



Contractor



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Project **FORTH REPLACEMENT CROSSING**

Document title

**CONSTRUCTION NOISE MONITORING REPORT: APRIL 2017**

Rev	Rev. Date	Purpose of revision	Made	Checked	Approved
00	10/05/2017	First Revision	SWR	DCK	DCK

Document status

**FOR REVIEW**

Made by: Steven Westwater  
Initials: SWR

Checked By: David Clark  
Initials: DCK

Document number

**REP-00319**

Rev  
**00**

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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 April 2017. 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 April 2017, 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 Linn Mill and Whinny Hill.
- 2.3 Various construction works were undertaken across the site during April 2017. **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 April 2017
M1	Whinny Hill	Network	<ul style="list-style-type: none"> <li>• Earth Works/Fill Placement</li> <li>• Park and Ride works</li> <li>• Main carriageway roadworks</li> </ul>
M3	Tigh-Na-Grian	Crossing	<ul style="list-style-type: none"> <li>• Central Tower stay cable installation works</li> <li>• North Tower stay cable installation works,</li> <li>• Tower crane removal</li> <li>• Falsework removal</li> <li>• Bridge Deck works</li> </ul>
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> <li>• Central Tower stay cable installation works</li> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Deck surfacing</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower stay cable installation works</li> <li>• Bridge deck works</li> </ul>
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• SUDS detention basin works</li> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Deck surfacing</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower stay cable installation works</li> <li>• Bridge deck works</li> <li>• South abutment works</li> </ul>
M11	Linn Mill	Network (close proximity to Crossing)	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Deck surfacing</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower stay cable installation works</li> <li>• Bridge deck works</li> <li>• South abutment works</li> </ul>
M13	Clufflat Brae	Crossing / Network	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• SUDS detention basin works</li> <li>• AVS concrete works on deck</li> <li>• Waterproofing on deck</li> <li>• Deck surfacing</li> <li>• Wind shield installation</li> <li>• Scour protection</li> <li>• South Tower stay cable installation works</li> <li>• Bridge deck works</li> <li>• South abutment works</li> <li>• Cycle / footpath work</li> </ul>



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M14	Springfield	Network	<ul style="list-style-type: none"> <li>• Minor main carriageway works</li> <li>• SUDS detention basin works</li> <li>• South abutment works</li> </ul>
M15	Echline	Network	<ul style="list-style-type: none"> <li>• AVS rebar and concrete deck works</li> <li>• South Abutment works</li> <li>• Cycle/footway works</li> </ul>
M16	Scotstoun	Network	<ul style="list-style-type: none"> <li>• Minor main carriageway roadworks</li> </ul>
M17	Dundas Home Farm	Network	<ul style="list-style-type: none"> <li>• Minor main carriageway roadworks</li> </ul>
M18	Newton	Network	<ul style="list-style-type: none"> <li>• Outwith works area</li> </ul>

## Noise Monitoring Results

### Overview

- 2.4** 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)).
- 2.5** 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 generally 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, night 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.

## Results

- 2.6** Results demonstrate that the monthly average total of construction noise results for daytime and evening are within the threshold levels for all monitoring locations during April 2017. For night time periods, there were exceedances of monthly average at Butlaw, Clufflat, Linn Mill and Tigh-Na-Grian. There were also exceedances of Sunday average for Butlaw, Clufflat, Linn Mill and Tigh-Na-Grian during the night.
- 2.7** Most exceedances noted were not caused by construction activities. Each exceedance was found to be influenced by increased noise levels due to periods of weather, traffic, residential noise or birdsong. Audio recordings demonstrate that the increased levels were caused by sea waves and birdsong at Butlaw Fisheries and birdsong at Tigh-Na-Grian. With regard to the averages reported for night-time periods, it should be noted that these averages are based only on the highest LAeq levels for 1 hour periods which can affect the averages.
- 2.8** 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.
- 2.9** Construction related noise at the Clufflat monitor during the daytime period on the 4<sup>th</sup>, 13<sup>th</sup> and 29<sup>th</sup> April were caused by the excavation work nearby at the eastern SUDs pond. Site teams were made aware of these exceedances.
- 2.10** A summary of the findings for exceedances occurring at each of the locations can be found in Table 2.



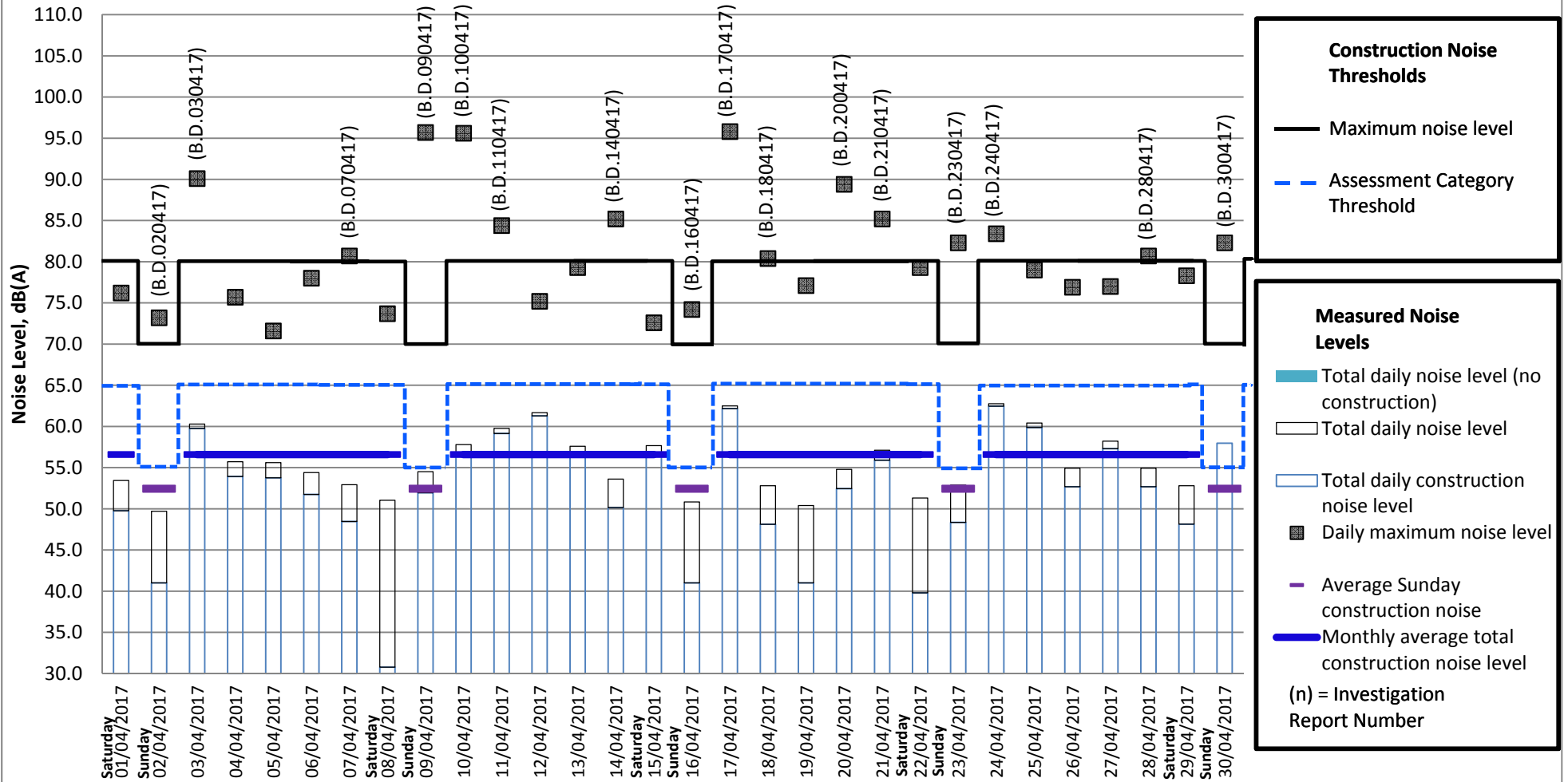
**Table 2: Summary of Exceedances at Monitoring Locations**

<b>Monitoring Location</b>	<b>Summary of Exceedance Details</b>
Butlaw Fisheries	During April the maximum noise threshold was exceeded on 67 occasions (16 day time, 22 evening and 29 night time). Exceedances were attributed to non-construction factors, notably birdsong and waves.
Clufflat Brae	During April the maximum noise threshold was exceeded on 75 occasions (25 daytime, 24 evening and 26 night time). Exceedances were mainly found to be due to birdsong and residents. There were three instances of construction noise exceeding the threshold (see 2.9)
Inchgarvie Lodge	During April the maximum noise threshold was exceeded on 67 occasions (20 day time, 18 evening and 29 night time). Exceedances were mainly found to be due to birdsong, residents and wind.
Linn Mill	During April the maximum noise threshold was exceeded on 49 occasions (10 daytime, 9 evening and 30 night time). The majority of exceedances at this location were due to birdsong and wind.
Tigh-Na-Grian	During April the maximum noise threshold was exceeded on 43 occasions (7 daytime, 14 evening and 22 night time). Exceedances were mainly due to birdsong and wind.
Dundas Home Farm	During April the maximum noise threshold was exceeded on 25 occasions. The main exceedances were due to residents and birdsong.
Echline	During April the maximum noise threshold was exceeded on 30 occasions. Exceedances were attributed to vehicles passing by on the adjacent roads.
Springfield	During April the maximum noise threshold was exceeded on 17 occasions. These exceedances were due to local residents.
Scotstoun	During April the maximum noise threshold was exceeded on 30 occasions. These exceedances were attributed to general traffic noise on the adjacent road.
Whinny Hill	During April the maximum noise threshold was exceeded on 19 occasions during the daytime. No exceedances at this location were attributed to construction activities. Most exceedances were due to birdsong and residents
Newton	Recordings taken for data record purposes



