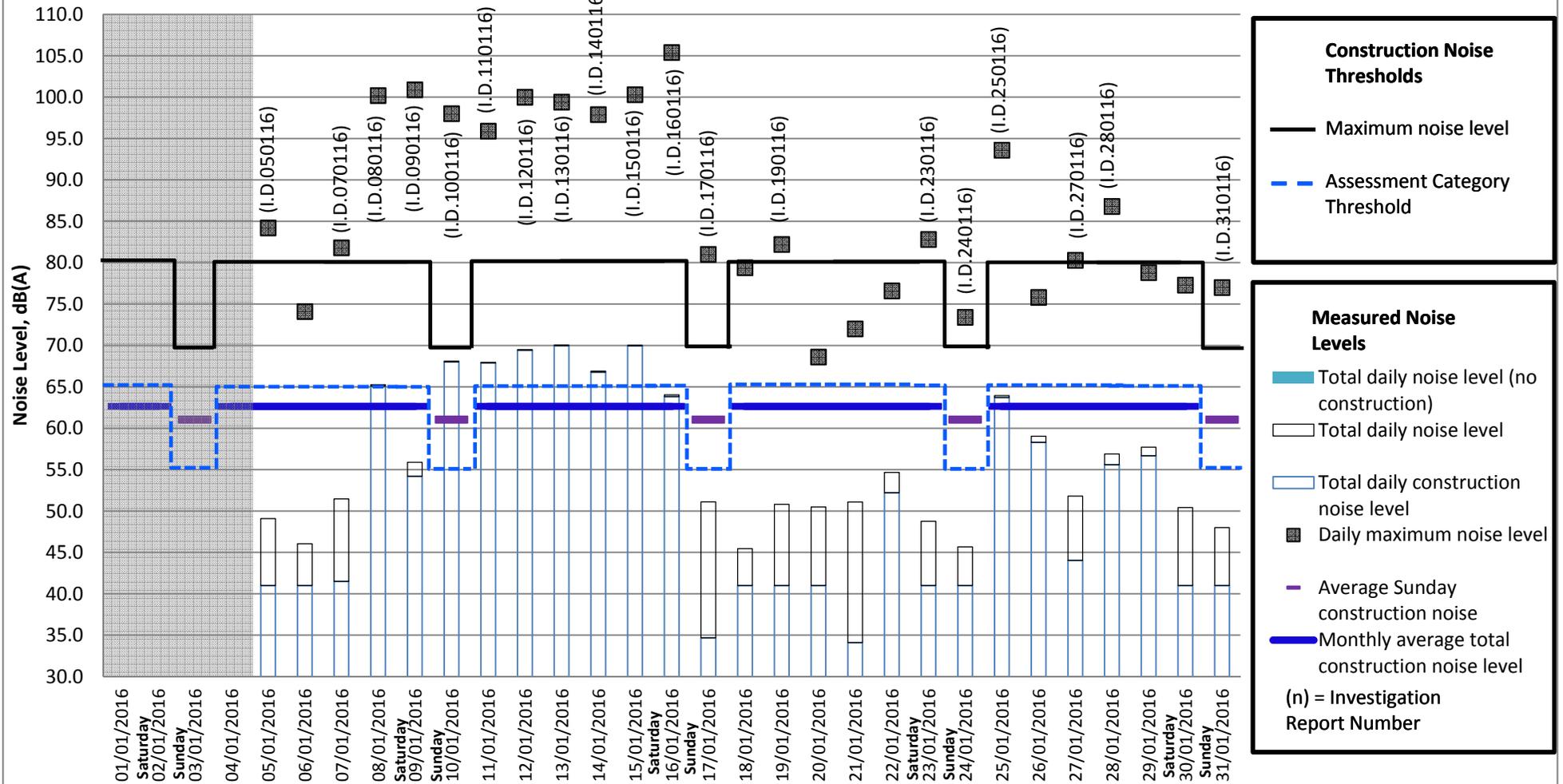
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Night time Noise Levels at Clufflat Measurement period: January 2016



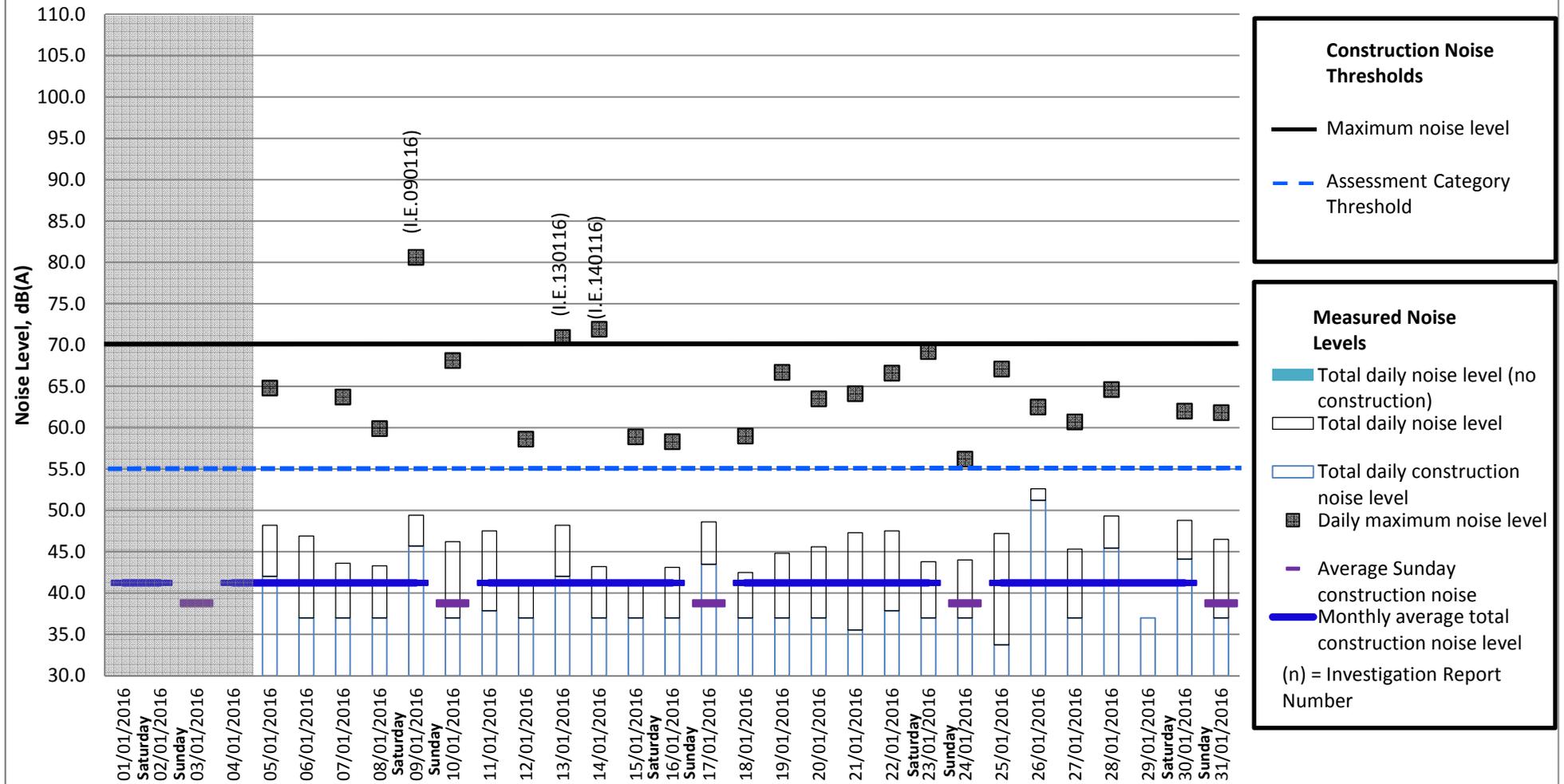
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedances of the LAeq 'Total Daily Construction' throughout the month were caused by wind

