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Project **FORTH REPLACEMENT CROSSING**

Document title

**CONSTRUCTION NOISE MONITORING REPORT: FEBRUARY 2016**

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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 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 February 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 February 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 February 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>• 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 Launch</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> <li>• AVS rebar &amp; concrete deck 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> <li>• AVS rebar &amp; concrete deck works</li> </ul>
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> <li>• AVS rebar &amp; concrete deck 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>• Main carriageway roadworks</li> </ul>
M11	Linn Mill	Network (close proximity to Crossing)	<ul style="list-style-type: none"> <li>• AVS rebar &amp; concrete deck works</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway roadworks</li> </ul>

M13	Clufflat Brae	Crossing / Network	<ul style="list-style-type: none"> <li>• AVS rebar and concrete deck works</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway roadworks</li> </ul>
M14	Springfield	Network	<ul style="list-style-type: none"> <li>• AVS rebar and concrete deck works</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway roadworks</li> </ul>
M15	Echline	Network	<ul style="list-style-type: none"> <li>• AVS rebar and concrete deck works</li> <li>• No night time or Sunday construction in the vicinity</li> <li>• Main carriageway roadworks</li> </ul>
M16	Scotstoun	Network	<ul style="list-style-type: none"> <li>• Footpath works</li> <li>• Utility works</li> <li>• ESQ11 rebar works</li> <li>• B800 roadworks including bridge works (these works are directly in the location of the meter which now sits within the construction boundary).</li> <li>• Mainline roadworks</li> </ul>
M17	Dundas Home Farm	Network	<ul style="list-style-type: none"> <li>• Utility works</li> <li>• ESQ11 rebar works</li> <li>• B800 Roadworks</li> <li>• Main carriageway roadworks</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.

## 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 February 2016. For evening and night time periods, there were exceedances of monthly average noise at Butlaw, Linn Mill and Tigh-Na-Grian during the night-time period. There were also exceedances of Sunday averages at Tigh-Na-Grian during the night.
- 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 February it was noted that there was construction related noise at Linn Mill. The  $L_{AFmax}$  exceedances on the 3<sup>rd</sup>, 15<sup>th</sup>, 16<sup>th</sup> and 19<sup>th</sup> February 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. There was one exceedance during February at Tigh-na-grian which occurred during the night time period. This exceedance was caused by hammering and site teams were reminded about noise levels. There were exceedances at Inchgarvie and Clufflat on the 10<sup>th</sup> February that resulted from metal being dropped into a skip from the AVS area. Site staff were emailed regarding the incident and reminded of noise levels.



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- 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 February the maximum noise threshold was exceeded on 47 occasions (15 day time, 7 evening and 25 night time). Exceedances were attributed to non-construction factors notably birds, waves and wind.
Clufflat Brae	During February the maximum noise threshold was exceeded on 31 occasions (11 daytime, 4 evening and 16 night time). . Exceedances were mainly found to be due to birds and high winds. There was one instance of construction noise exceeding the threshold (see 3.6)
Inchgarvie Lodge	During February the maximum noise threshold was exceeded on 39 occasions (15 day time, 7 evening and 17 night time). 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. There was one instance of construction noise exceeding the threshold (see 3.6)
Linn Mill	During February the maximum noise threshold was exceeded on 37 occasions (16 daytime, 4 evening and 17 night time). The majority of exceedances at this location were due to birds, wind and rain. There were four instances of construction noise exceeding the threshold (see 3.6)
Tigh-Na-Grian	During February the maximum noise threshold was exceeded on 34 occasions (12 daytime, 2 evening and 20 night time). Exceedances were mainly due to birds and wind. There was one instance of construction noise exceeding the threshold (see 3.6)
Dundas Home Farm	During February the maximum noise threshold was exceeded on 13 occasions. The main exceedances were due to residents and birds.
Echline	During February the maximum noise threshold was exceeded on 29 occasions. No exceedances at this location were due to construction activities. Most exceedances were attributed to vehicles passing by on the adjacent roads and wind.
Springfield	During February the maximum noise threshold was exceeded on 12 occasions. These exceedances were due to local residents, birds and wind.
Scotstoun	During February the maximum noise threshold was exceeded on 24 occasions. These exceedances were attributed to general traffic on the adjacent road.
Whinny Hill	During February 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

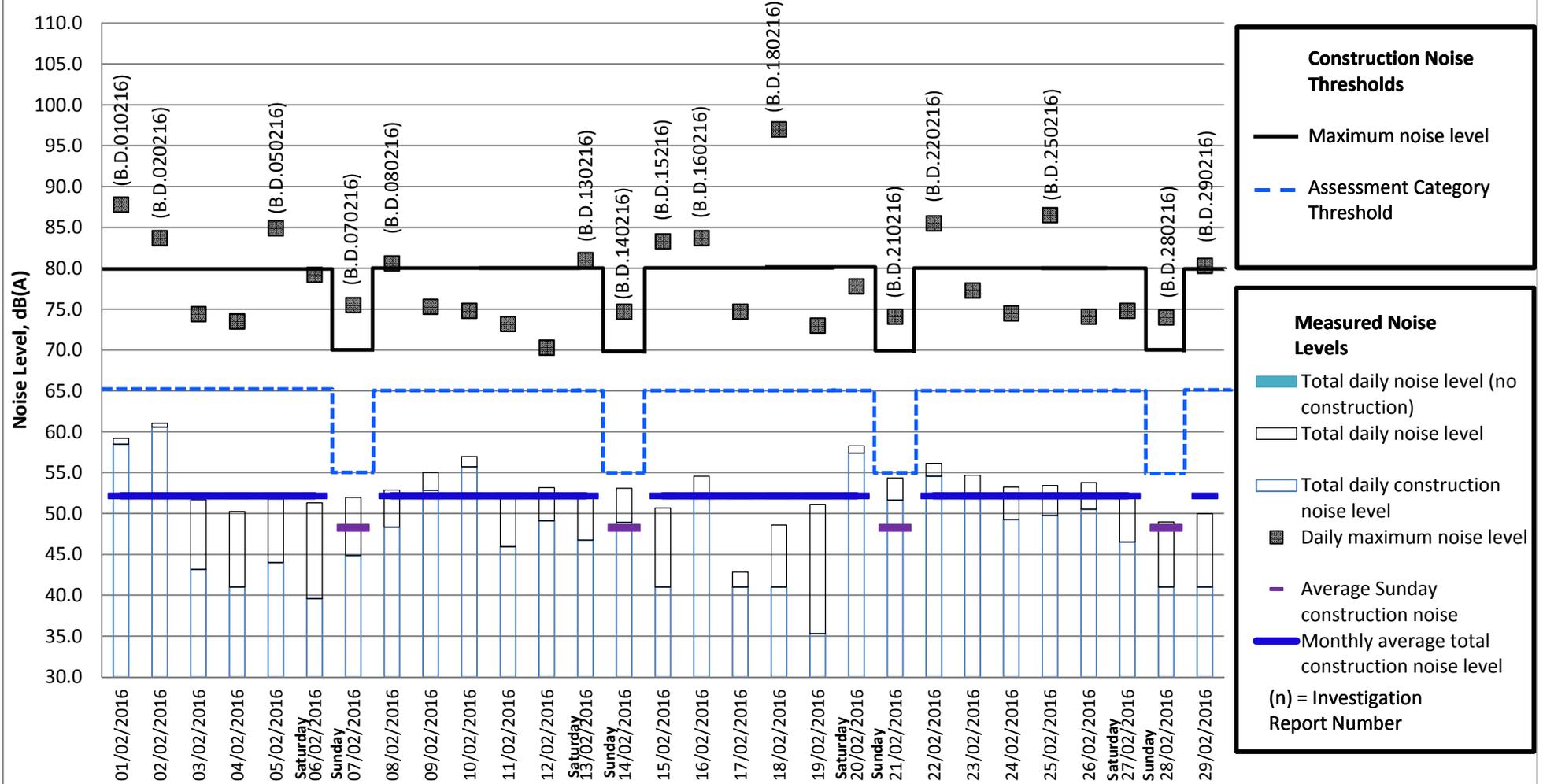


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## **APPENDIX A**

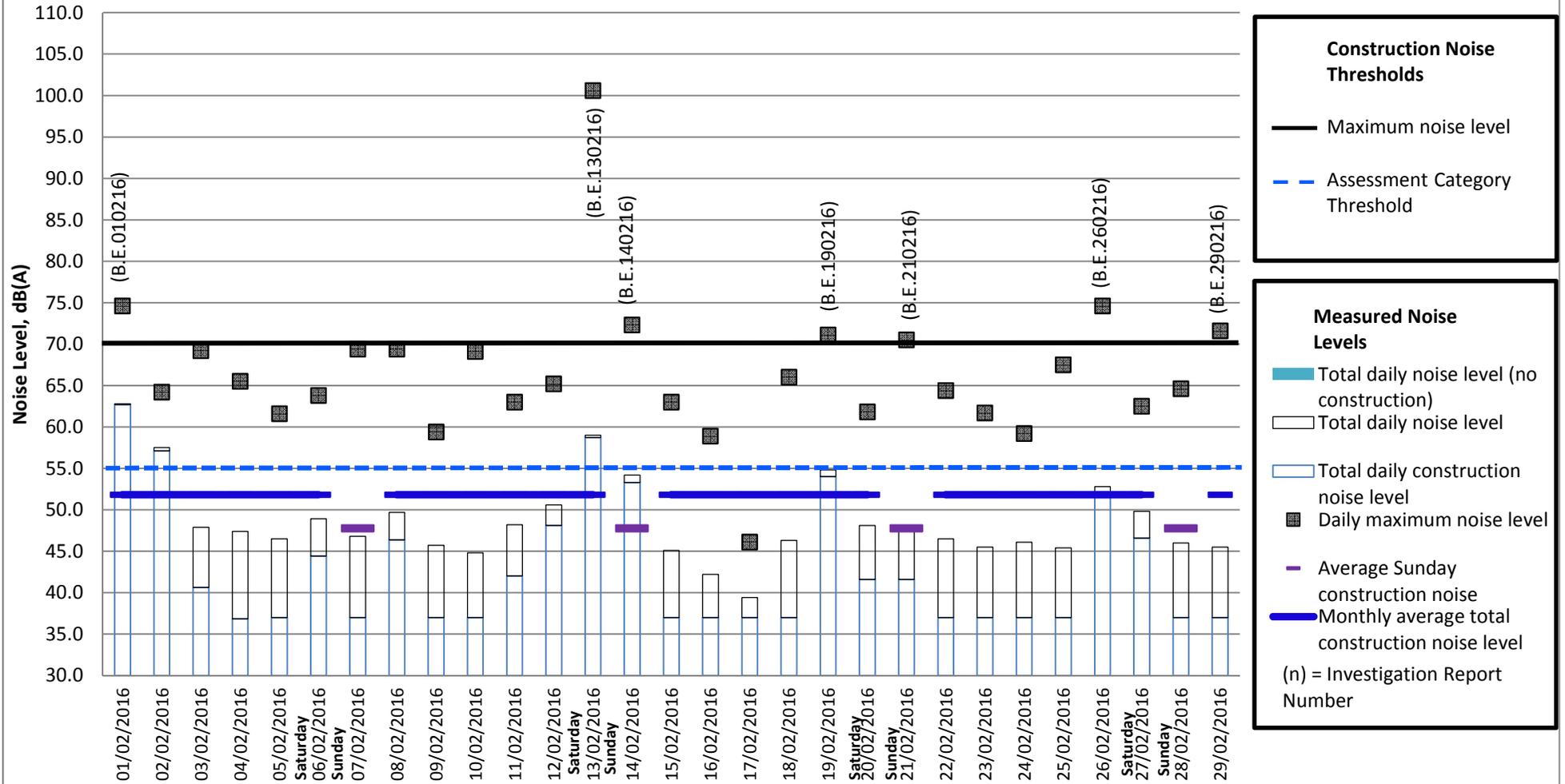
## Measured Daytime Noise Levels at Butlaw Fisheries Measurement period: February 2016