## APPENDIX A

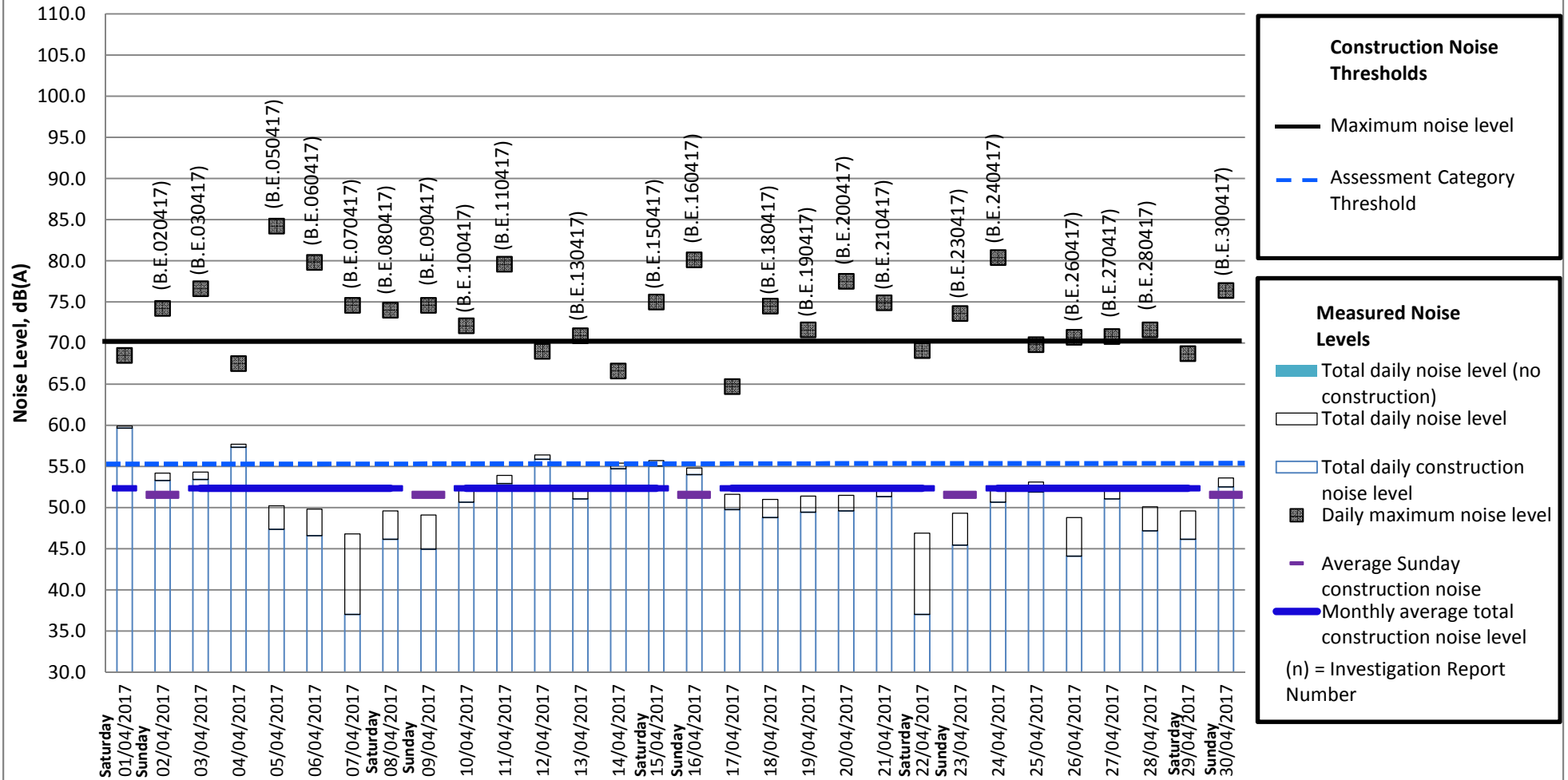
## Measured Daytime Noise Levels at Butlaw Fisheries Measurement period: April 2017



**Note:**

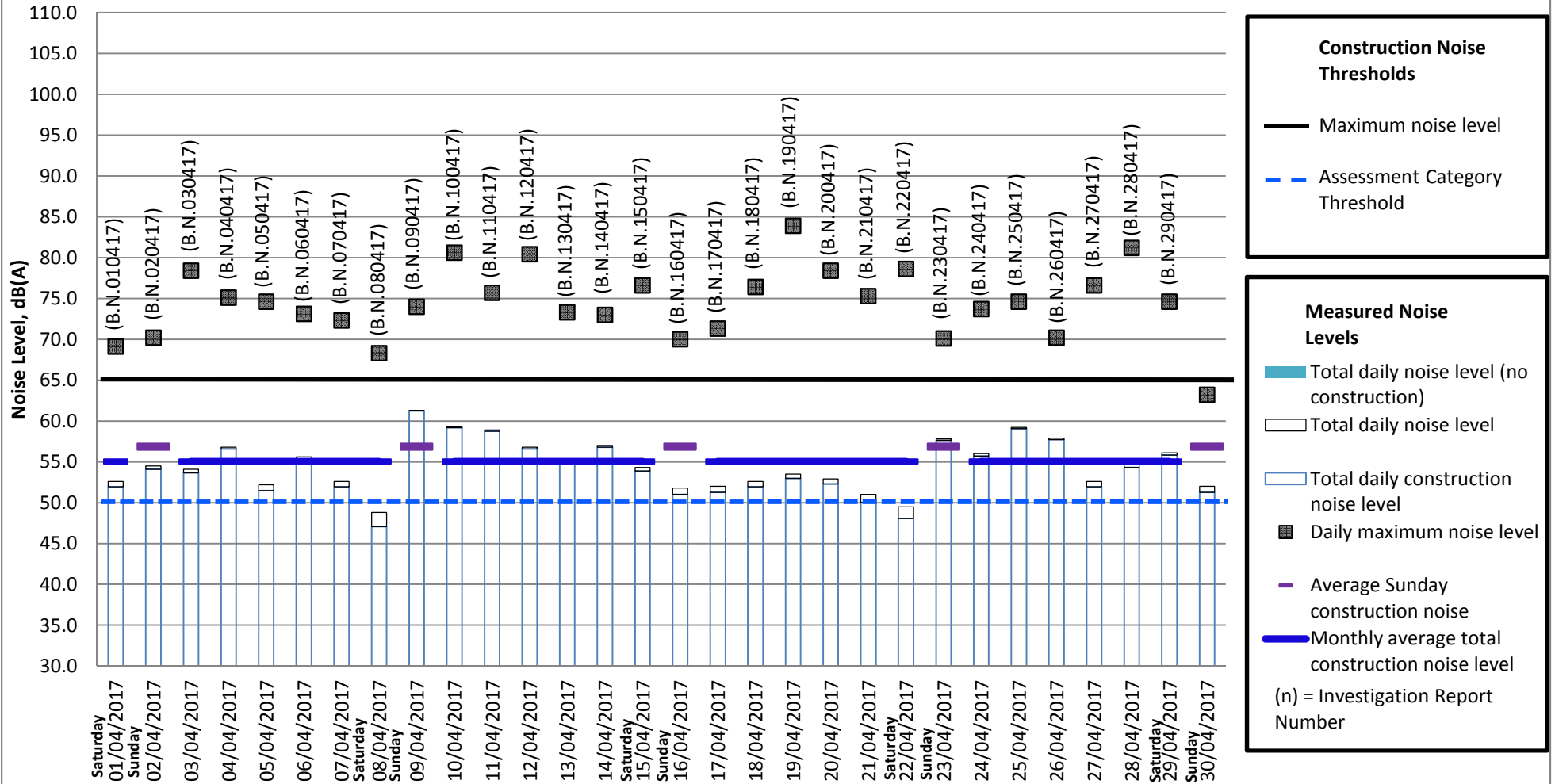
# Measured Evening Noise Levels at Butlaw Fisheries

