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Project **FORTH REPLACEMENT CROSSING**

Document title

**CONSTRUCTION NOISE MONITORING REPORT: SEPTEMBER 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 September 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 September 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 September 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 September 2015
M1	Whinny Hill	Network	<ul style="list-style-type: none"> <li>• Earth Works/Fill Placement</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 stay cable installation works</li> <li>• North Tower rebar, formwork, concreting works Stay cable installation works</li> <li>• Pier N1 rebar formwork &amp; concrete works</li> <li>• AVN works</li> <li>• North Tower Deck Section Lifts</li> </ul>
M4	North Leg	Crossing	<ul style="list-style-type: none"> <li>• Central Tower rebar, formwork, concreting works stay cable installation works</li> <li>• North Tower rebar, formwork, concreting works stay cable installation works</li> <li>• Pier N1 rebar formwork &amp; concrete works</li> <li>• North Tower Deck Section Lifts</li> </ul>
M6	Port Edgar	• Crossing	<ul style="list-style-type: none"> <li>• Central Tower rebar, formwork, concreting works stay cable installation works</li> <li>• South Tower rebar, formwork, concreting works stay cable installation works</li> <li>• Pier S2 rebar, formwork &amp; concrete works</li> <li>• Pier S1 rebar, formwork &amp; concrete works</li> <li>• South Tower Deck Section Lifts</li> </ul>
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> <li>• Pier S1, rebar, formwork &amp; concrete works</li> <li>• Pier S2 formwork and concrete work</li> <li>• Central Tower rebar, formwork, concreting works stay cable installation works</li> <li>• South Tower rebar, formwork, concreting works stay cable installation works</li> <li>• South Tower Deck Section Lifts</li> </ul>
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> <li>• AVS ,Scaffolding,shuttering and reinforcement to deck</li> <li>• Pier S1, rebar, formwork &amp; concrete works</li> <li>• Central Tower rebar, formwork, concreting works stay cable installation works</li> <li>• South Tower rebar, formwork, concreting works stay cable installation works.</li> <li>• South Tower Deck Section Lifts</li> <li>• Main carriageway earthworks</li> <li>• Test Pier Removal</li> </ul>

			<ul style="list-style-type: none"> <li>• Pile removal at pier S6</li> </ul>
M11	Linn Mill	Network (close proximity to Crossing)	<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> <li>• Pile removal at pier S6</li> </ul>
M13	Clufflat Brae	Crossing / 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> <li>• Test Pier Removal</li> </ul>
M14	Springfield	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> <li>• Test Pier Removal</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>• Evening and Night beam painting 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> </ul>
M17	Dundas Home Farm	Network	<ul style="list-style-type: none"> <li>• Utility works</li> <li>• Evening and night painting works</li> <li>• B800 South road works including bridge works etc...</li> <li>• Main carriageway 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 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 were unavailable from the 10<sup>th</sup> September due to the monitor being calibrated.

## 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 September 2015 with the exception of Newton. For Evening and night time periods, there were no exceedances of monthly average construction noise during September. 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 complaints were received from any of the residents in the location of the works during this period. There was a construction related exceedance at Scotstoun on the 30<sup>th</sup> September
- 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 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 September 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 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 September it was noted that there was construction related noise at Linn Mill. The exceedances at Linn Mill on the 2<sup>nd</sup>, 5<sup>th</sup>, 11<sup>th</sup>, 23<sup>rd</sup>, 25<sup>th</sup>, 28<sup>th</sup> and 30<sup>th</sup> September occurred during the day and seem 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 three exceedances at Butlaw that occurred during the day on the 15<sup>th</sup>-17<sup>th</sup> September. This was caused by the removal of sheet piles. There was six construction related exceedances at Tigh-Na-Grain. An exceedance occurred during the night on the 6<sup>th</sup> and this was caused by an isolated metal bang. The exceedances on the 12<sup>th</sup> 22<sup>nd</sup> and 25<sup>th</sup> all occurred at night and were the results of hammering. The environmental team contacted site teams to remind them about hammering at night. The exceedance on the 29<sup>th</sup> of occurred at night and was a result of the barge banging against the cofferdam. This was resolved straight away.
- 3.8** 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. 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.

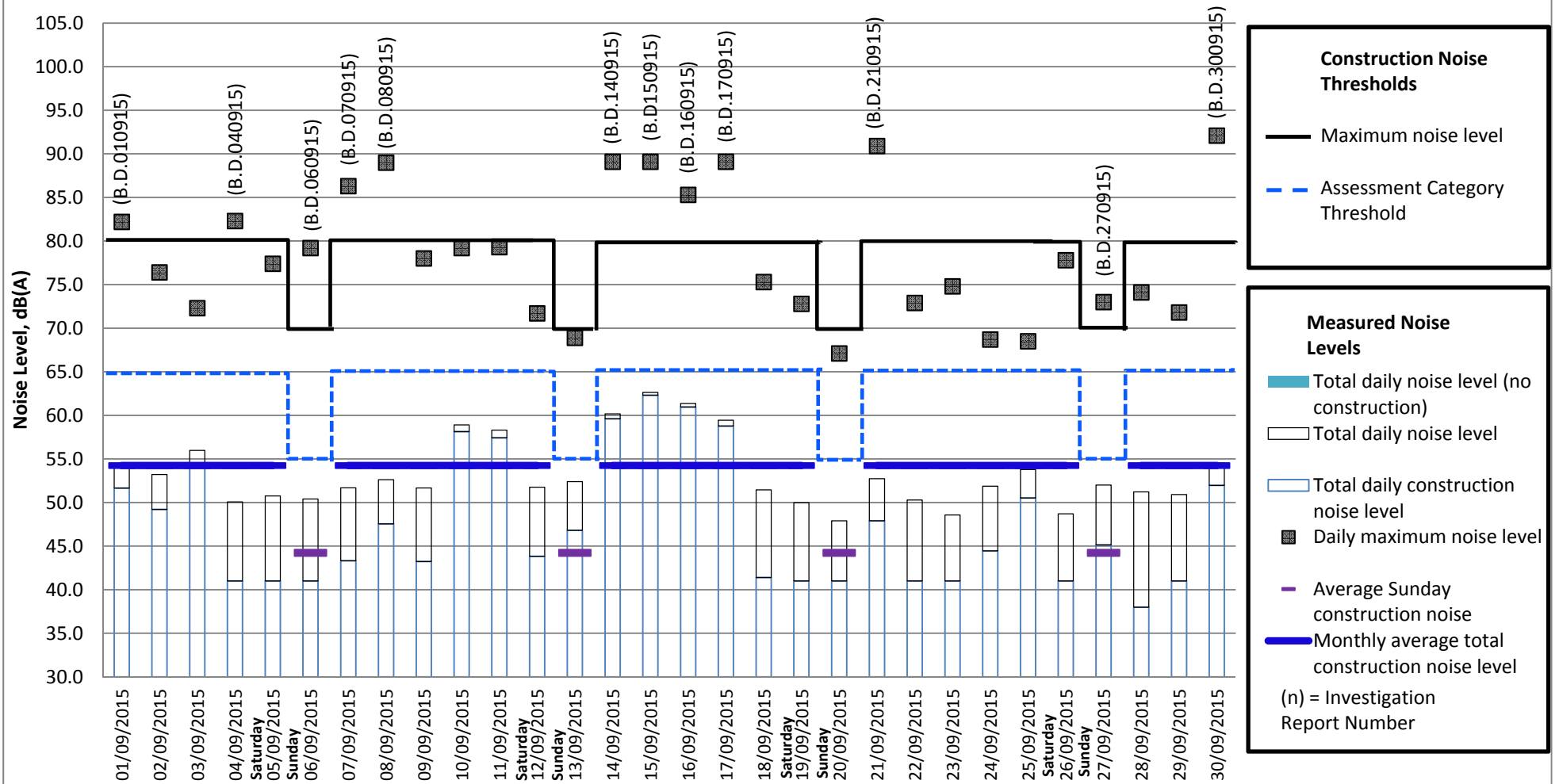
**Table 2: Summary of Exceedances at Monitoring Locations**

Monitoring Location	Summary of Exceedance Details
Butlaw Fisheries	During September the maximum noise threshold was exceeded on 46 occasions (12 day time, 8 evening and 26 night time). Three exceedances were related to construction works (see 3.7). Other exceedances were attributed to non-construction factors notably birds, traffic, waves and residents.
Clufflat Brae	During September the maximum noise threshold was exceeded on 33 occasions (11 daytime, 7 evening and 15 night time). No exceedances were found to be due to construction works. Exceedances were found to be due to birds, residential activity and planes.
Inchgarvie Lodge	During September the maximum noise threshold was exceeded on 62 occasions (22 day time, 15 evening and 25 night time). No exceedances were attributed to construction works. Investigations found residential building works and vehicle movements the main contributing factors to the exceedances in this location. Other factors included birds and monitor maintenance.
Linn Mill	During September the maximum noise threshold was exceeded on 32 occasions (15 daytime, 4 evening and 13 night time). The majority of exceedances at this location were due to birds and residents. There were 7 instances of construction noise exceeding the threshold (see 3.7)
Tigh-Na-Grian	During September the maximum noise threshold was exceeded on 27 occasions (8 daytime, 0 evening and 19 night time). Exceedances were mainly due to birds.
Dundas Home Farm	During September the maximum noise threshold was exceeded on 12 occasions. These exceedances were not caused by construction works. The exceedances were due to residents and birds.
Echline	During September 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. Another exceedance was attributed to a chainsaw however this was not FCBC construction related
Springfield	During September the maximum noise threshold was exceeded on 19 occasions. These exceedances were due to, local residents and their pet (dog). The monitor is situated within a garden with a dog next door.
Scotstoun	During September the maximum noise threshold was exceeded on 26 occasions. The majority of exceedances were attributed to vehicles passing (including Sundays) on the adjacent road. There was one construction related exceedance (see 3.4)
Whinny Hill	During September the maximum noise threshold was exceeded on 14 occasions. Exceedances were not due to construction activities. Mostly, exceedances were due to birds, residents and vehicles.
North Leg	No data is reported after 9 <sup>th</sup> September due to the monitor being calibrated. Recordings taken for data record purposes
Port Edgar	No data is reported in this report due to an error with the monitor. This problem has now been resolved.
Newton	Recordings taken for data record purposes