**Note:**

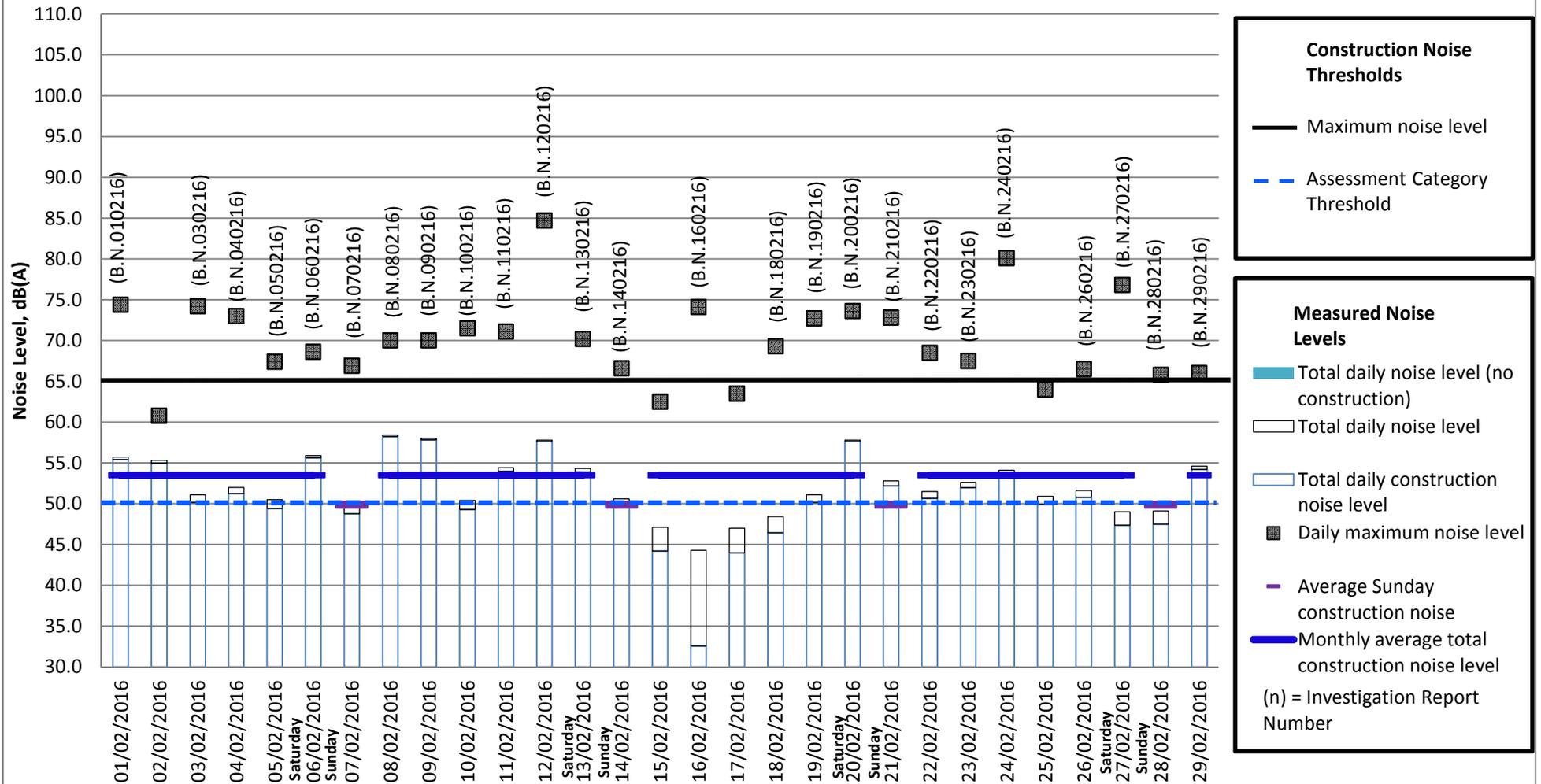
## Measured Evening Noise Levels at Butlaw Fisheries

### Measurement period: February 2016



**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 1st 2nd and 13th were caused by wind

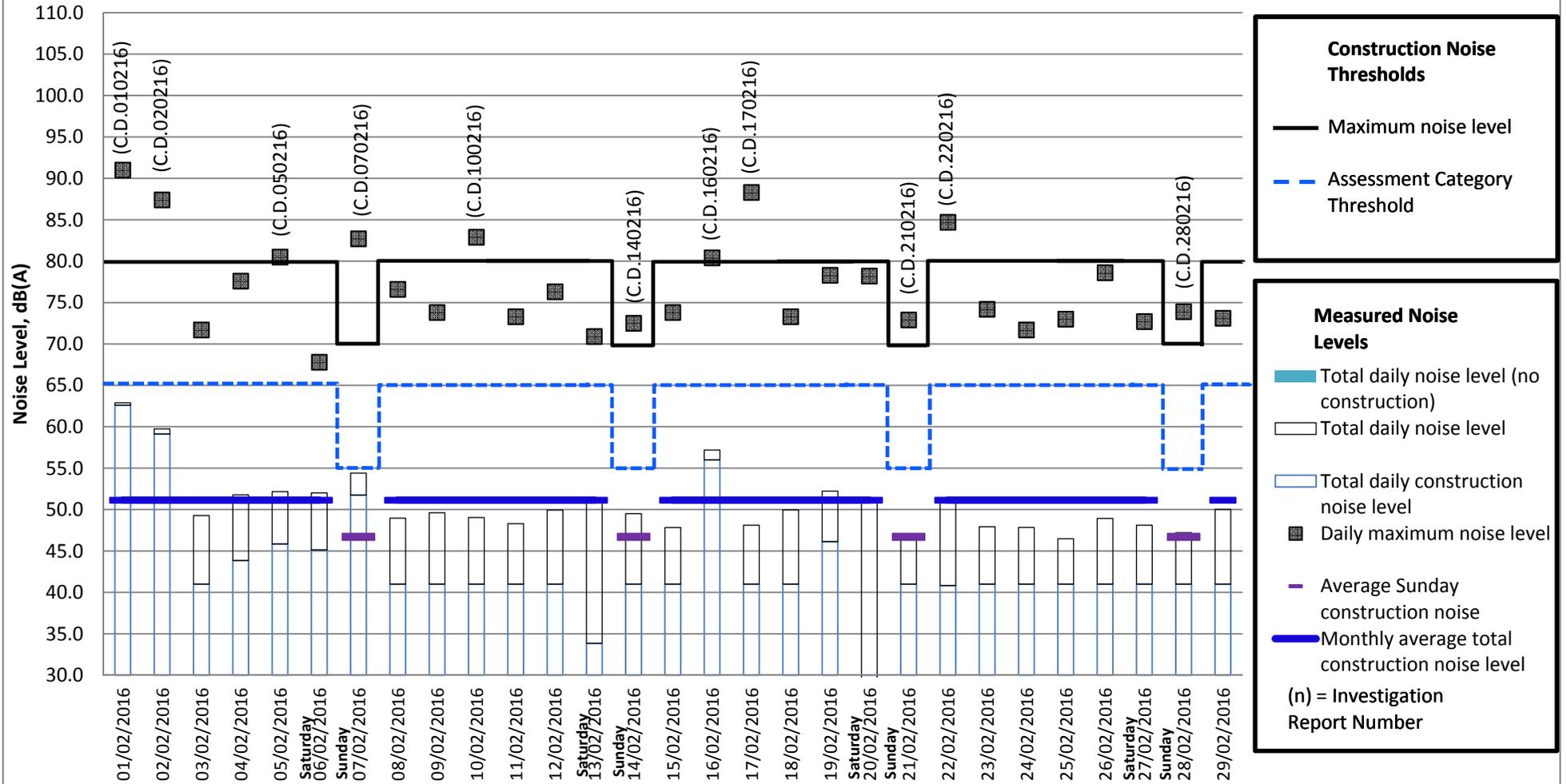
## Measured Night time Noise Levels at Butlaw Fisheries Measurement period: February 2016



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

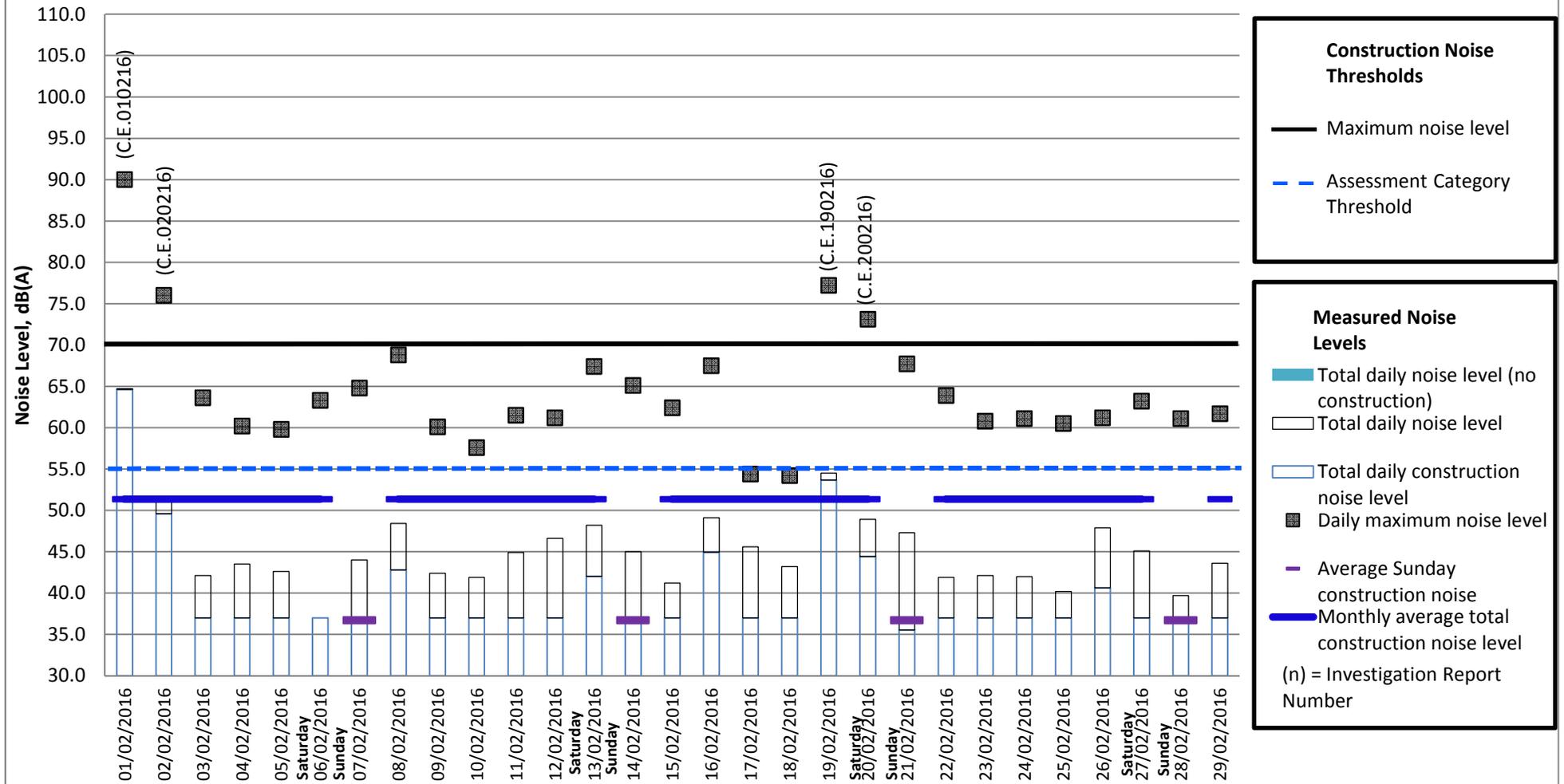
# Measured Daytime Noise Levels at Clufflat Brae