## Measurement period: April 2017



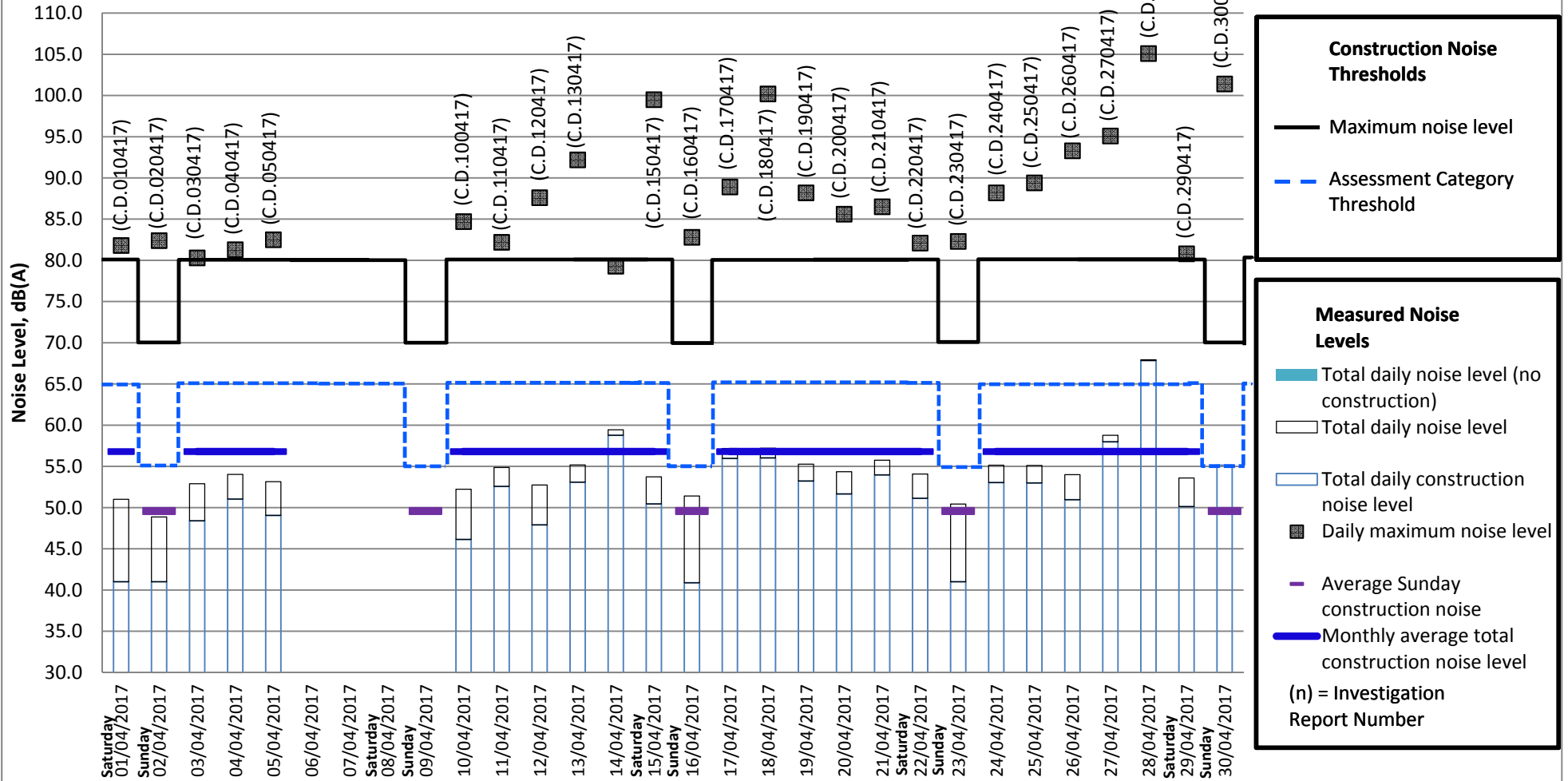
**Note:**

## Measured Night time Noise Levels at Butlaw Fisheries Measurement period: April 2017



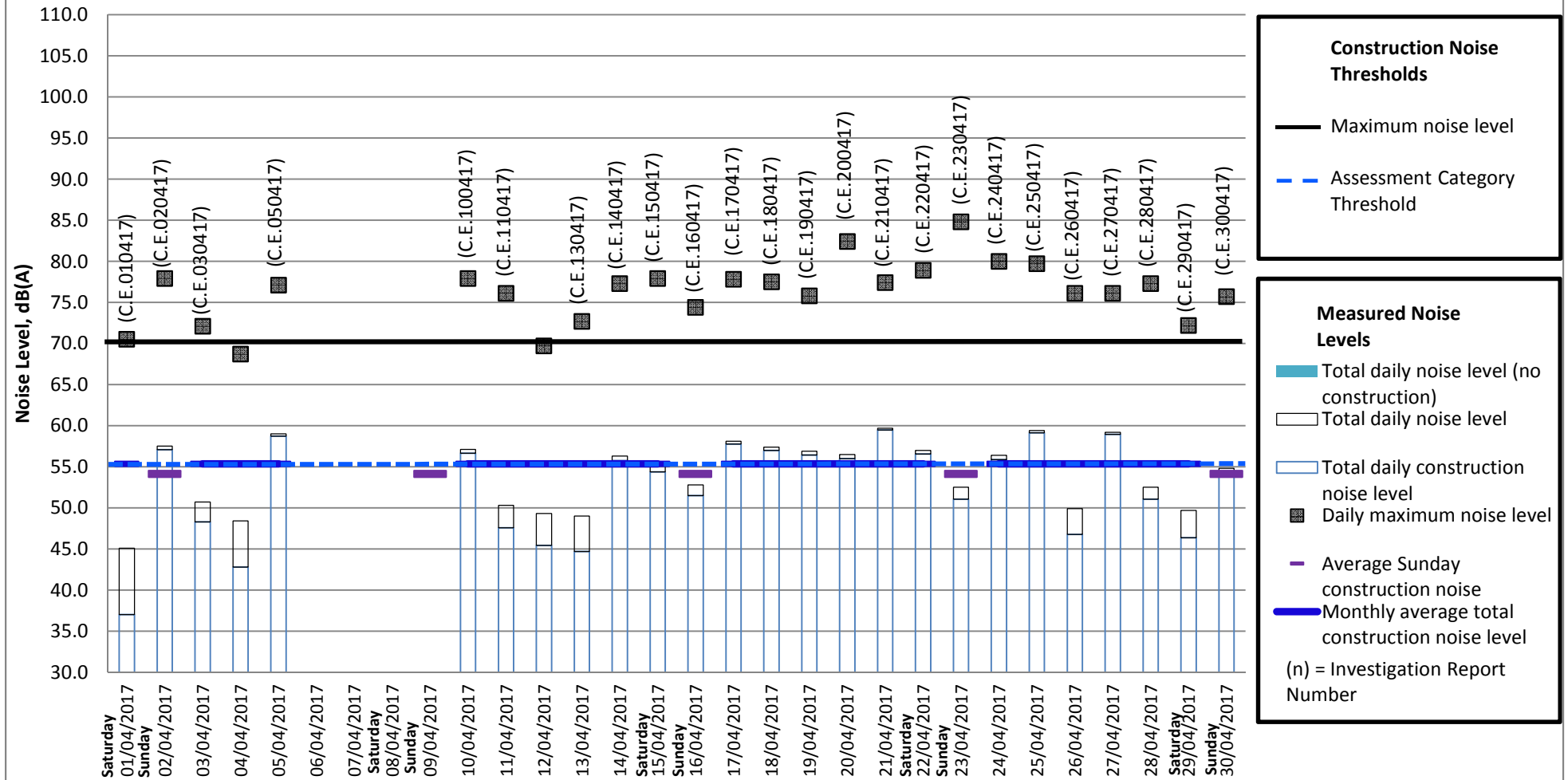
**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' throughout the month were caused by birds and waves

## Measured Daytime Noise Levels at Clufflat Measurement period: April 2017



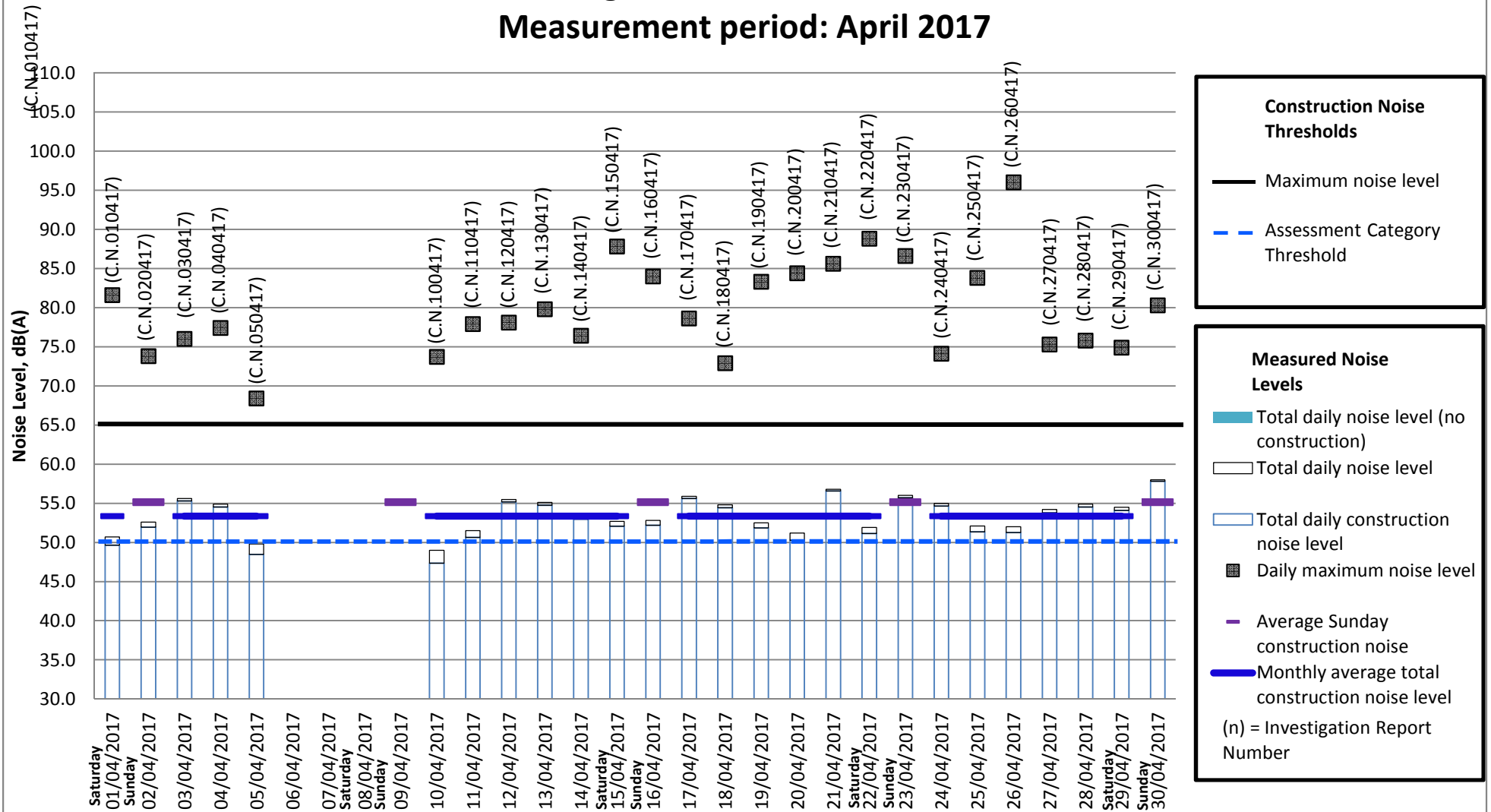
**Note:** Please note there was no data from the 6th April - 9th April due to a problem with the noise monitor

## Measured Evening Noise Levels at Clufflat Measurement period: April 2017



**Note:** Please note there was no data from the 6th April - 9th April due to a problem with the noise monitor

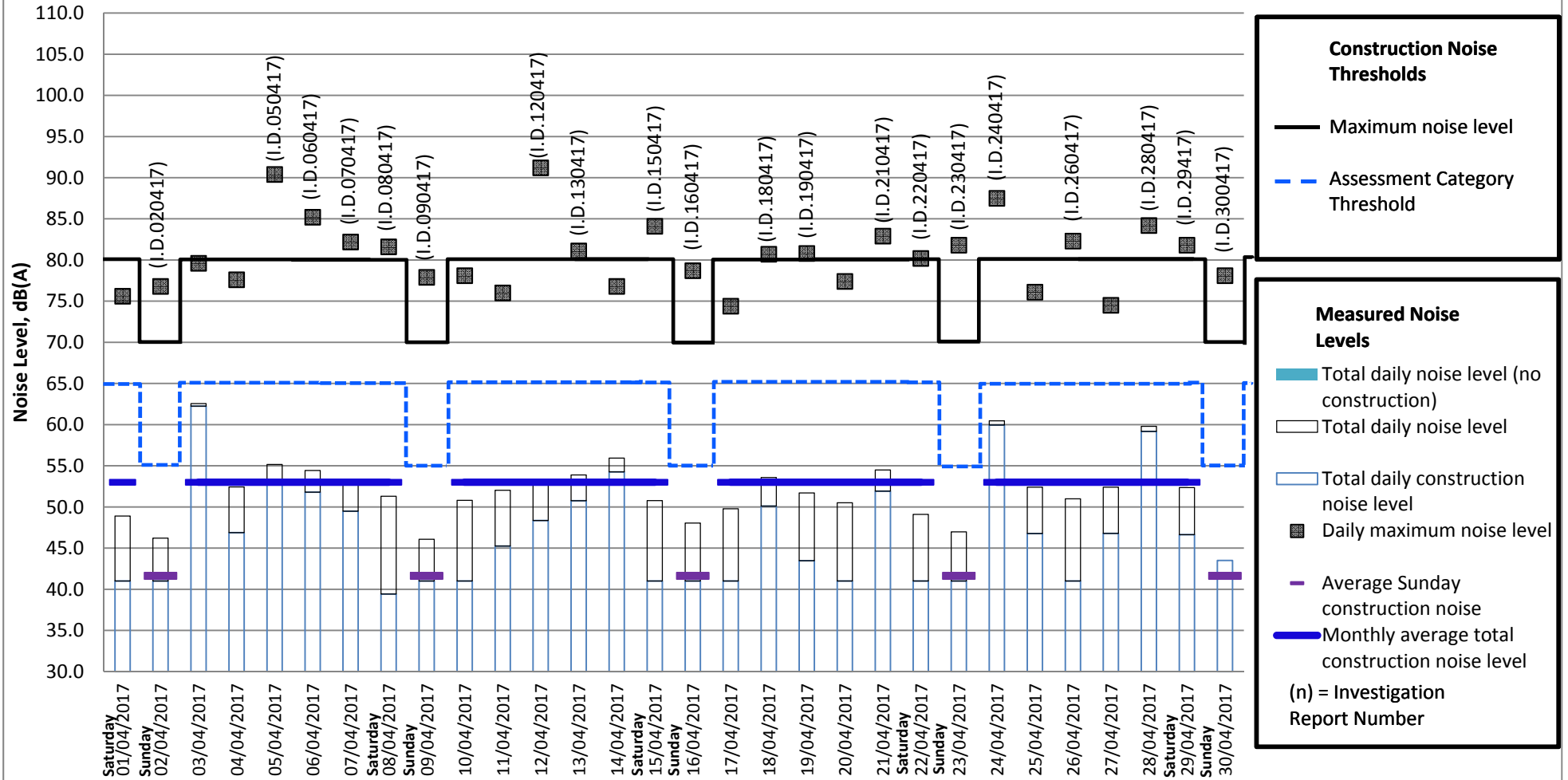
## Measured Night time Noise Levels at Clufflat Measurement period: April 2017



