



Contractor



**Forth Crossing** Bridge Constructors

HOCHTIEF Solutions  
American Bridge International  
DRAGADOS  
Morrison Construction

Project **FORTH REPLACEMENT CROSSING**

Document title

**CONSTRUCTION NOISE MONITORING REPORT: APRIL 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 April 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 April 2015, construction noise was monitored using permanent, continuous noise monitoring devices (01 db 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 March 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 April 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 April 2015
M1	Whinny Hill	Network	<ul style="list-style-type: none"> <li>• Rock Trimming/Breaking/Crushing</li> <li>• Earth Works</li> <li>• New Ferrytoll Road</li> <li>• FT19 Construction</li> <li>• FT03 &amp; FT04 deck works</li> </ul>
M3	Tigh-Na-Grian	Crossing	<ul style="list-style-type: none"> <li>• Central Tower rebar, formwork, concreting works deck table installation works</li> <li>• North Tower rebar, formwork, concreting works deck table installation works</li> <li>• Pier N1 rebar formwork &amp; concrete works</li> <li>• AVN works</li> </ul>
M4	North Leg	Crossing	<ul style="list-style-type: none"> <li>• Central Tower rebar, formwork, concreting works deck table installation works</li> <li>• North Tower rebar, formwork, concreting works deck table installation works</li> <li>• Pier N1 rebar formwork &amp; concrete works</li> </ul>
M6	Port Edgar	Crossing	<ul style="list-style-type: none"> <li>• Central Tower rebar, formwork, concreting works deck table installation works</li> <li>• South Tower rebar, formwork, concreting works deck table installation works</li> <li>• Pier S1 foundation work</li> <li>• Pier S2 airlifting</li> <li>• Pier S3 rebar, formwork &amp; concreting.</li> </ul>
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> <li>• Assembling and fixing rebar and formwork works at Pier S3</li> <li>• Concrete pouring at Pier S3</li> <li>• Excavation/Cleaning at Pier S2</li> <li>• Central Tower rebar, formwork, concreting works deck table installation works</li> <li>• South Tower rebar, formwork, concreting works deck table installation works</li> </ul>
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> <li>• Launch – Painting works, snagging and bearing installation</li> <li>• Assembling and fixing rebar and formwork works at Pier S3</li> <li>• Concrete, rebar, formwork at Pier S3</li> <li>• Excavation/Cleaning at Pier S2</li> <li>• Central Tower rebar, formwork, concreting works deck table installation works</li> <li>• South Tower rebar, formwork, concreting works deck table installation works.</li> <li>• Main carriageway earthworks</li> </ul>
M11	Linn Mill	Network (close proximity to	<ul style="list-style-type: none"> <li>• Launch – Painting works, snagging and bearing installation</li> <li>• No night time or Sunday construction in the</li> </ul>

		Crossing)	vicinity • Earthworks South Abutment area
M13	Clufflat Brae	Crossing / Network	• Launch – install plates to props, painting works, cast concrete and curing • N.B. No night time or Sunday daytime construction in vicinity. Earthworks South Abutment area
M14	Springfield	Network	• Launch – install plates to props, painting works, cast concrete and curing N.B. No night time or Sunday daytime construction in vicinity. • Earthworks South Abutment area
M15	Echline Field	Network	• Launch – install plates to props, painting works. • A904 tie in road works, including verge fill, kerbing and placing/trimming of type 1 sub-base for footpath. • Earthworks
M16	Scotstoun	Network	• Arup Access Earthworks • Drainage works • Utility works • Concrete finishing ESQ04 • B800 North road works including bridge works (these works are directly in the location of the meter which now sits within the construction boundary).
M17	Dundas Home Farm	Network	• Utility works • Fill south bund/landscape • Mainline Earthworks • BP Speciality works • ESQ04 Construction • B800 North road works including bridge works etc...
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](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 in greyed out areas.
- An average for Sunday construction noise data has been included where applicable; in locations where no Sunday works were conducted no average is shown.
- As set out in the CoCP, the assessment time for evening, nights and Sunday daytime is in one hour periods. To present the construction noise results for these periods, therefore, the maximum  $L_{AFmax}$  (fast time response) and maximum  $L_{Aeq}$  within the overall evening/night time period has been taken. It should be noted, therefore, that the average shown for these periods is an average of only the highest  $L_{Aeq}$  results.
- It has been indicated on the graphs where noise data is missing for day, evening or night during which construction works were conducted. Results for the North leg are unavailable due to inaccessibility of the monitor location in April 2015.

## Results

- 3.3** Results demonstrate that the monthly average total construction noise results for daytime are within the threshold levels for all monitoring locations during April 2015, with the exception of Scotstoun. For the night time periods, there were exceedances at locations; Butlaw Fisheries, Clufflat Brae, Inchgarvie, Linn Mill and Tigh-Na Grian. There are no exceedances of Sunday averages.
- 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 residential 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 of the exceedances with the exception of the daytime averages at Scotstoun, were found to be affected by increased noise levels due to periods of adverse weather, traffic, residential noise and birds. Audio demonstrates that the increased levels were caused by waves and birds at Butlaw Fisheries and birds at Clufflat Brae, Inchgarvie, and Linn Mill, strong wind also contributed to increased levels at these locations. 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 April 2015, some exceedances of the maximum noise thresholds occurred. Each exceedance of the threshold was investigated using triggered audio recordings, records of construction works (i.e. site programmes and diaries and daily marine reports) and analysis of weather station data, where required. A Noise and Vibration Investigative Report (NVIR) spread sheet has been produced detailing the results of the investigation for each exceedance. No exceedances this month are due to construction works.
- 3.7** The majority of exceedances at all locations were caused by factors including periods of localised noises at nearby properties such as traffic, residential noise and birds. At some locations, notably Scotstoun and Echline, existing traffic noise had an effect on maximum noise levels during the period covered in this report. Butlaw Fisheries also records a high number of waves against the shore during times of bad weather and high tides.



**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**

<b>Monitoring Location</b>	<b>Summary of Exceedance Details</b>
Butlaw Fisheries	During April the maximum noise threshold was exceeded on 45 occasions (nine day time, eight evening and twenty-eight night time). No exceedances were related to construction works. Exceedances were attributed to non-construction factors notably birds, wind and waves.
Clufflat Brae	During April the maximum noise threshold was exceeded on 83 occasions (30 daytime, 24 evening and 29 night time). No exceedances were found to be due to construction works. Exceedances were found to be largely due to birds, dogs and residential activity.
Inchgarvie Lodge	During April the maximum noise threshold was exceeded on 70 occasions (18 day time, 23 evening and 29 night time). No exceedances were attributed to construction works. Investigations found residents at the property and bird song to be the main contributing factors to the exceedances in this location. Other factors included vehicles and monitor maintenance.
Linn Mill	During April the maximum noise threshold was exceeded on 67 occasions (18 daytime, 19 evening and 30 night time). The majority of exceedances at this location were largely due to residents, wind and bird songs. All the night time exceedances were attributed to bird song.
Tigh-Na-Grian	During April the maximum noise threshold was exceeded on 44 occasions (13 daytime, 4 evening and 27 night time). Exceedances were due to non-construction factors, notably wind and birds. Residential noise was also picked-up during the daytime.
Dundas Home Farm	During April the maximum noise threshold was exceeded on 17 occasions. These exceedances were not caused by the works. The exceedances were due to monitor maintenance, kids playing and birds.
Echline	During April the maximum noise threshold was exceeded on 10 occasions. No exceedances at this location were due to construction activities. All exceedances were attributed to vehicles passing by on the adjacent roads.
Springfield	During April the maximum noise threshold was exceeded on six occasions. These exceedances were due to, local residents and their pets (dogs). The monitor is situated within a garden with a dog next door.
Scotstoun	During April the maximum noise threshold was exceeded on 29 occasions. The majority of these exceedances were due to construction, this is due to the location of the current meter being within 20m of on-going work on the B800. Some exceedances were attributed to vehicles passing (including Sundays) by on the adjacent road
Whinny Hill	During April the maximum noise threshold was exceeded on 21 occasions. Exceedances were not due to construction activities. Exceedances were due to a range of factors such as residents, dogs and birds.
North Leg	No data is reported in this report due to access to monitor being restricted due to limited accessibility to this device. Wireless operation is unavailable and awaiting repair which is scheduled for June 2015.
Port Edgar	Recordings taken for data purposes



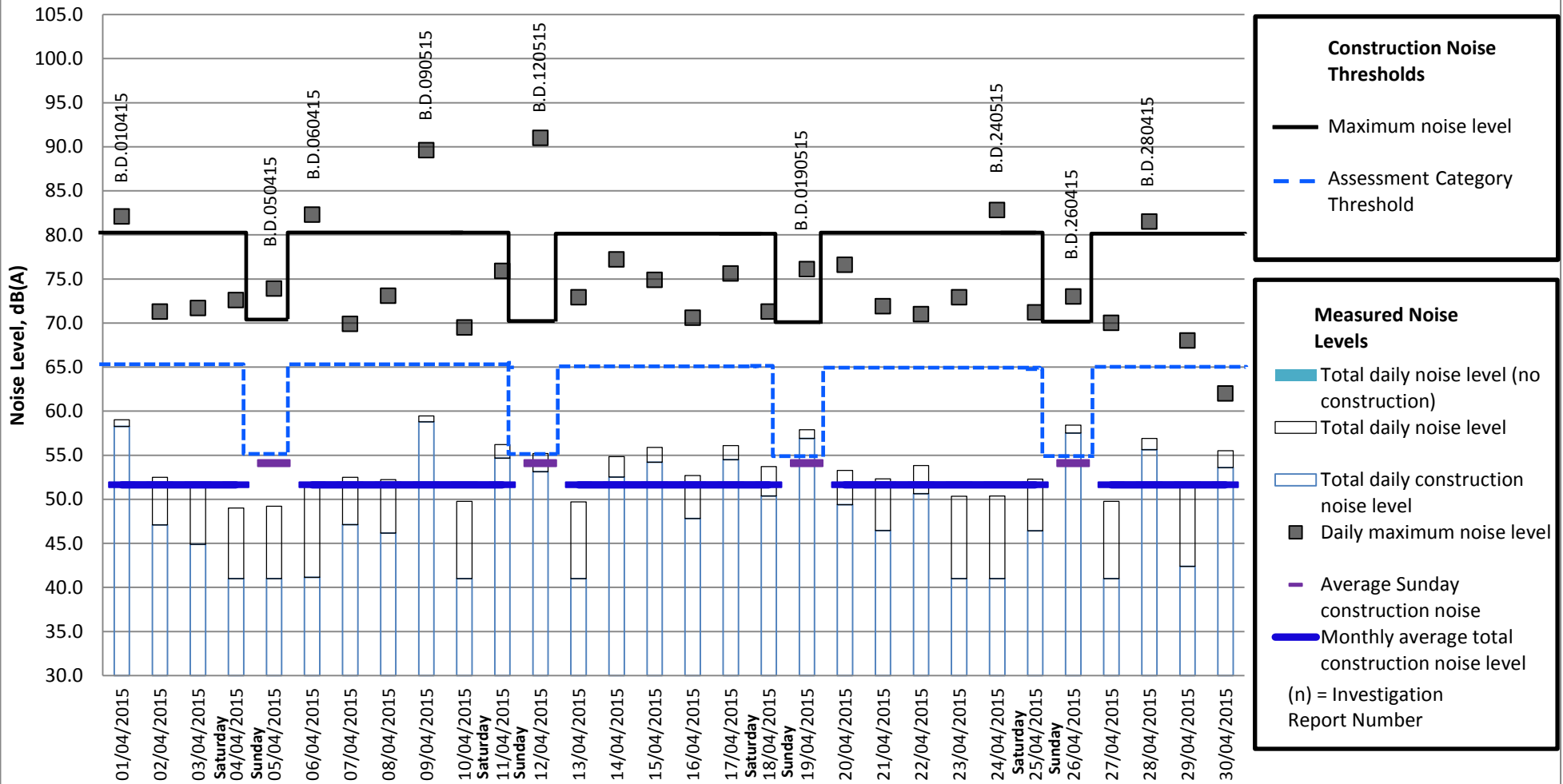
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## **APPENDIX A**