## **APPENDIX A**

# Measured Daytime Noise Levels at Butlaw Fisheries

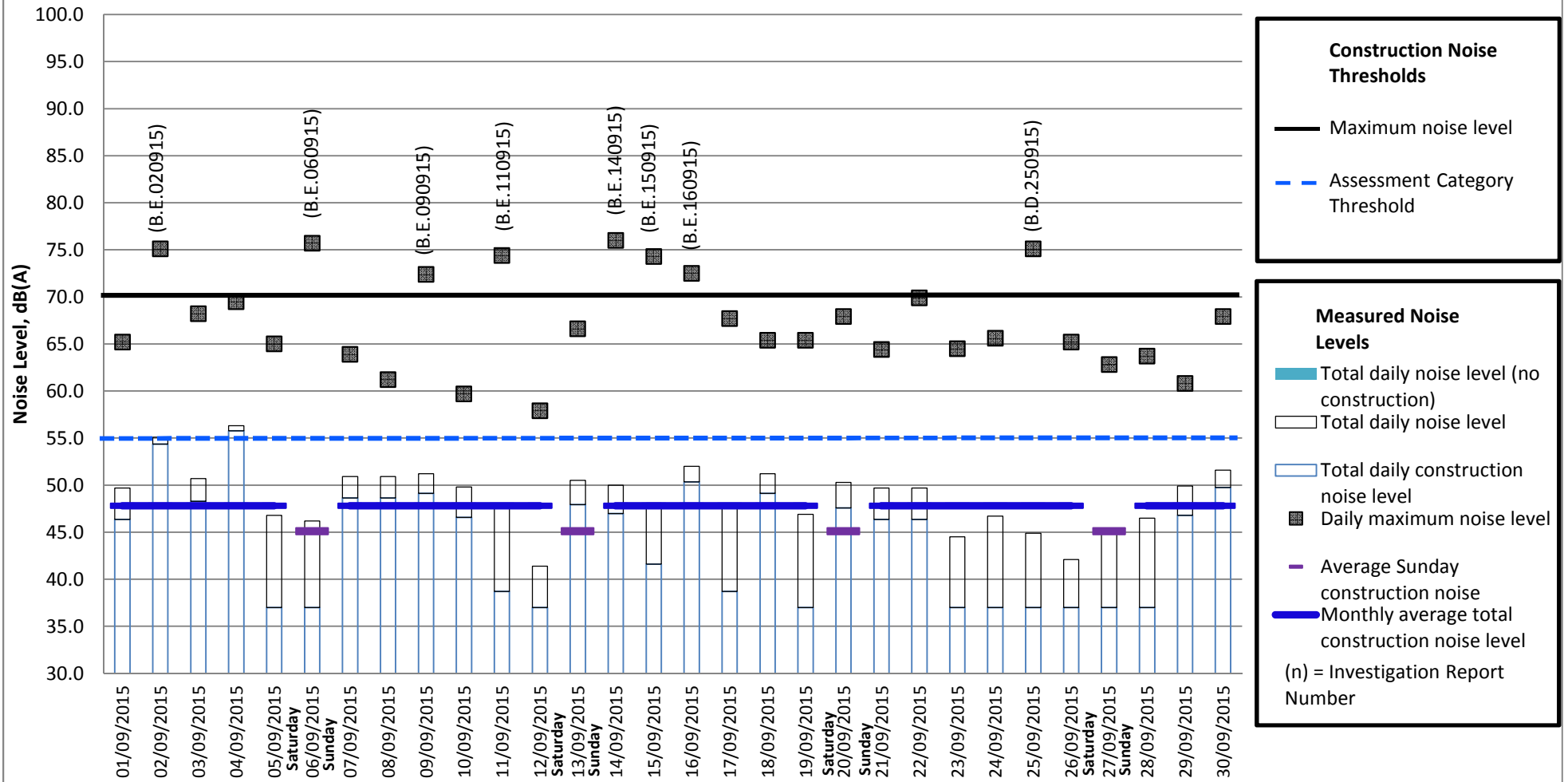
## Measurement period: September 2015



**Note:**

# Measured Evening Noise Levels at Butlaw Fisheries

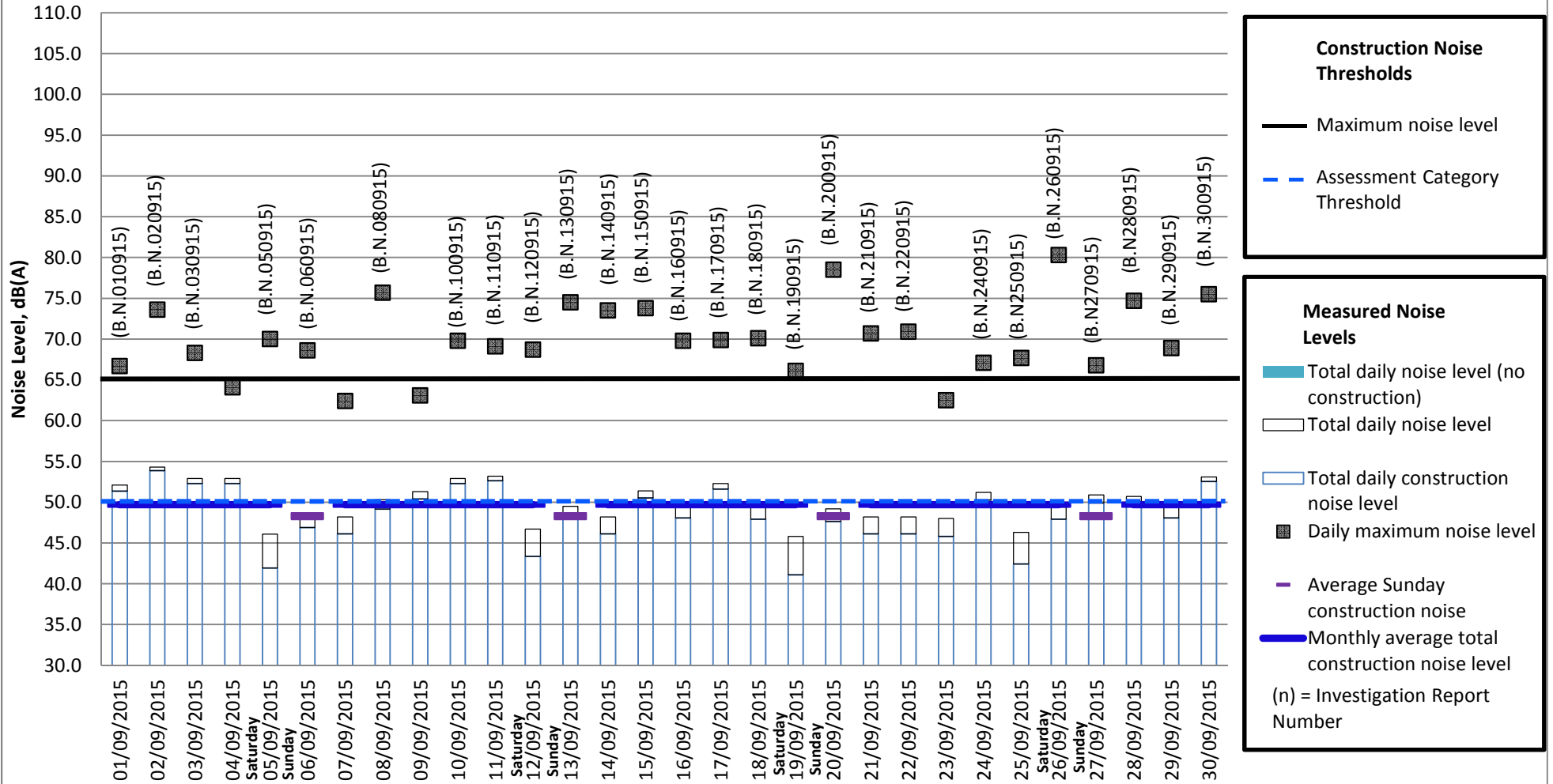
## Measurement period: September 2015



**Note:**

# Measured Night time Noise Levels at Butlaw Fisheries

## Measurement period: September 2015



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

**Measured Noise Levels**

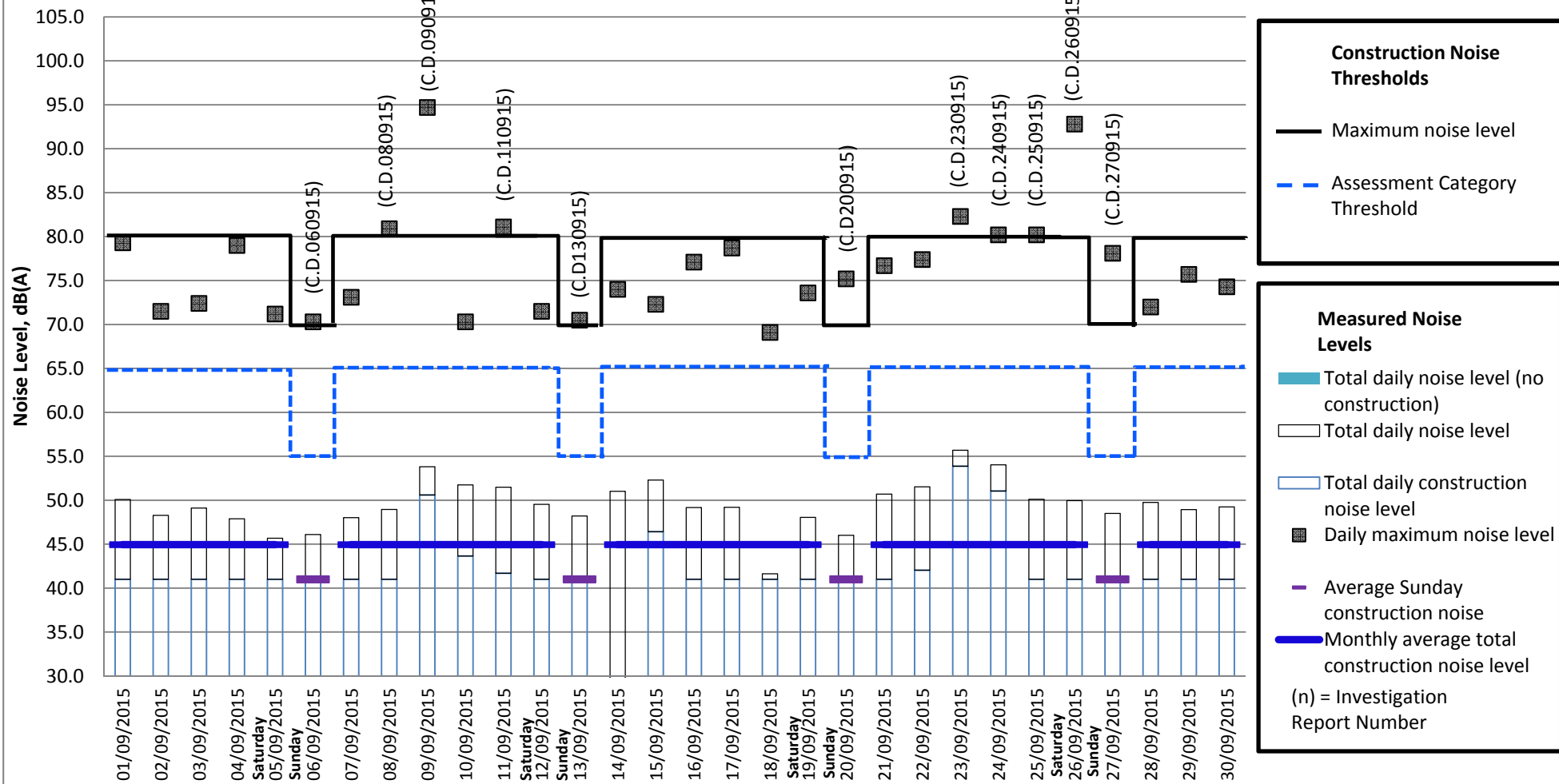
- Total daily noise level (no construction)
- Total daily noise level
- Total daily construction noise level
- Daily maximum noise level
- Average Sunday construction noise
- Monthly average total construction noise level