**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' throughout the month were caused by birds. Please note there was no data from the 6th April - 9th April due to a problem with the noise monitor

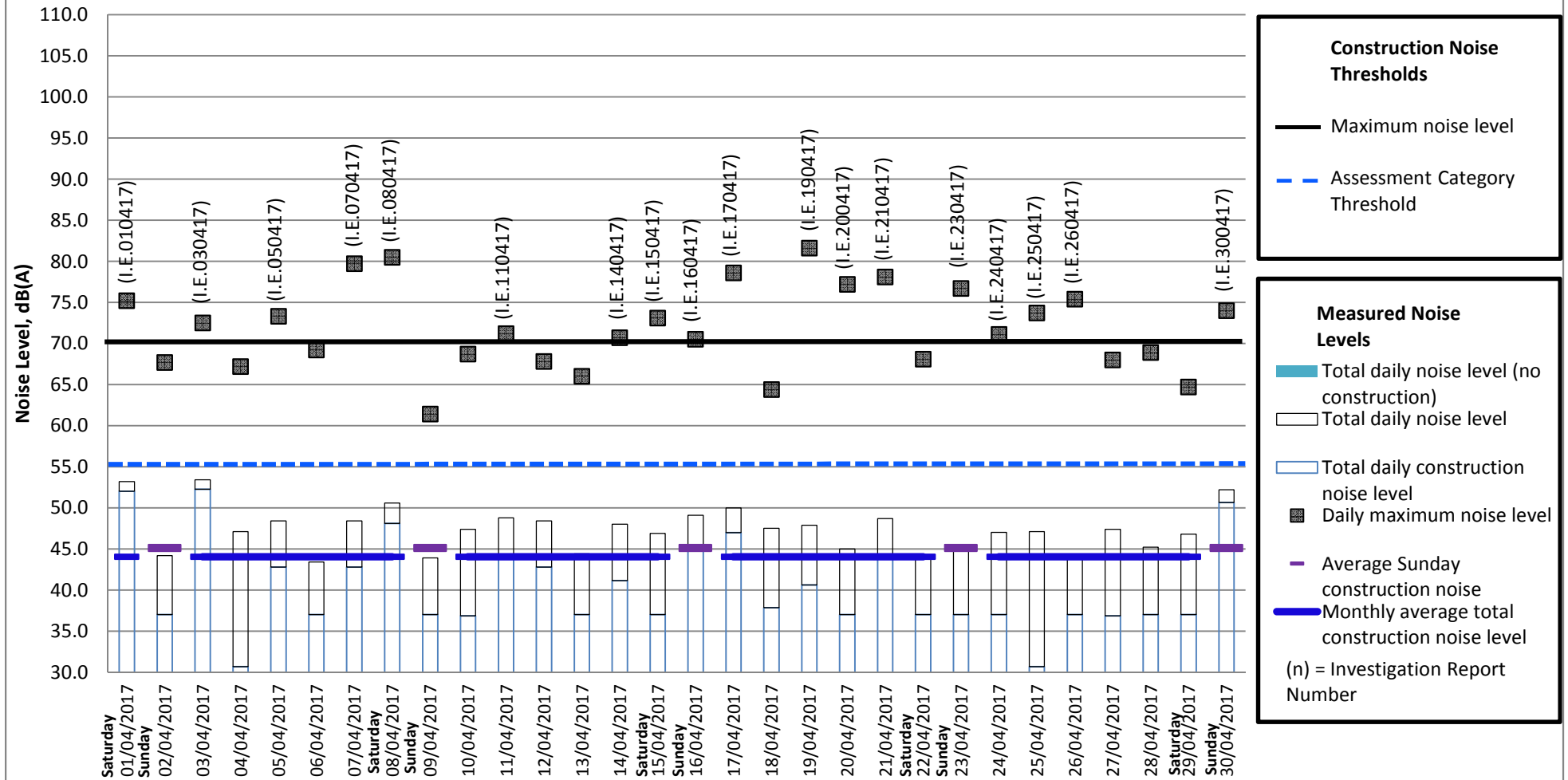


## Measured Daytime Noise Levels at Inchgarvie Measurement period: April 2017



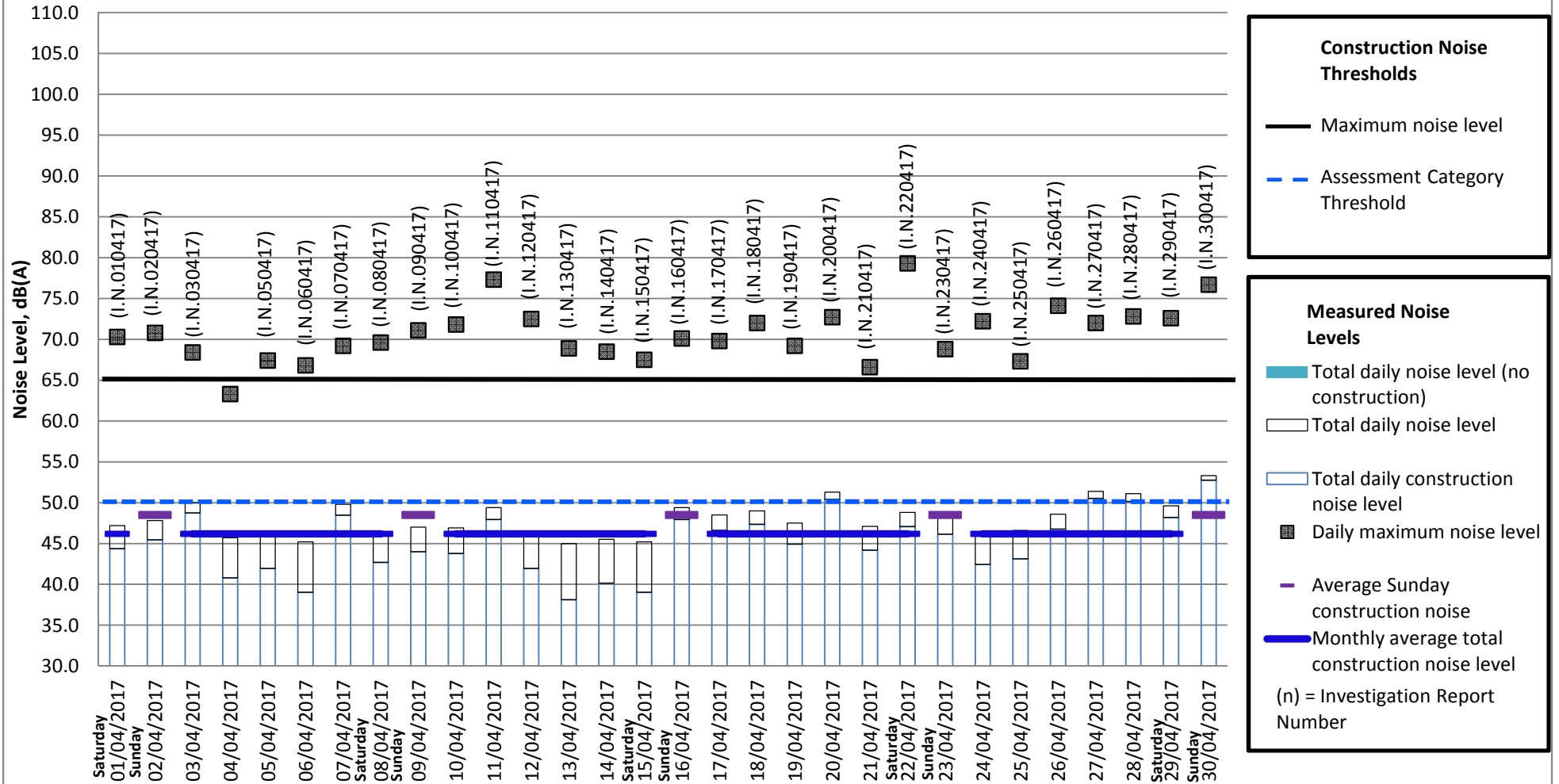
**Note:**

## Measured Evening Noise Levels at Inchgarvie Measurement period: April 2017



**Note:**

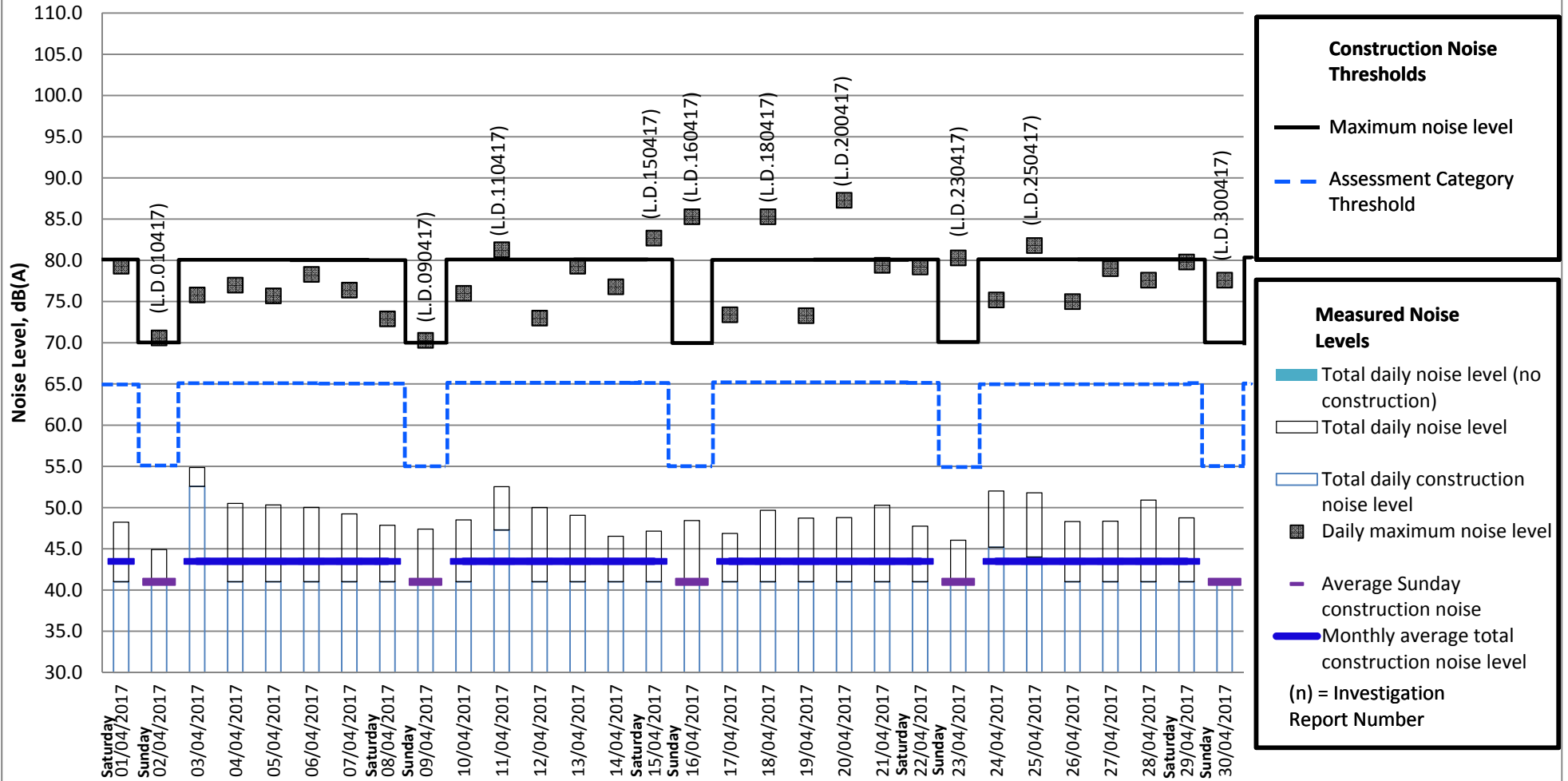
## Measured Night time Noise Levels at Inchgarvie Measurement period: April 2017