## Measured Daytime Noise Levels at Inchgarvie Measurement period: January 2016



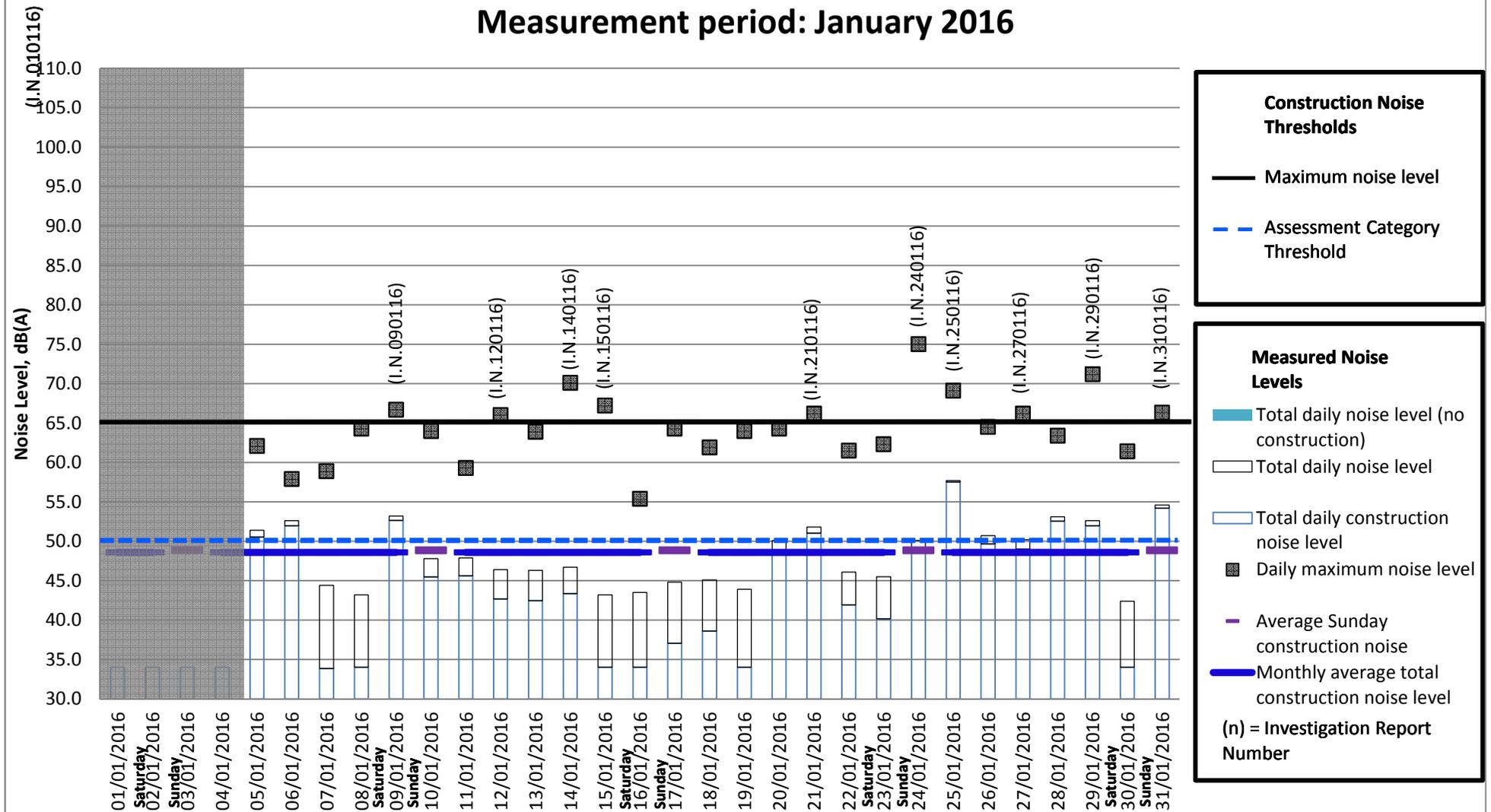
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' from the 10/01/2016 to 15/01/2016 was caused by the resident carrying out work on his property.

## Measured Evening Noise Levels at Inchgarvie Measurement period: January 2016



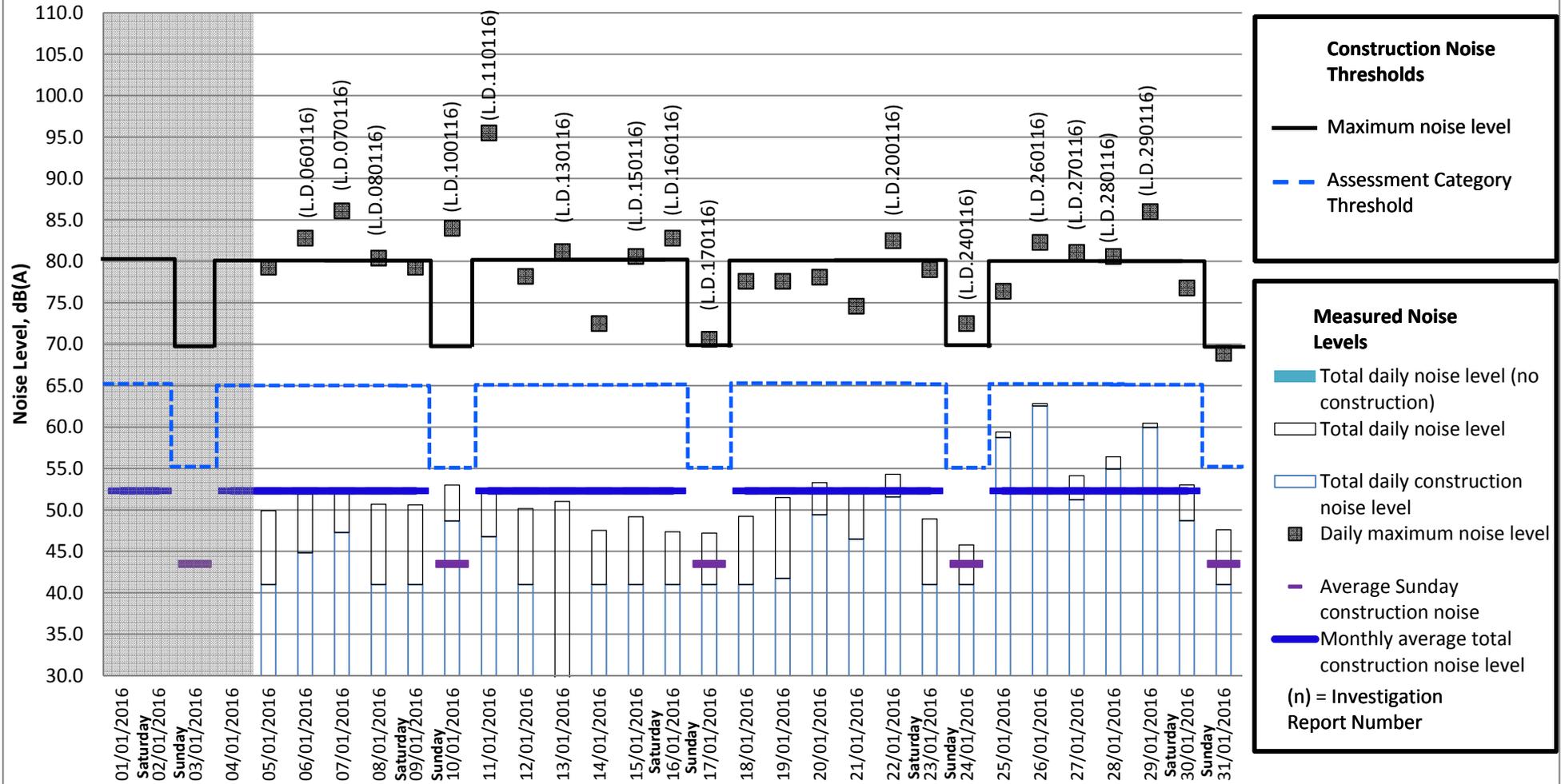
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Night time Noise Levels at Inchgarvie Measurement period: January 2016