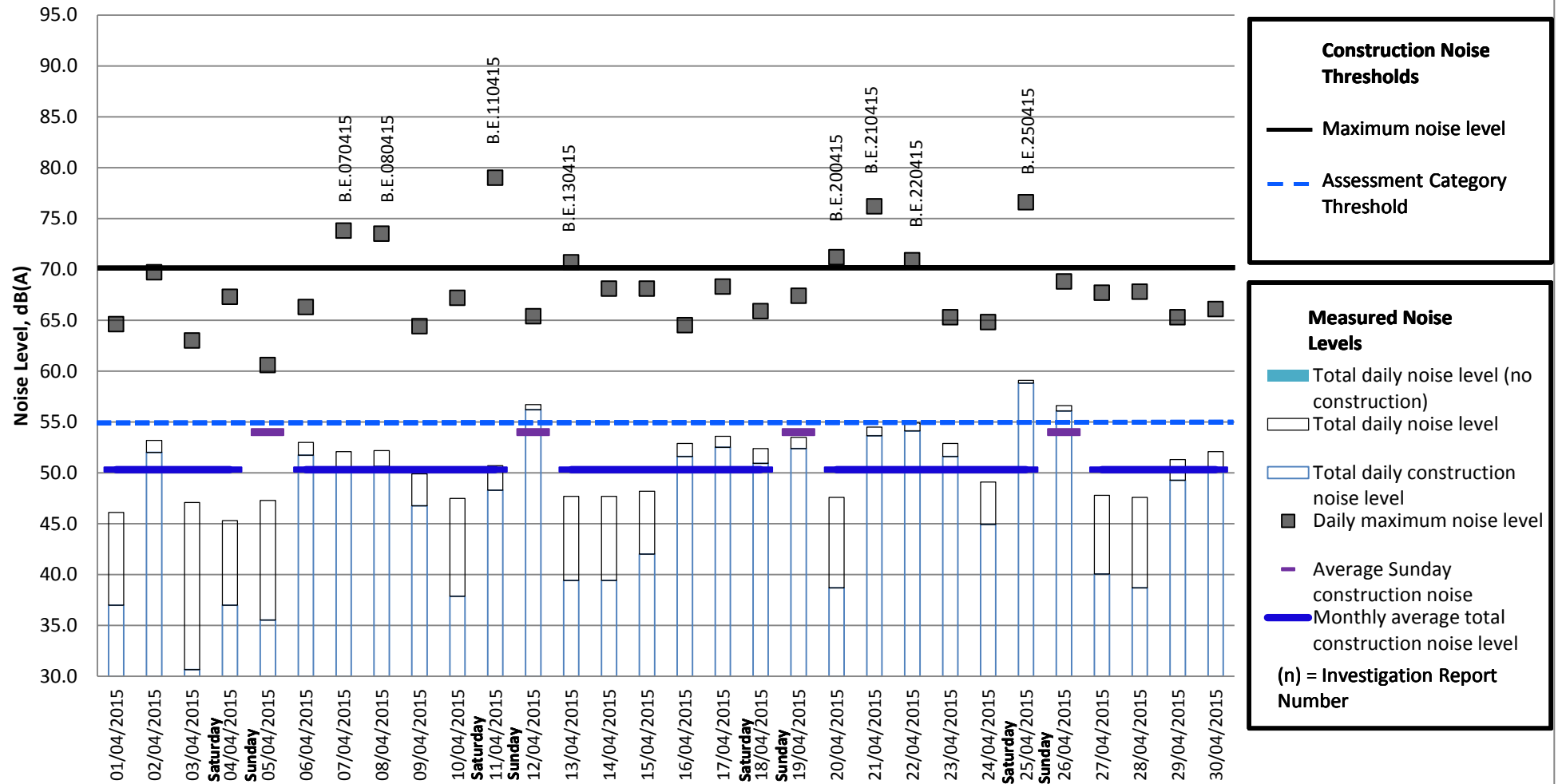
# Measured Daytime Noise Levels at Butlaw Fisheries

## Measurement period: April 2015



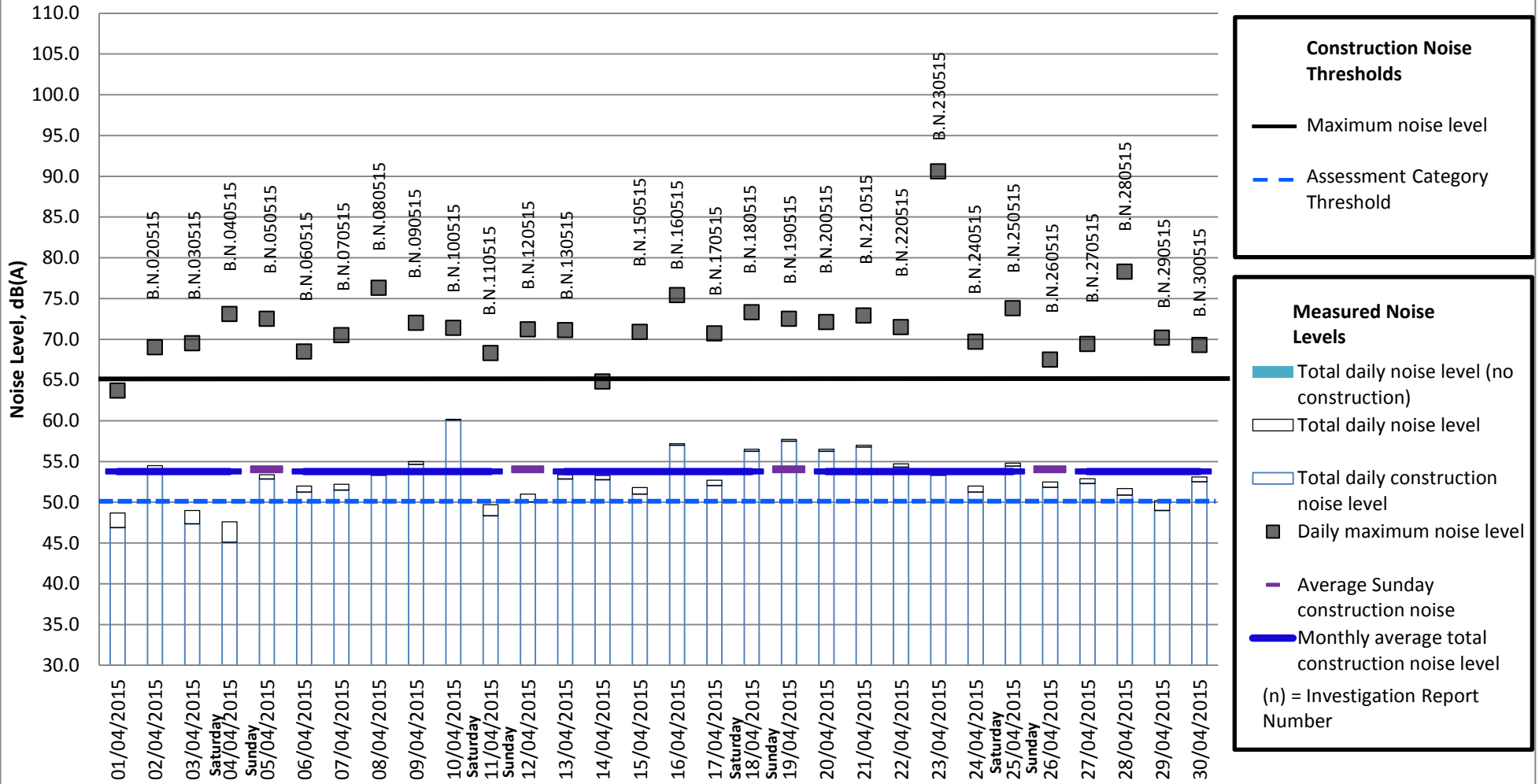
# Measured Evening Noise Levels at Butlaw Fisheries

## Measurement period: April 2015



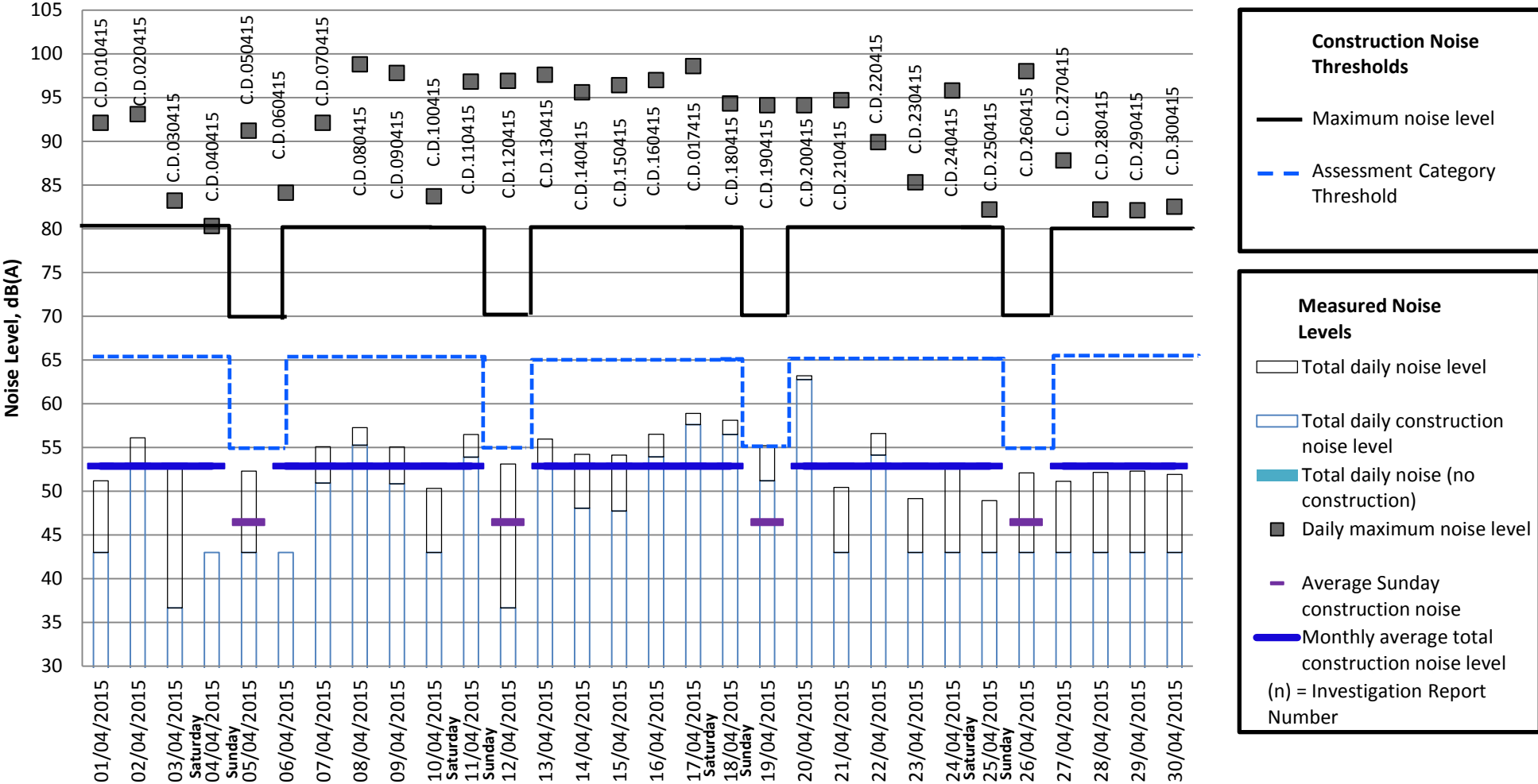
# Measured Night time Noise Levels at Butlaw Fisheries