**Note:**

# Measured Daytime Noise Levels at Linn Mill

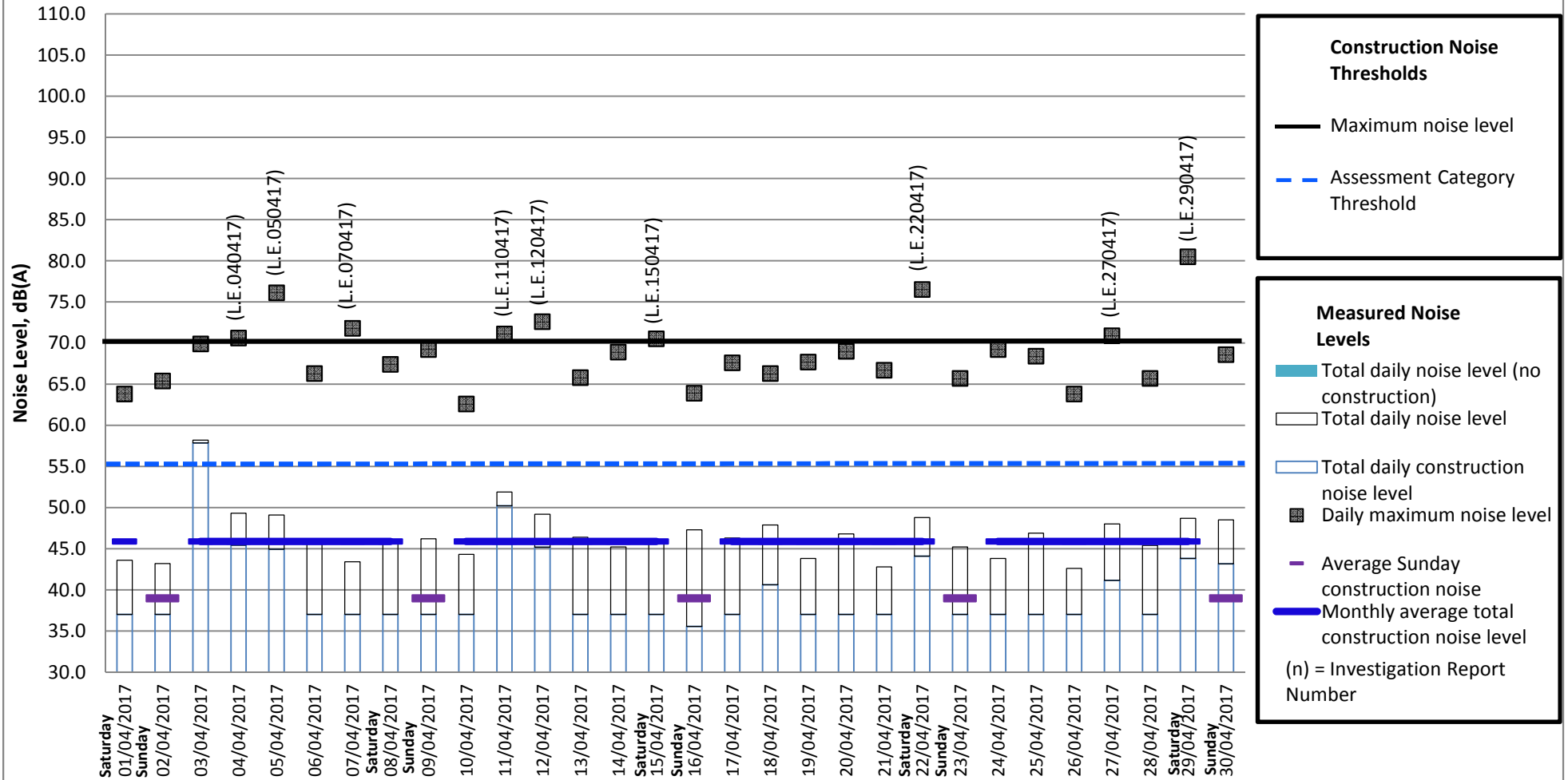
## Measurement period: April 2017



**Note:**

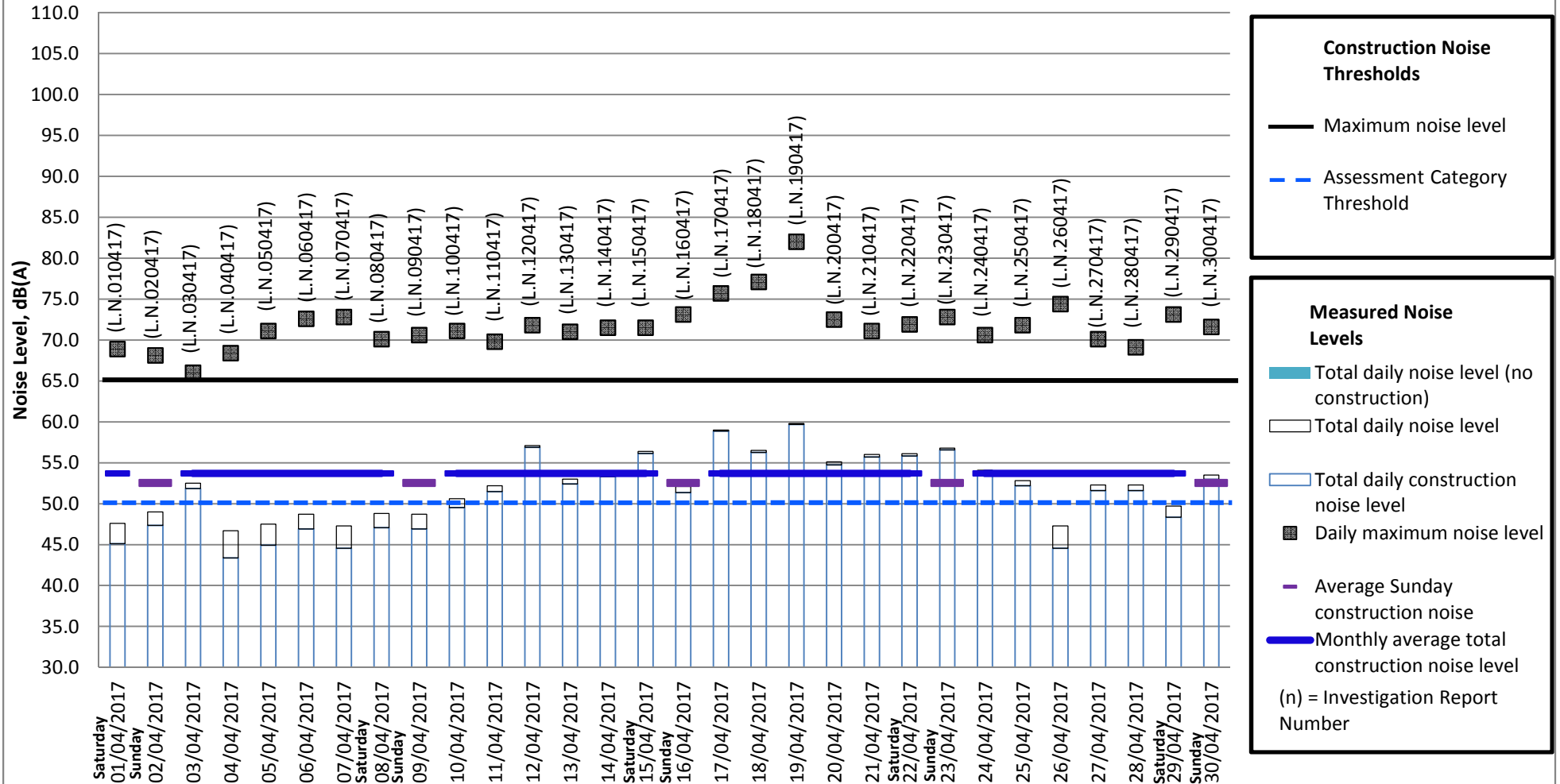
# Measured Evening Noise Levels at Linn Mill