(n) = Investigation Report Number

**Note:**

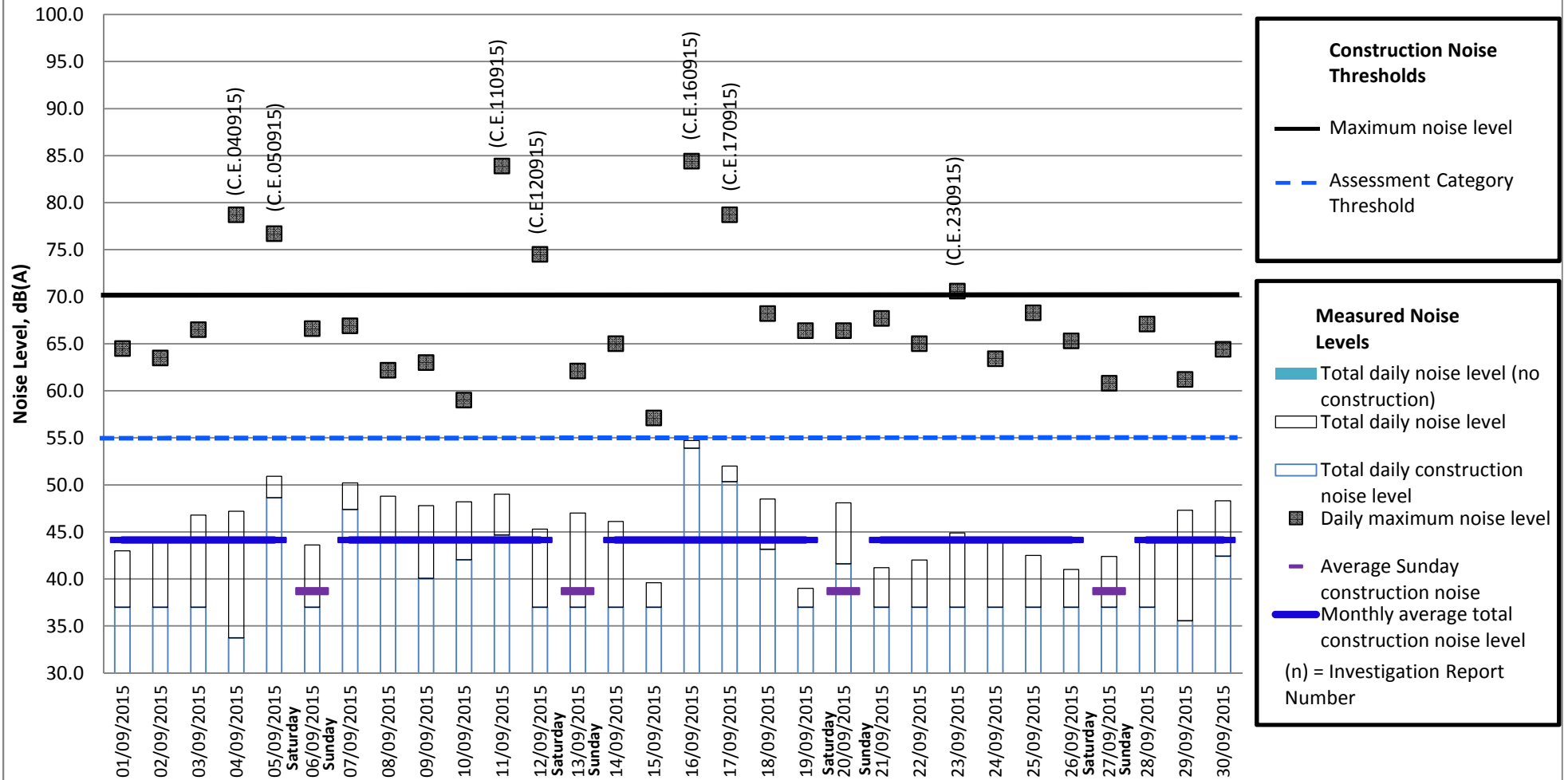
# Measured Daytime Noise Levels at Clufflat