## Measurement period: February 2016



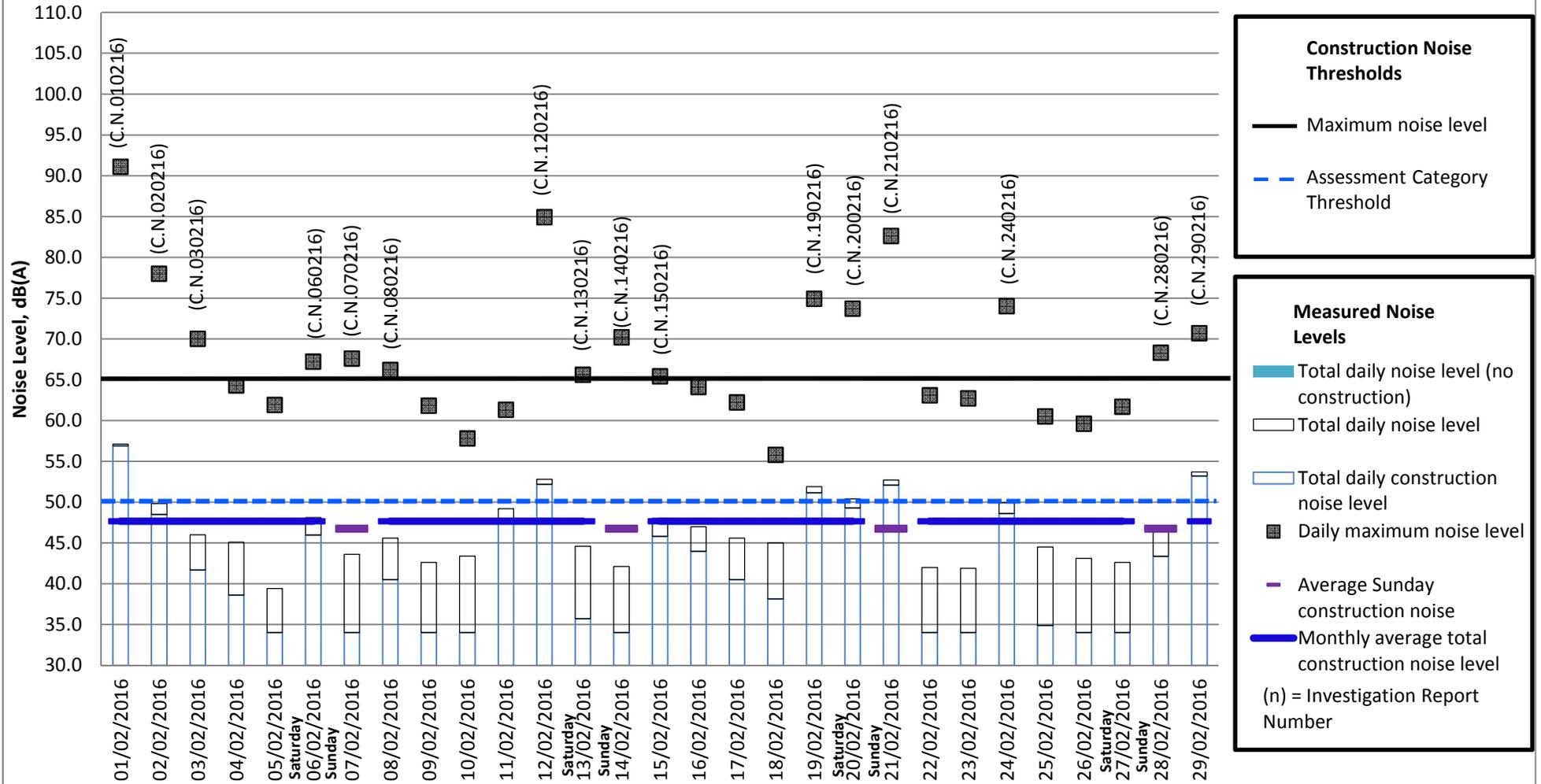
**Note:**

## Measured Evening Noise Levels at Clufflat Brae Measurement period: February 2016



**Note:** After investigation, it was concluded that the exceedance of the LAeq ' Total Daily Construction' on the 1st was caused by wind

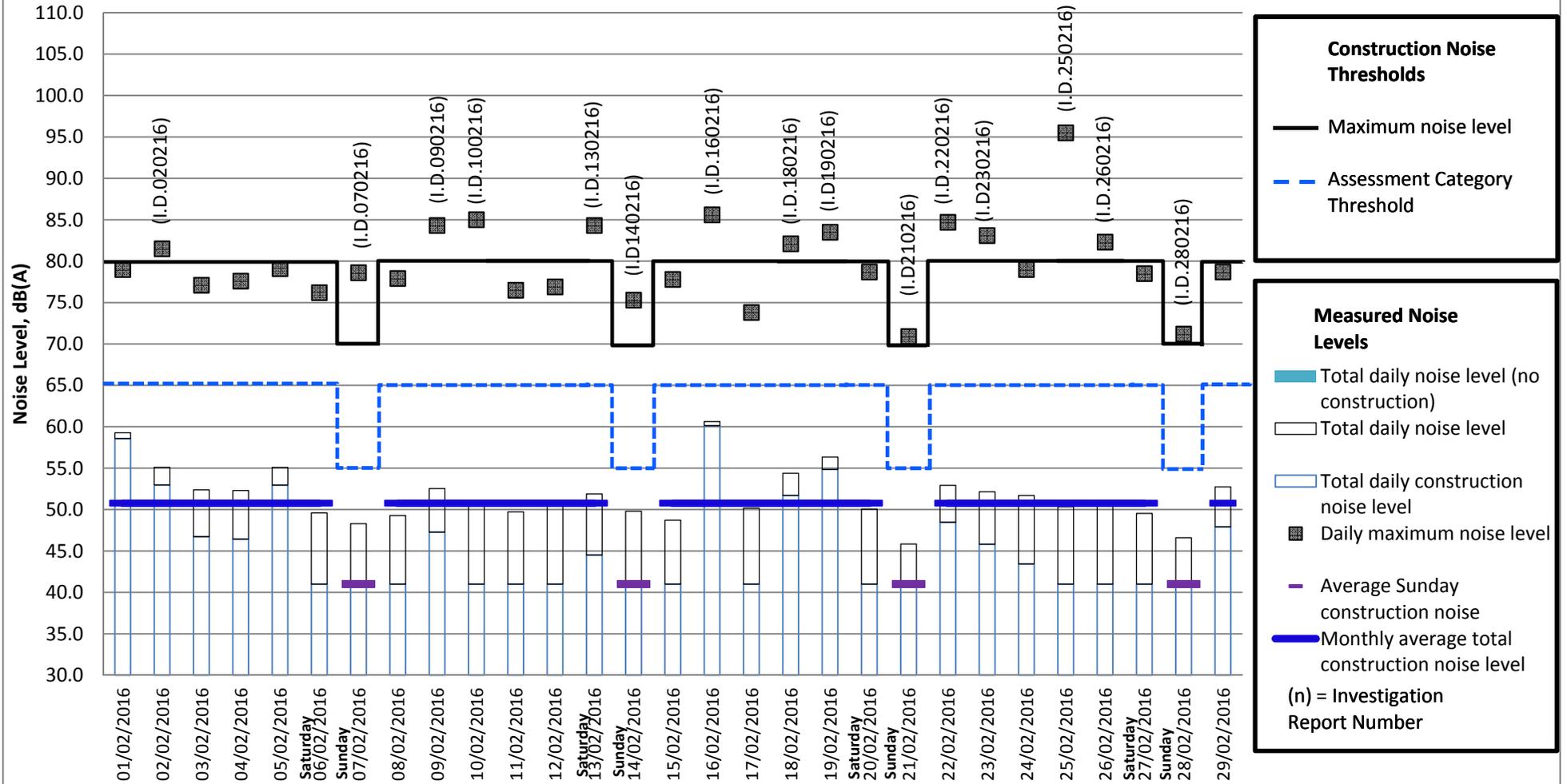
## Measured Night time Noise Levels at Clufflat Brae Measurement period: February 2016



**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' throughout the month was caused by birds and wind.

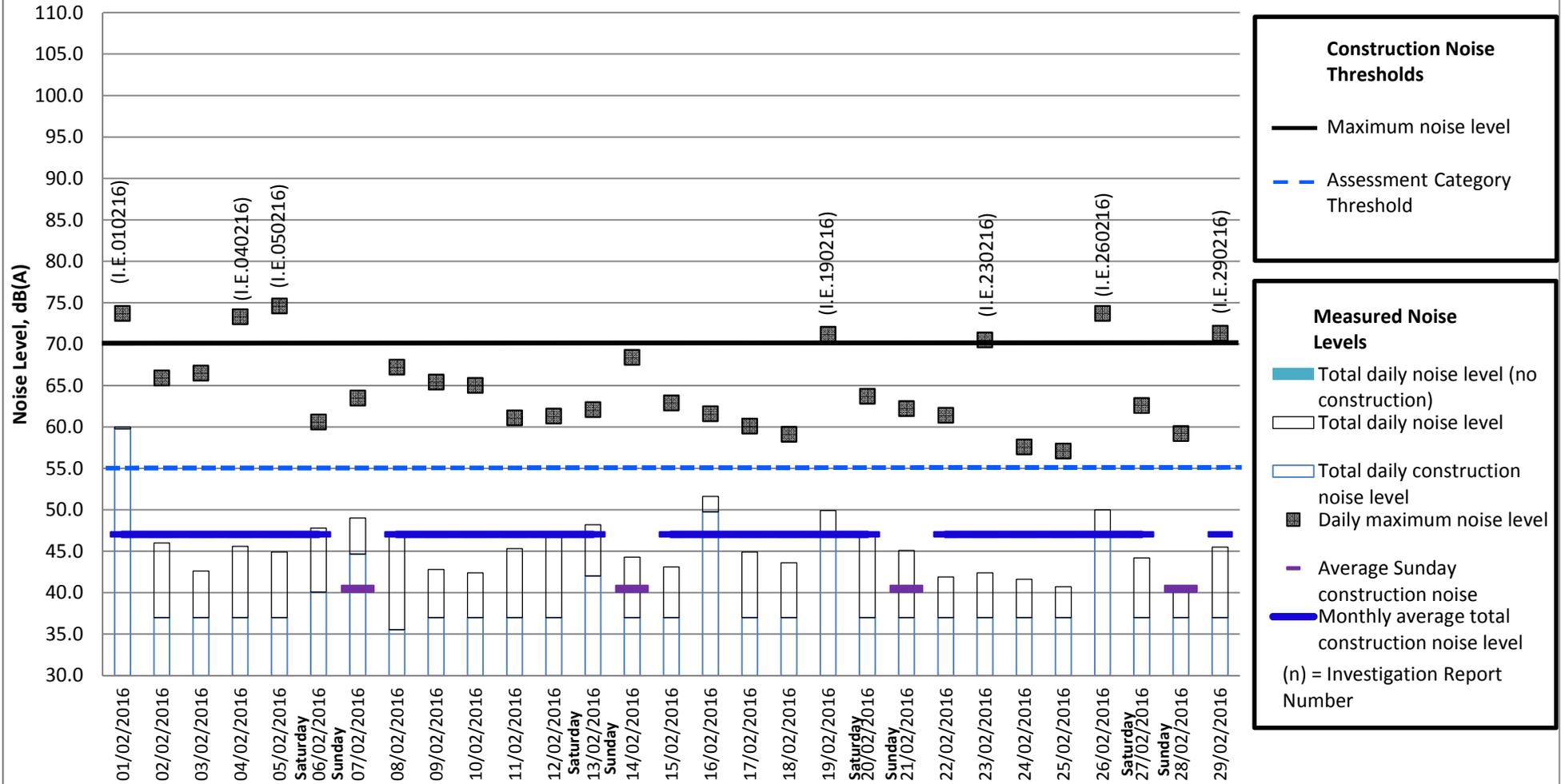
# Measured Daytime Noise Levels at Inchgarvie