## Measurement period: April 2017



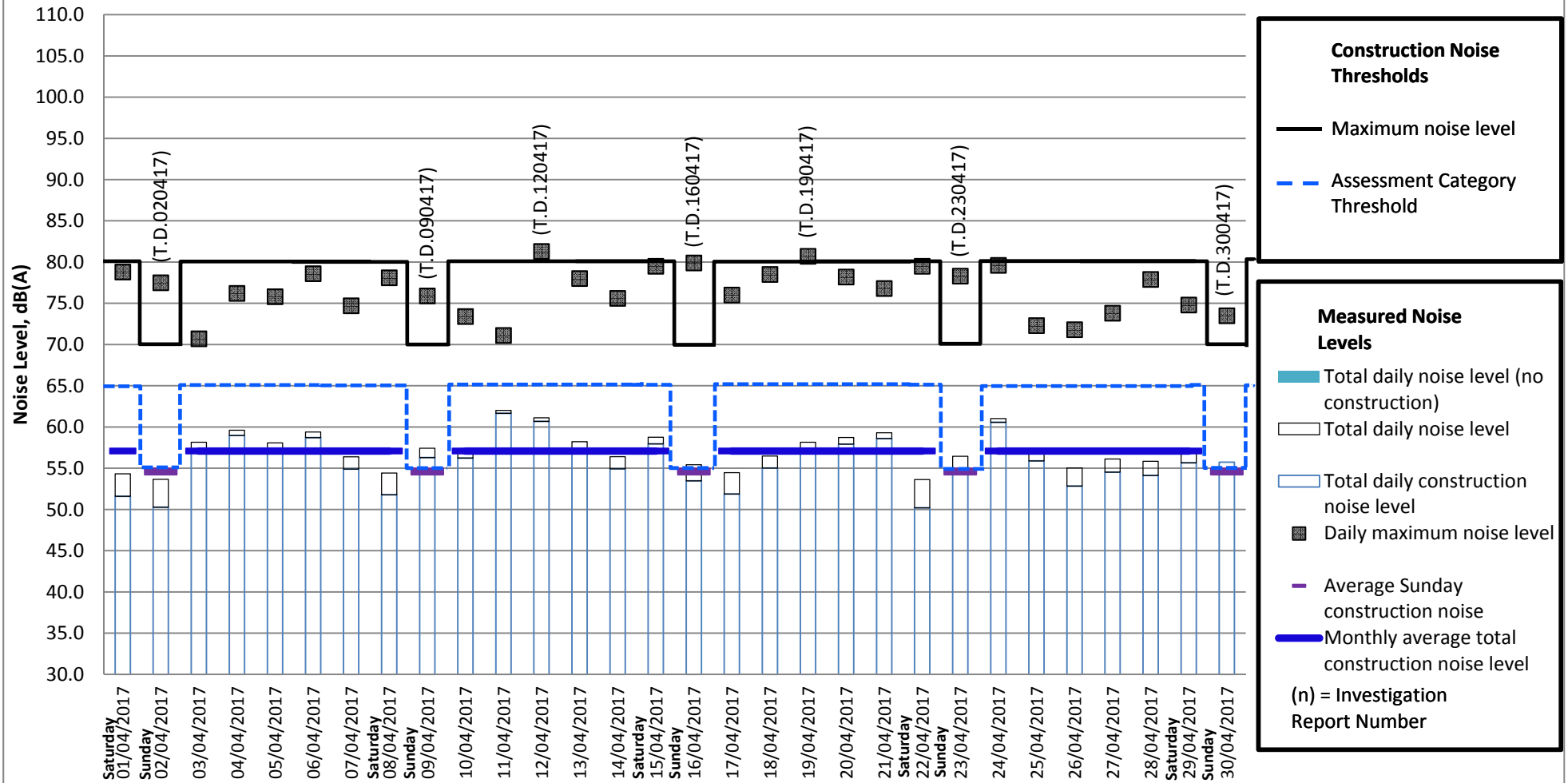
**Note:**

## Measured Night time Noise Levels at Linn Mill Measurement period: April 2017



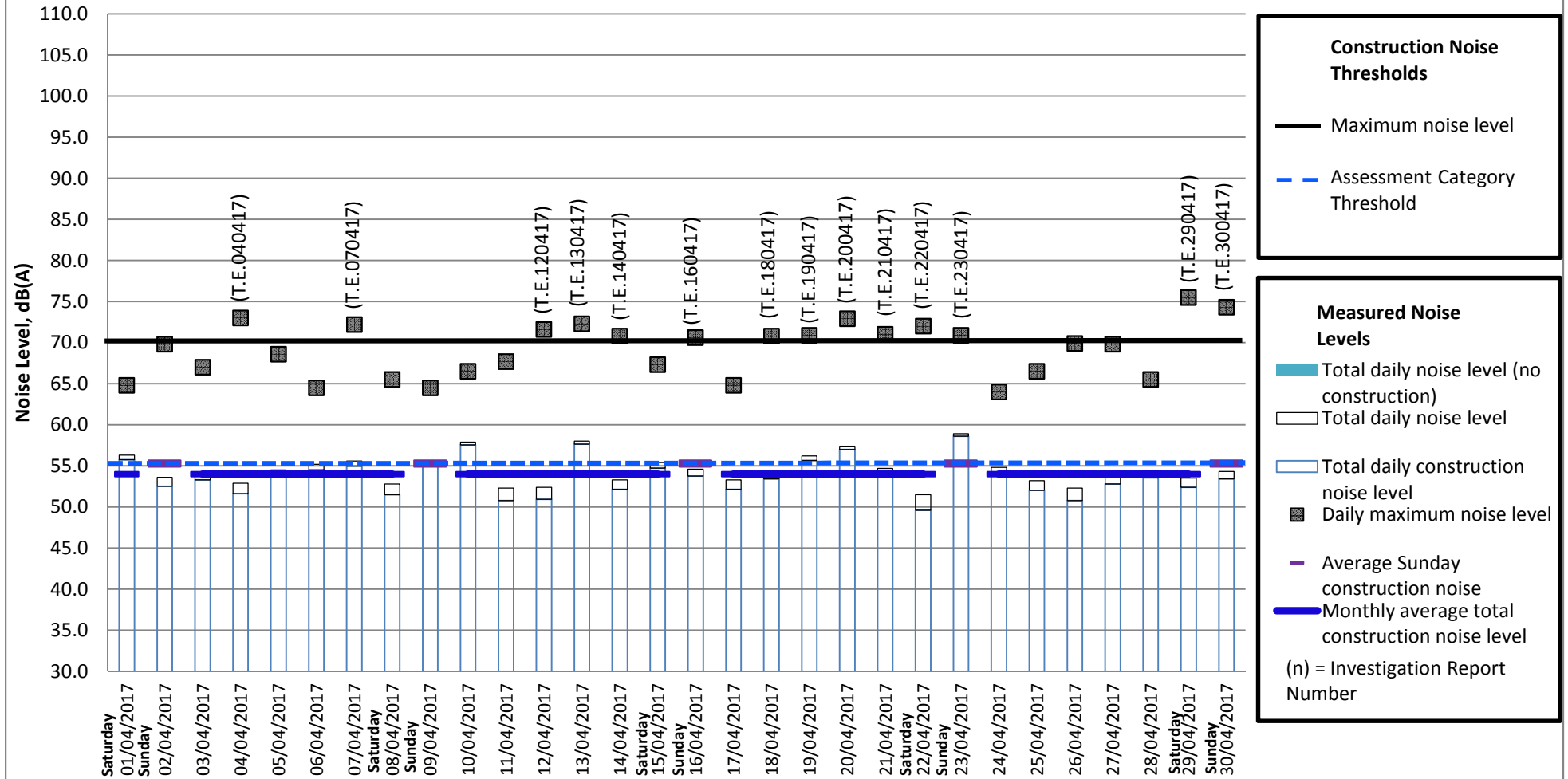
**Note:** After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' throughout the month were caused by birds

## Measured Daytime Noise Levels at Tigh-Na-Grian Measurement period: April 2017



**Note:**

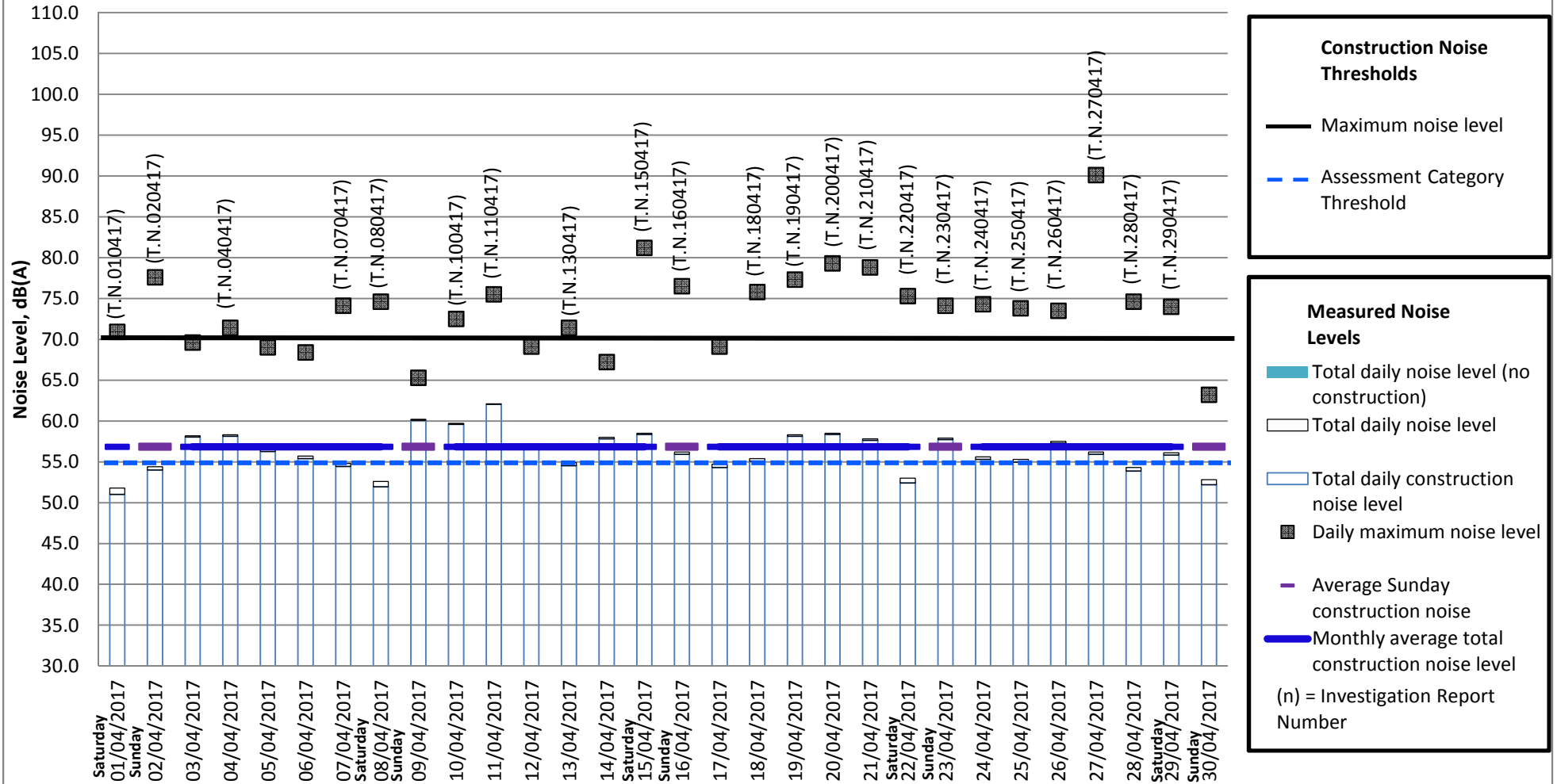
## Measured Evening Noise Levels at Tigh-Na-Grian Measurement period: April 2017