## Measurement period: September 2015



**Note:**

## Measured Evening Noise Levels at Clufflat Measurement period: September 2015

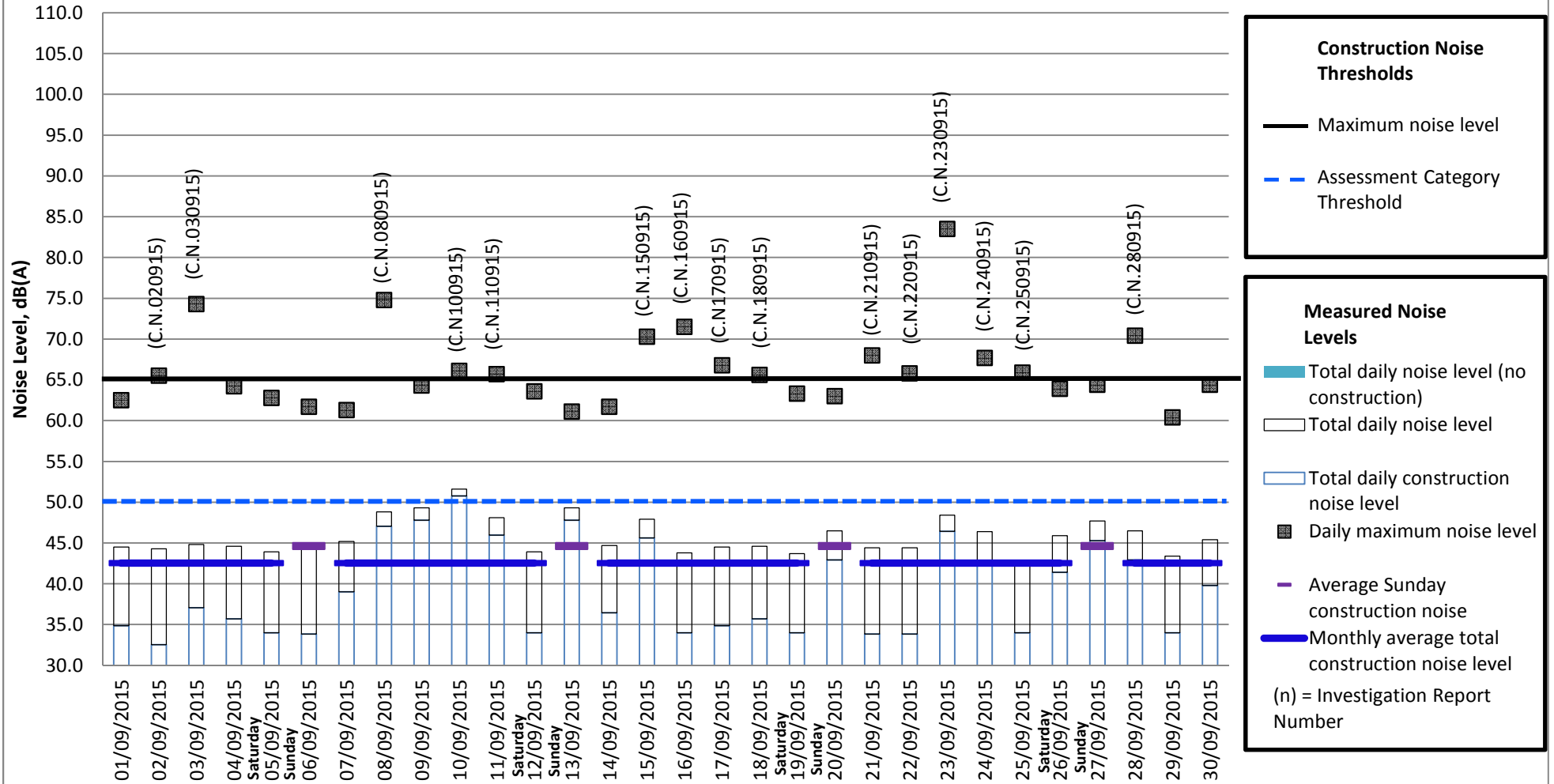


**Note:**



# Measured Night time Noise Levels at Clufflat

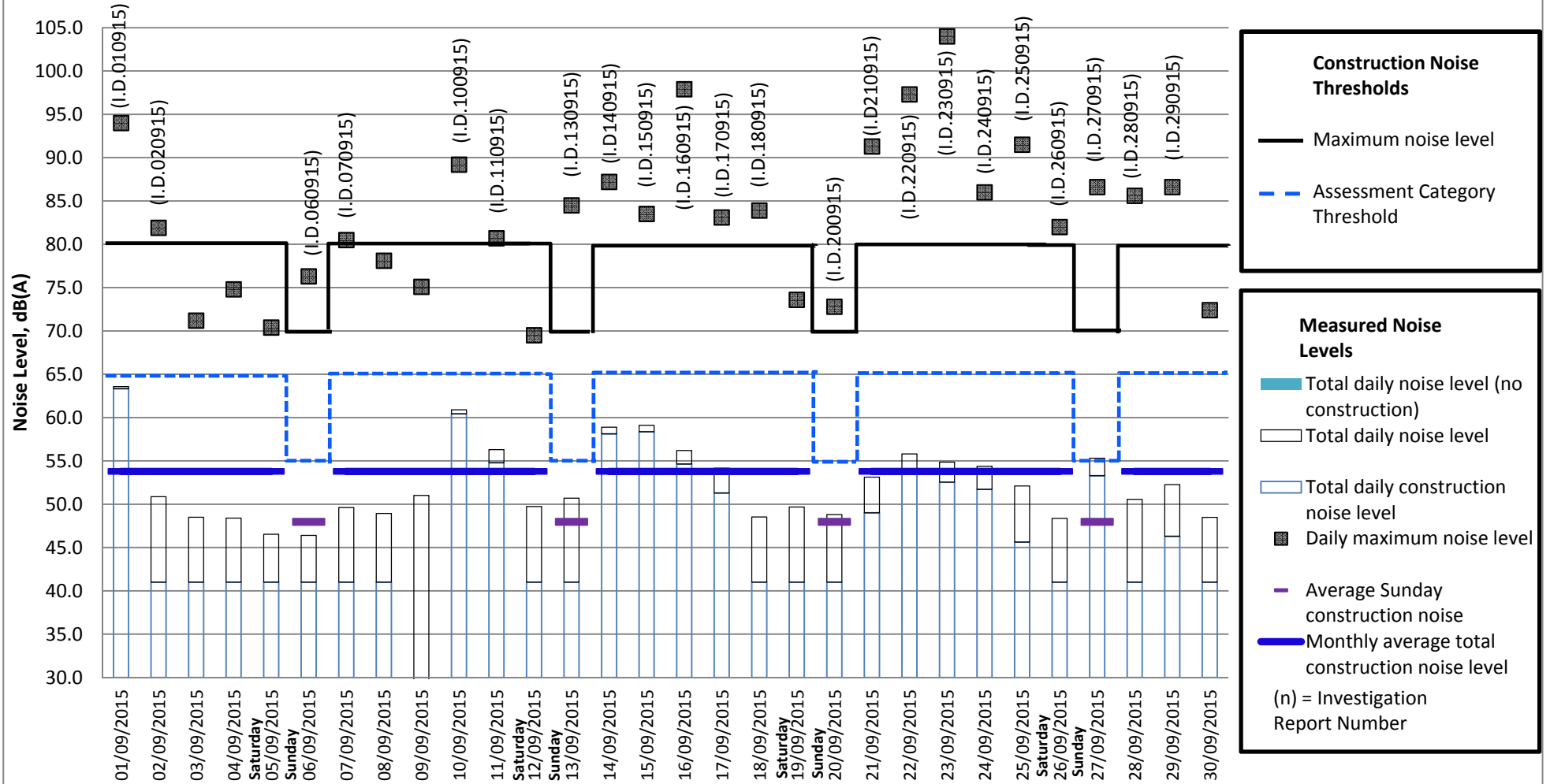
## Measurement period: September 2015



**Note:**

# Measured Daytime Noise Levels at Inchgarvie

## Measurement period: September 2015



**Construction Noise Thresholds**

- Maximum noise level
- Assessment Category Threshold

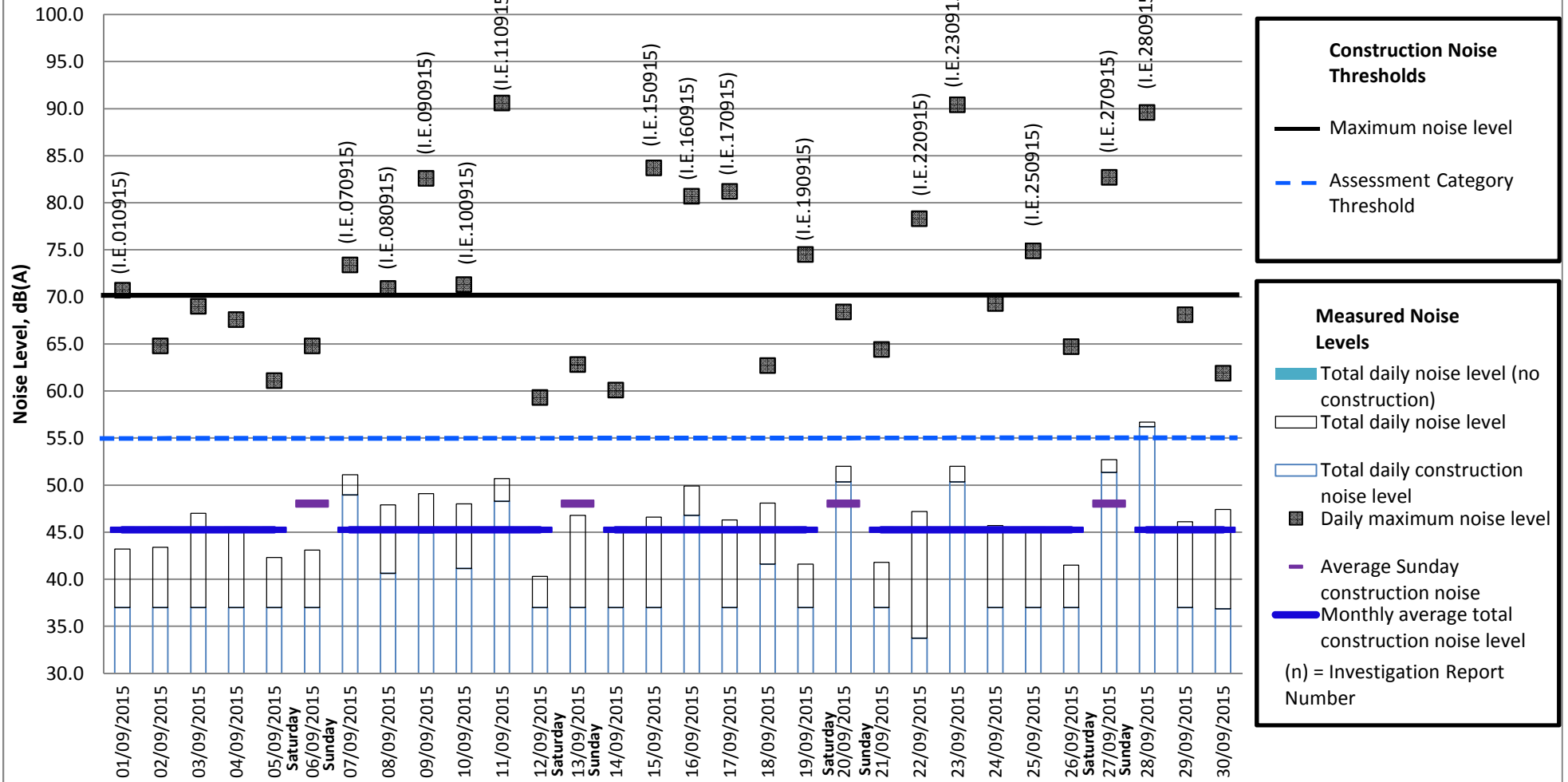
**Measured Noise Levels**

- 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

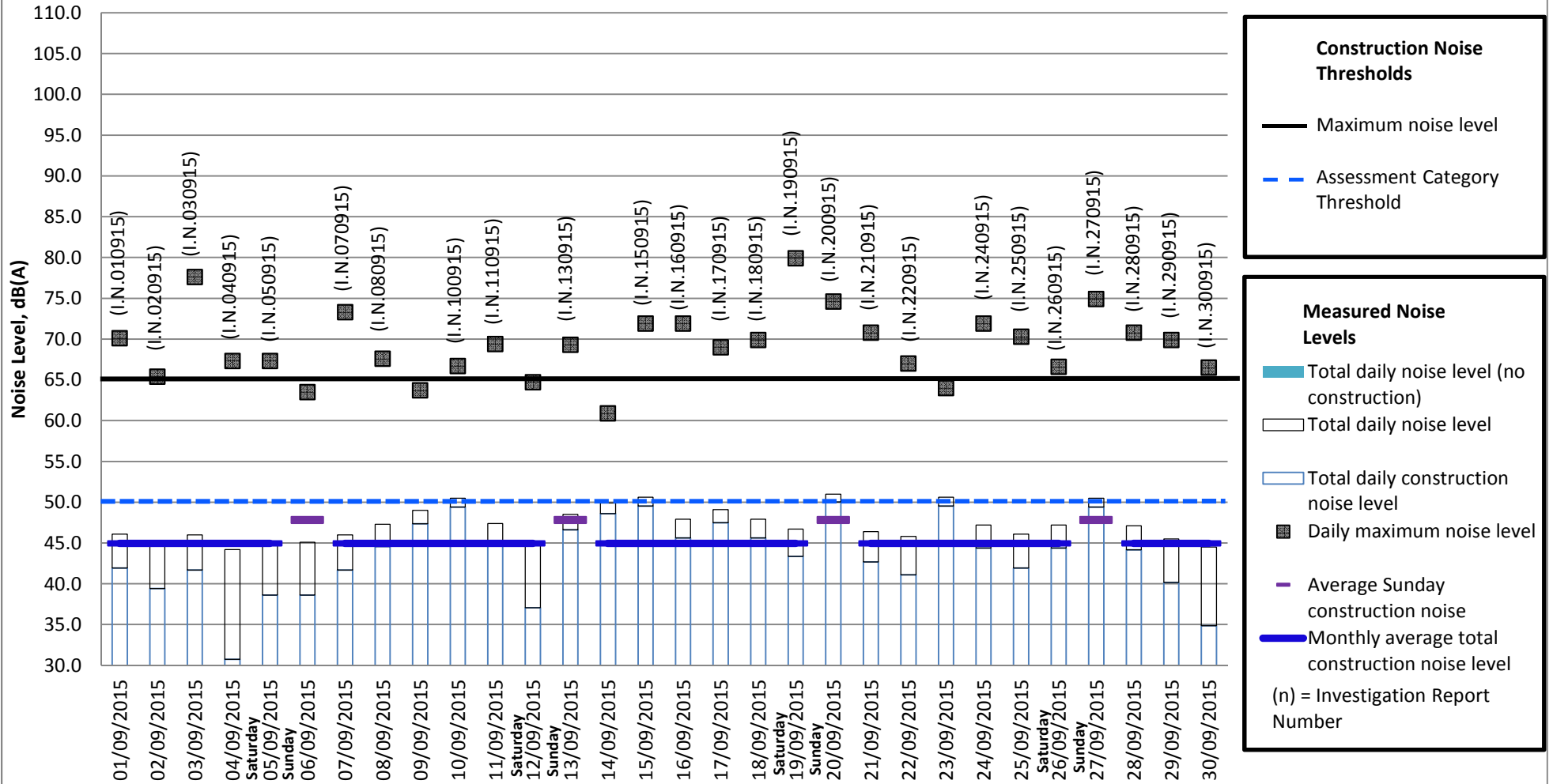
**Note:**

## Measured Evening Noise Levels at Inchgarvie Measurement period: September 2015



**Note:**

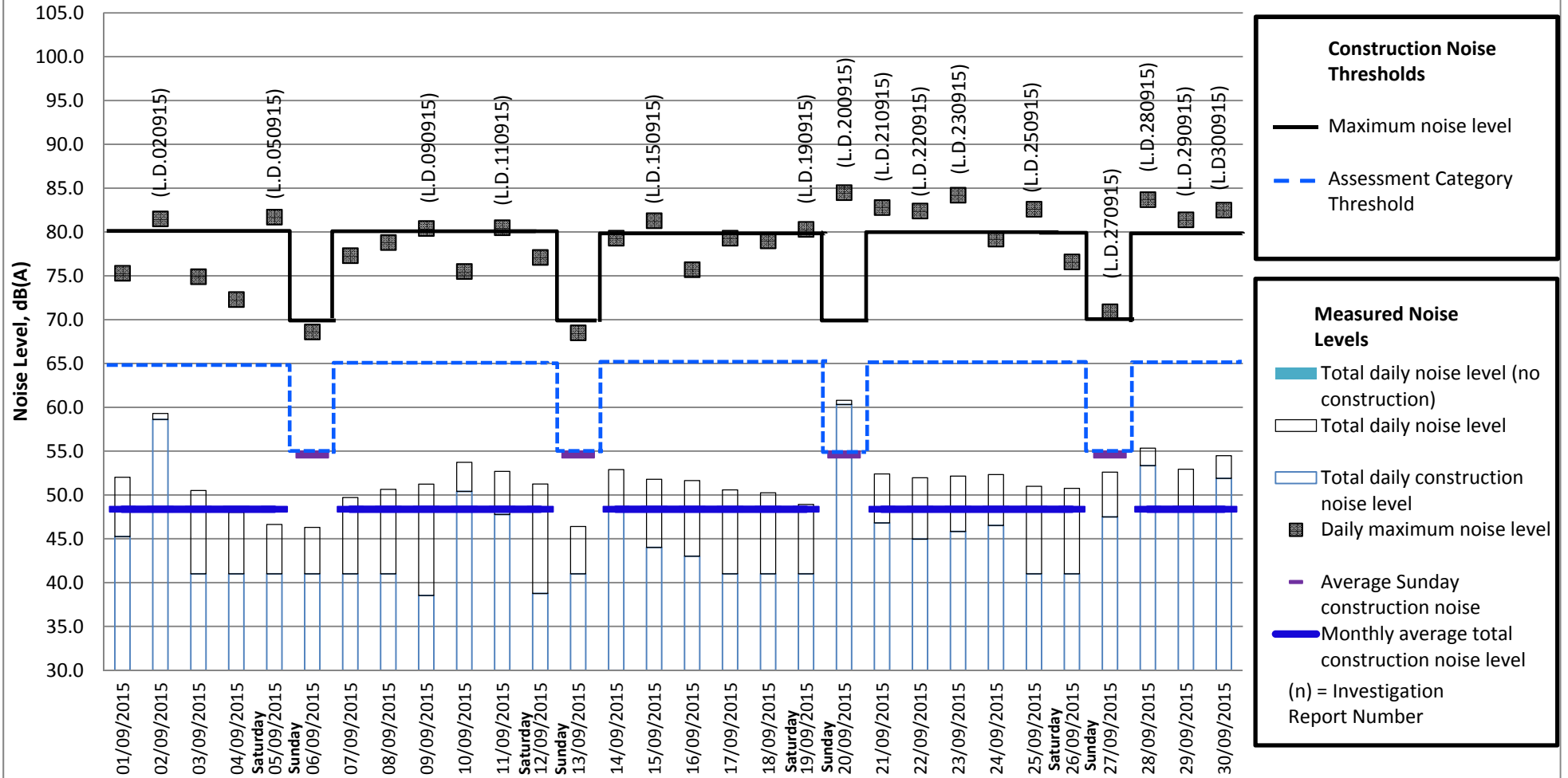
## Measured Night time Noise Levels at Inchgarvie Measurement period: September 2015