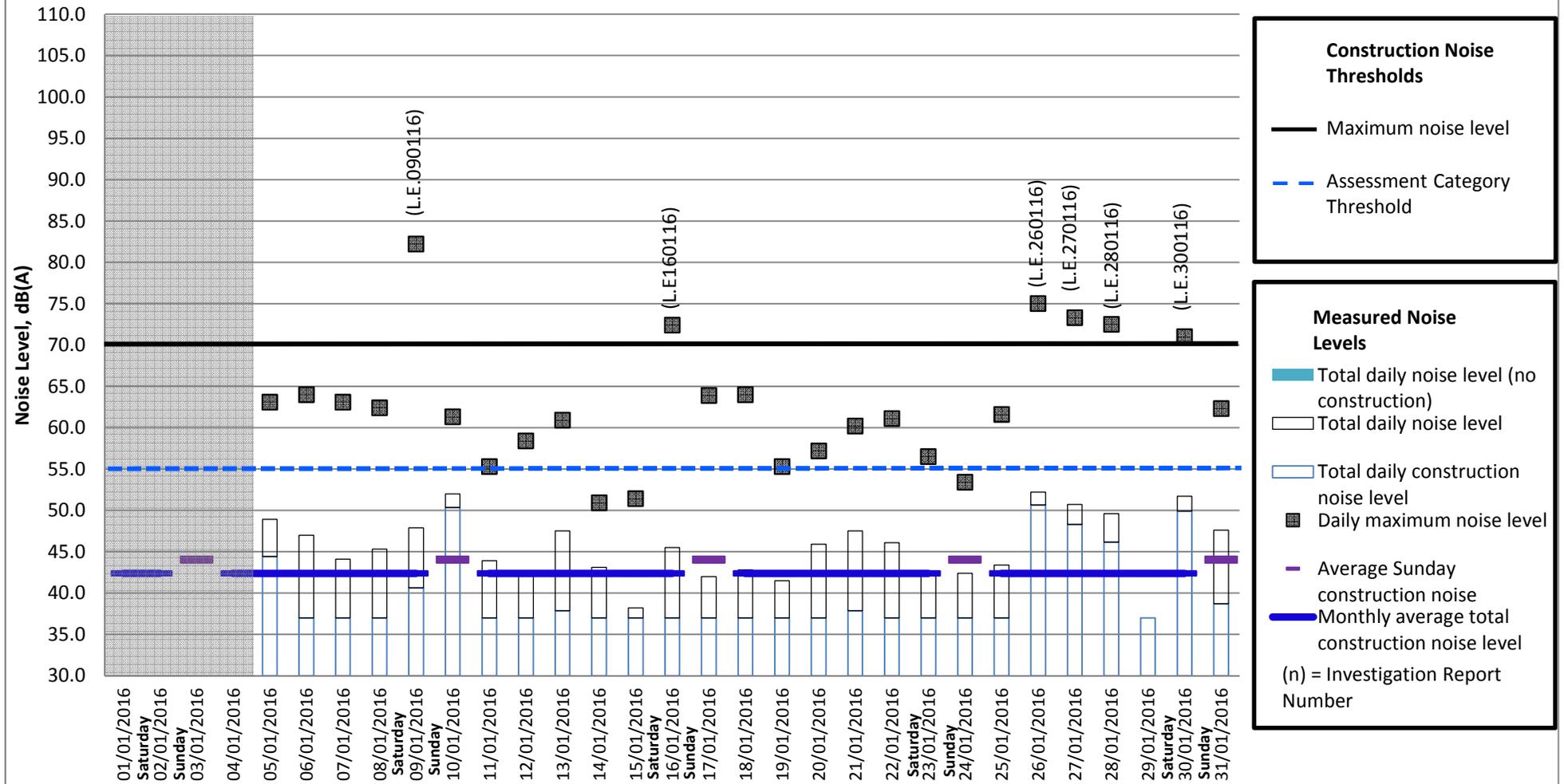
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' throughout the month were caused caused by wind

## Measured Daytime Noise Levels at Linn Mill Measurement period: January 2016



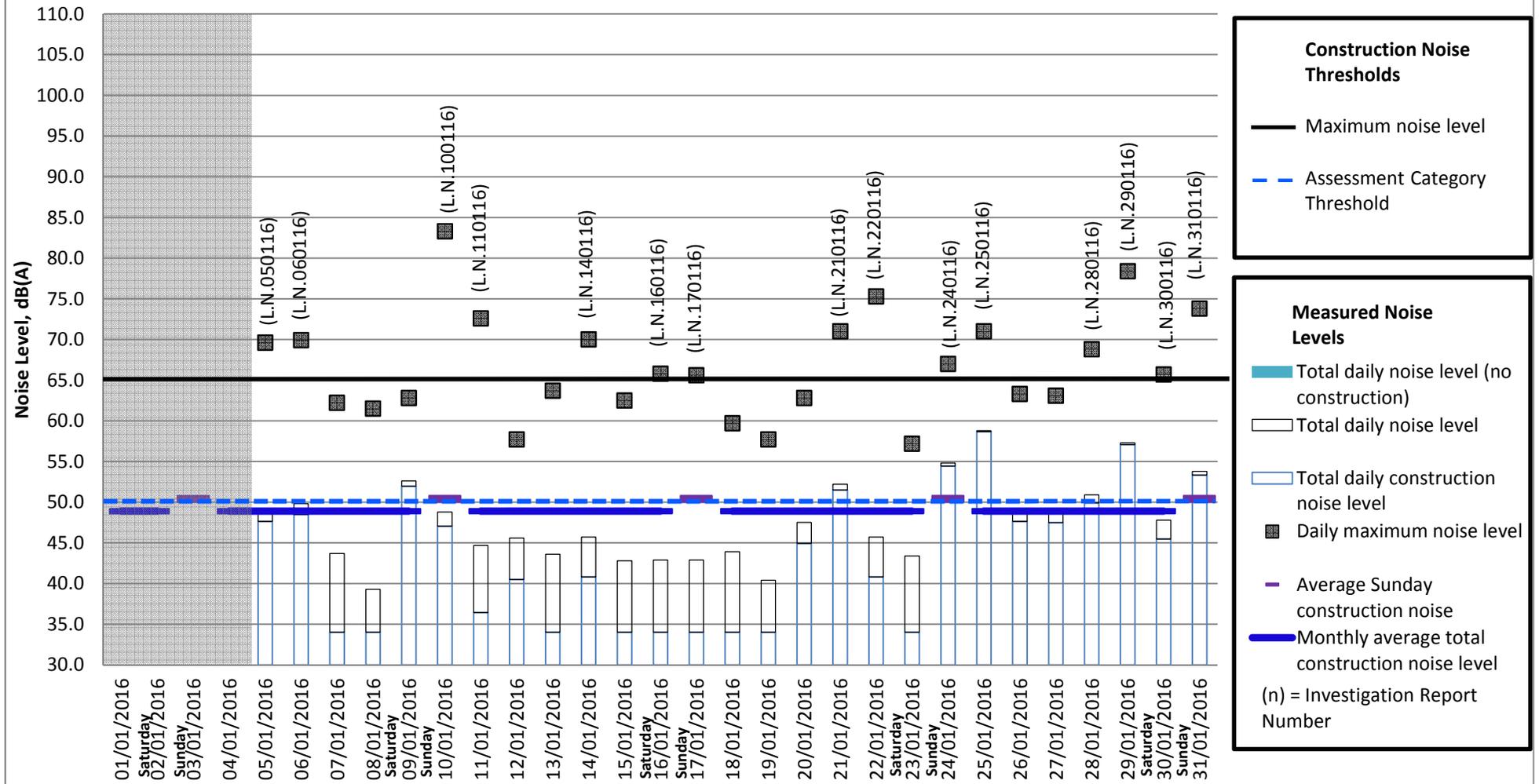
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Evening Noise Levels at Linn Mill Measurement period: January 2016



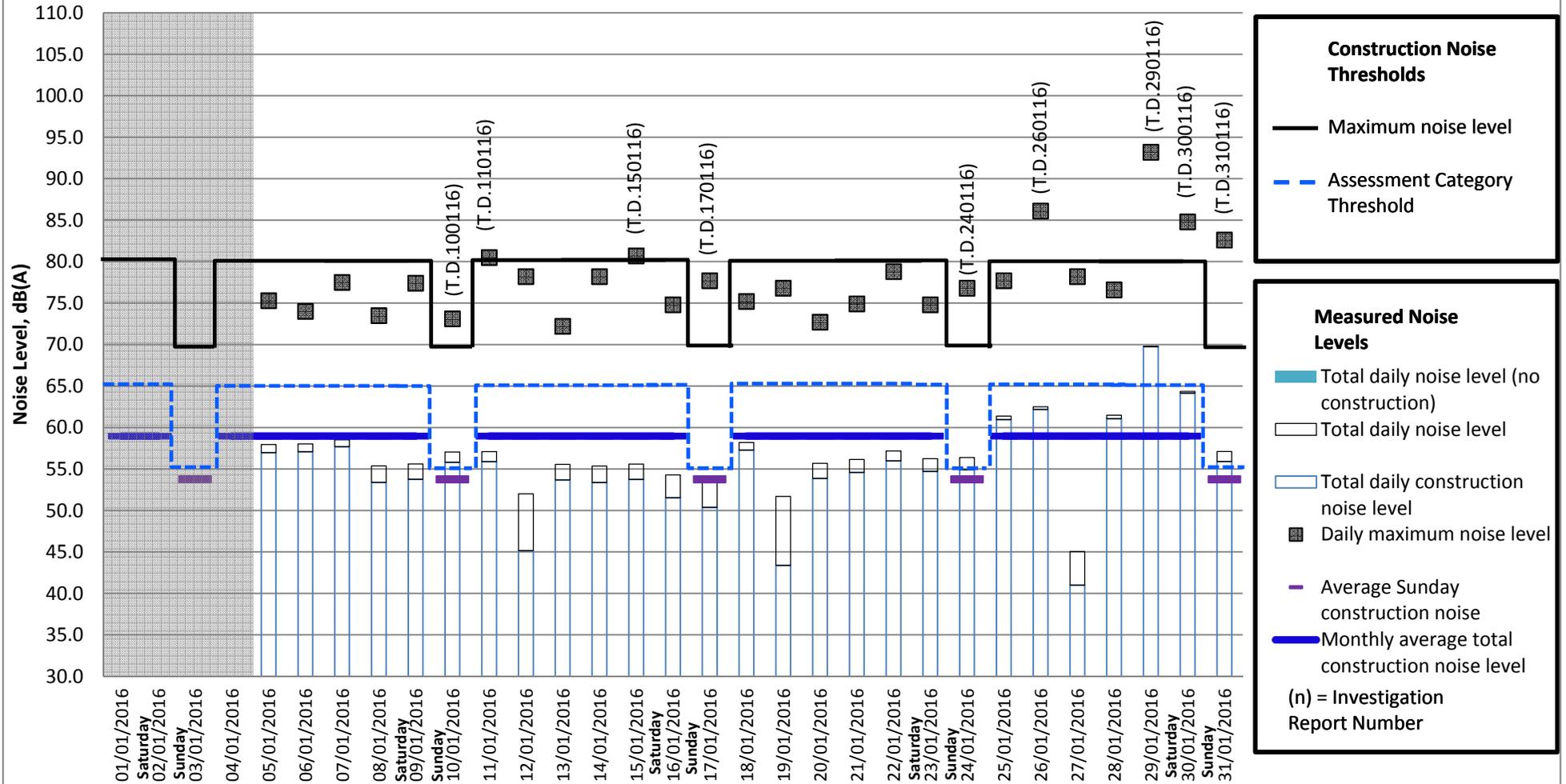
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Night time Noise Levels at Linn Mill Measurement period: January 2016