**Note:**



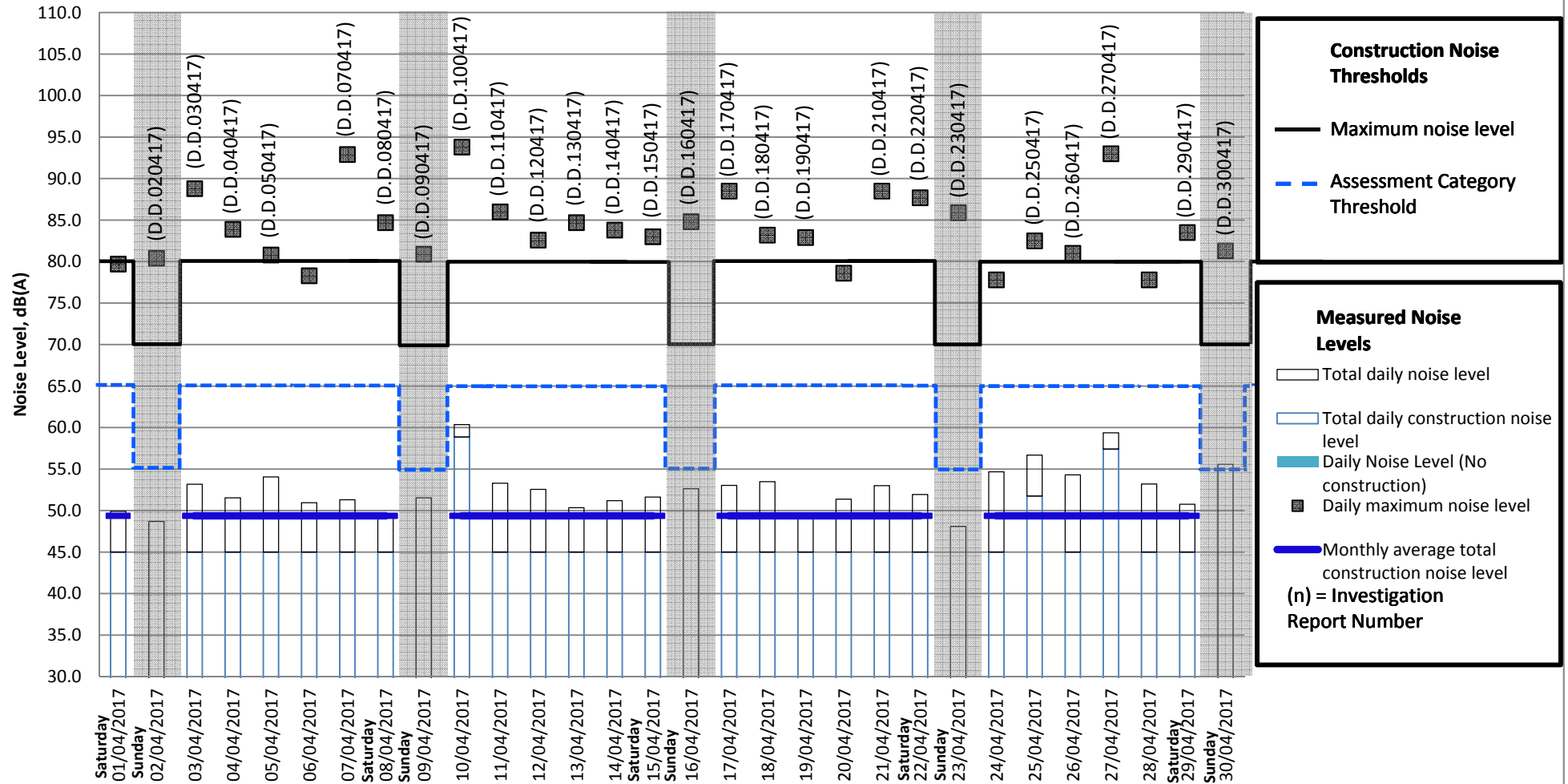
## Measured Night time Noise Levels at Tigh-Na-Grian Measurement period: April 2017



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

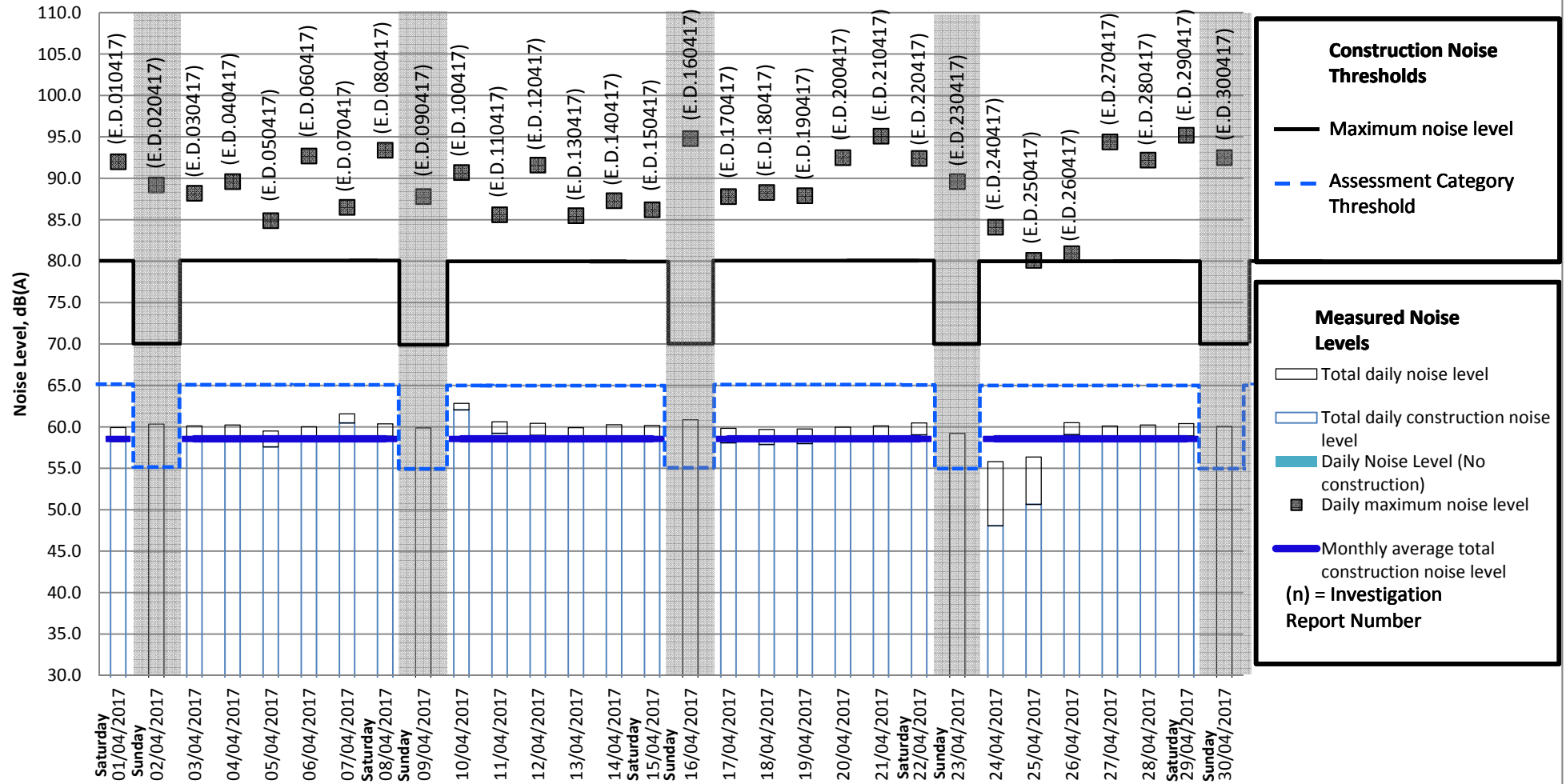
# Measured Daytime Noise Levels at Dundas Home Farm

## Measurement period: April 2017



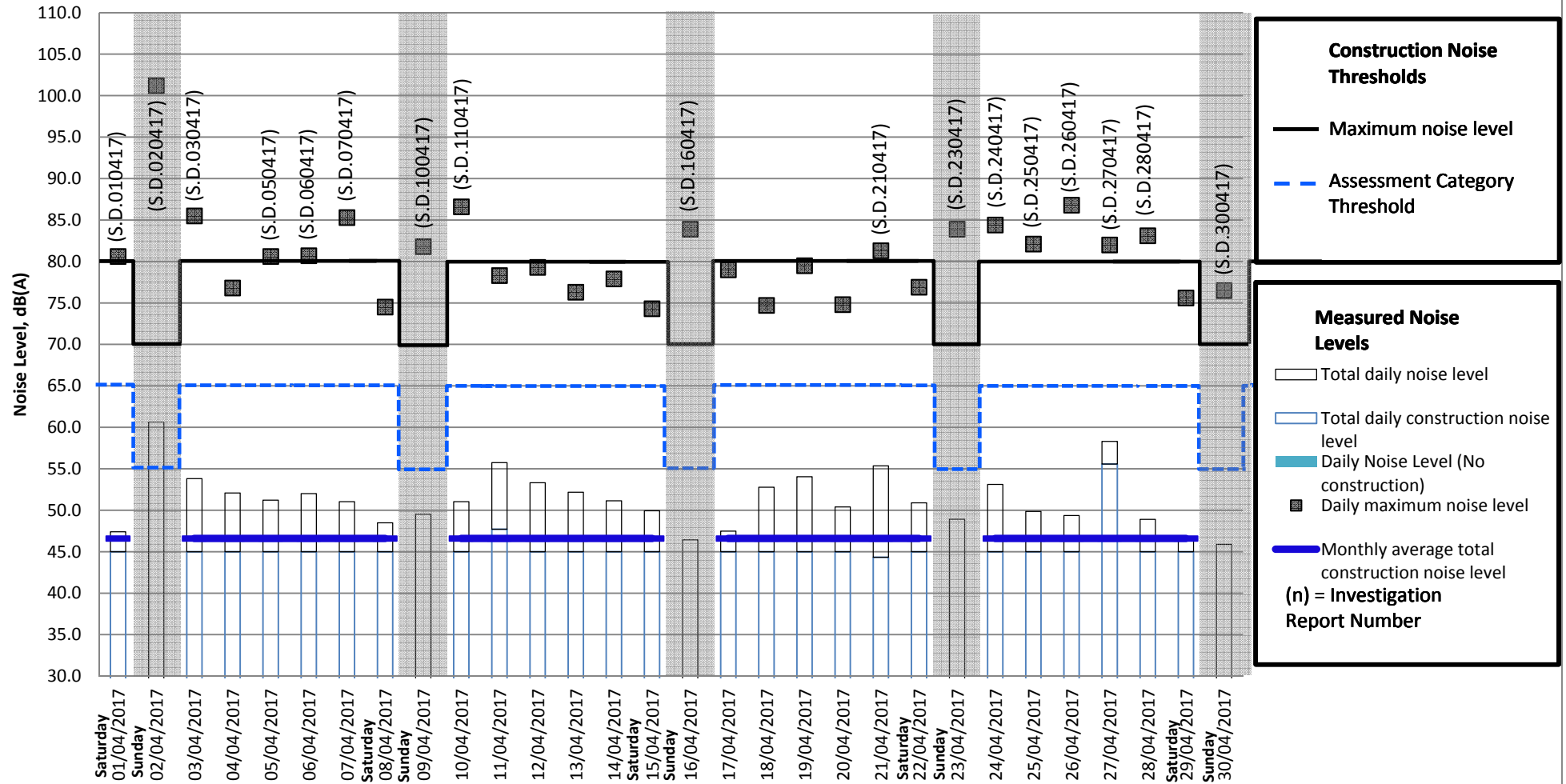
**Note:** The grey areas of the chart represent days on which no construction works have been conducted;