**Note:**

# Measured Daytime Noise Levels at Linn Mill

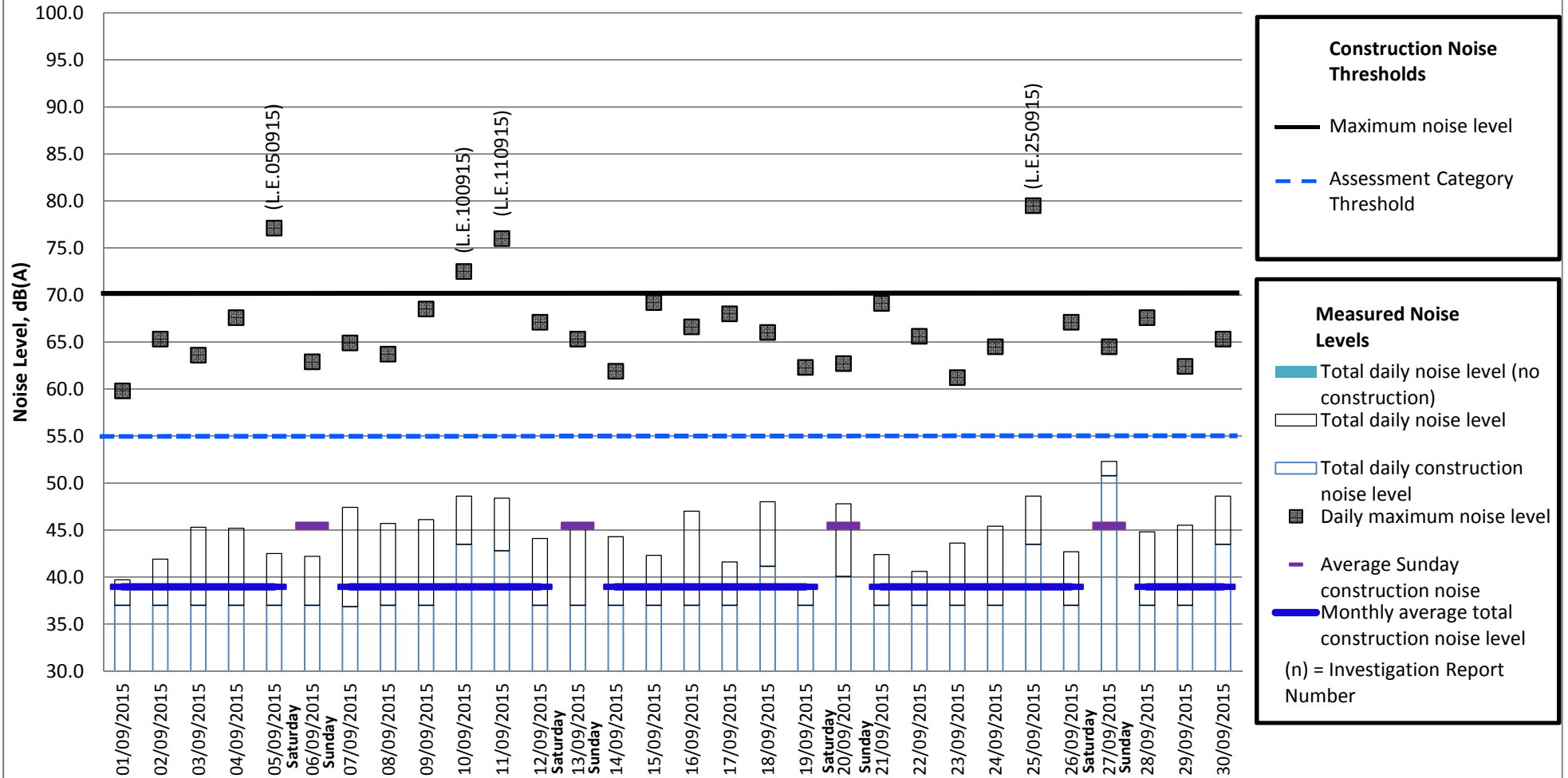
## Measurement period: September 2015



**Note:**

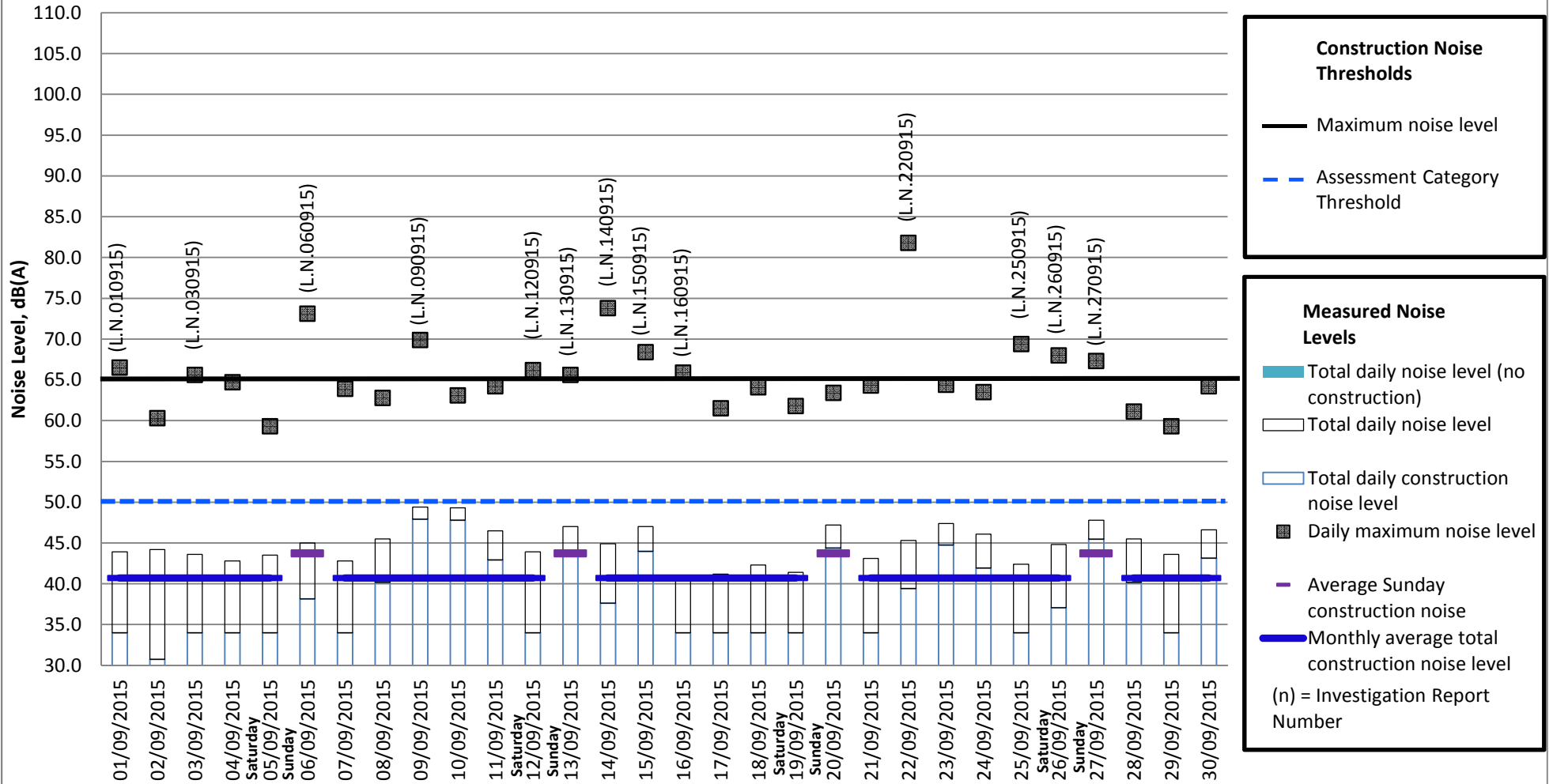
# Measured Evening Noise Levels at Linn Mill

## Measurement period: September 2015



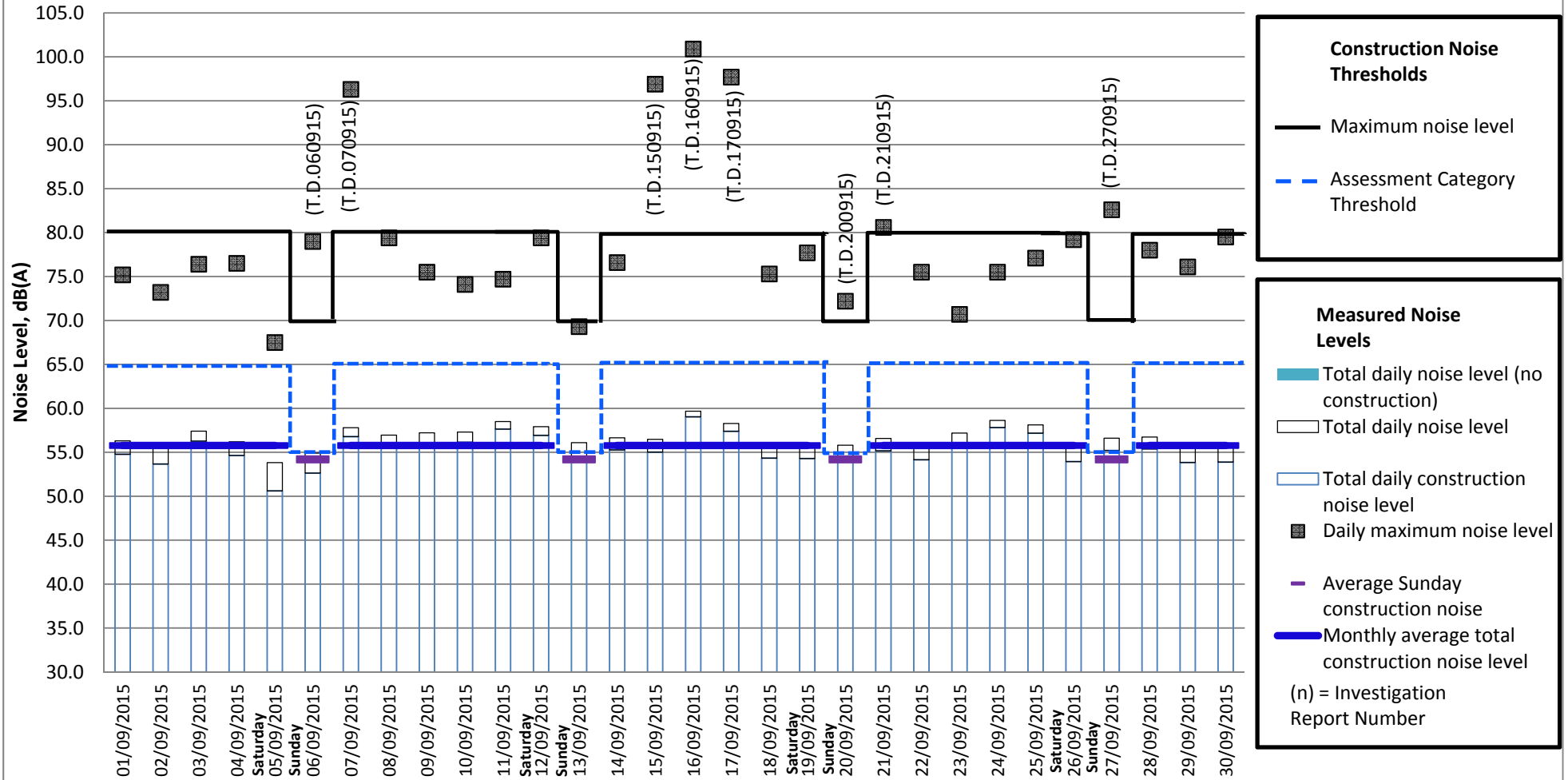
Note:

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



**Note:**

## Measured Daytime Noise Levels at Tigh-Na-Grian Measurement period: September 2015

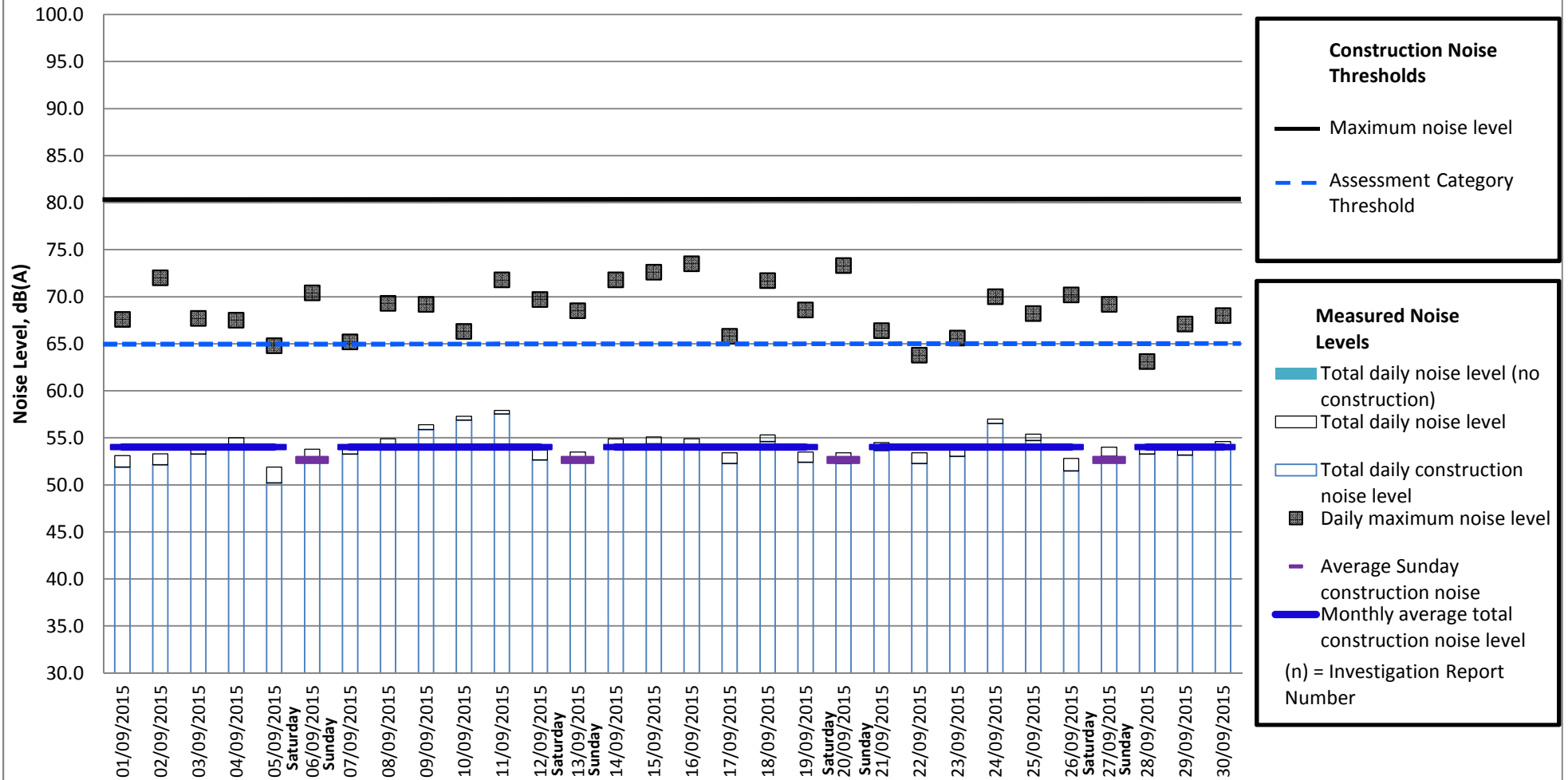


**Note:**



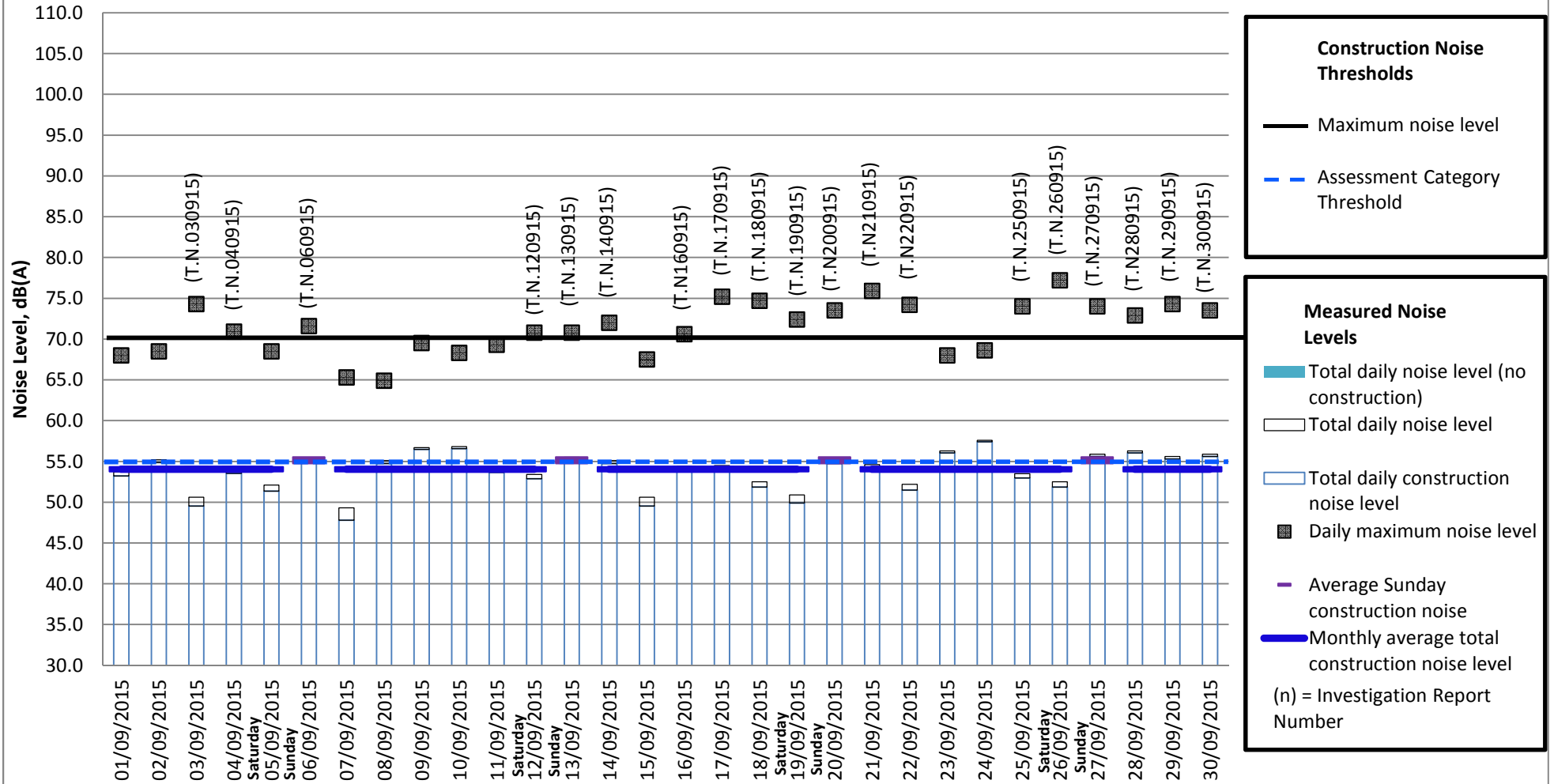
# Measured Evening Noise Levels at Tigh-Na-Grian