## Measurement period: April 2015



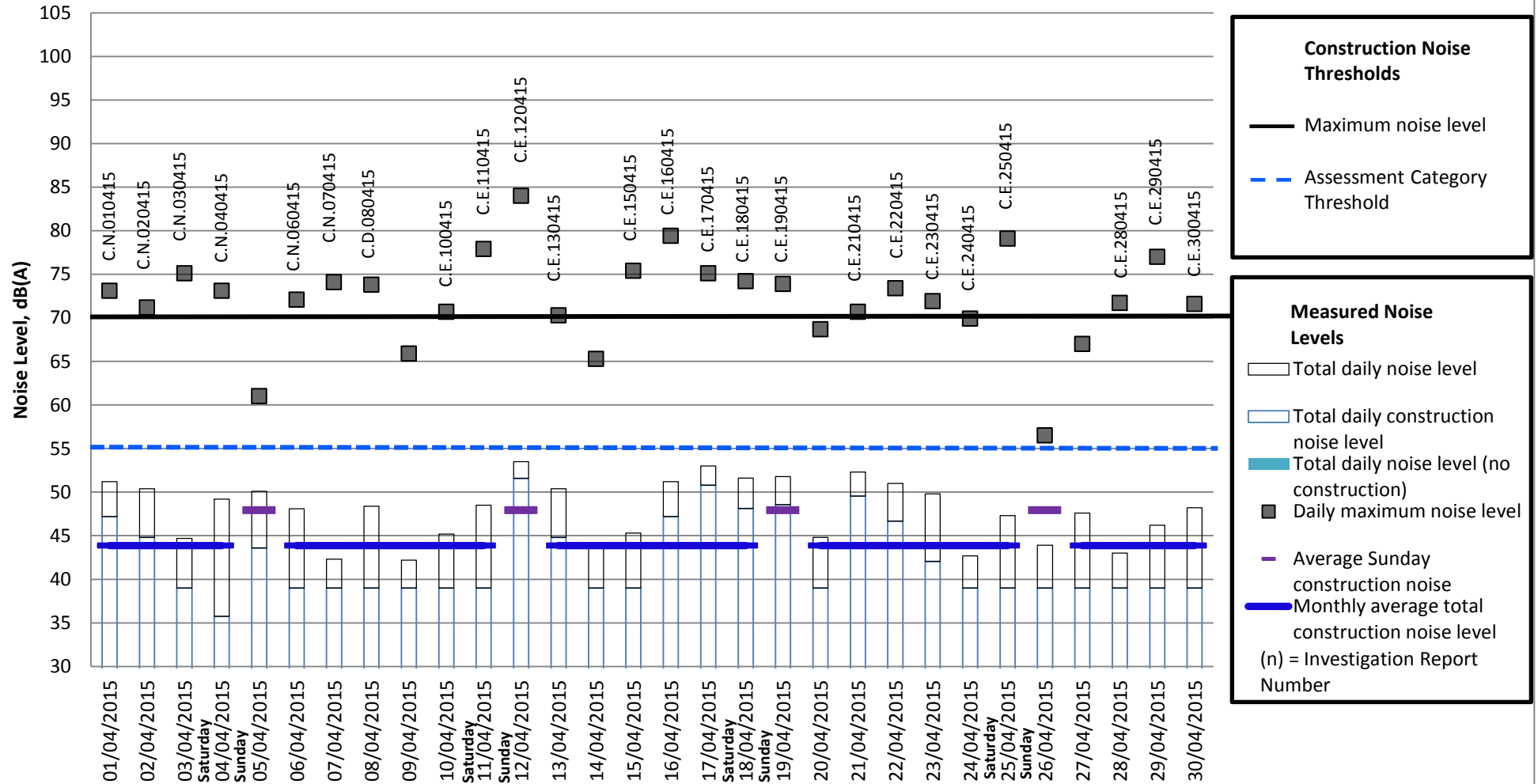
# Measured Daytime Noise Levels at Clufflat Brae

## Measurement period: April 2015



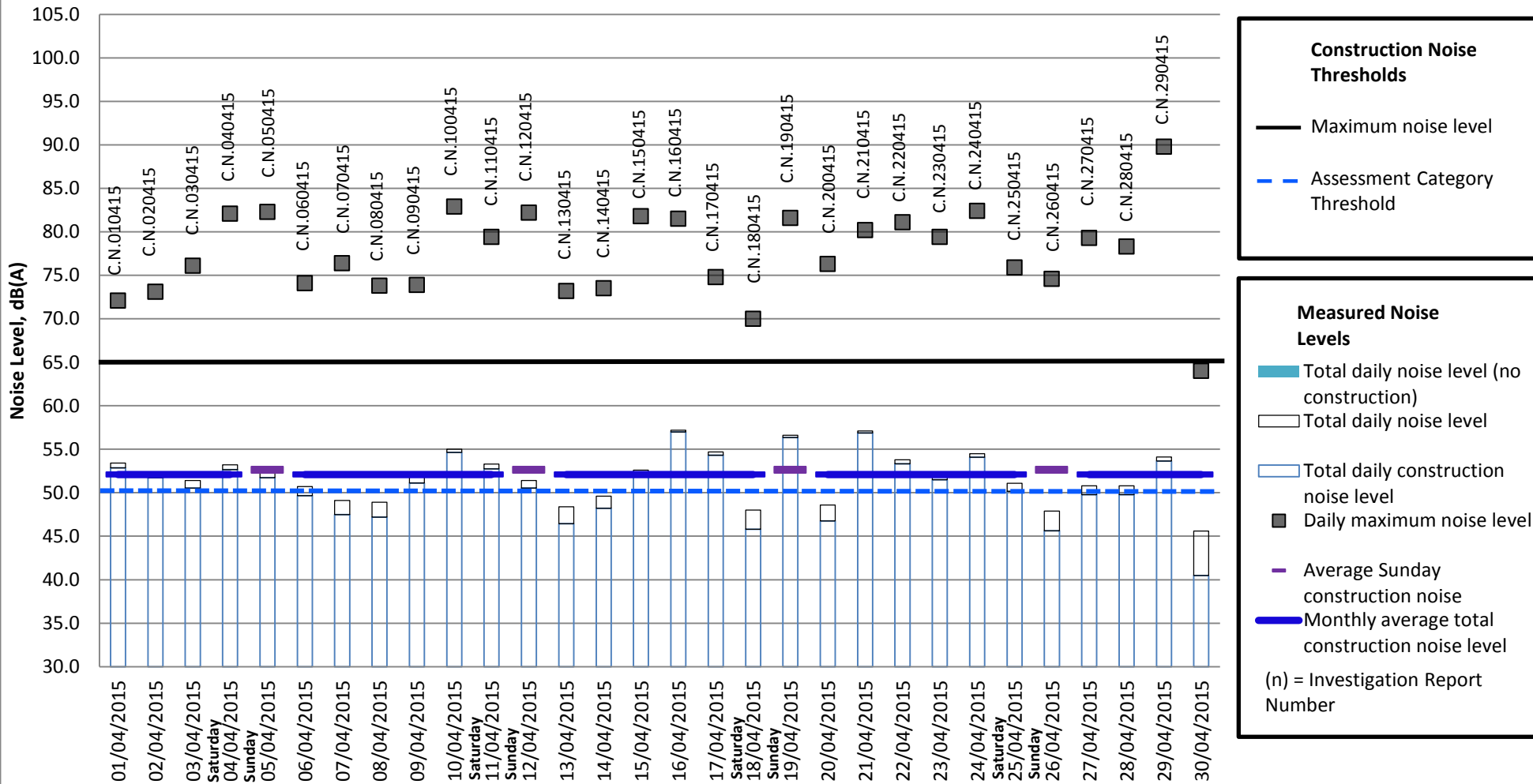
# Measured Evening Noise Levels at Clufflat Brae

## Measurement period: April 2015



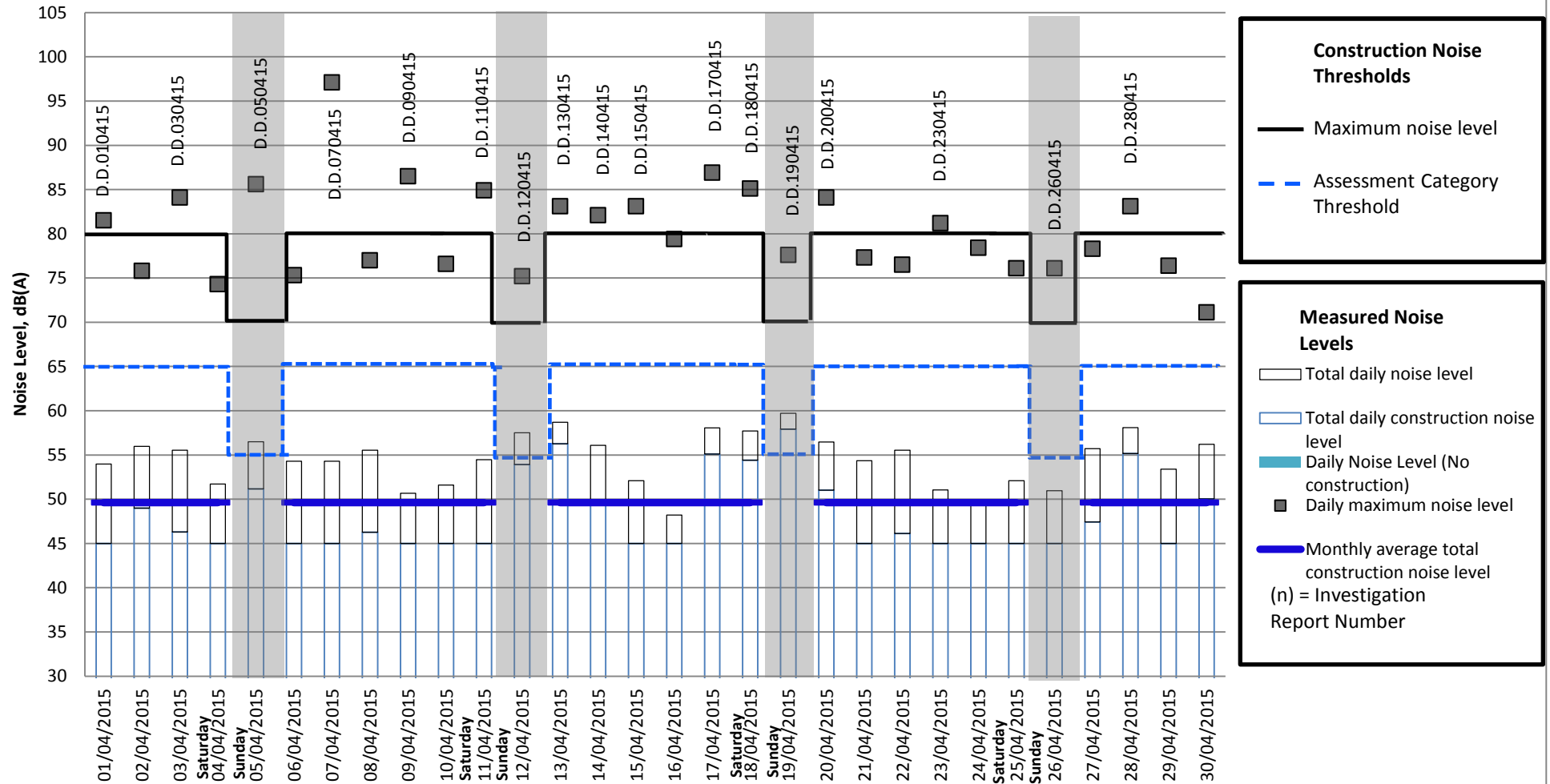
# Measured Night-time Noise Levels at Clufflat Brae