## Measurement period: February 2016



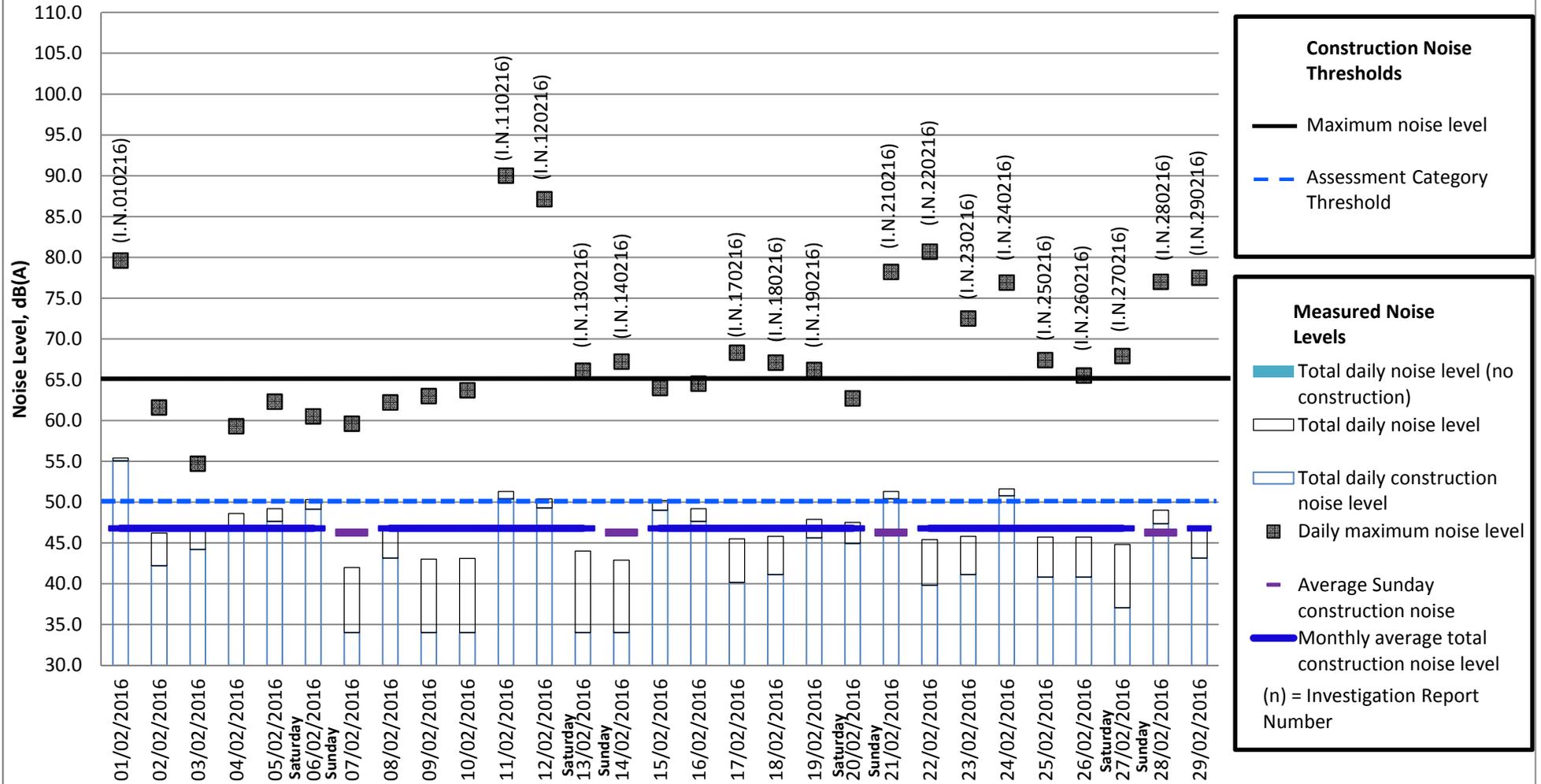
**Note:**

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



**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 1st was caused by wind.

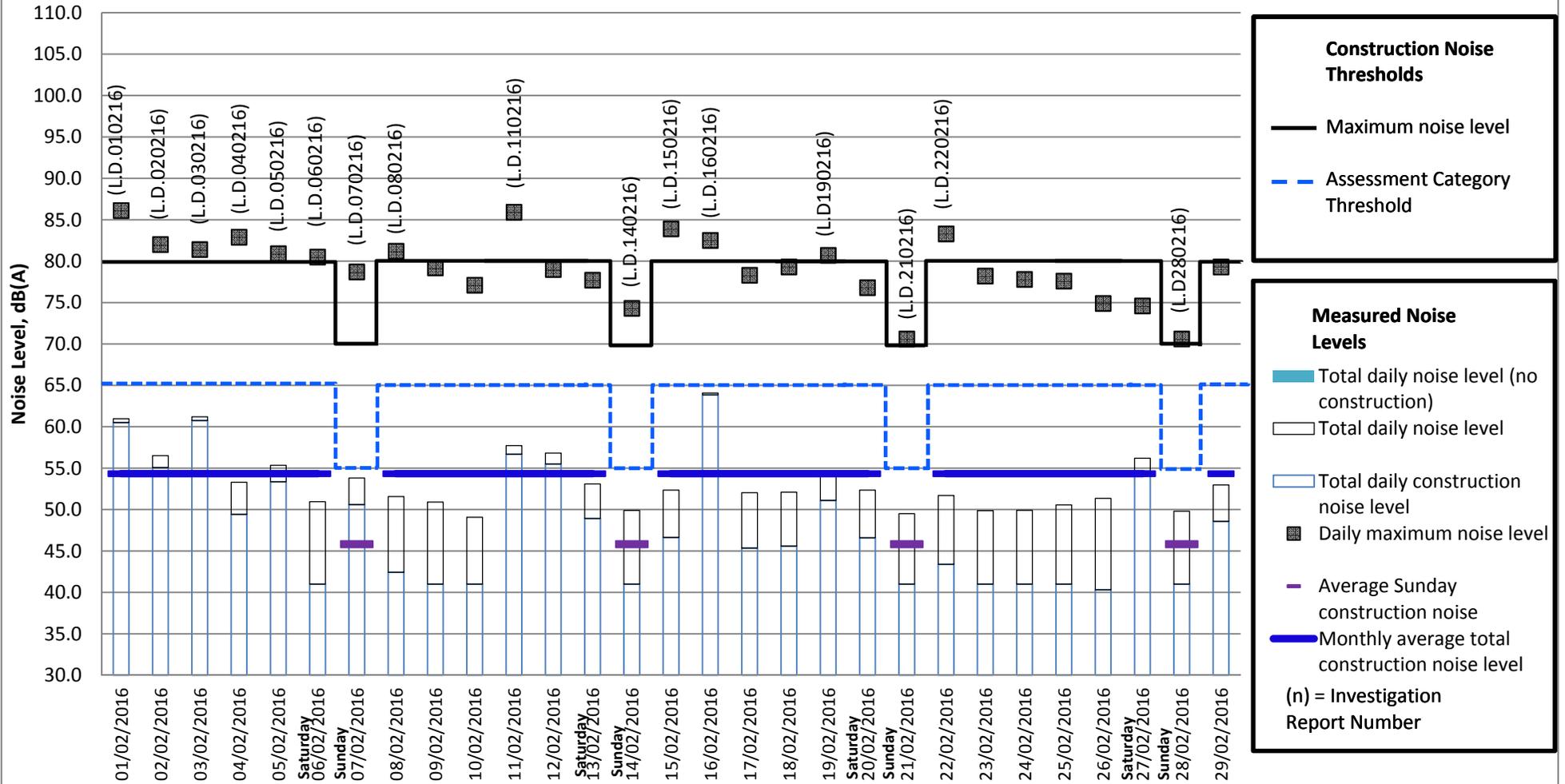
## Measured Night time Noise Levels at Inchgarvie Measurement period: February 2016