## Measurement period: September 2015



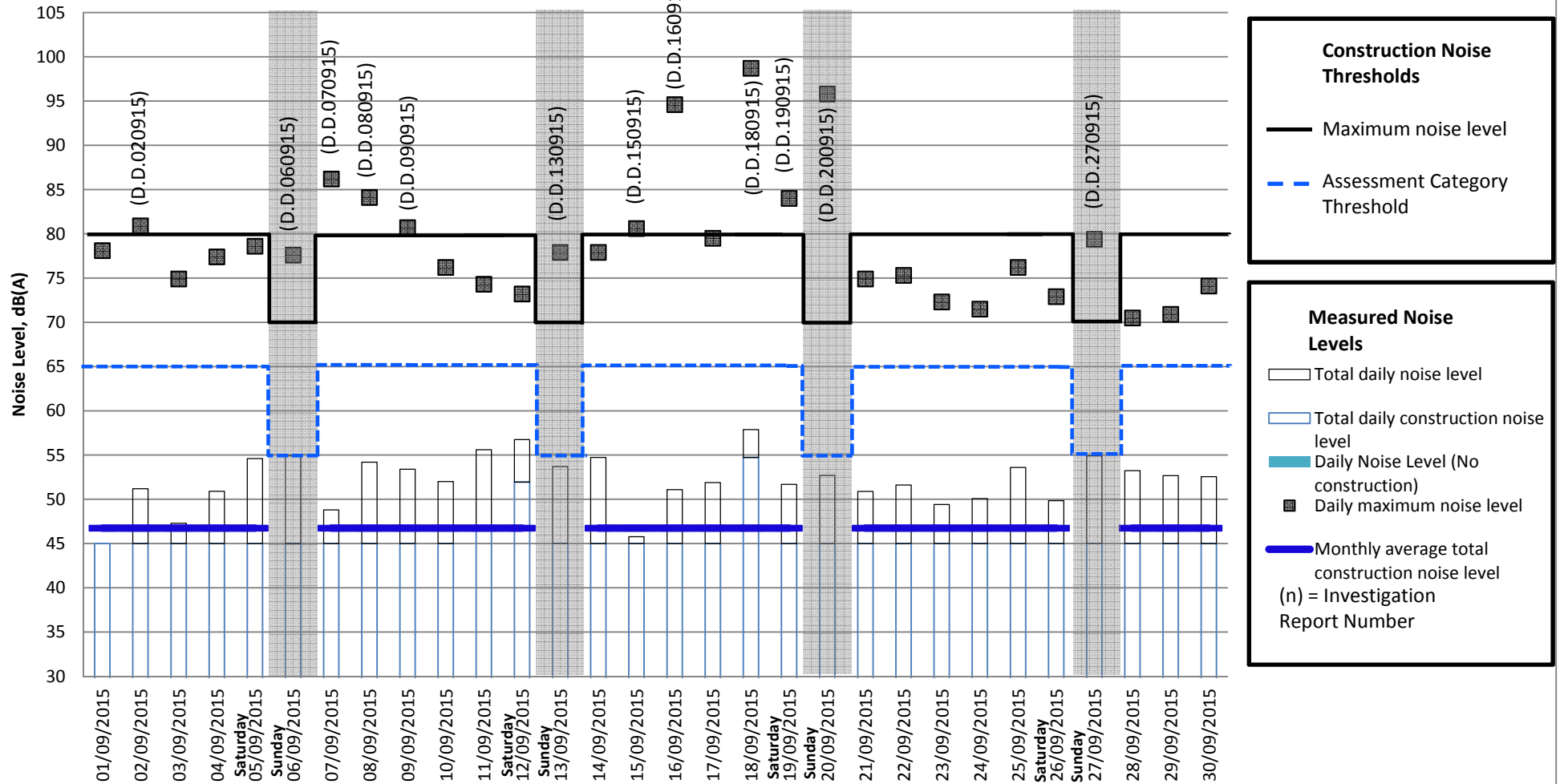
**Note:**

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



**Note:**

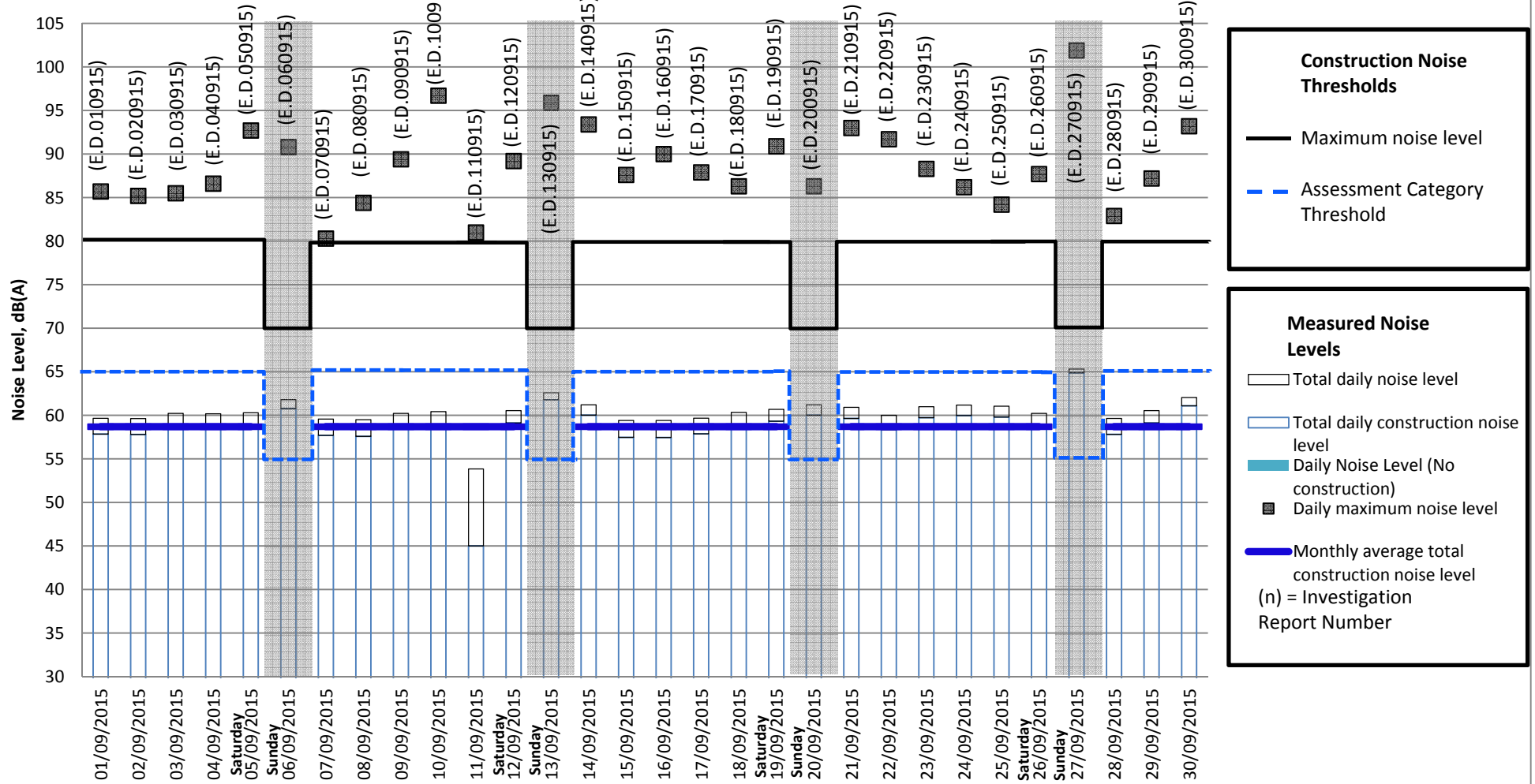
## Measured Daytime Noise Levels at Dundas Home Farm Measurement period: September 2015



**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

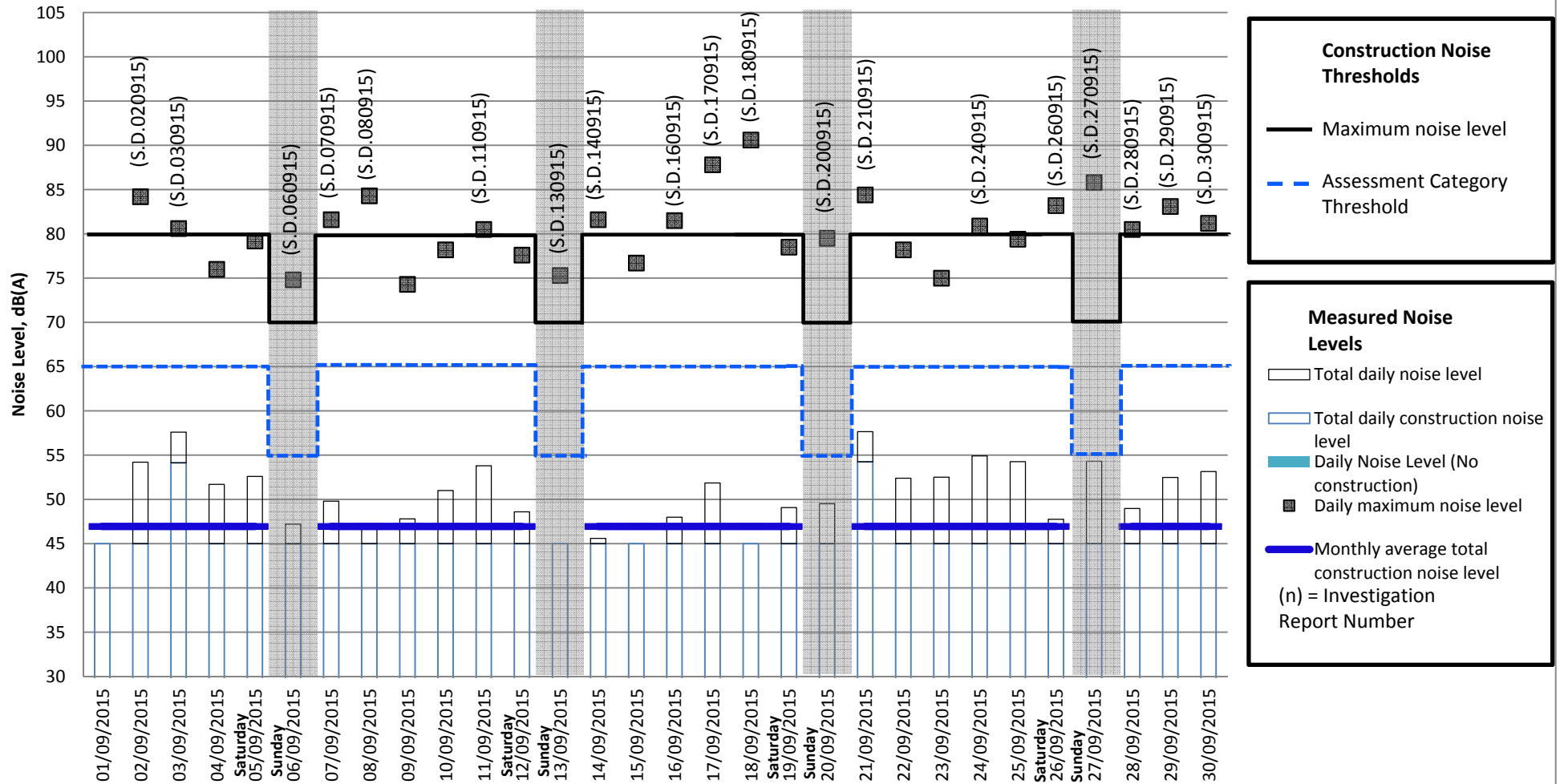
# Measured Daytime Noise Levels at Echline

## Measurement period: September 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

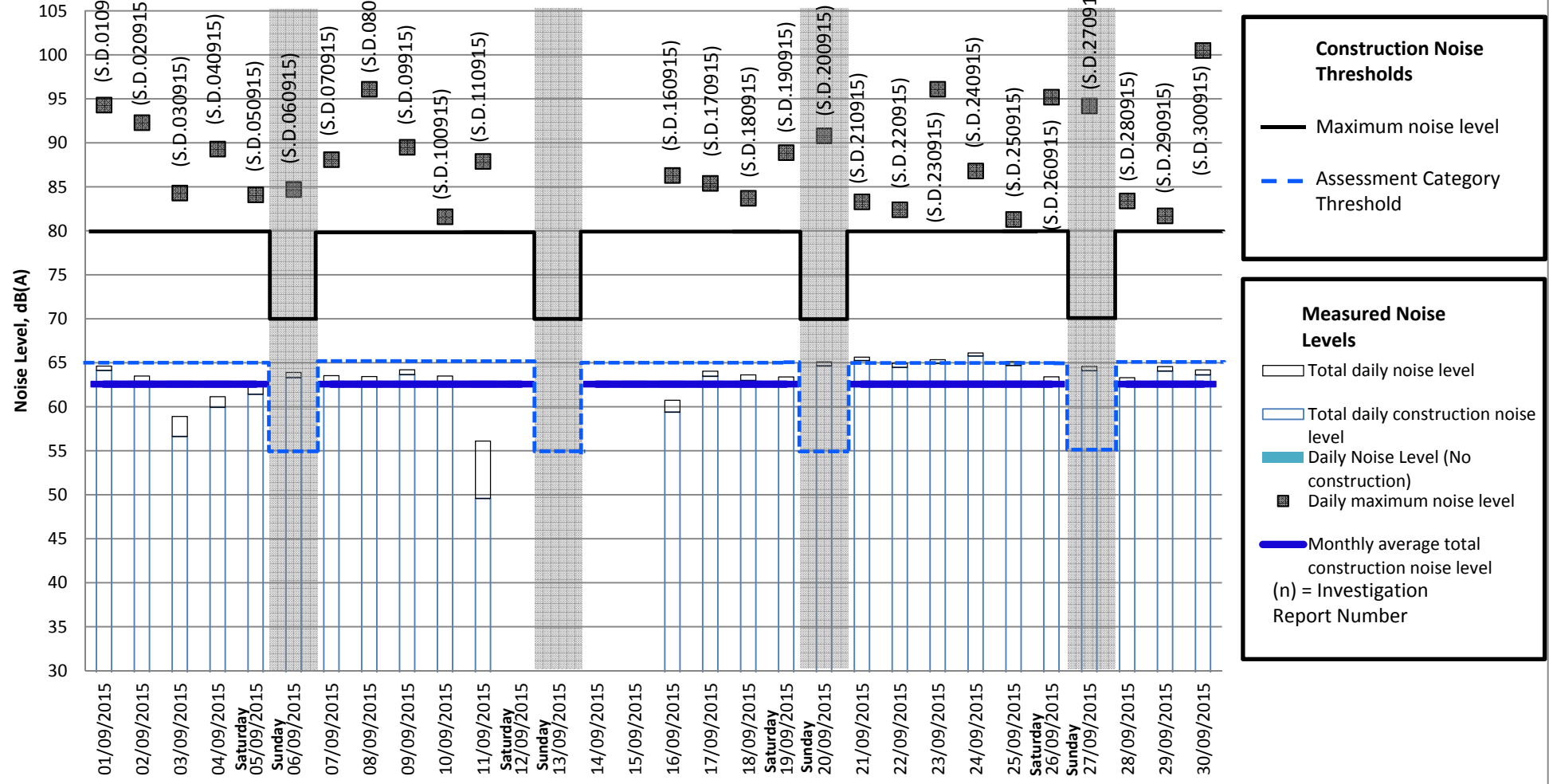
## Measured Daytime Noise Levels at Springfield Measurement period: September 2015



**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. Please note there is no date on 1/09/2015 due to an error with the monitor