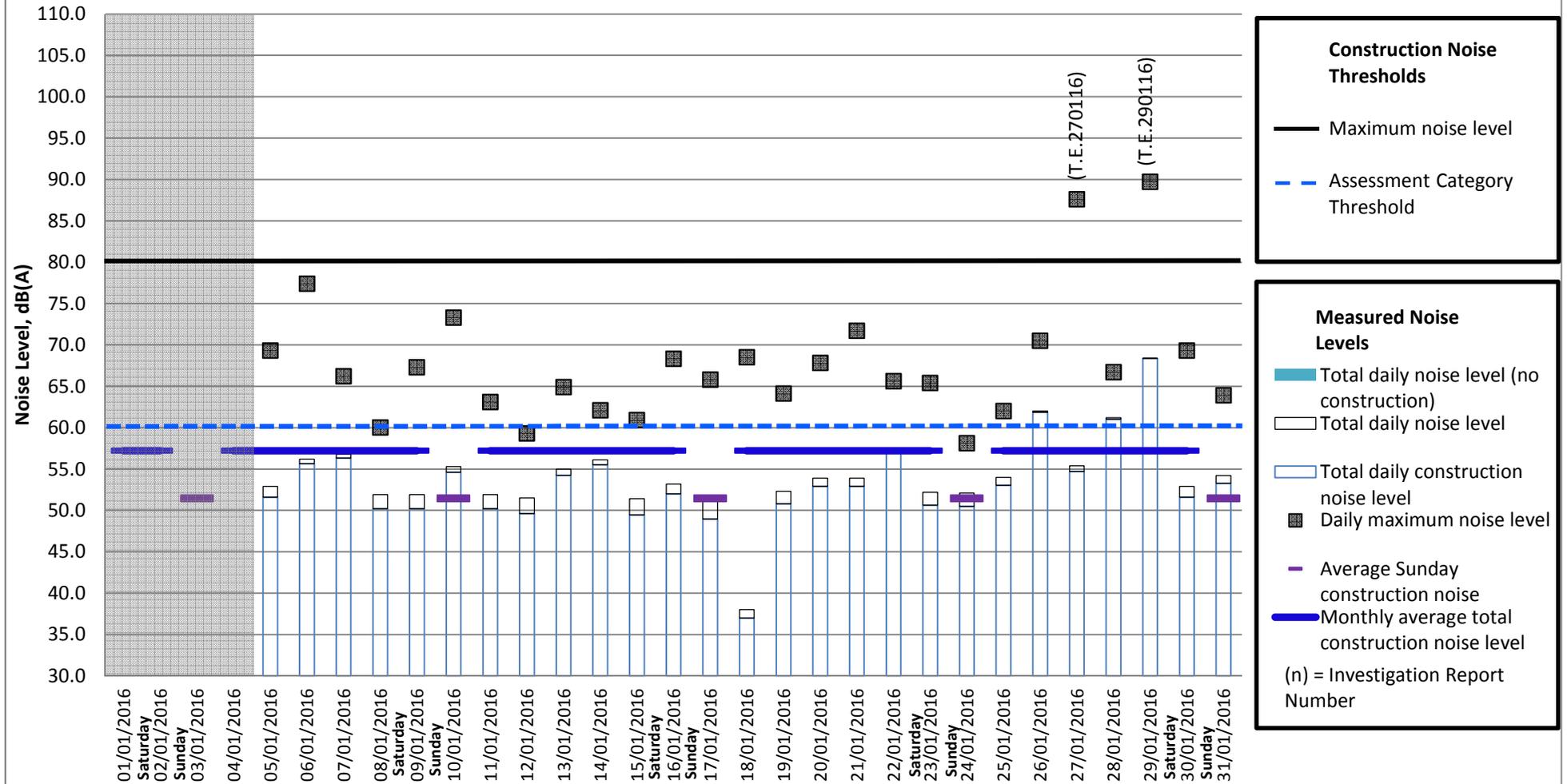
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedances of the LAeq 'Total Daily Construction' throughout the month were caused by wind

## Measured Daytime Noise Levels at Tigh-Na-Grian Measurement period: January 2016



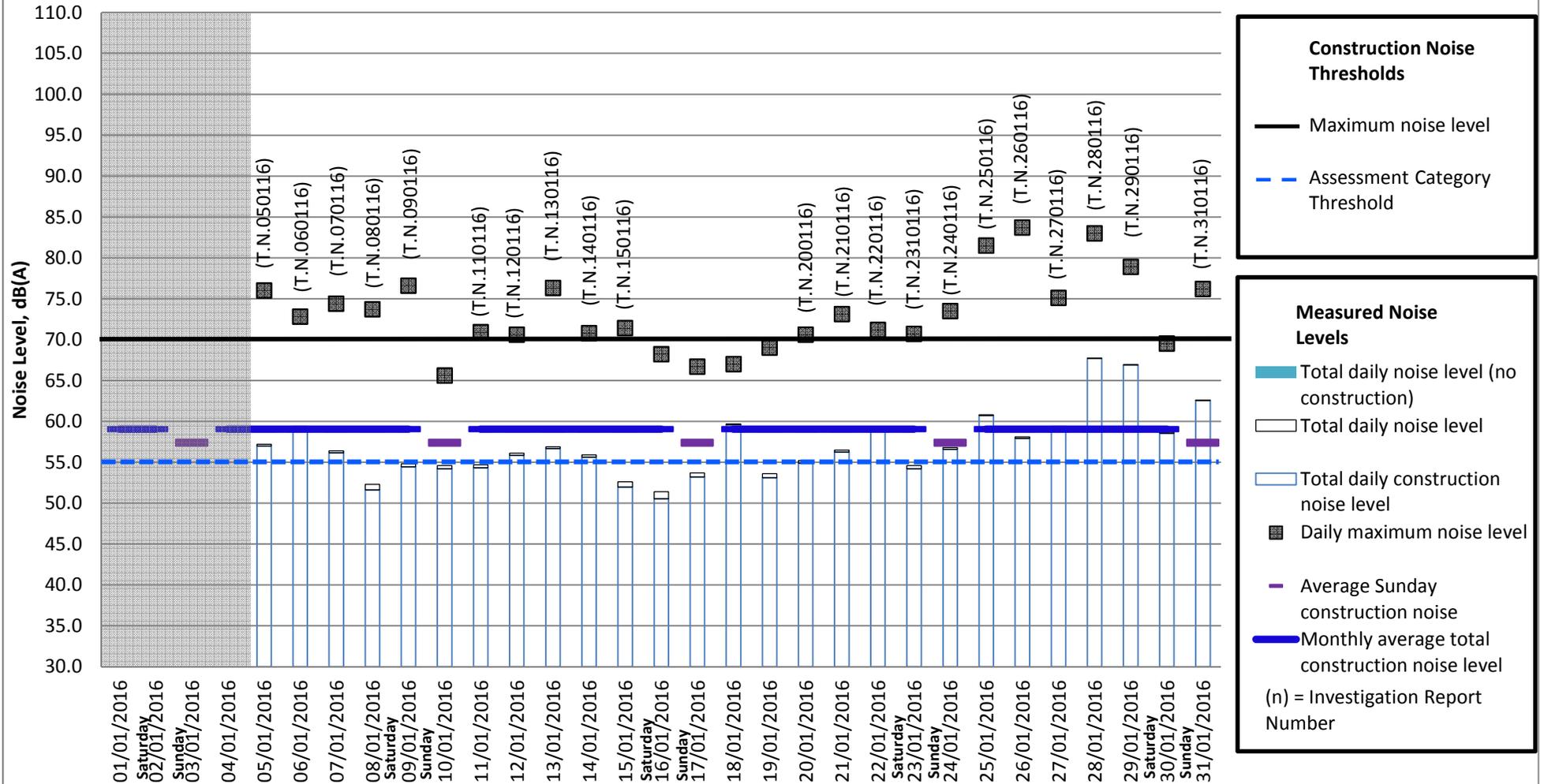
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Evening Noise Levels at Tigh-Na-Grian Measurement period: January 2016