**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 1st was caused by wind

# Measured Daytime Noise Levels at Linn Mill

## Measurement period: February 2016



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

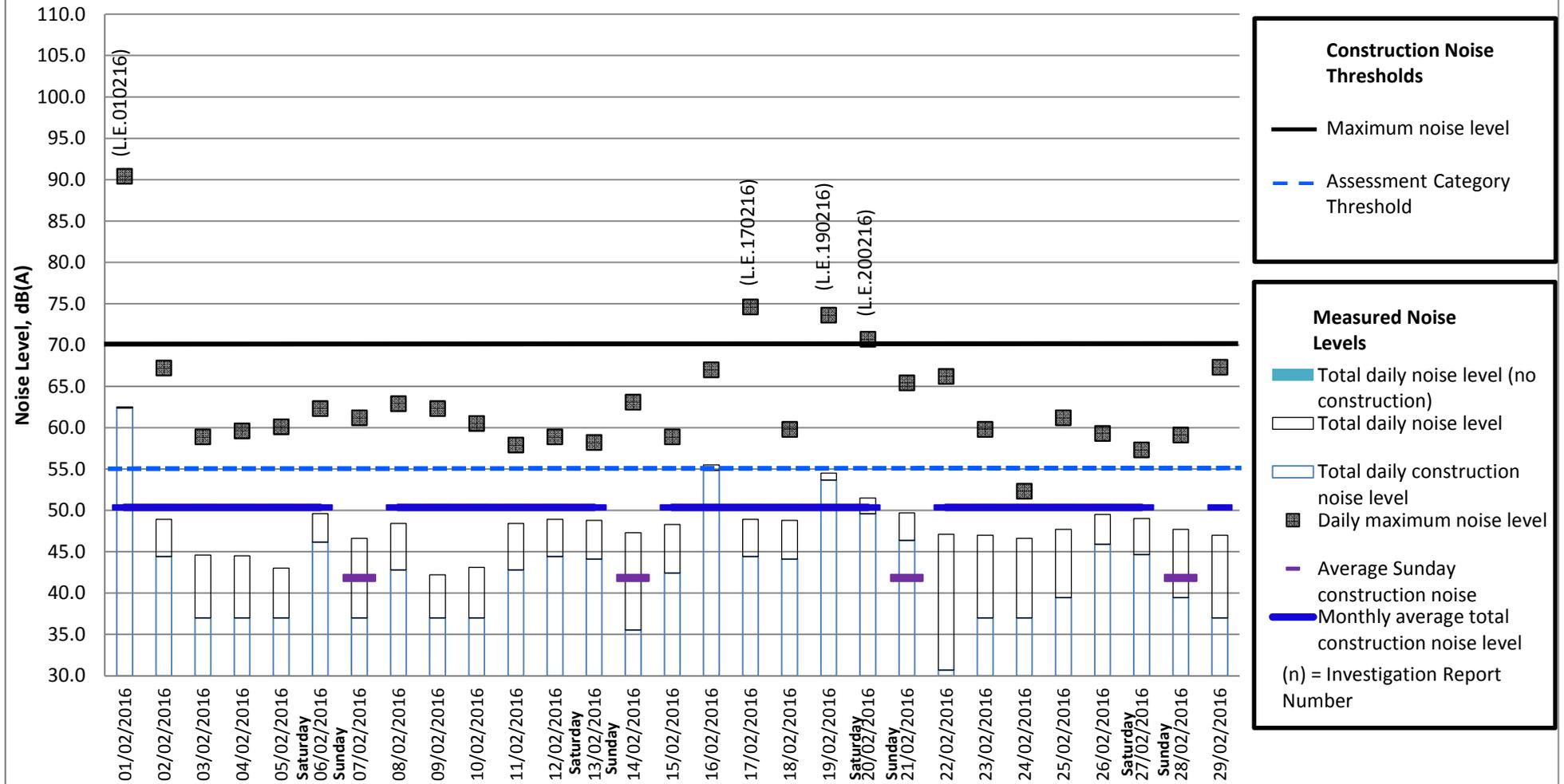
**Measured Noise Levels**

- 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

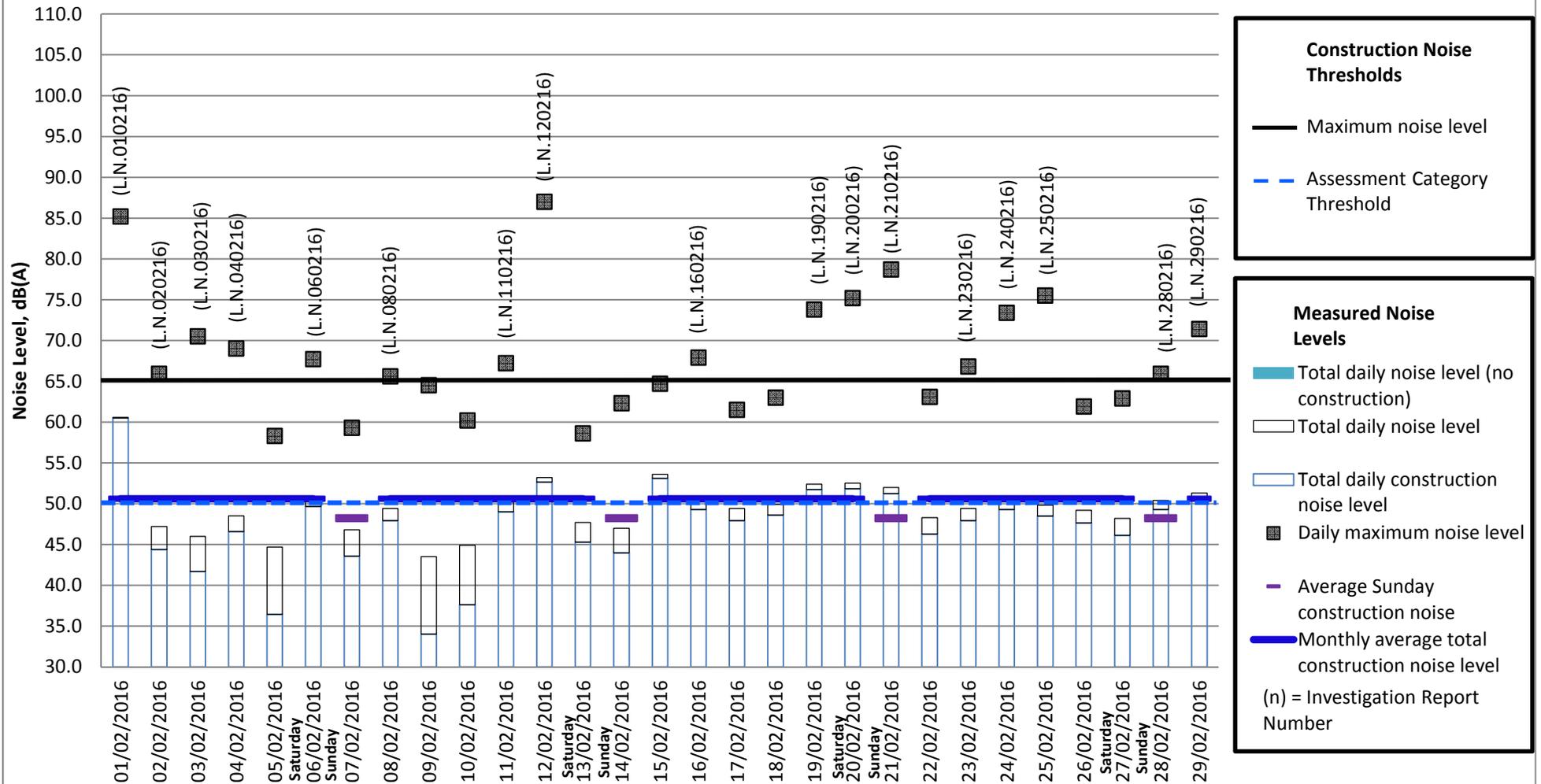
**Note:**

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



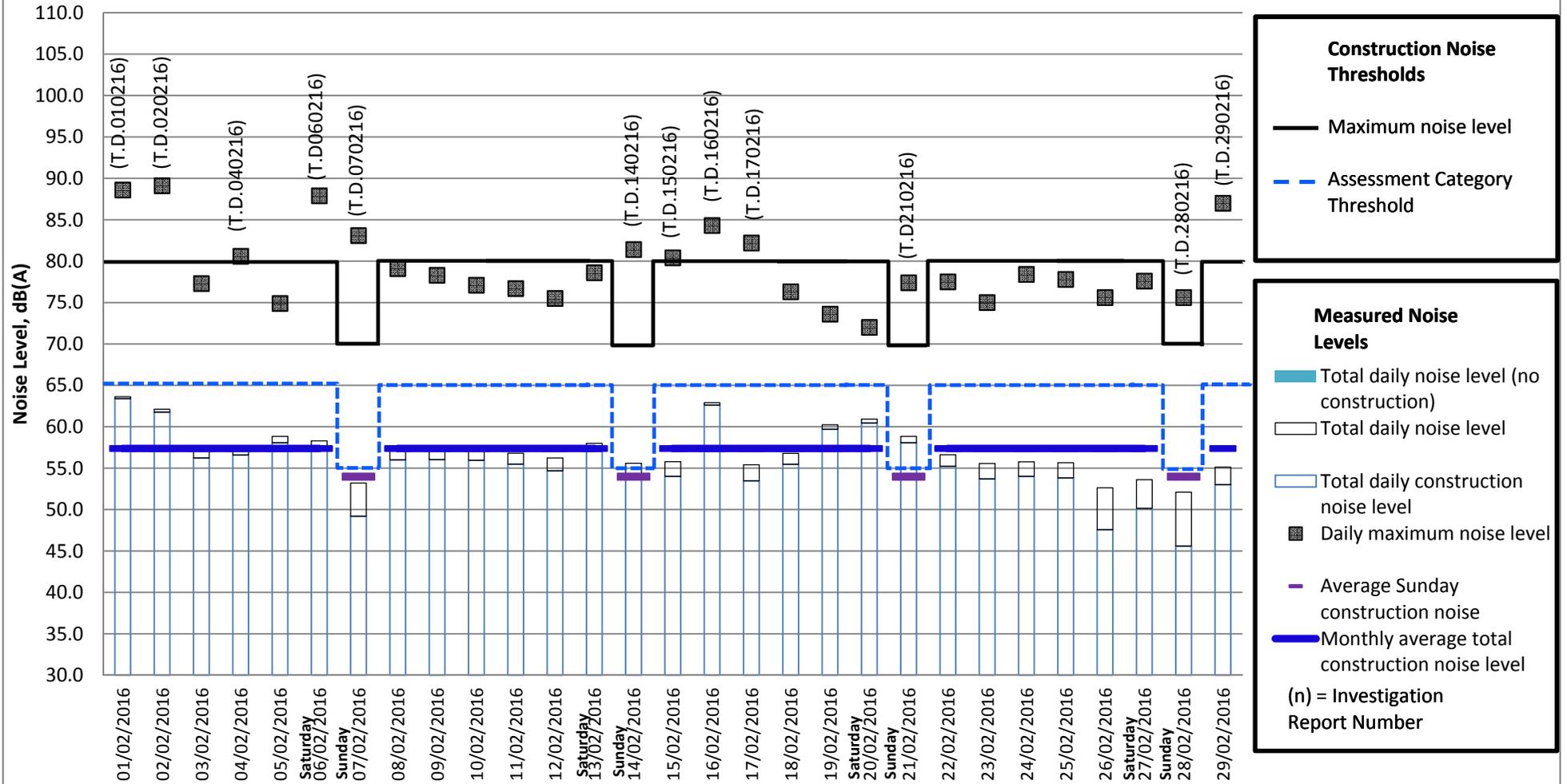
**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 1st was caused by wind

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



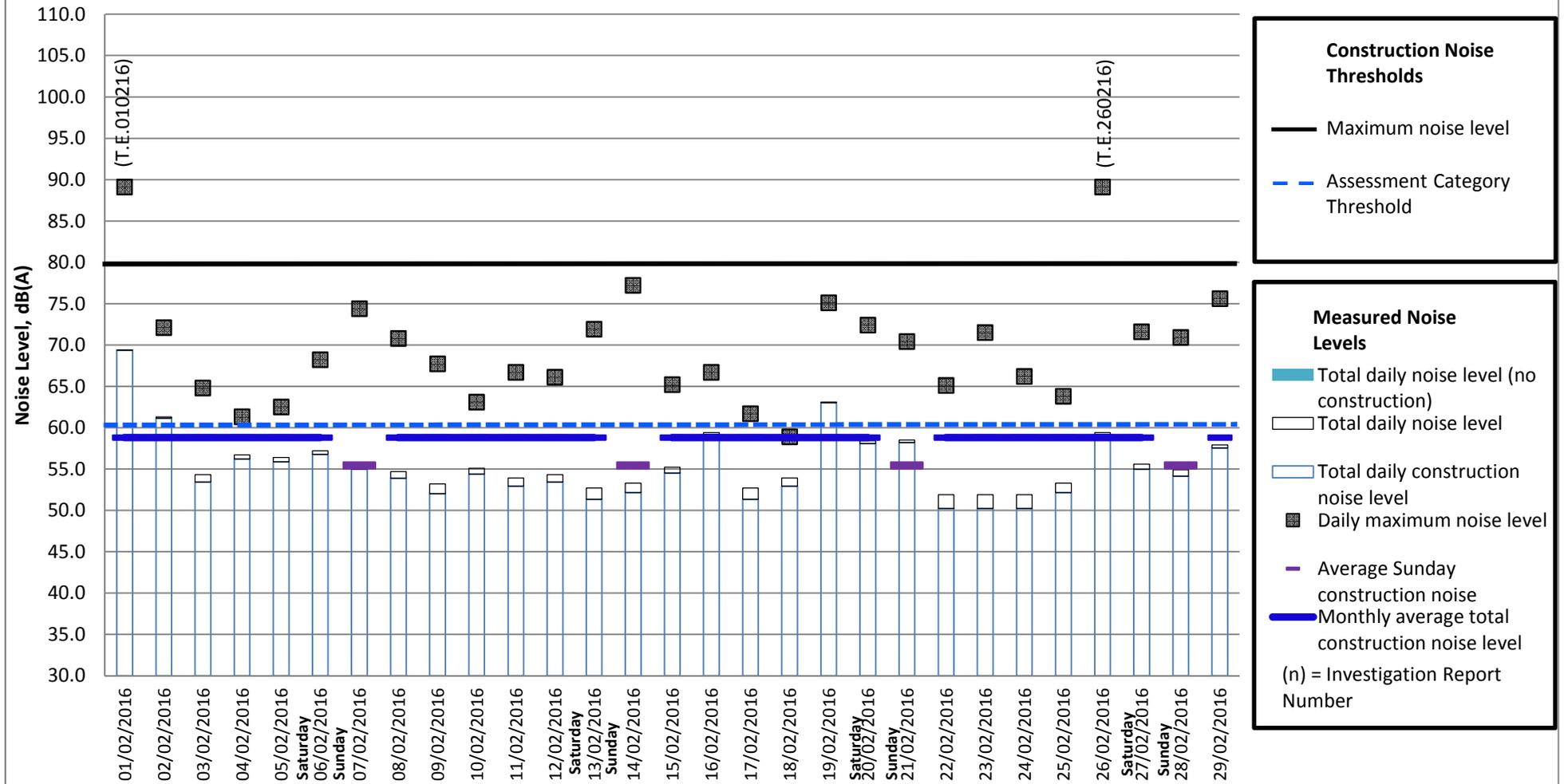
**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 1st was caused by wind

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



**Note:**

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



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

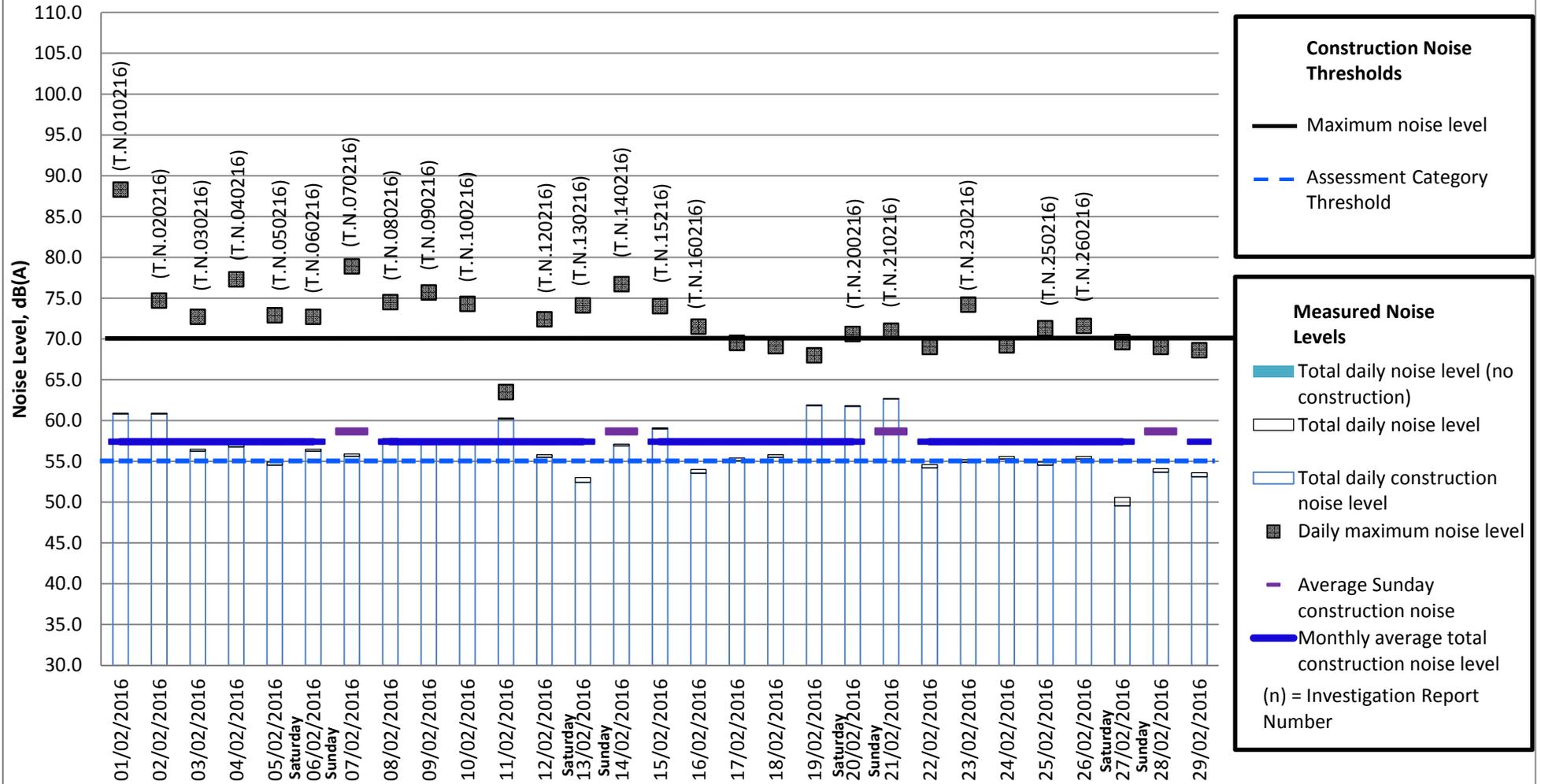
**Measured Noise Levels**

- 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:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' on the 1st was caused by wind