## Measurement period: April 2015





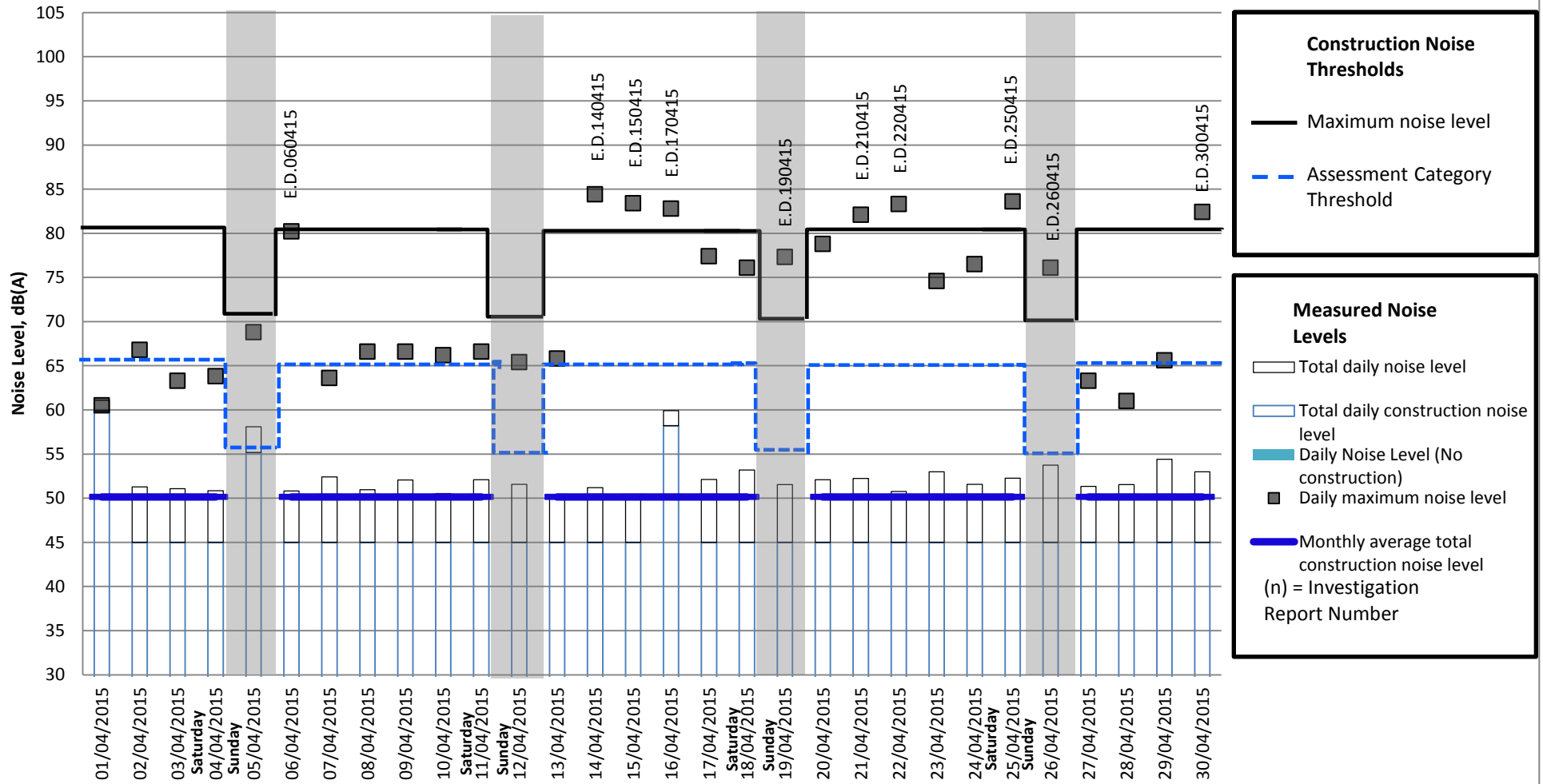
## Measured Daytime Noise Levels at Dundas Home Farm Measurement period: April 2015



**Note:** The grey areas of the chart represent days on which no construction works have been conducted. The Sunday average has not been included as no Sunday works have been conducted at this location.

# Measured Daytime Noise Levels at Echline

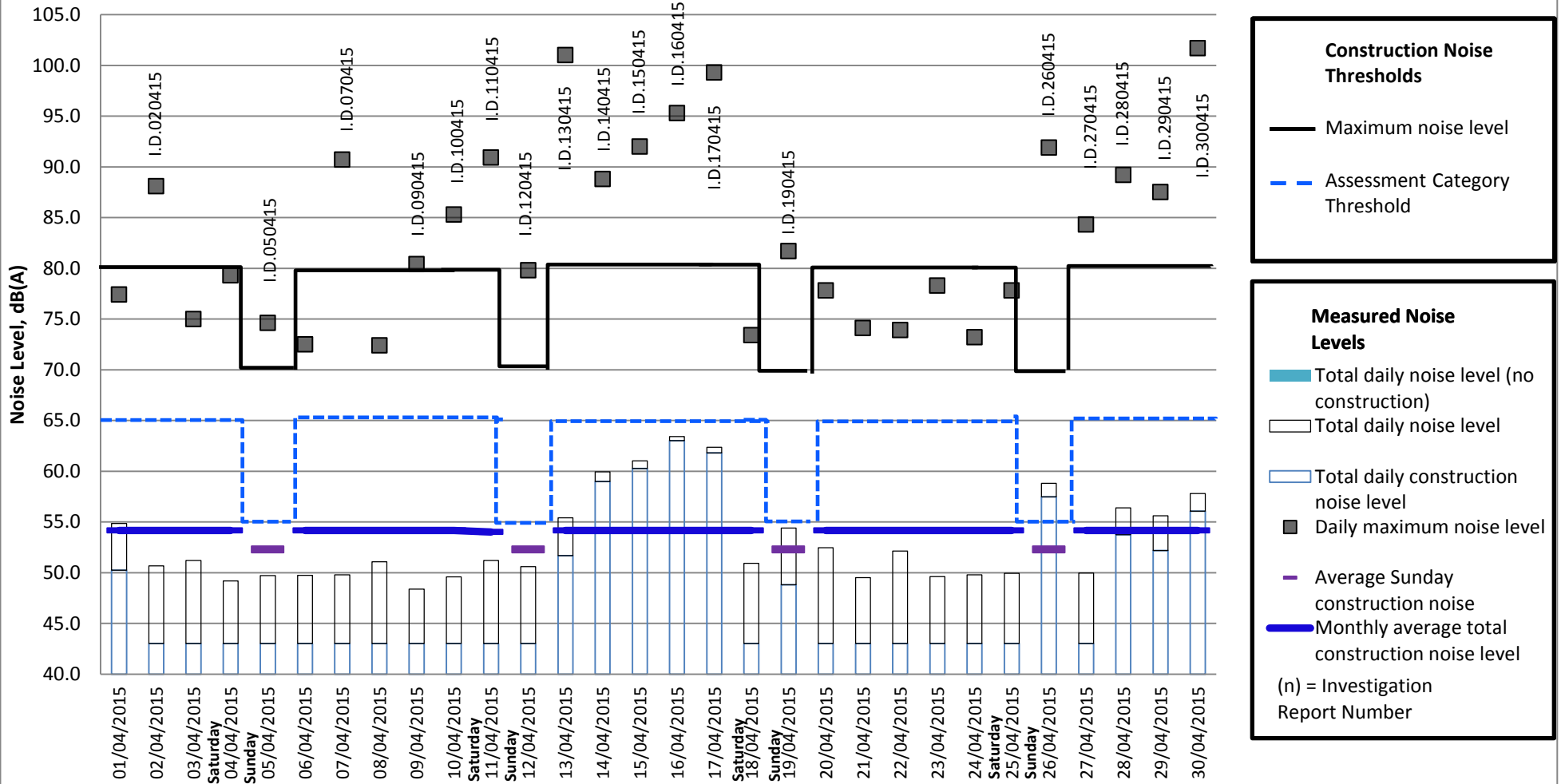
## Measurement period: April 2015



**Note:** The grey areas of the chart represent days on which no construction works have been conducted. The Sunday average has not been included as no Sunday works have been conducted at this location.

# Measured Daytime Noise Levels at Inchgarvie

## Measurement period: April 2015



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

**Measured Noise Levels**

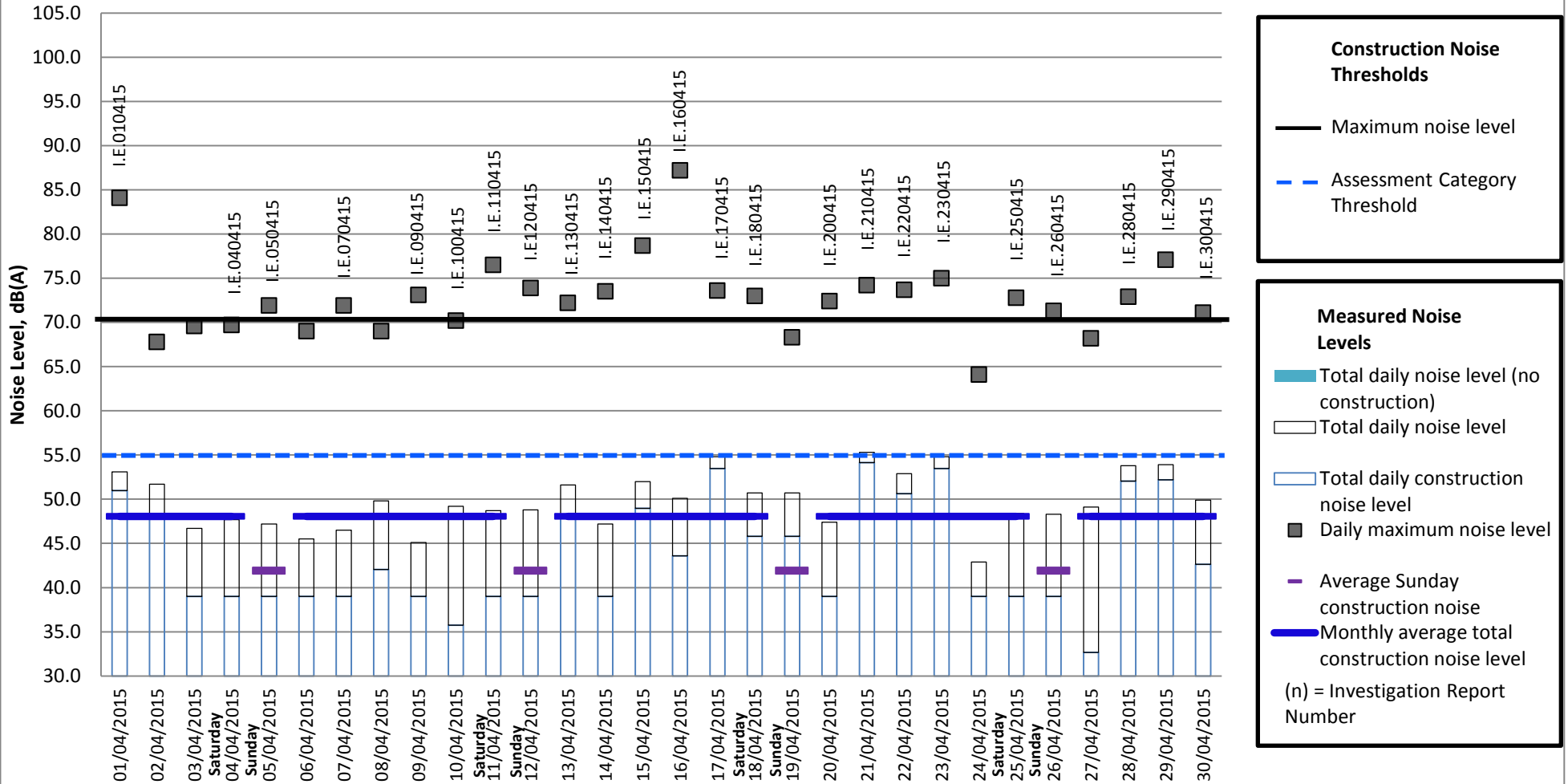
- Total daily noise level (no construction)
- Total daily noise level
- Total daily construction noise level
- Daily maximum noise level
- Average Sunday construction noise
- Monthly average total construction noise level