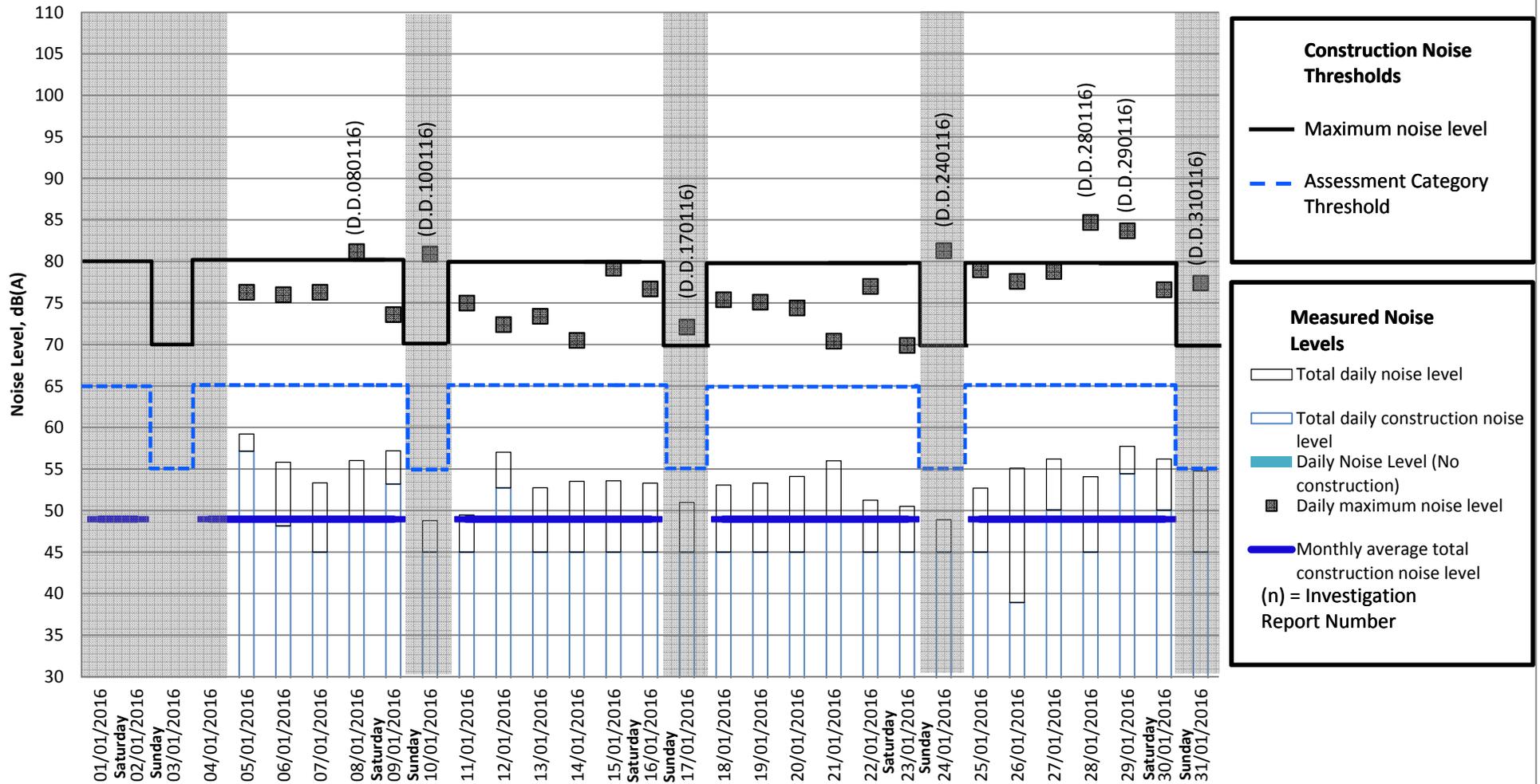
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 26, 28th and 29th January was caused by wind

## Measured Night time Noise Levels at Tigh-Na-Grian Measurement period: January 2016



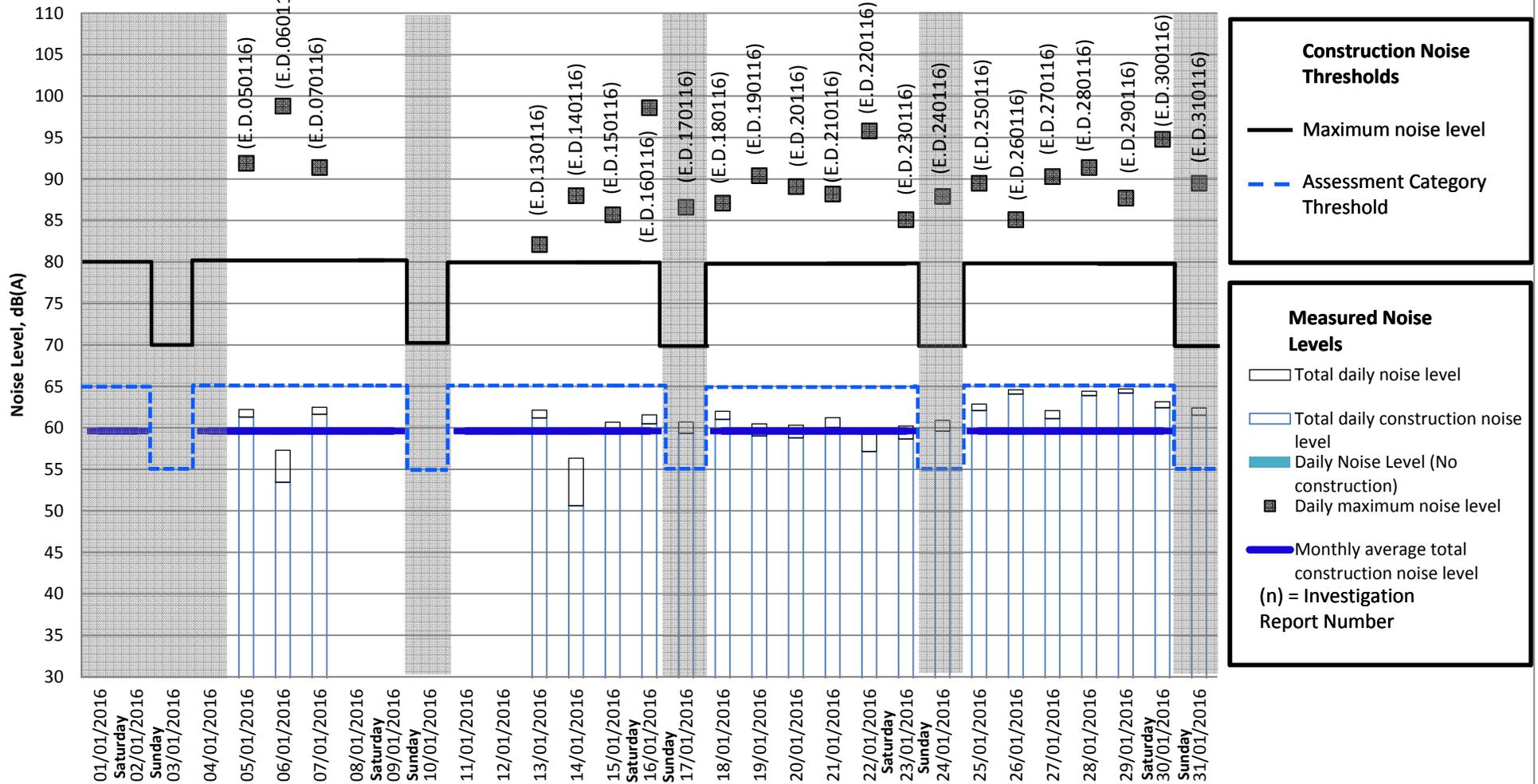
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). After investigation, it was concluded that the exceedances of the LAeq 'Total Daily Construction' throughout the month was caused by birds and wind

## Measured Daytime Noise Levels at Dundas Home Farm Measurement period: January 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16)