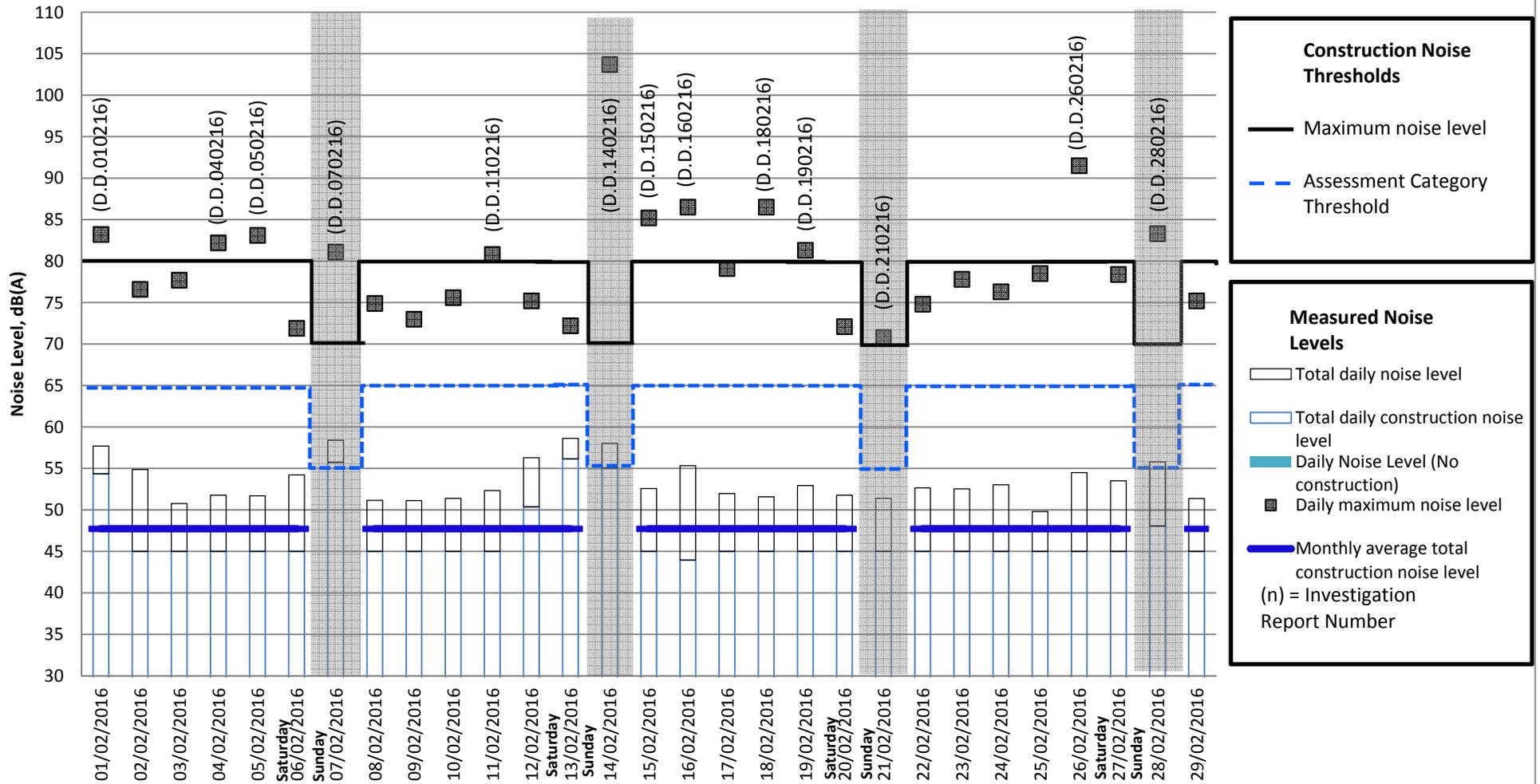
## Measured Night time Noise Levels at Tigh-Na-Grian Measurement period: February 2016



**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' throughout site was caused by wind and birds

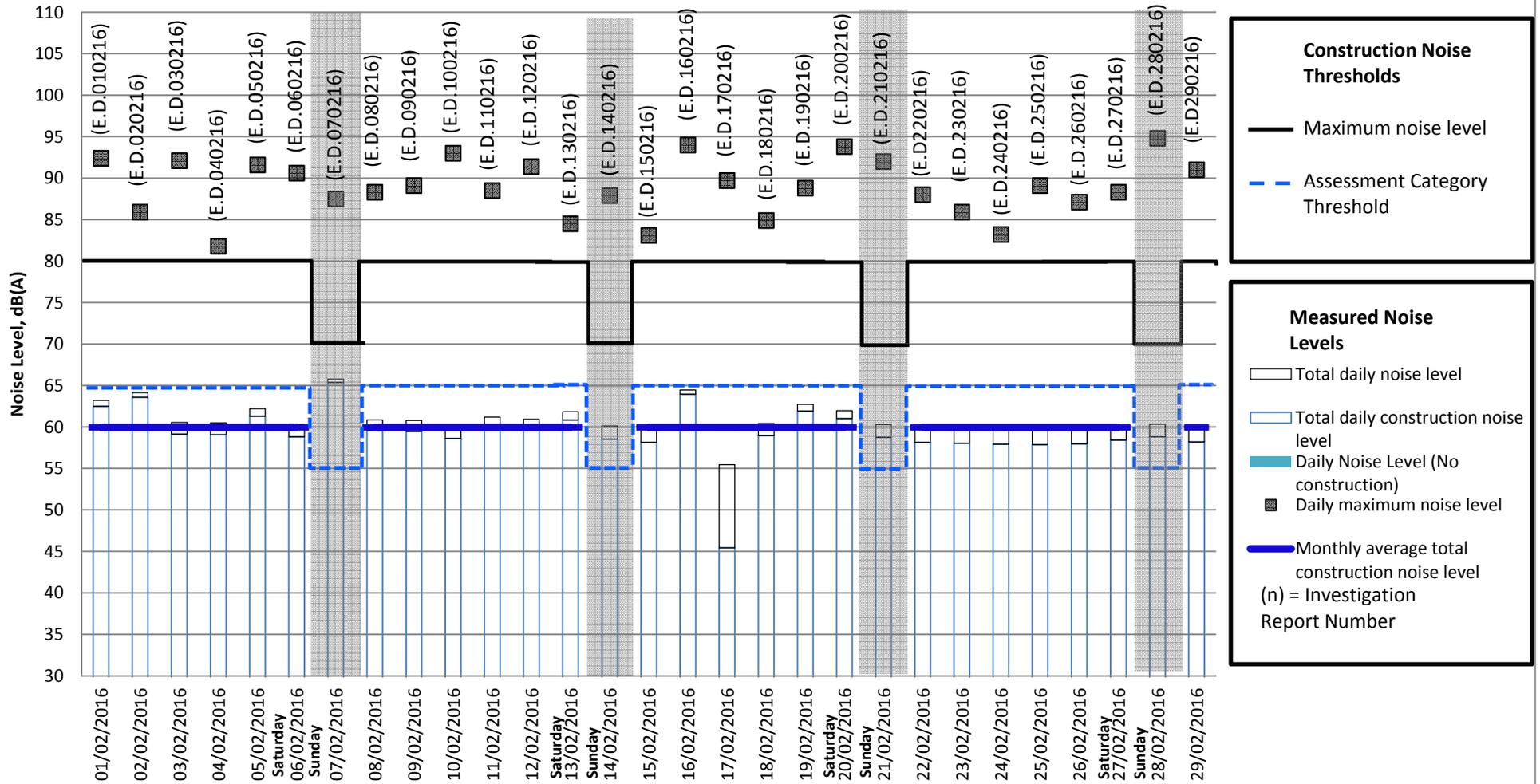
# Measured Daytime Noise Levels at Dundas Home Farm

## Measurement period: February 2016



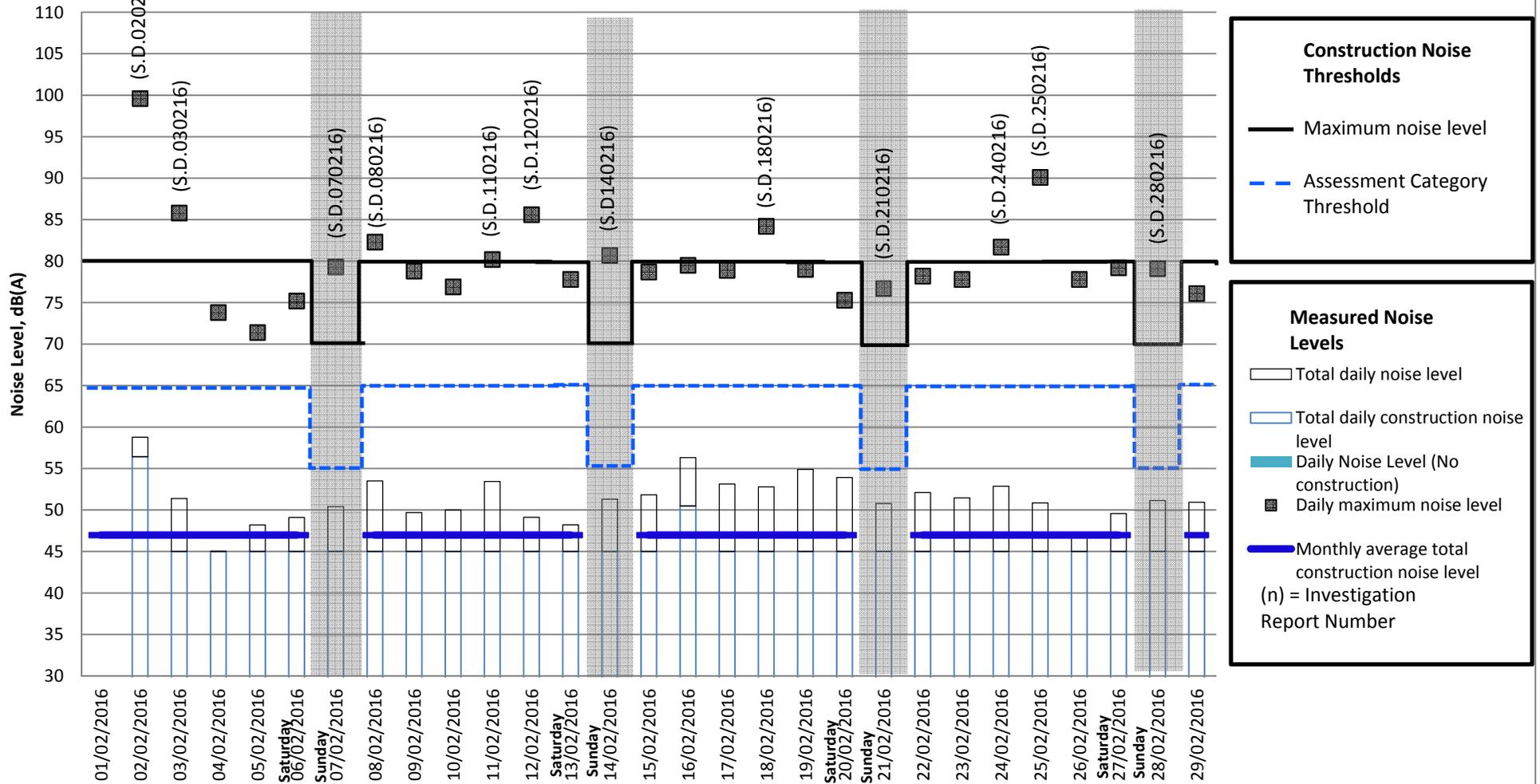
**Note:** The grey areas of the chart represent days on which no construction works have been conducted.