(n) = Investigation Report Number

**Note:**

# Measured Evening Noise Levels at Inchgarvie

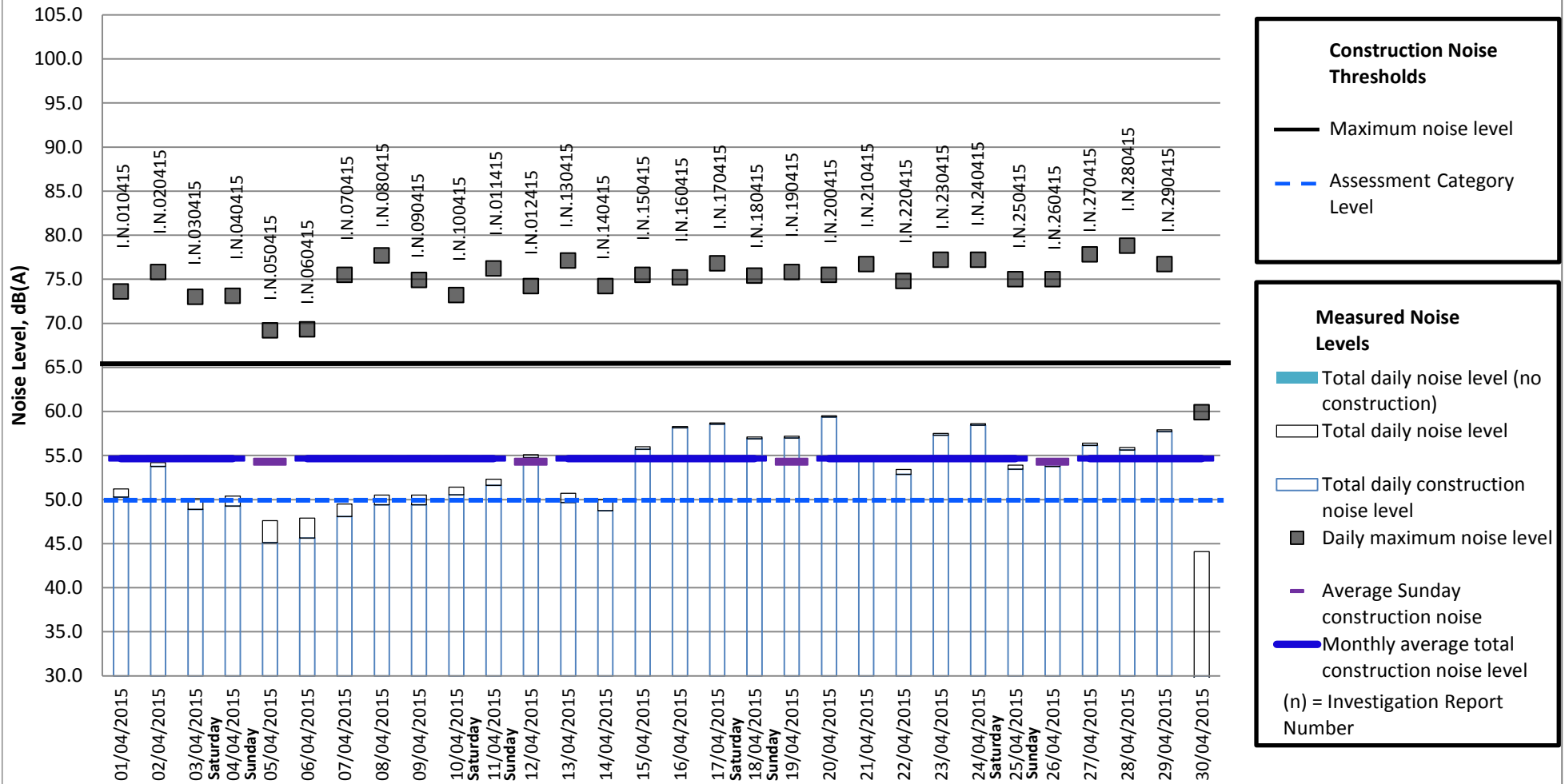
## Measurement period: April 2015



Note:

# Measured Night-time Noise Levels at Inchgarvie

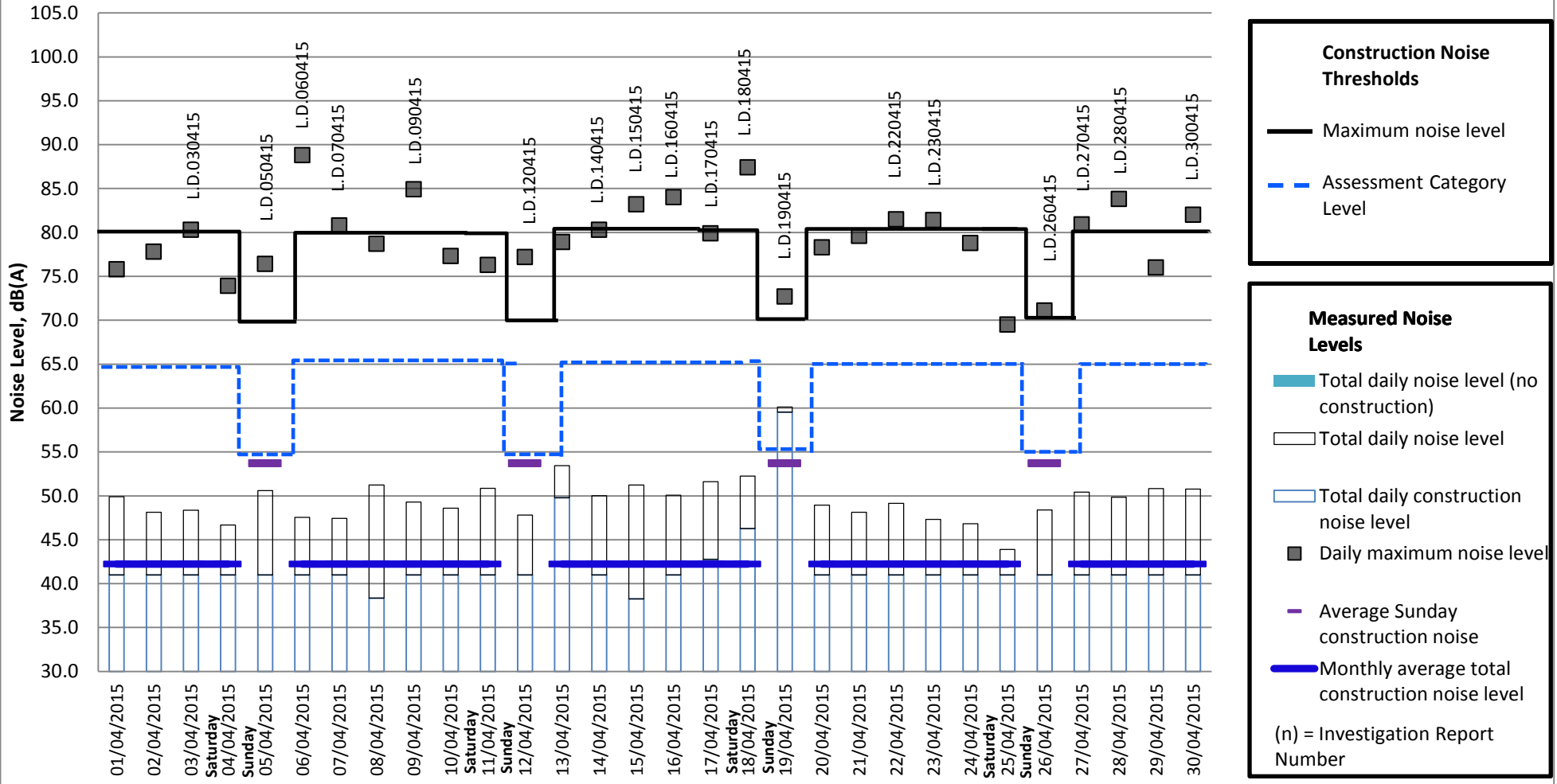
## Measurement period: April 2015



Note:

# Measured Daytime Noise levels at Linn Mill

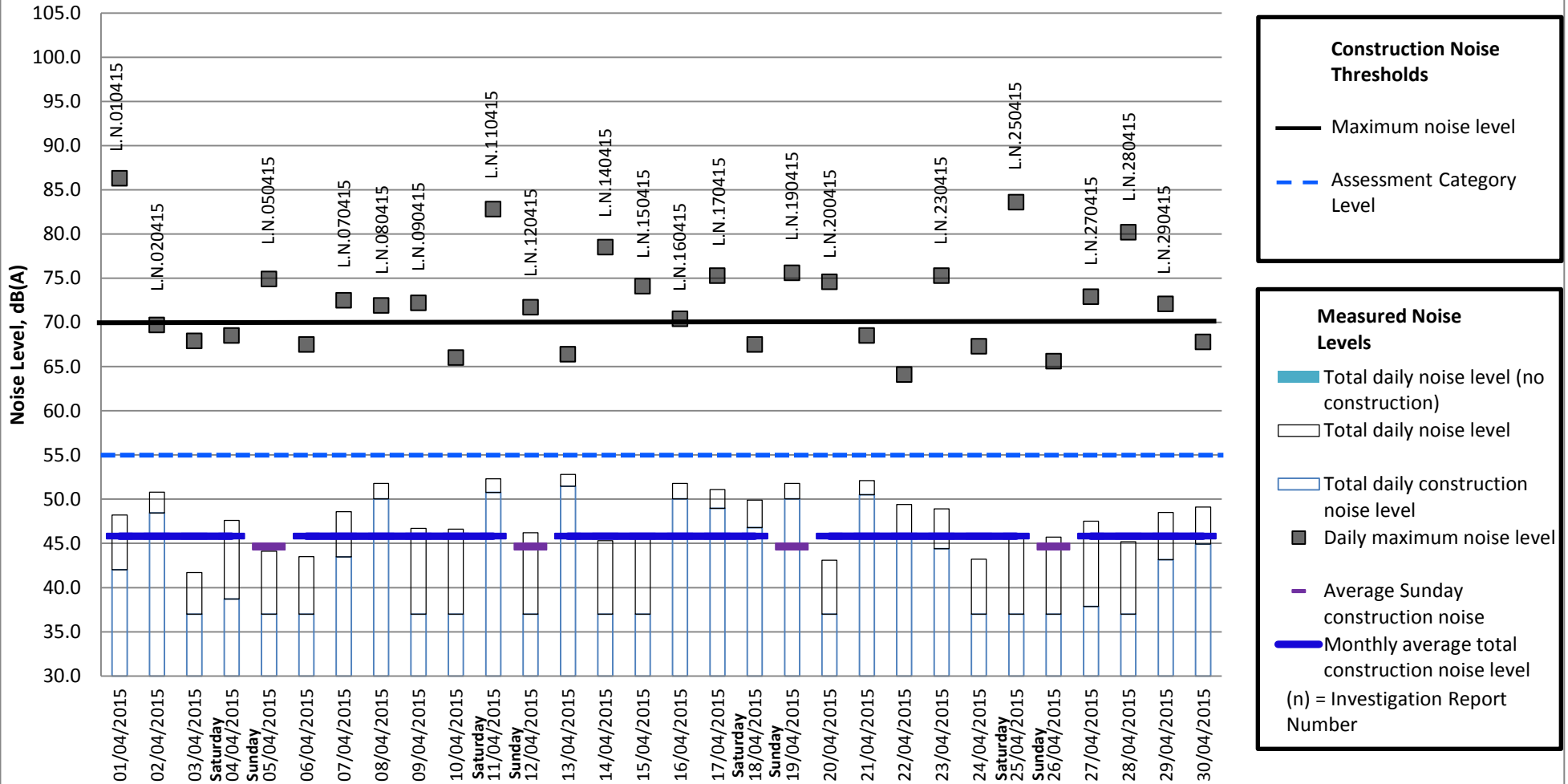
## Measurement period: April 2015



Note:

# Measured Evening Noise Levels at Linn Mill

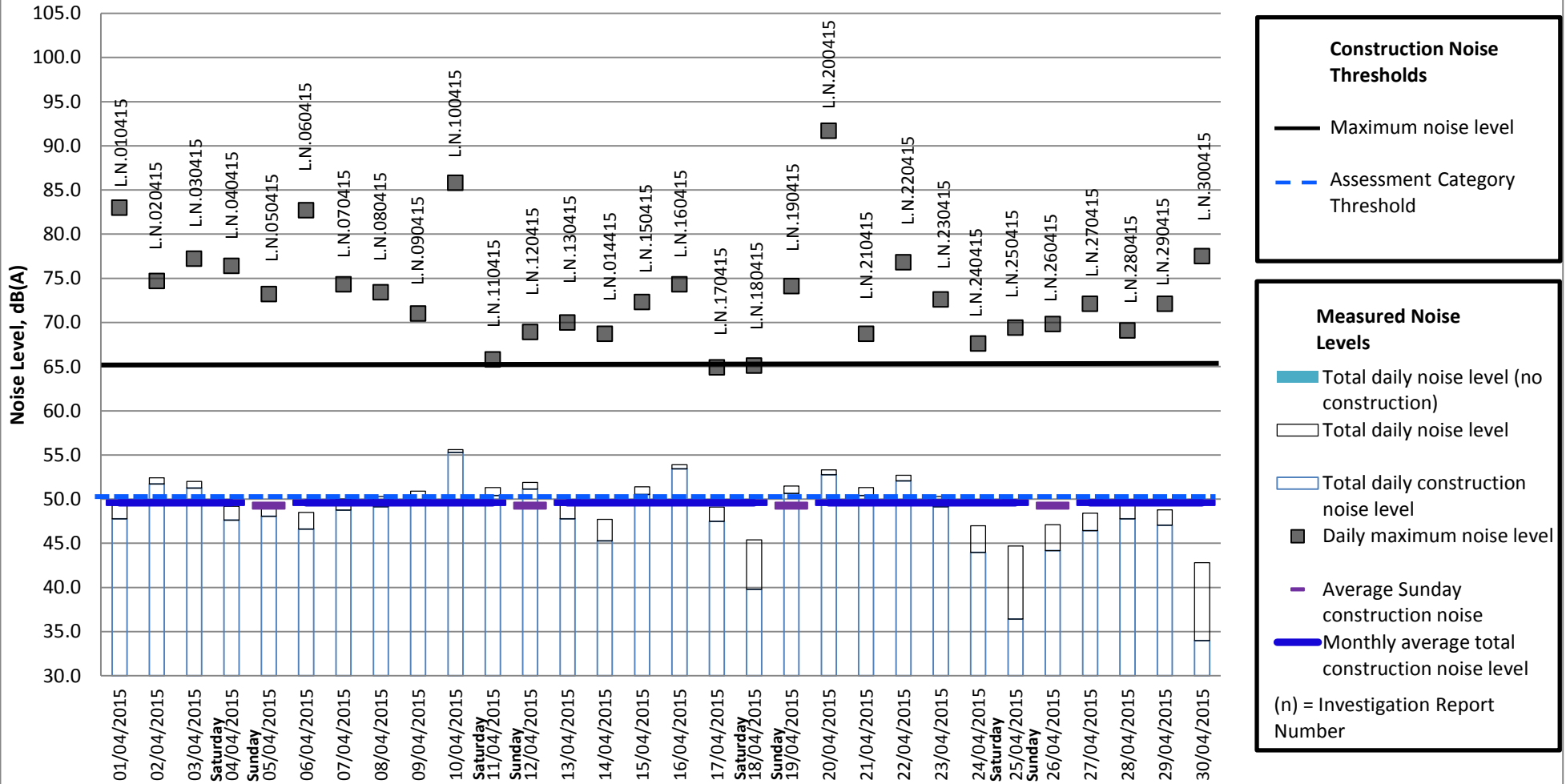
## Measurement period: April 2015



Note:

# Measured Night-time Noise Levels at Linn Mill

## Measurement period: April 2015



**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

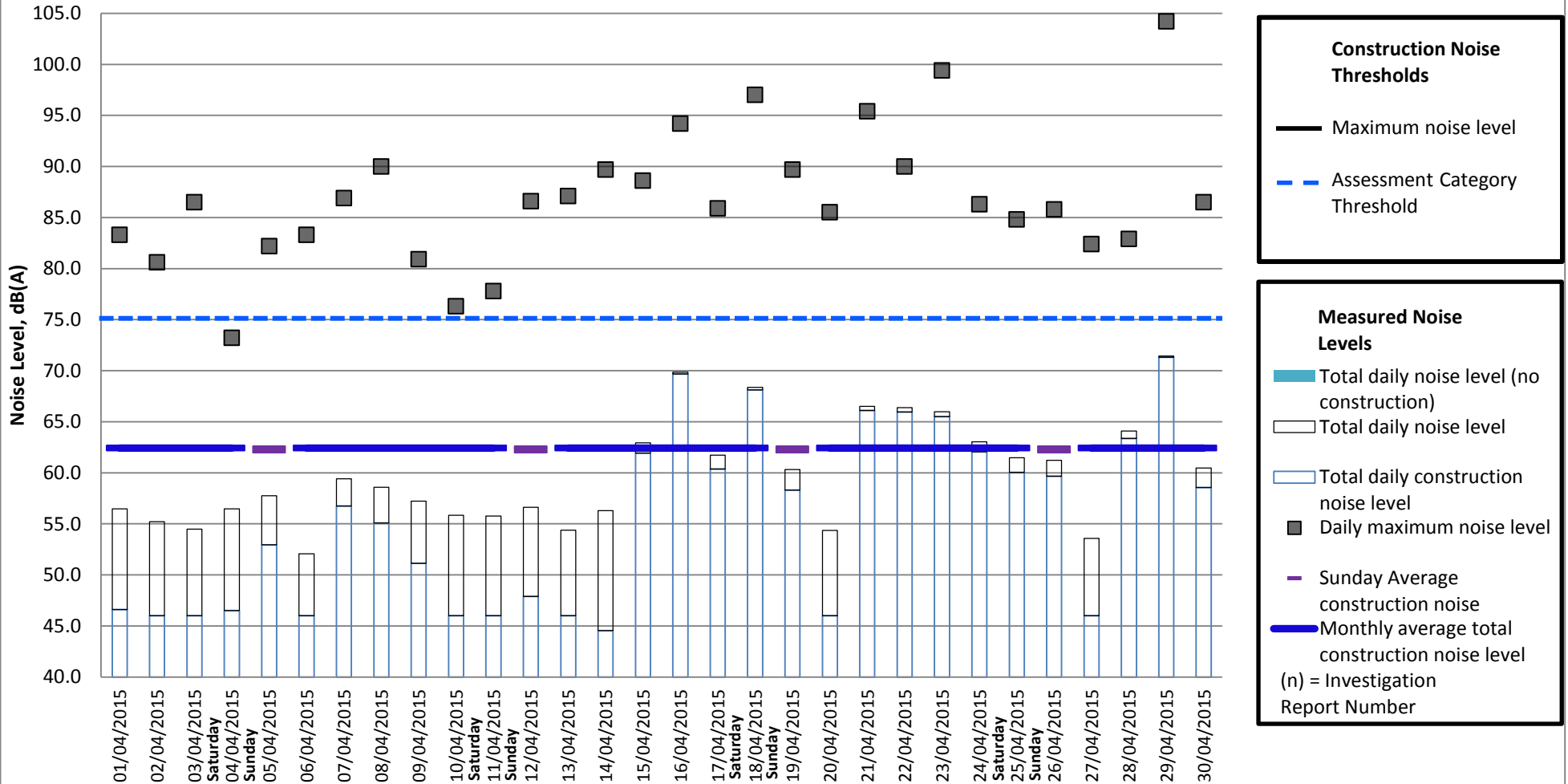
(n) = Investigation Report Number

**Note:**



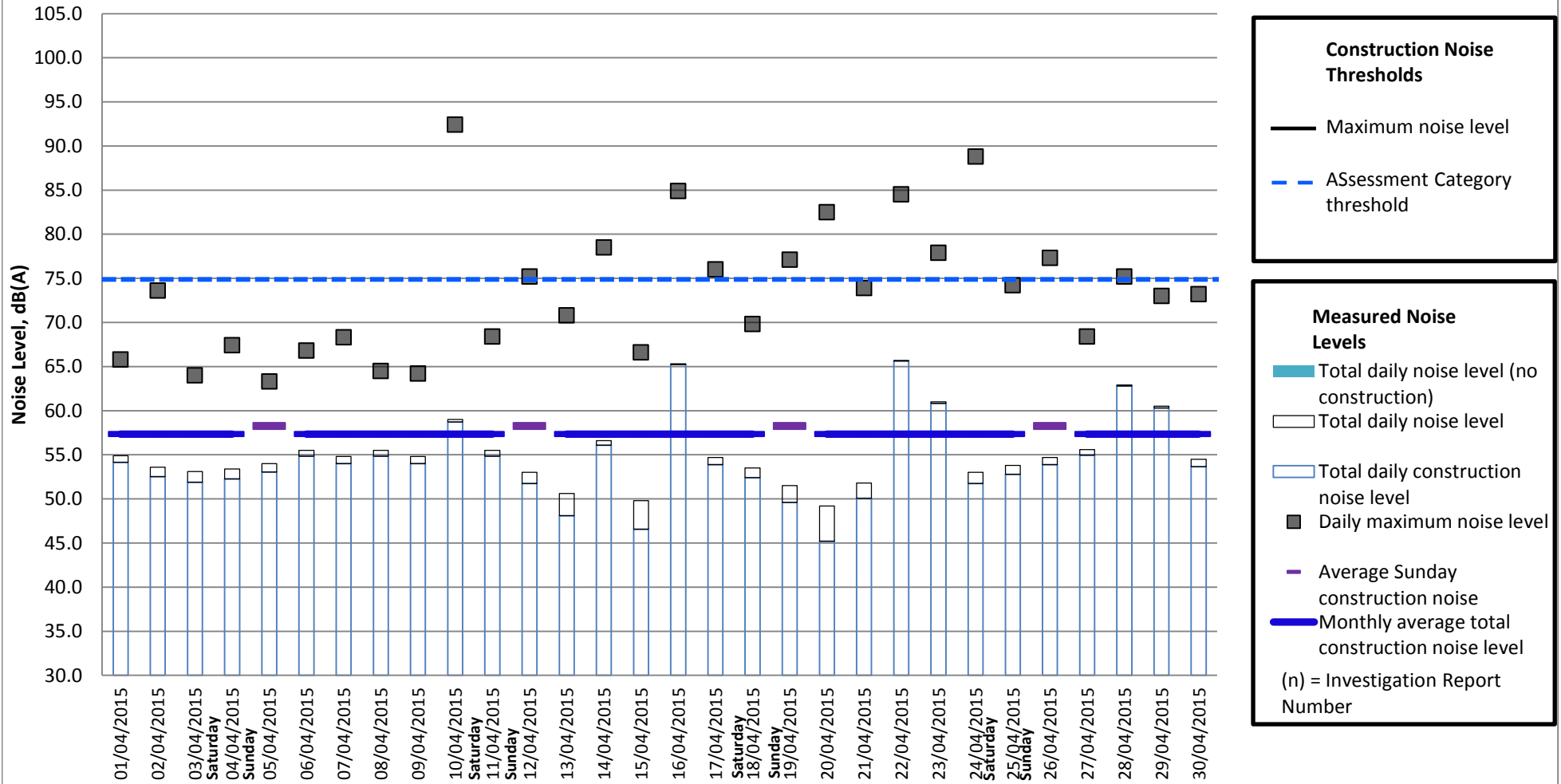
# Measured Daytime Noise Levels at Port Edgar

## Measurement period: April 2015



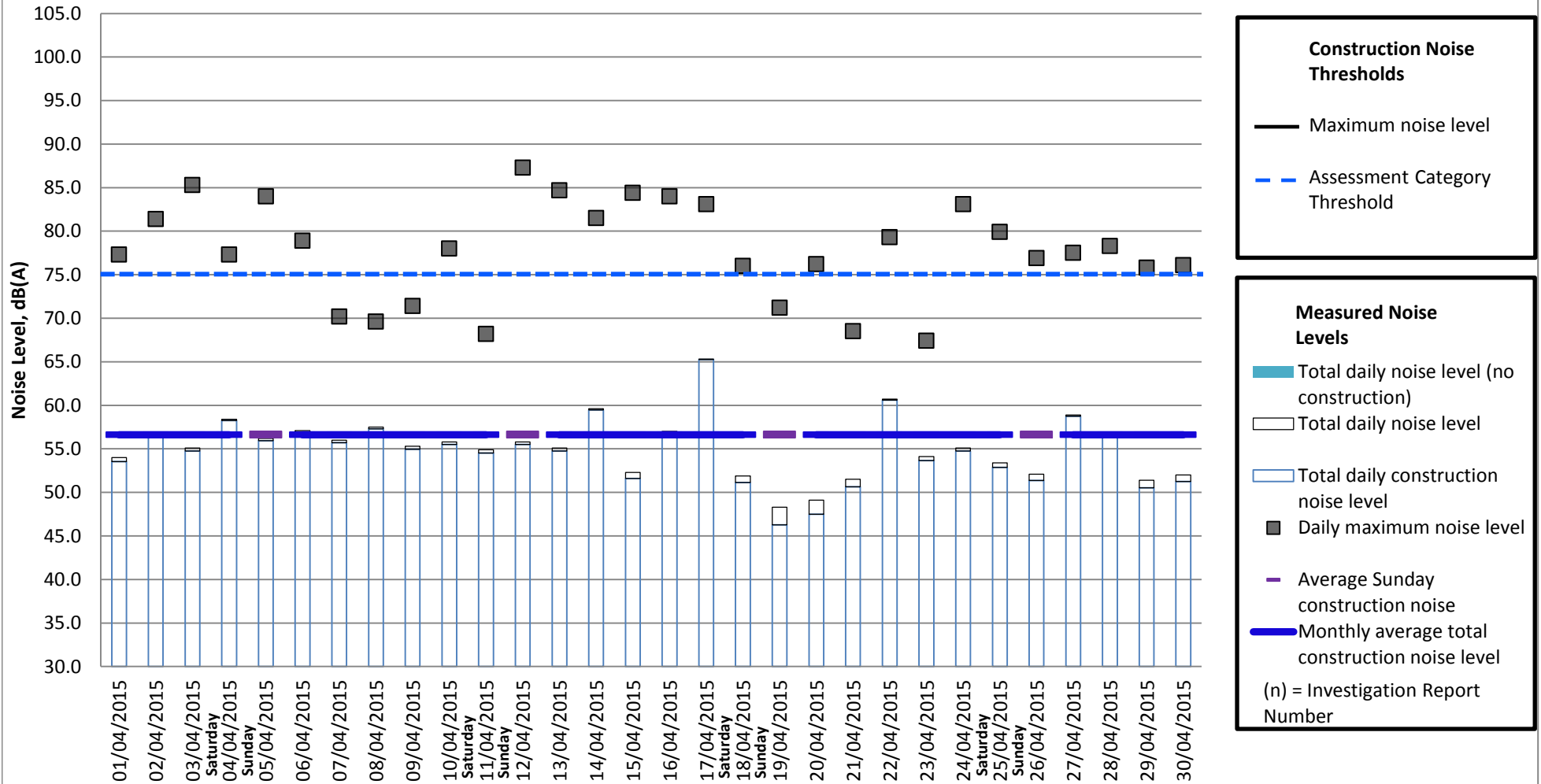
# Measured Evening Noise Levels at Port Edgar