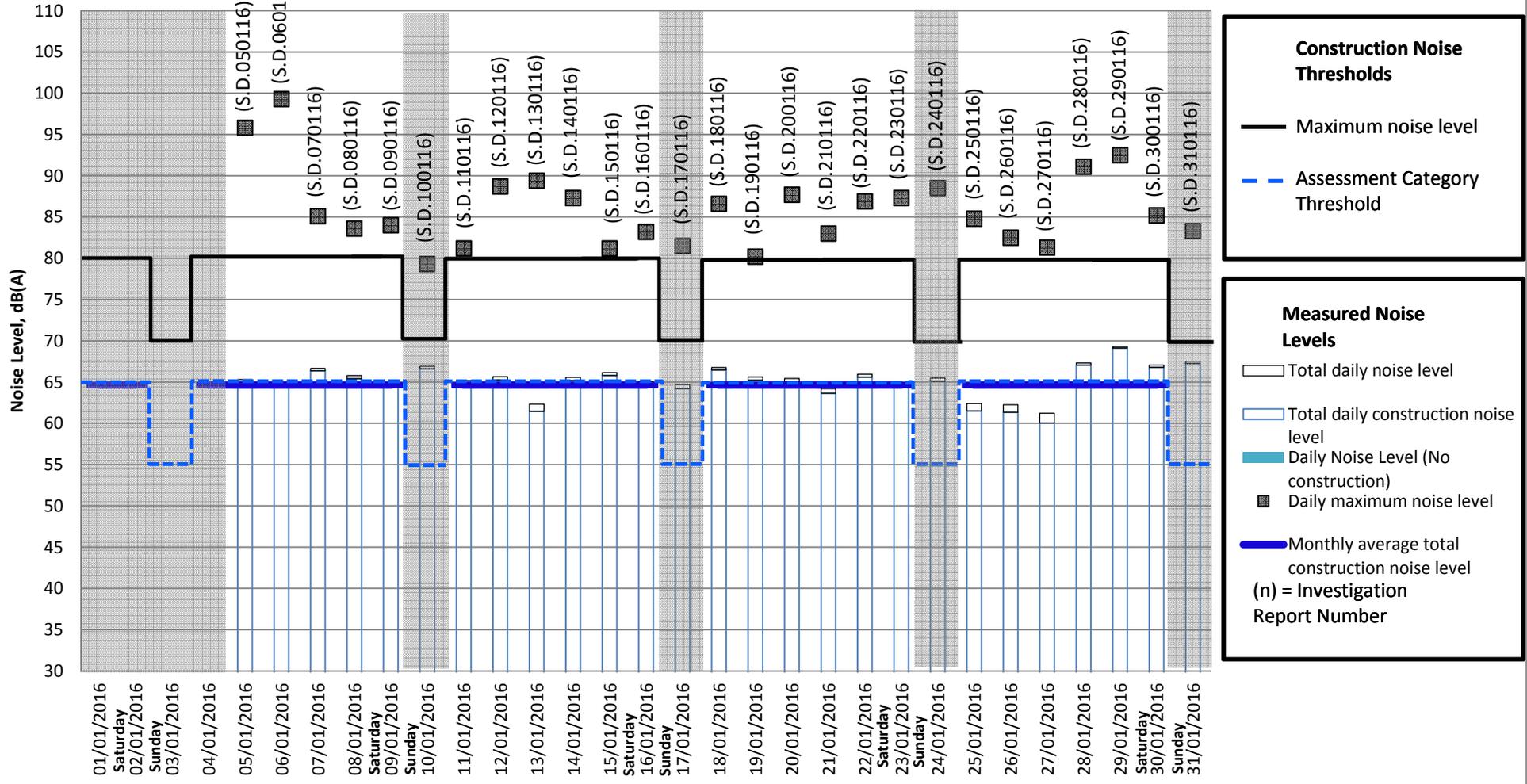
## Measured Daytime Noise Levels at Echline Measurement period: January 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). There was no data recorded between 08/01/2016 and 12/01/2016 due to a problem with the monitor.

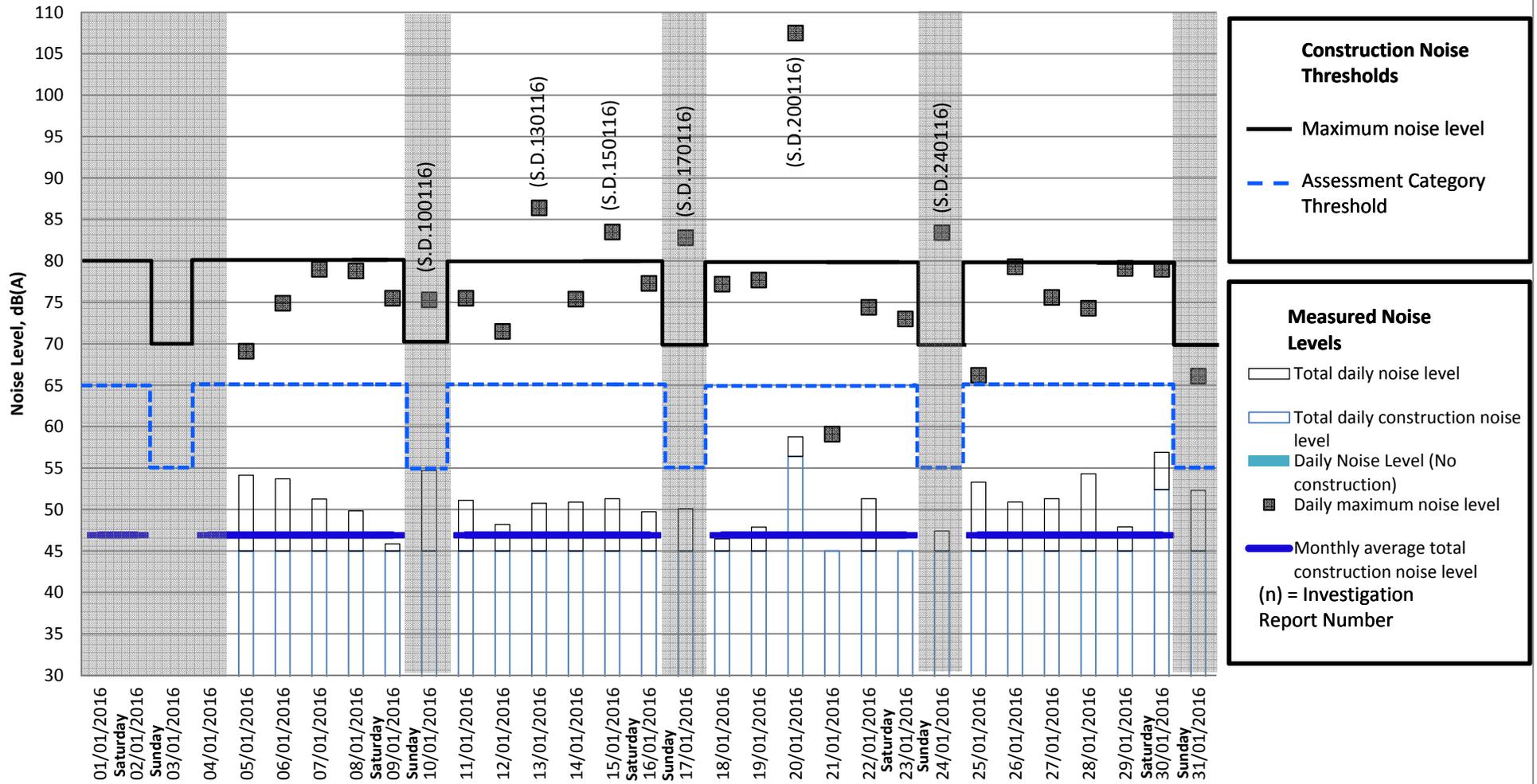
# Measured Daytime Noise Levels at Scotstoun

## Measurement period: January 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16)

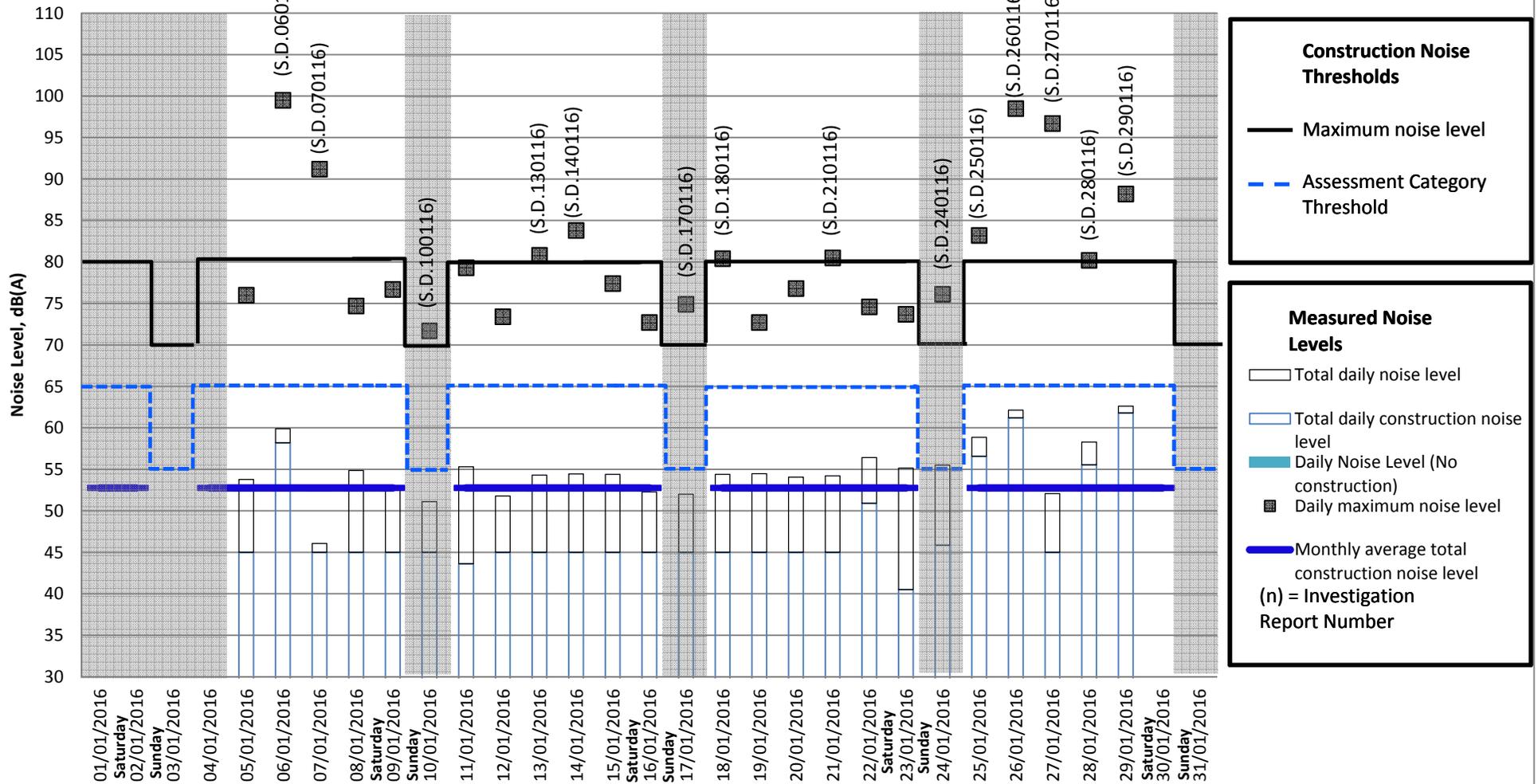
## Measured Daytime Noise Levels at Springfield Measurement period: January 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16)