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



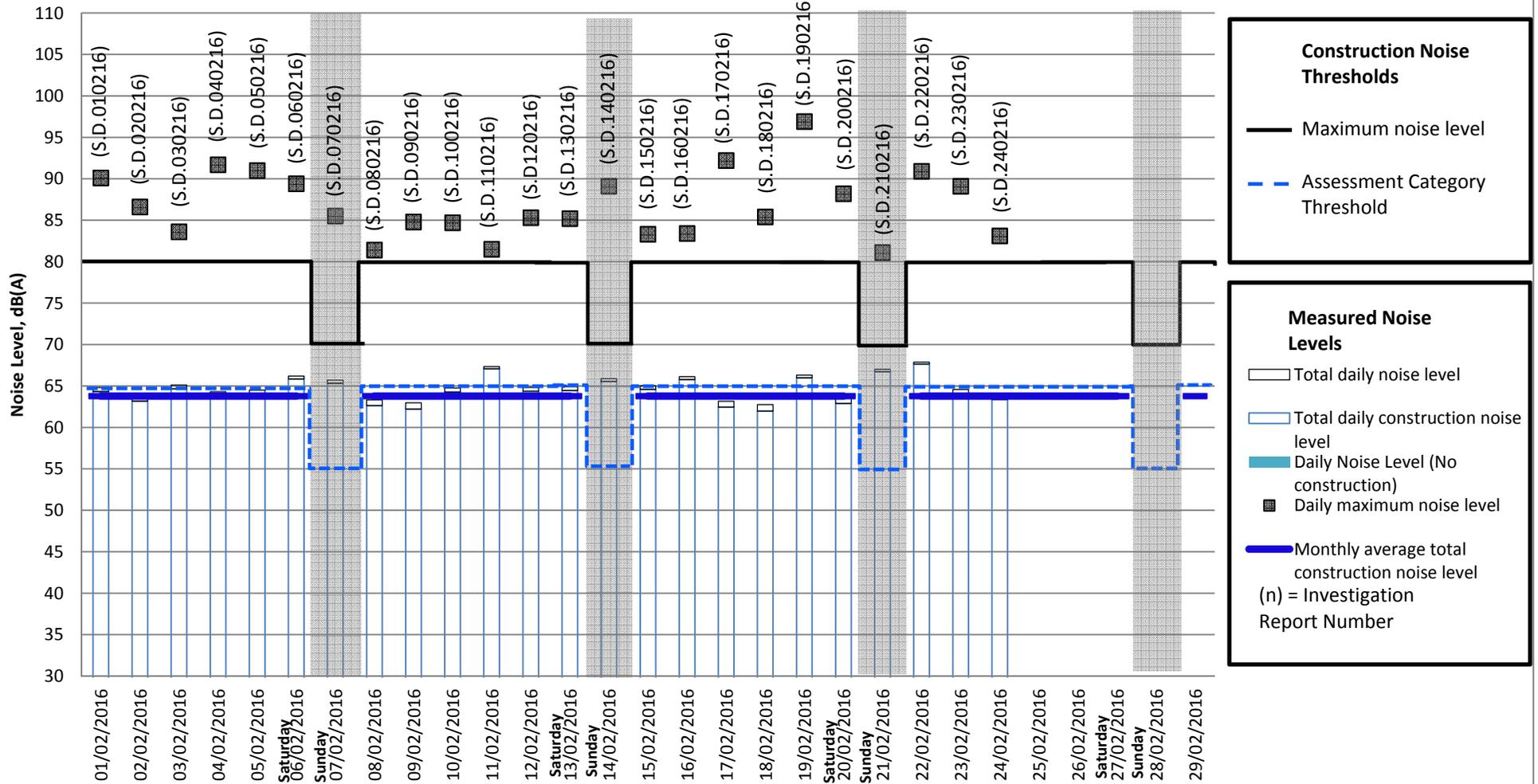
**Note:** The grey areas of the chart represent days on which no construction works have been conducted.

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



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; There is no data on the 01/02/16 due to a problem with the monitor.

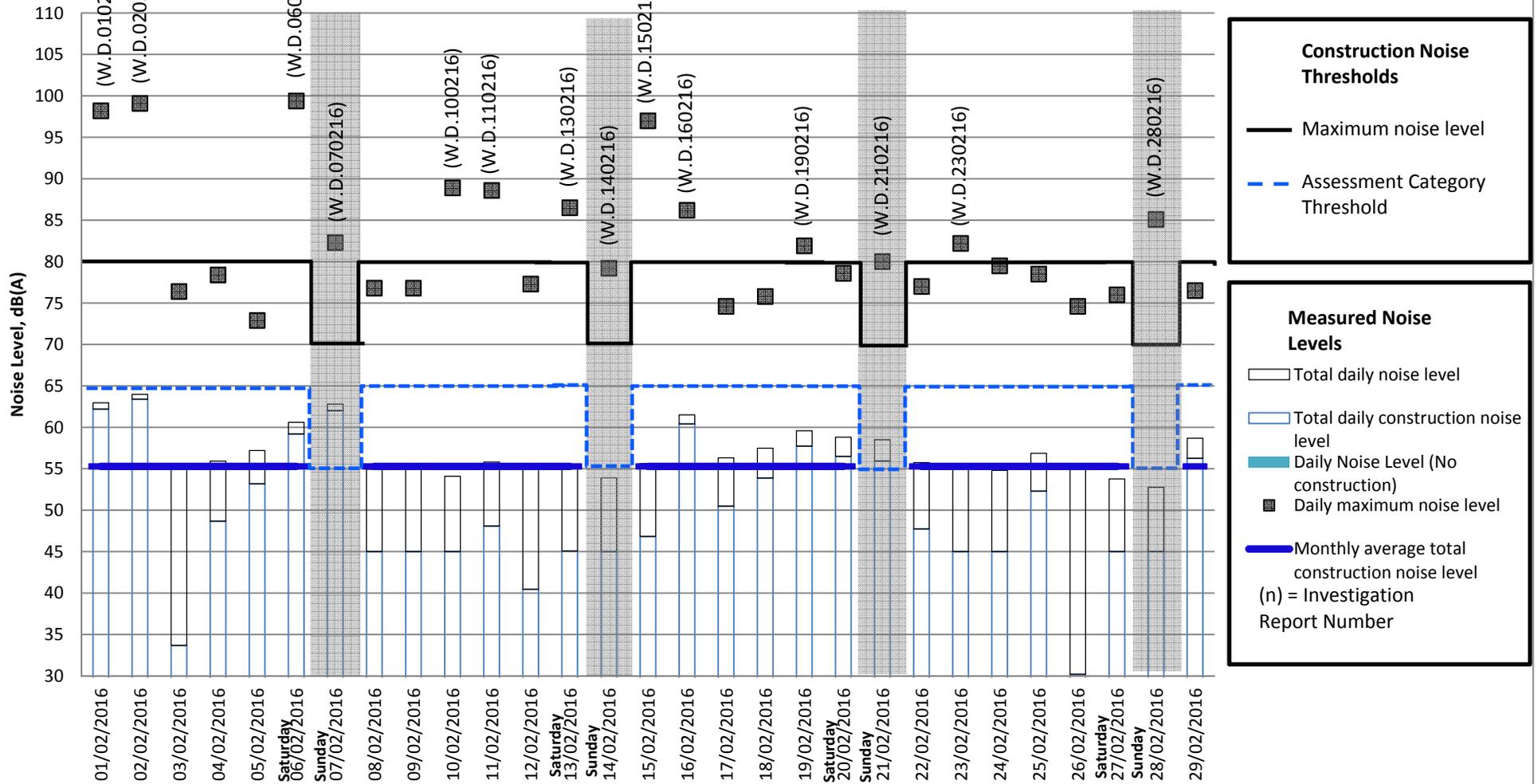
## Measured Daytime Noise Levels at Scotstoun Measurement period: February 2016



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; No data is available from the 25/02/16 - 29/02/2016 due to electrical issues. This was resolved on the 01/03/2016.

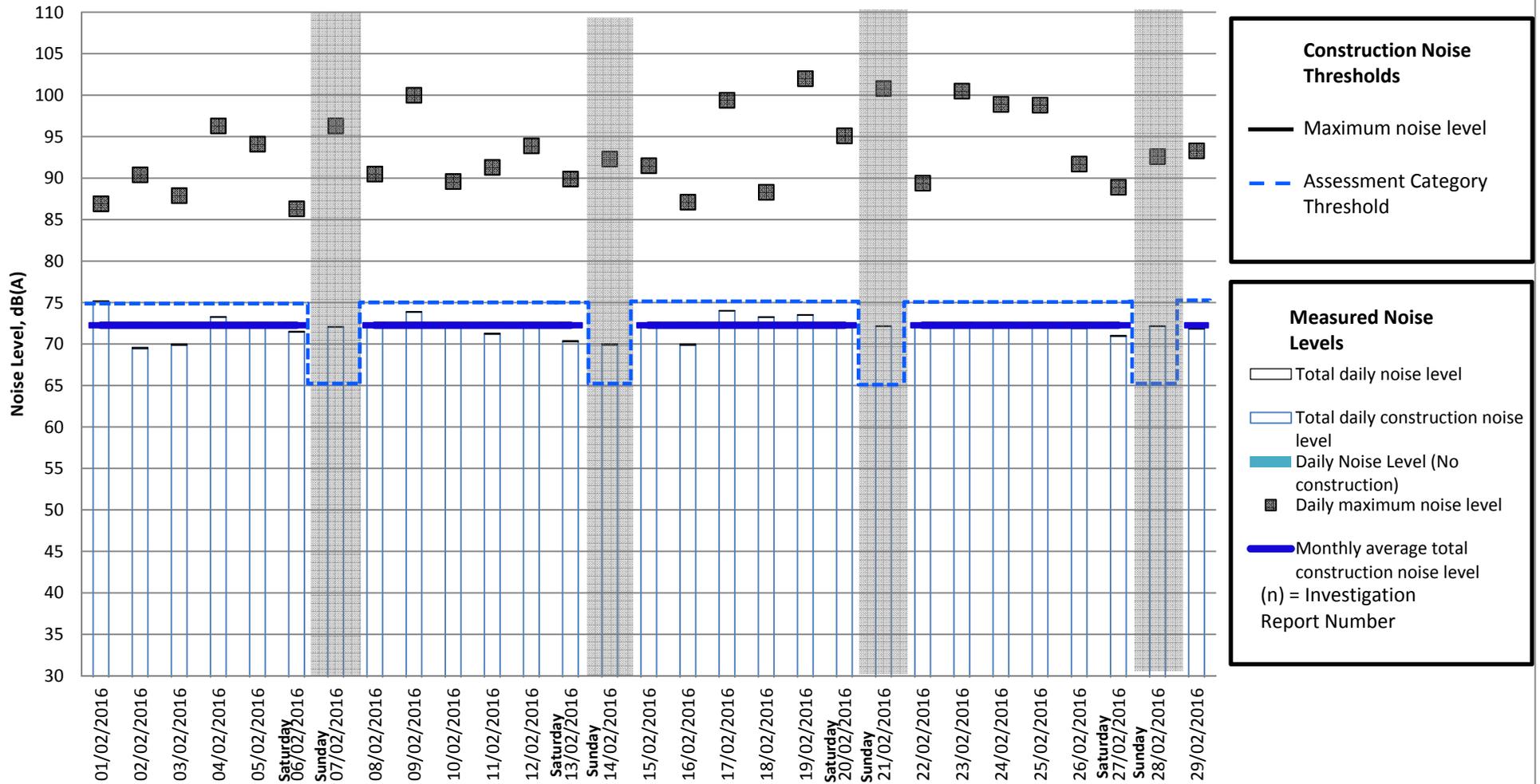
# Measured Daytime Noise Levels at Whinnyhill