## Measured Daytime Noise Levels at Echline Measurement period: April 2017



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

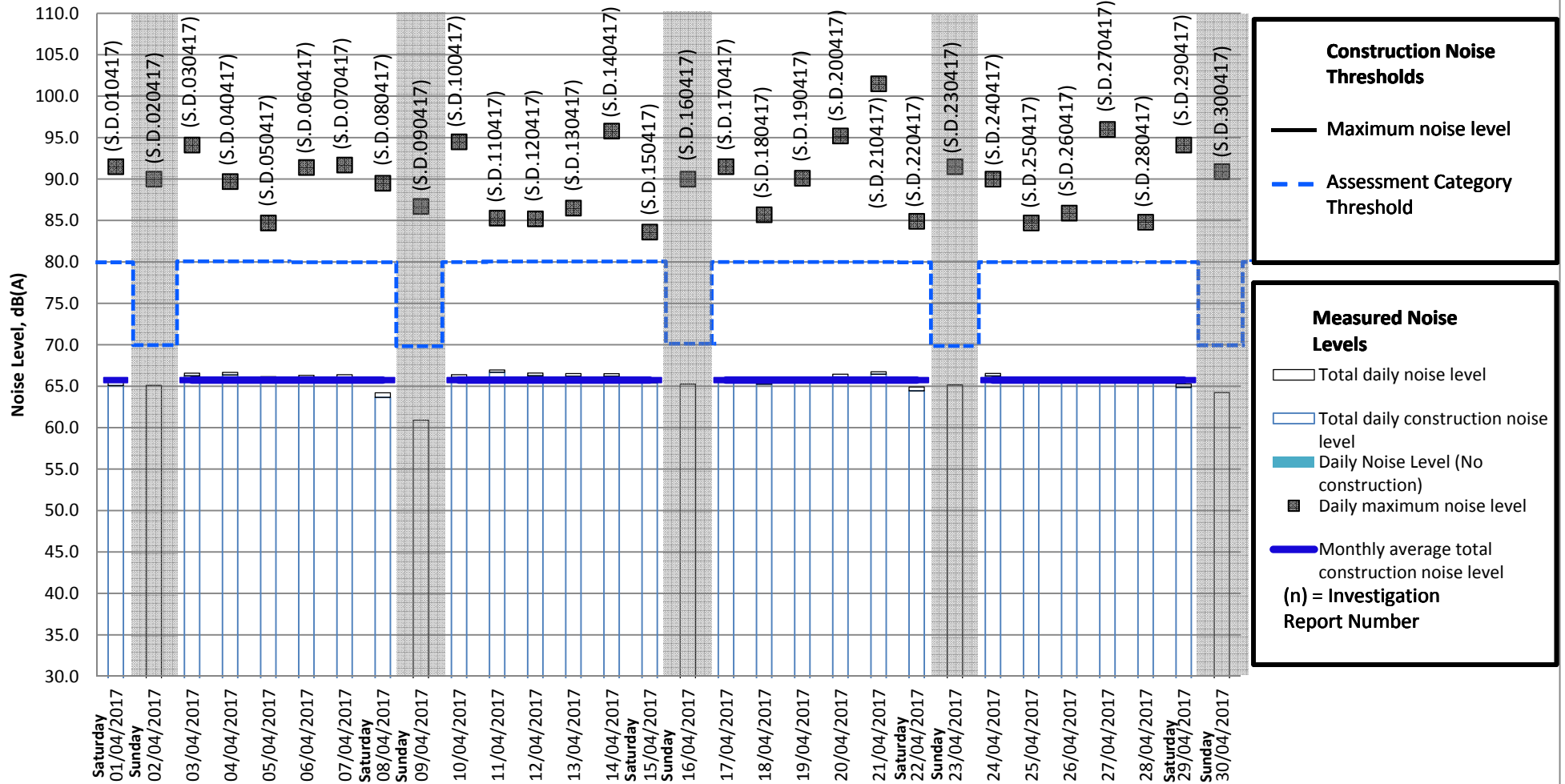
## Measured Daytime Noise Levels at Springfield Measurement period: April 2017



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

## Measured Daytime Noise Levels at Scotstoun

### Measurement period: April 2017



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

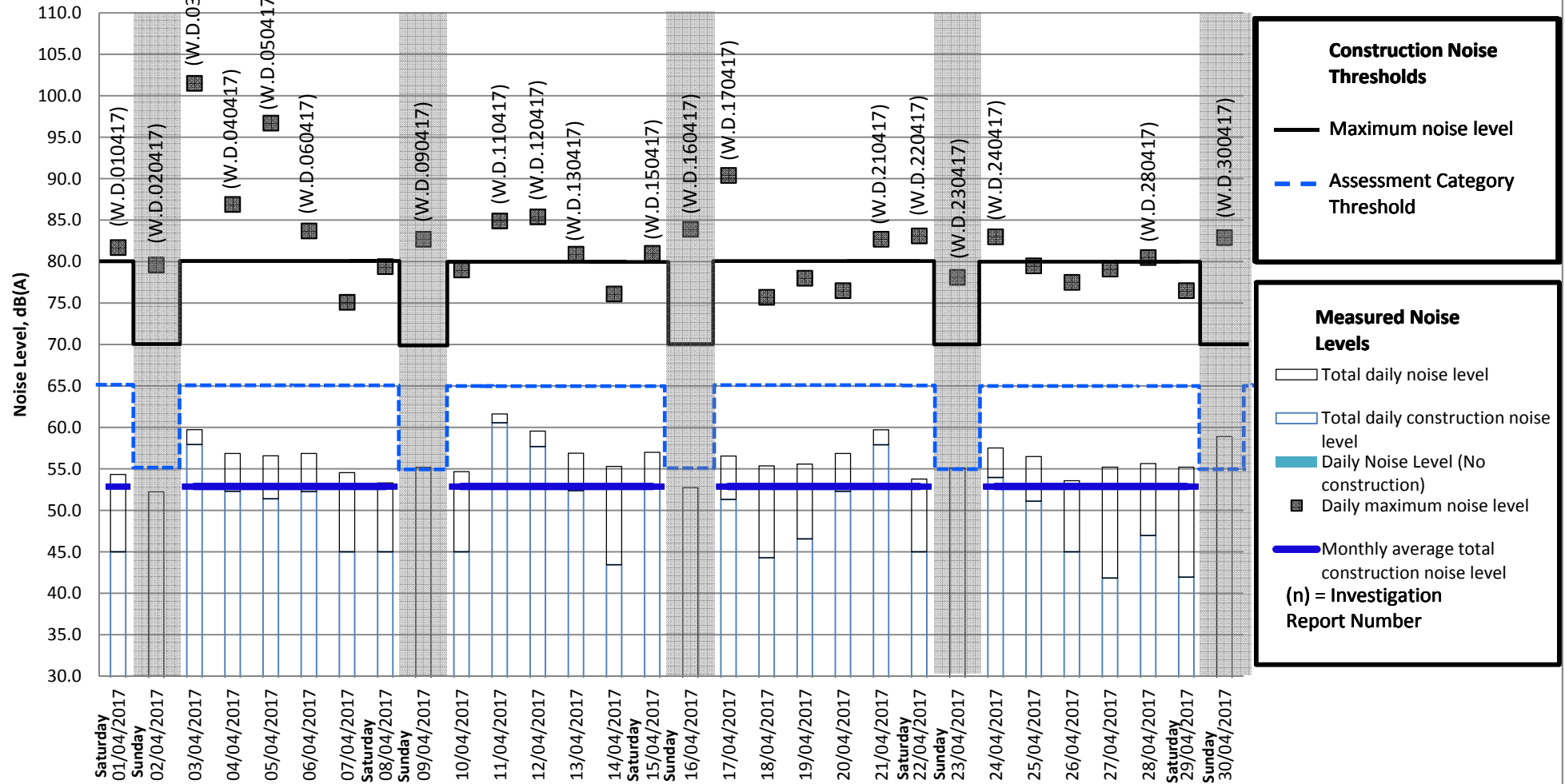
**Measured Noise Levels**

- 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 Whinnyhill

## Measurement period: April 2017



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

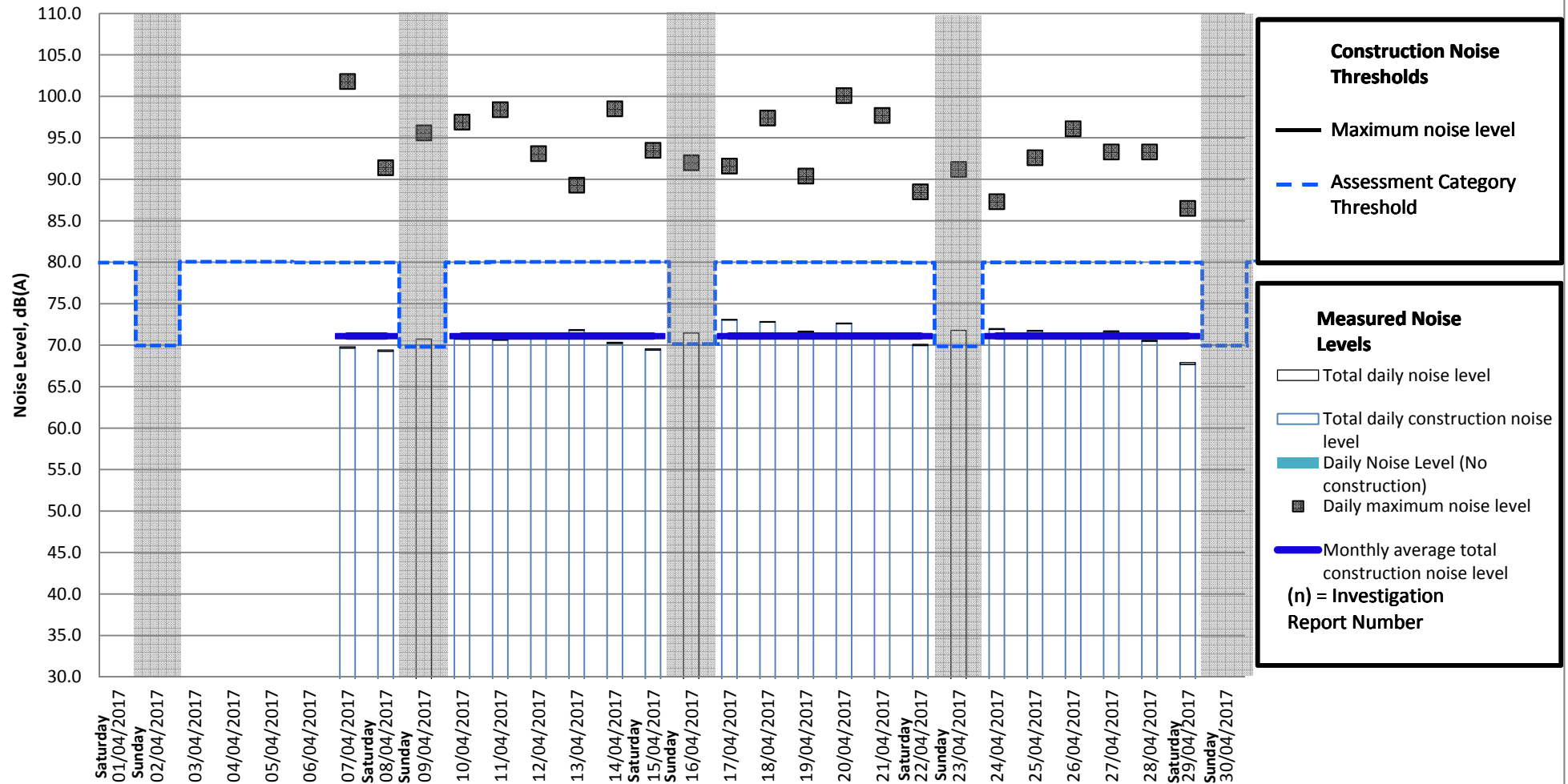
**Measured Noise Levels**

- 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 Newton Measurement period: April 2017



**Note:** The grey areas of the chart represent days on which no construction works have been conducted; There is no data between 01/04/2017 and 06/07/2017 due to an issue with the monitor.