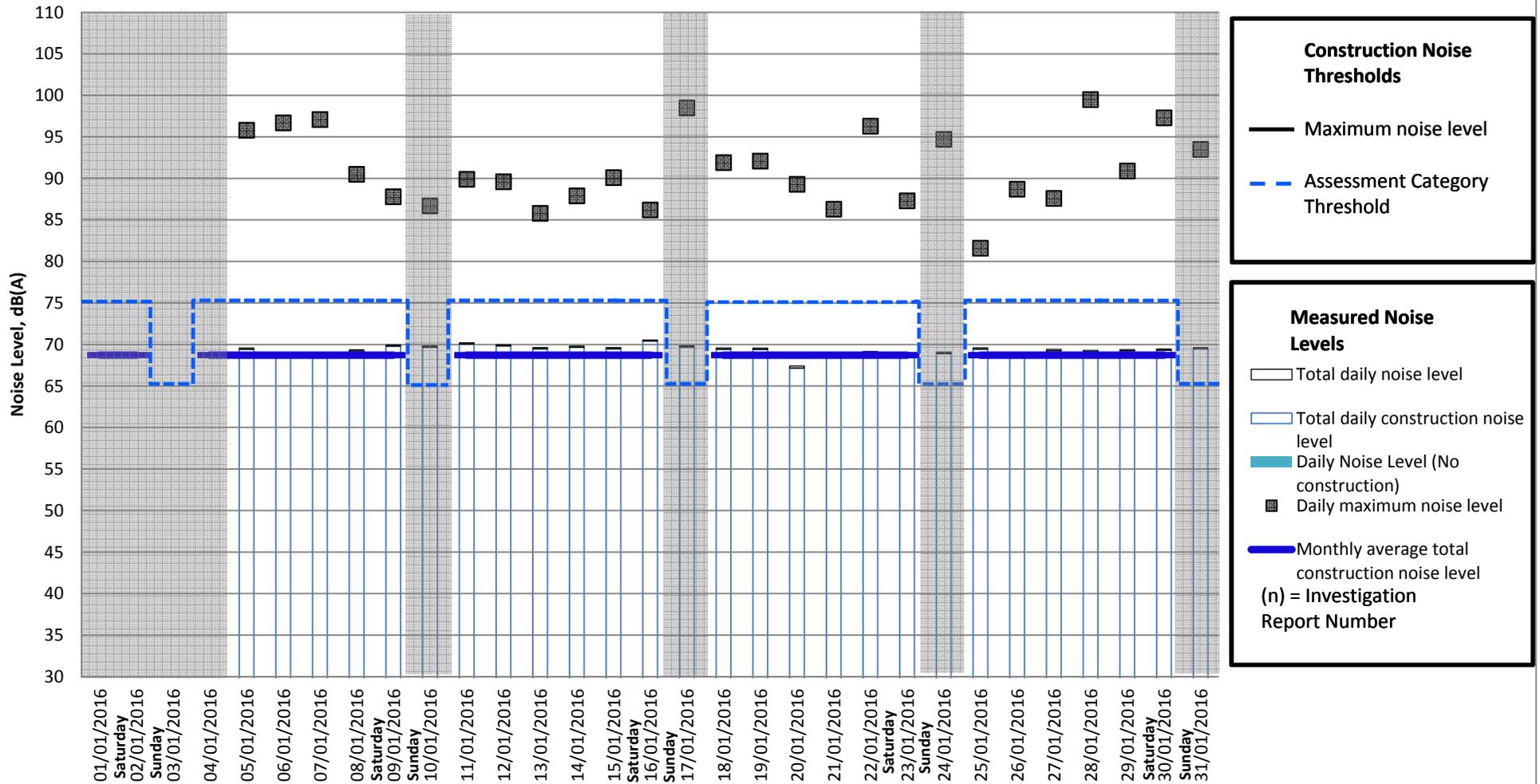
# Measured Daytime Noise Levels at Whinnyhill

## Measurement period: January 2016



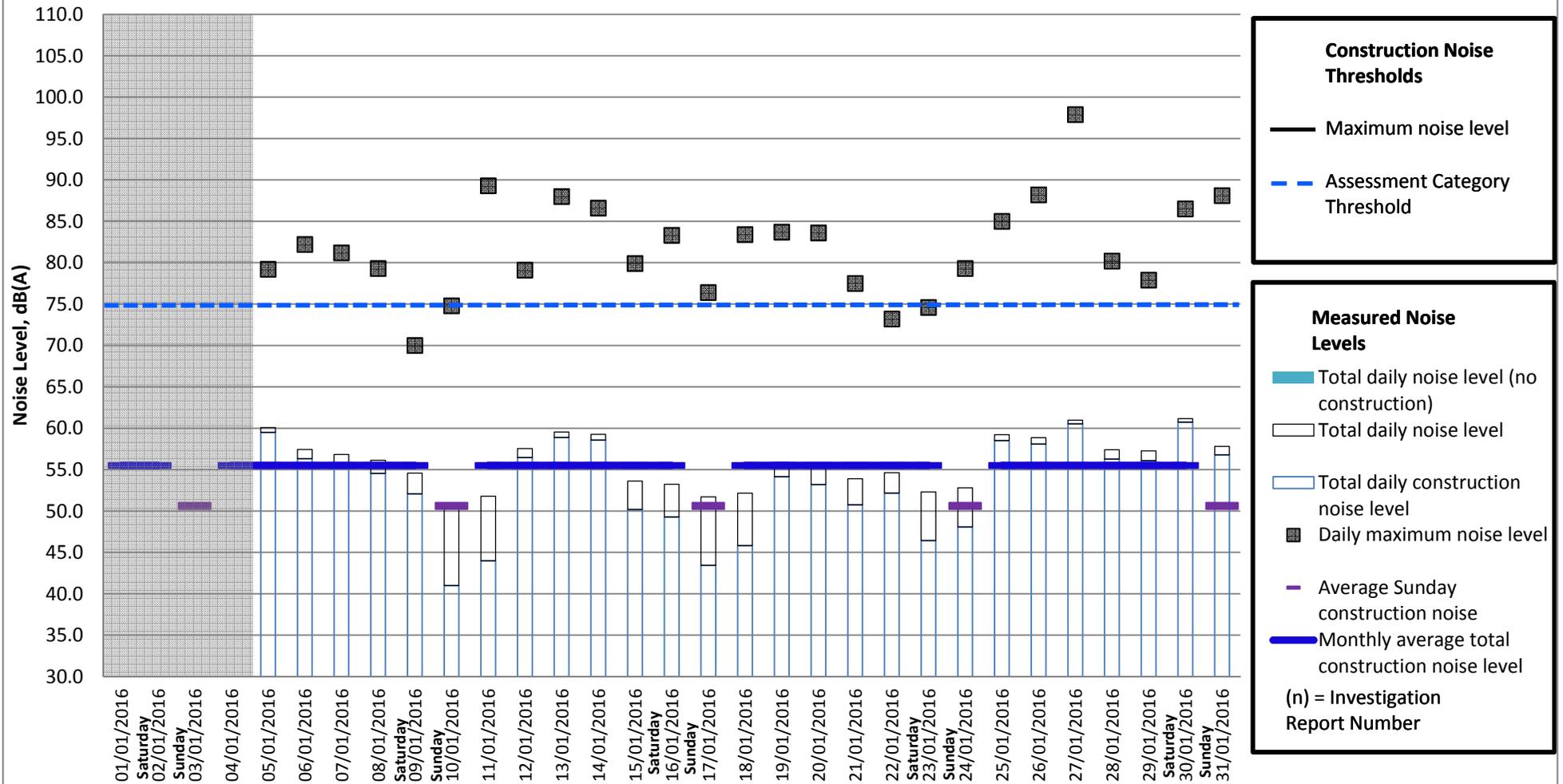
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16). There is no data from the 30/01/2016 to 31/01/2016 due to a problem with the monitor.