## Measurement period: February 2016



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

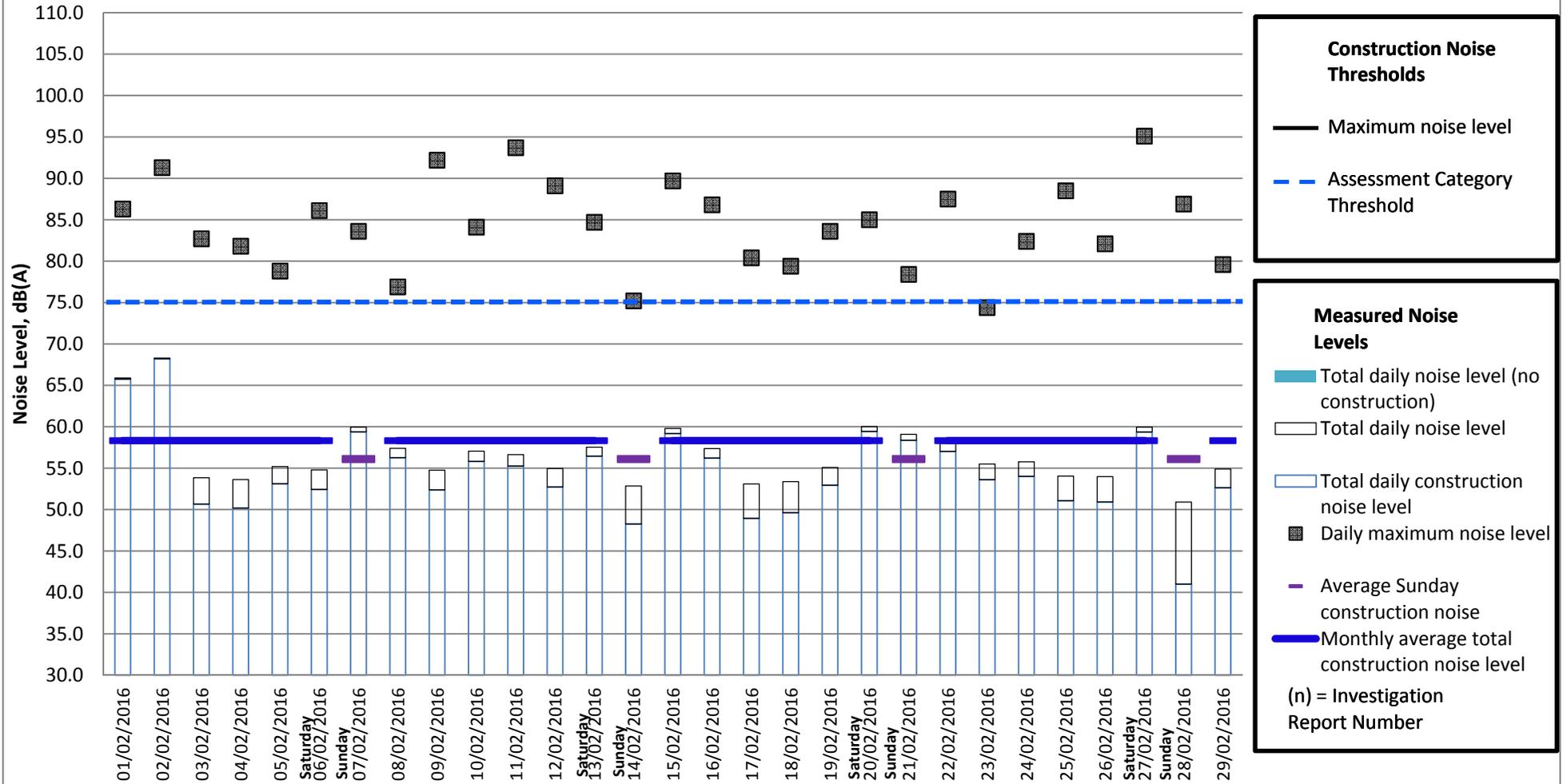
## Measured Daytime Noise Levels at Newton Measurement period: February 2016



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

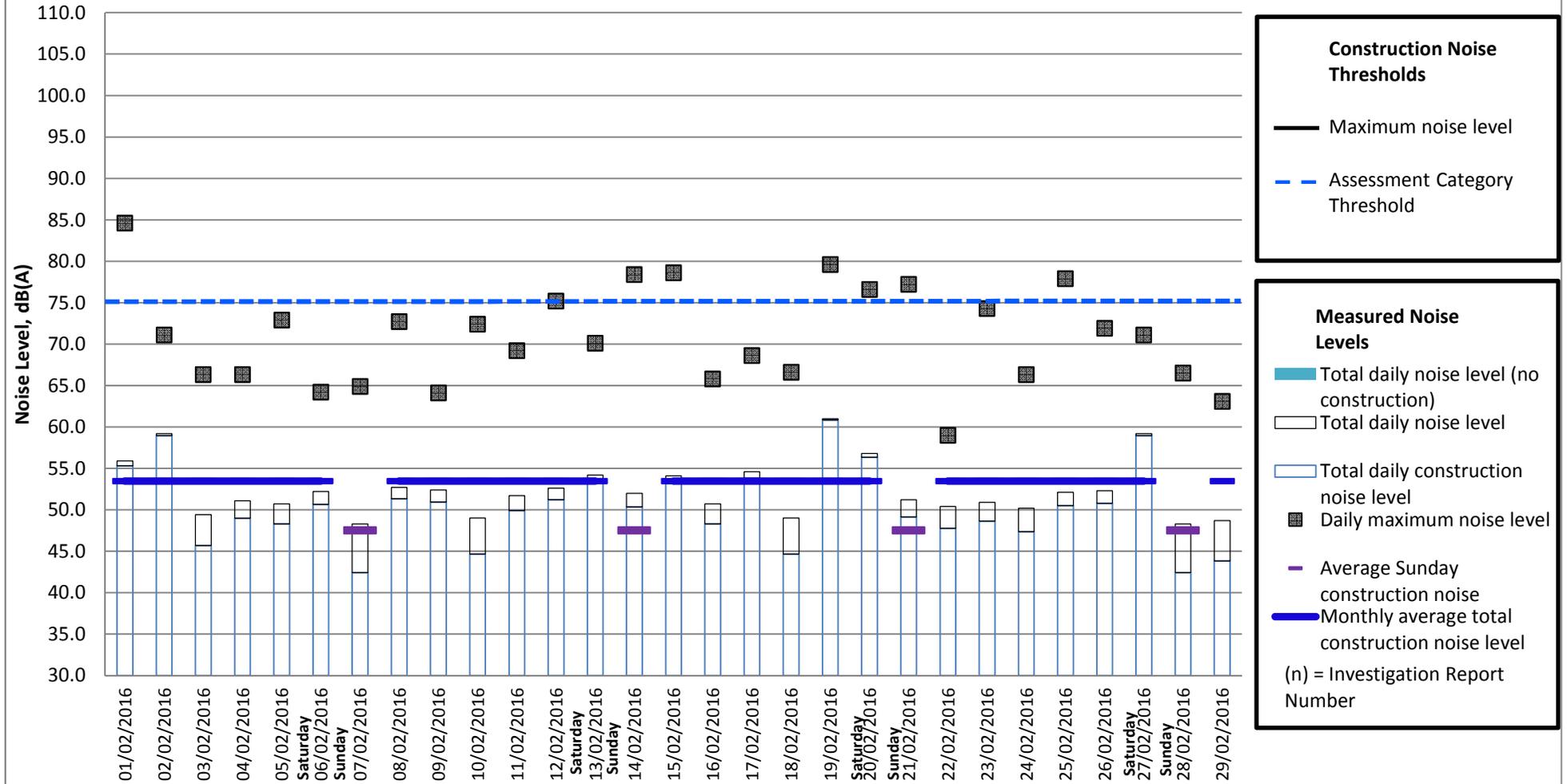
# Measured Daytime Noise Levels at Port Edgar

## Measurement period: February 2016



**Note:**

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



**Note:**

**Construction Noise Thresholds**

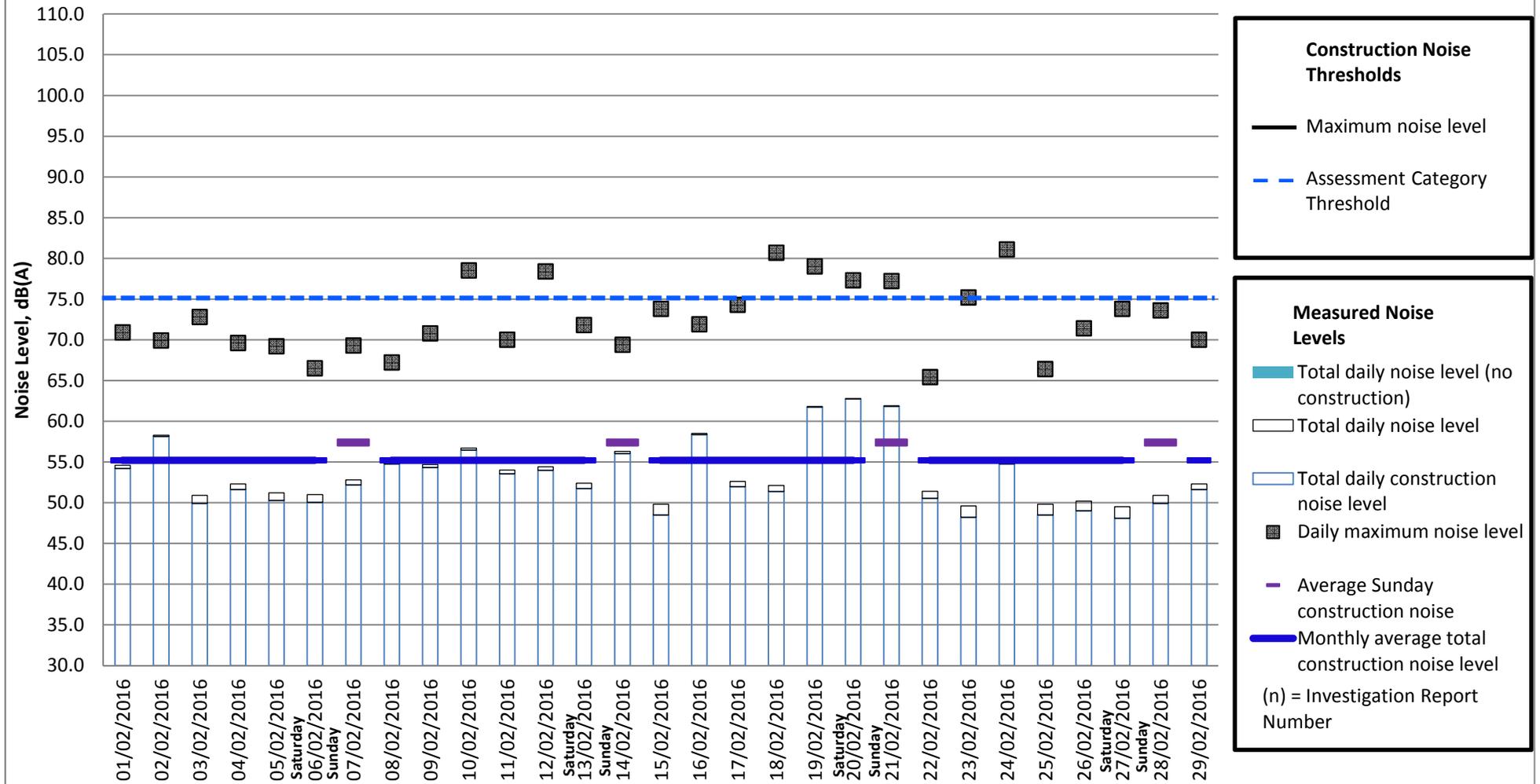
- Maximum noise level
- - - Assessment Category Threshold

**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

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



**Note:**

(n) = Investigation Report Number