## Measurement period: April 2015



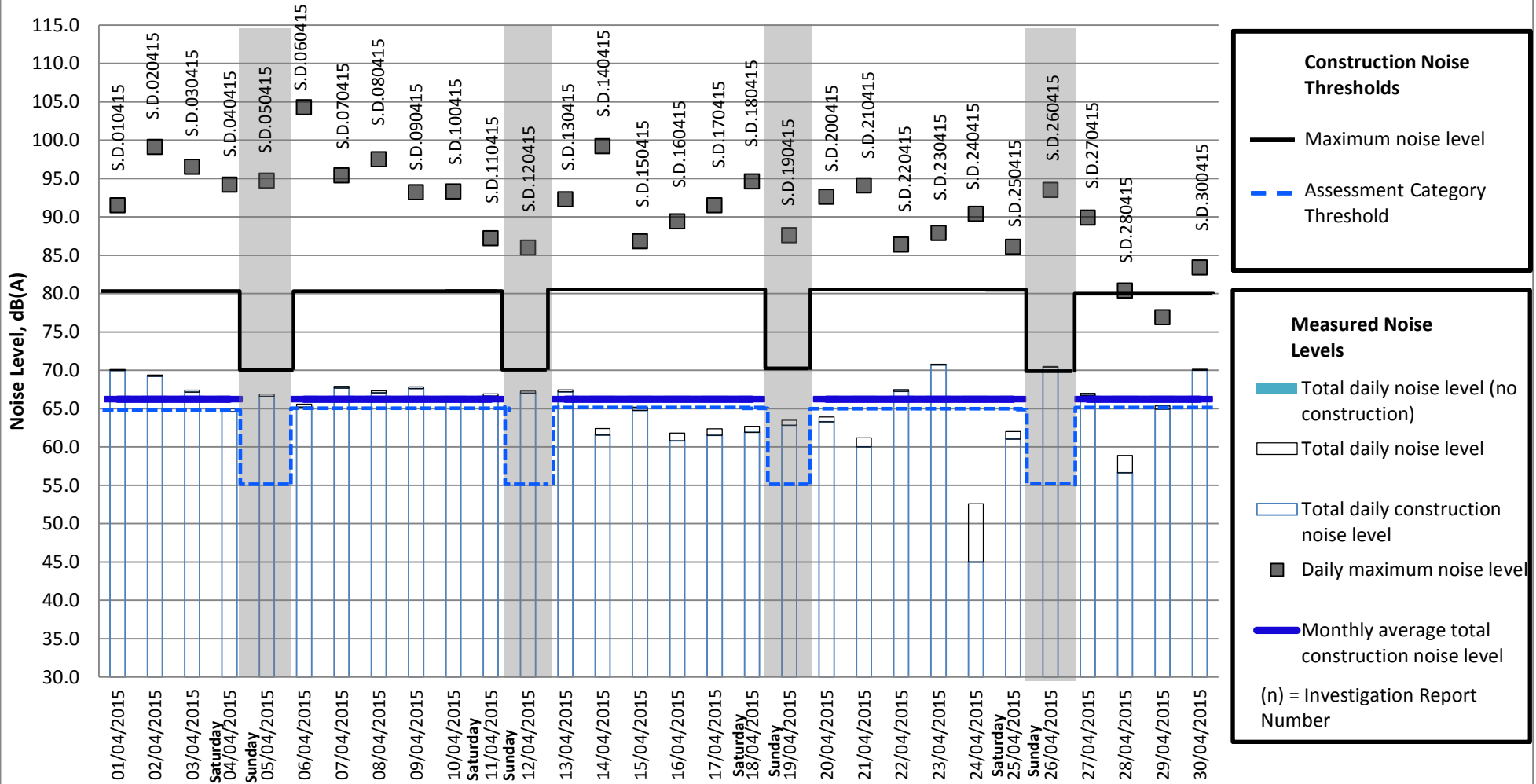
# Measured Night-time Noise Levels at Port Edgar

## Measurement period: April 2015



# Measured Daytime Noise Levels at Scotstoun

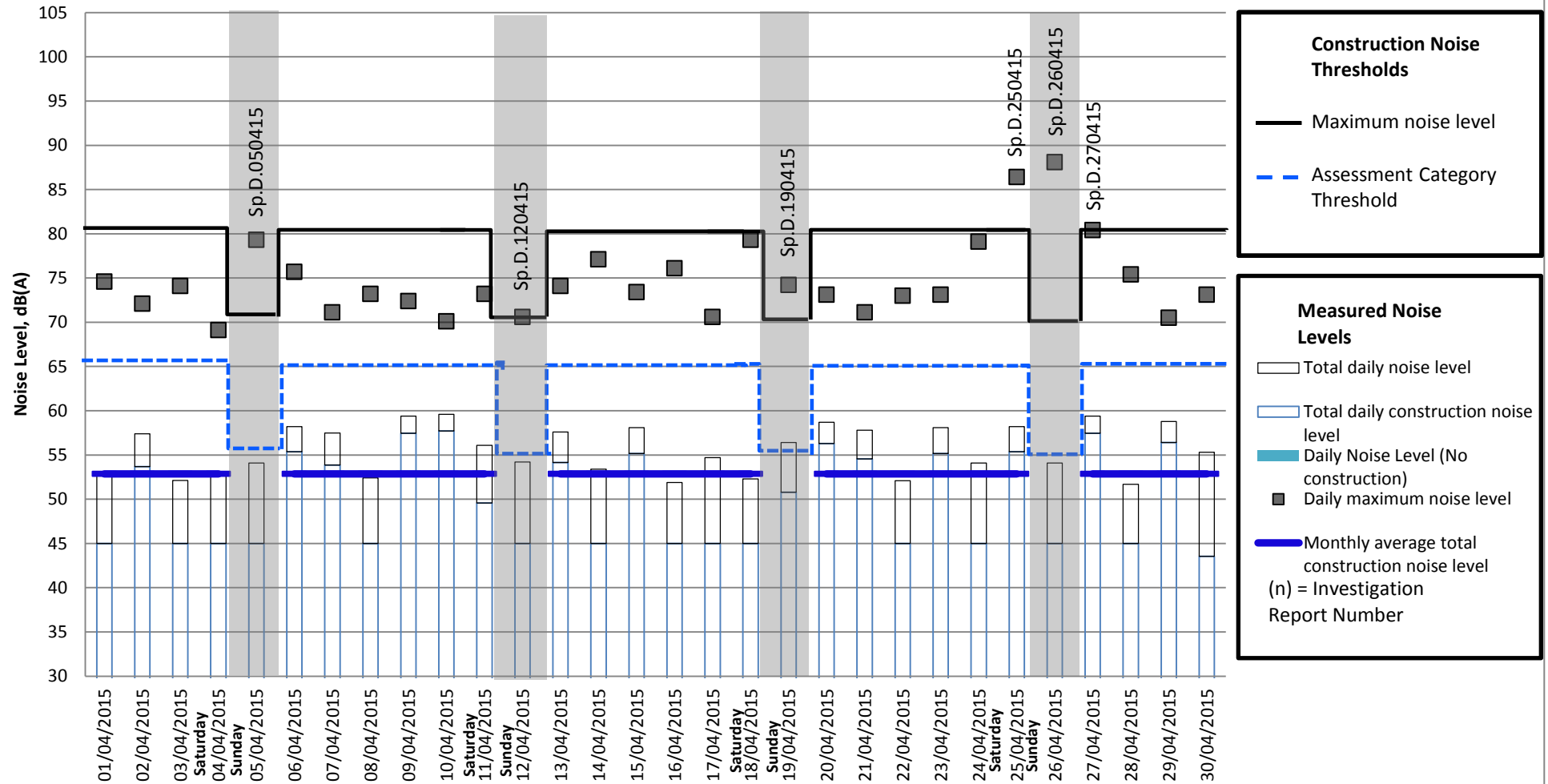
## Measurement period: April 2015



Note:

# Measured Daytime Noise Levels at Springfield

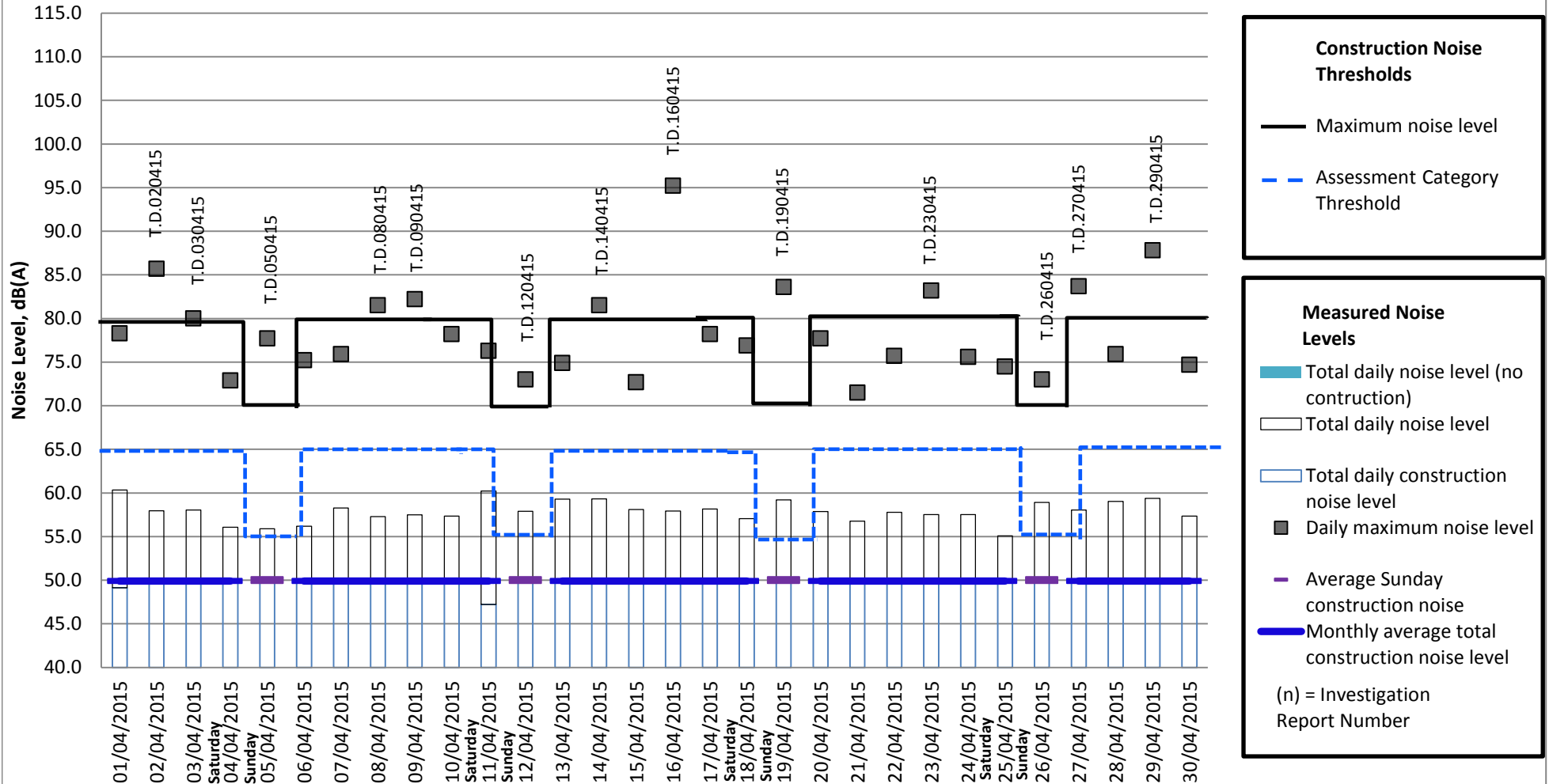
## Measurement period: April 2015



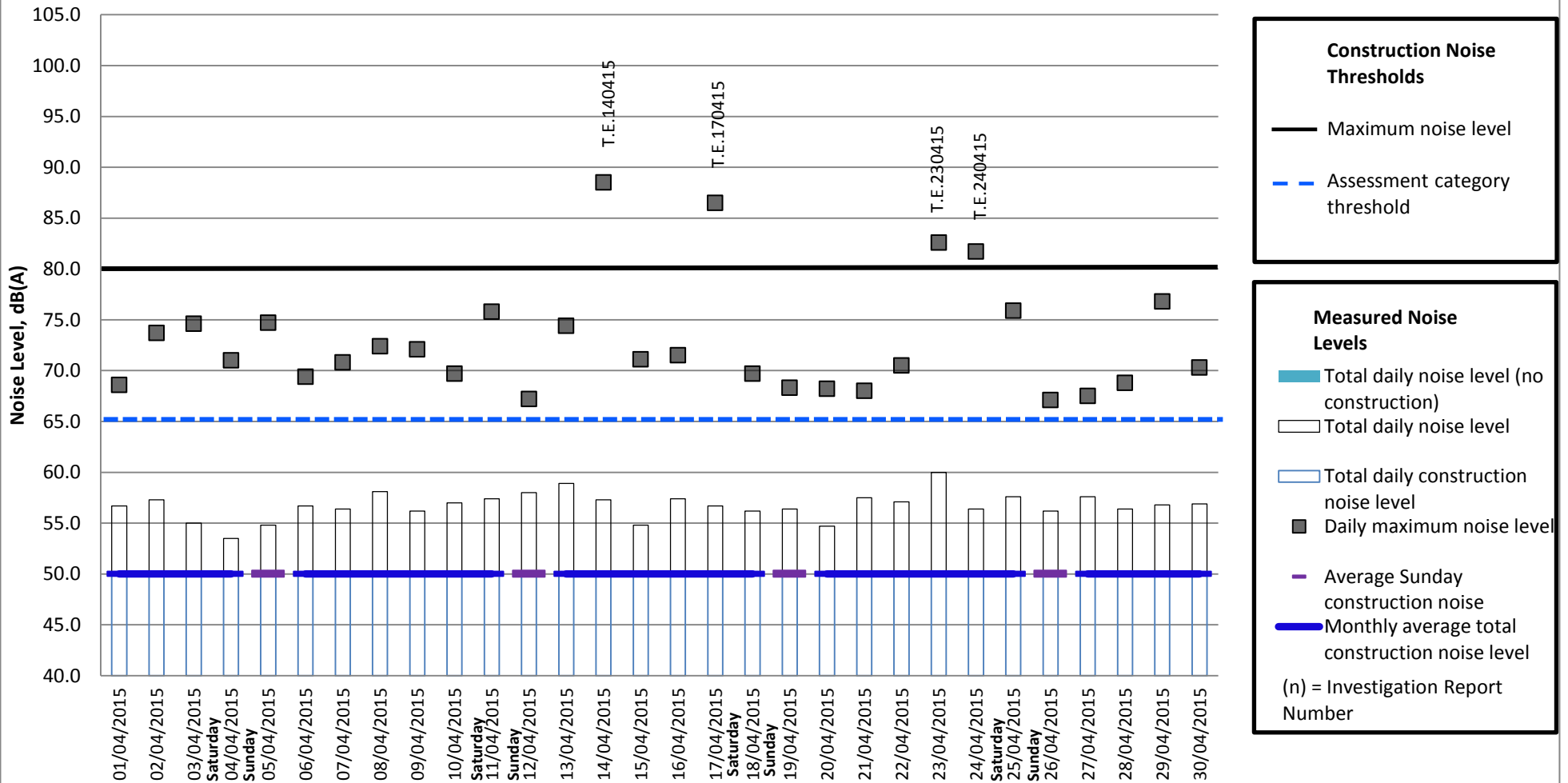
**Note:** The grey areas of the chart represent days on which no construction works have been conducted. The Sunday average has not been included as no Sunday works have been conducted at this location.

# Measured Daytime Noise Levels at Tigh-Na-Grian

## Measurement period: April 2015

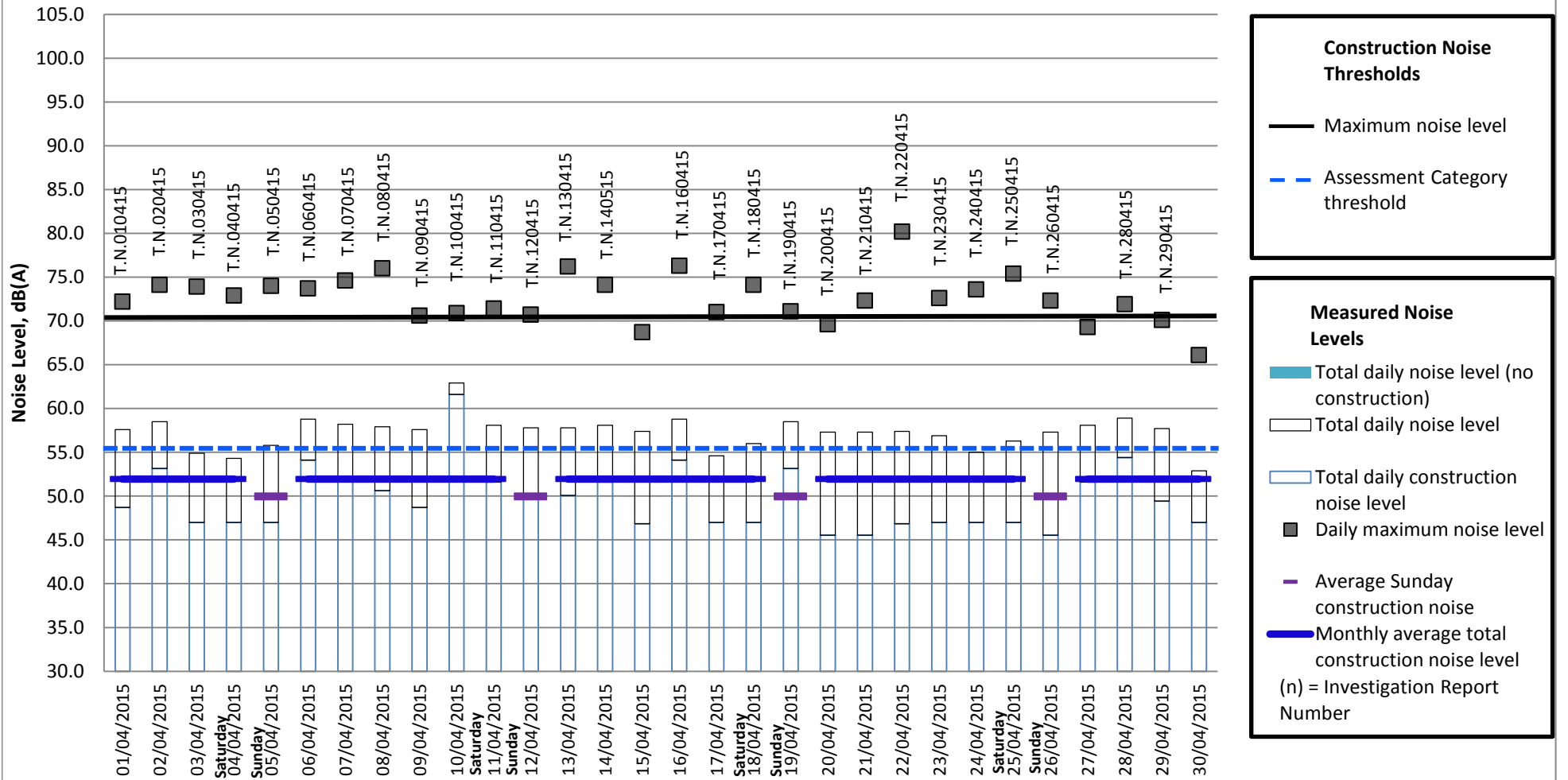


## Measured Evening Noise Levels at Tigh-Na-Grian Measurement period: April 2015



**Note:**

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

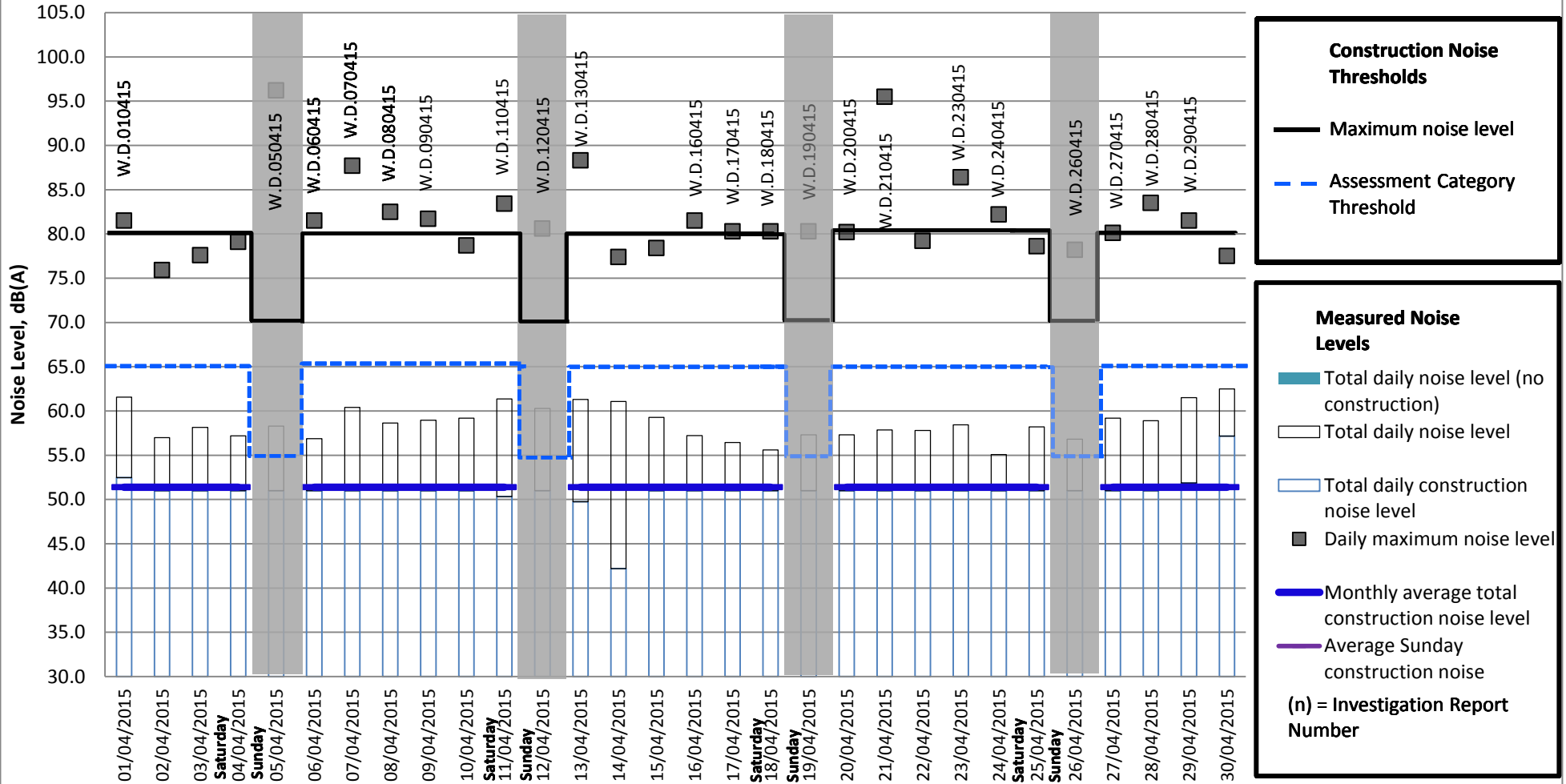


Note: .



# Measured Daytime Noise Levels at Whinny Hill

## Measurement period: April 2014



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