## Measured Daytime Noise Levels at Newton Measurement period: January 2016



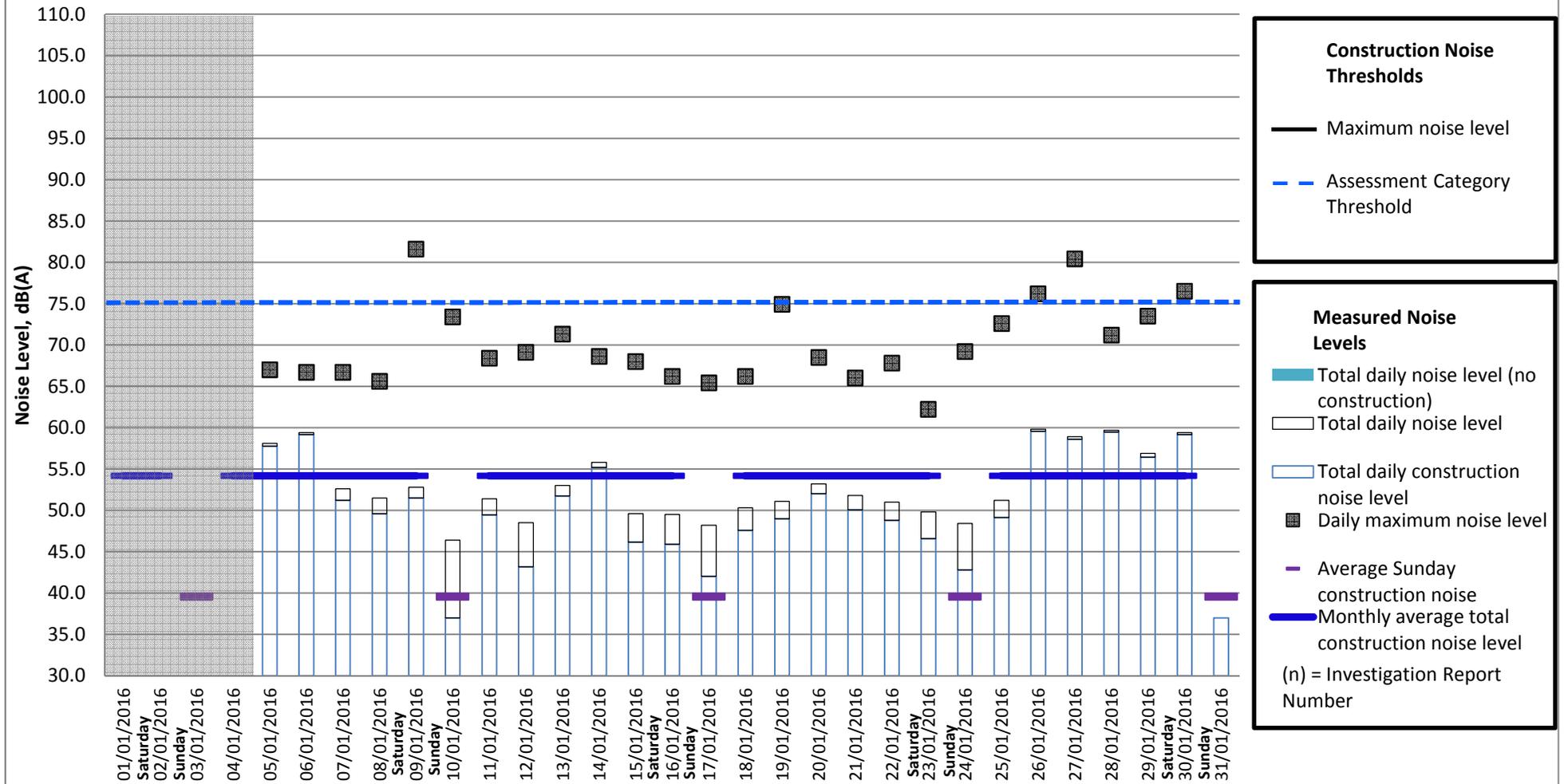
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16)

## Measured Daytime Noise Levels at Port Edgar Measurement period: January 2016



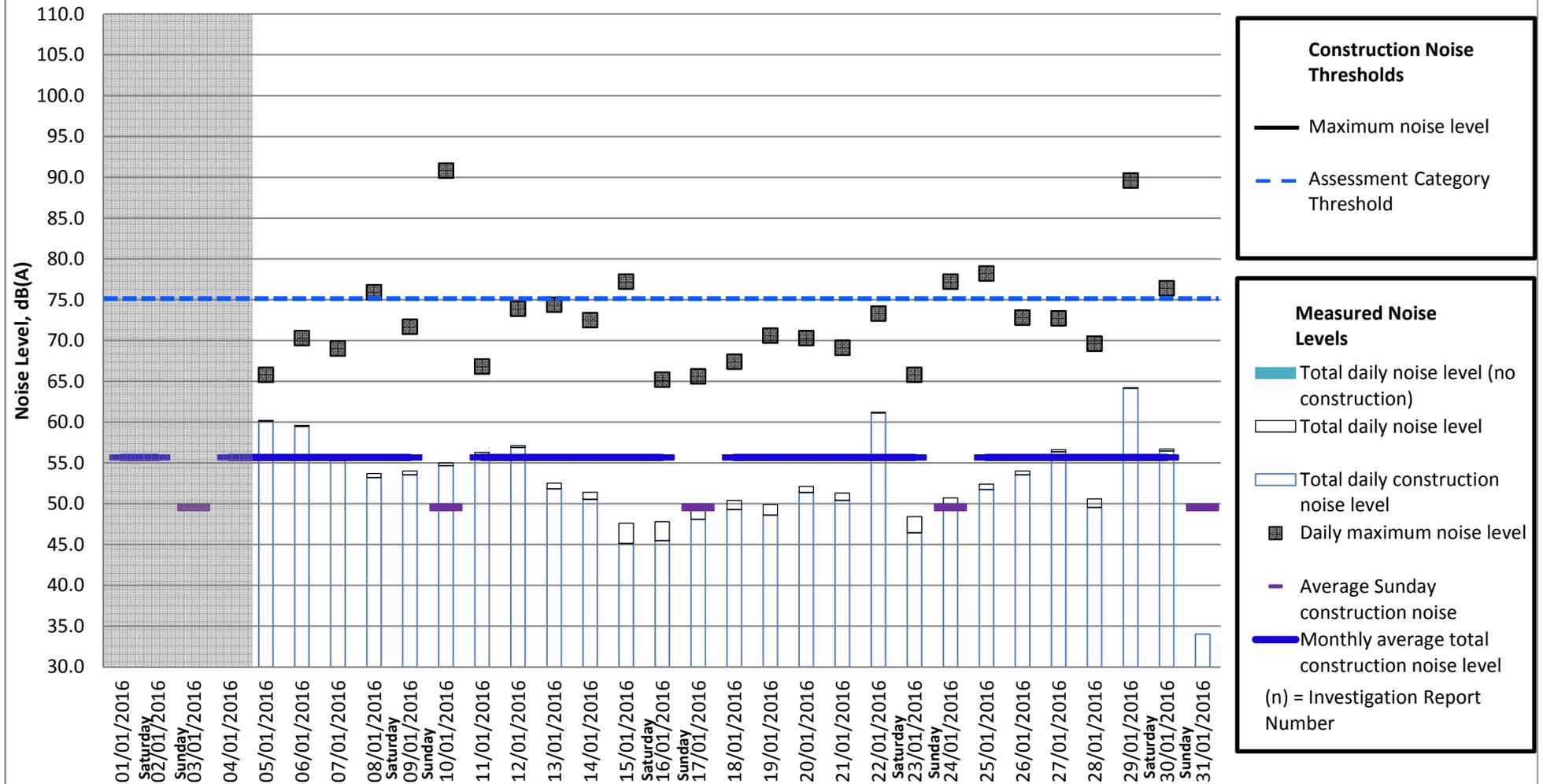
**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Evening Noise Levels at Port Edgar Measurement period: January 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).

## Measured Night time Noise Levels at Port Edgar Measurement period: January 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; no works were conducted over the Christmas period (24/12/15 to 04/01/16).