## Measured Daytime Noise Levels at Scotstoun

### Measurement period: September 2015



**Construction Noise Thresholds**

- Maximum noise level
- - - Assessment Category Threshold

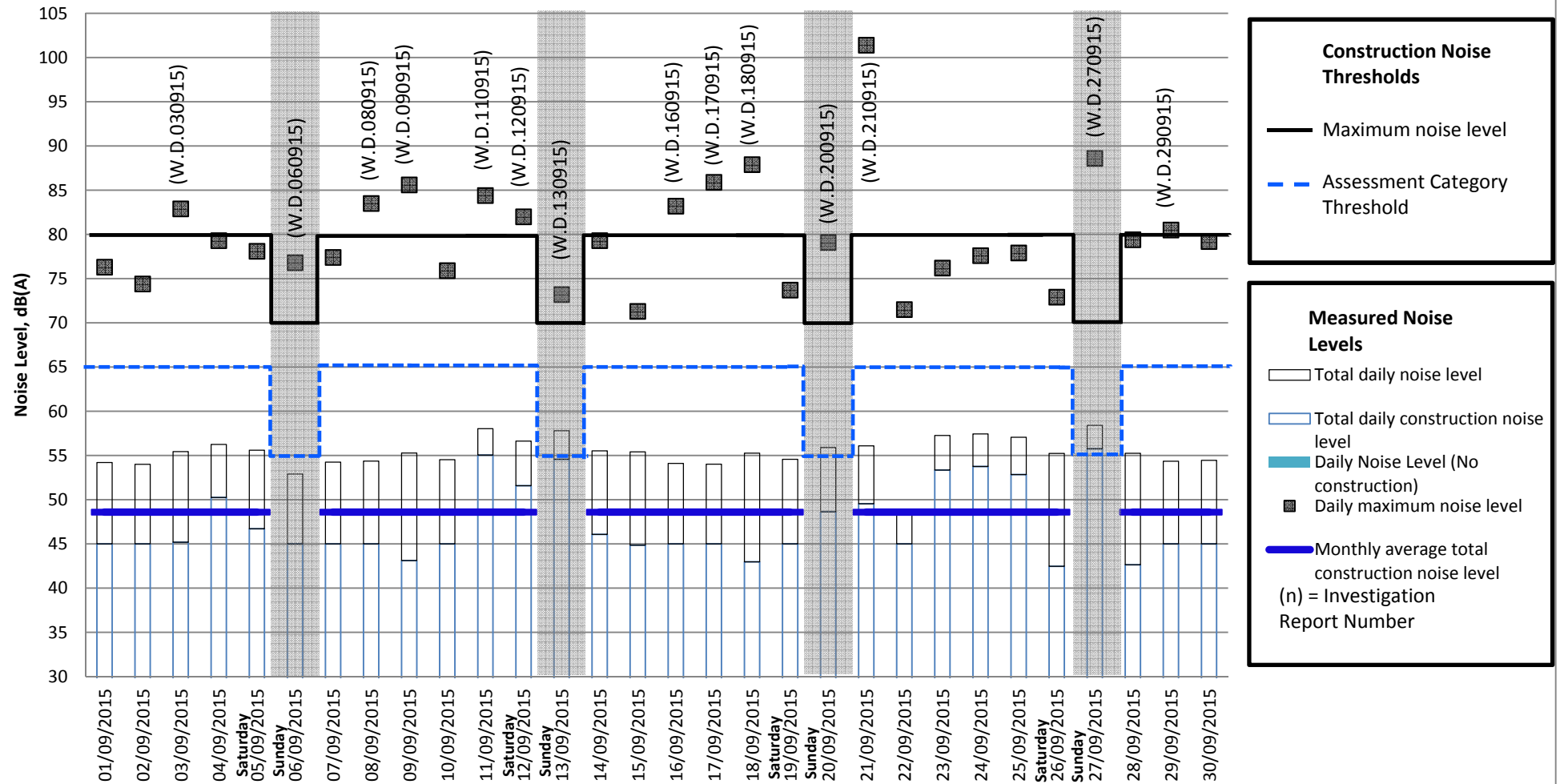
**Measured Noise Levels**

- 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. There were no data from 12/09/2015 - 15/09/2015 due to an error with the monitor

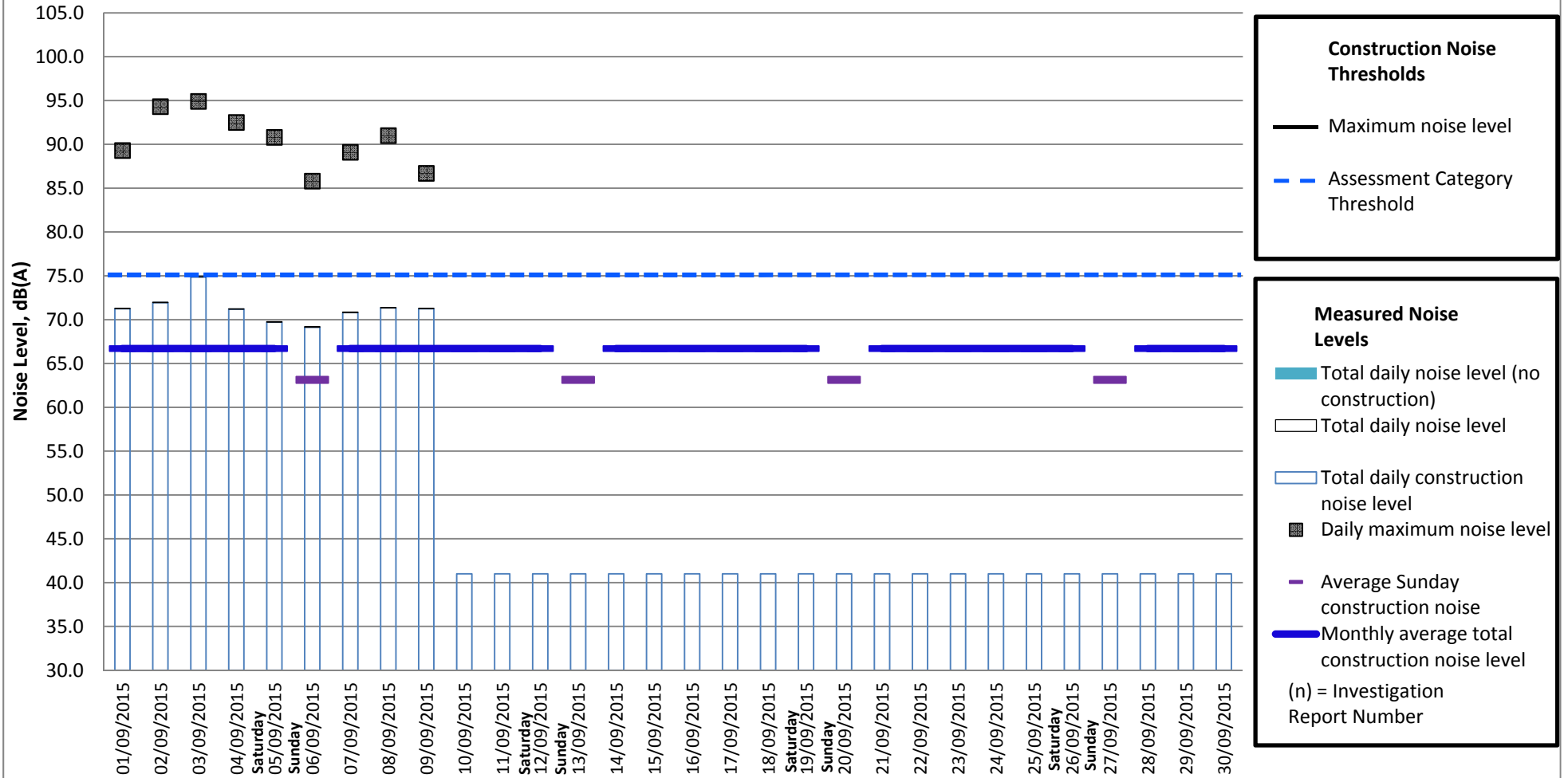
# Measured Daytime Noise Levels at Whinnyhill

## Measurement period: September 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

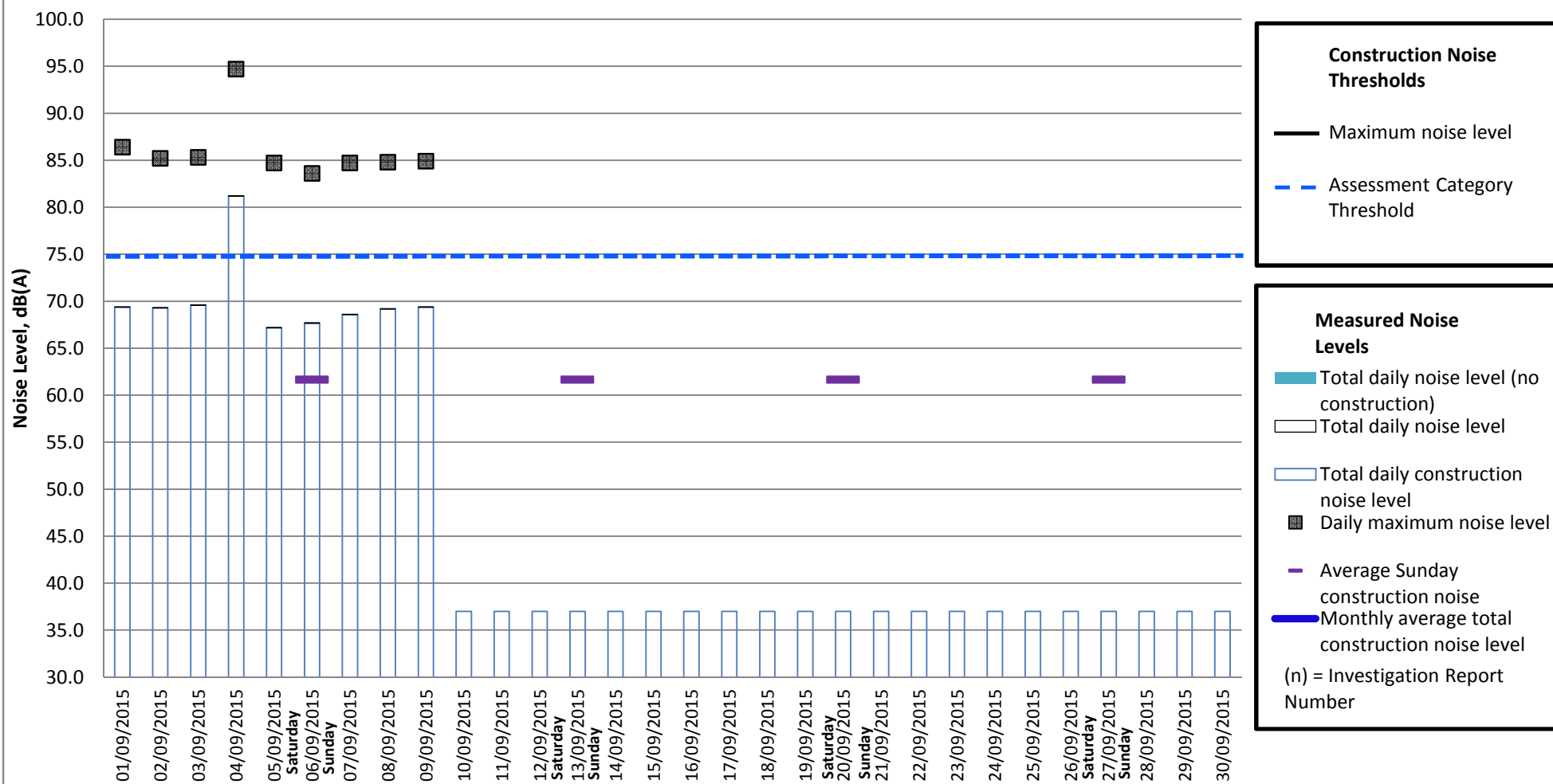
## Measured Daytime Noise Levels at North Leg Measurement period: September 2015



**Note:** There is no data after 09/09/2015 due to error with monitor.



## Measured Evening Noise Levels at North Leg Measurement period: September 2015



**Construction Noise Thresholds**

- Maximum noise level
- - - Assessment Category Threshold

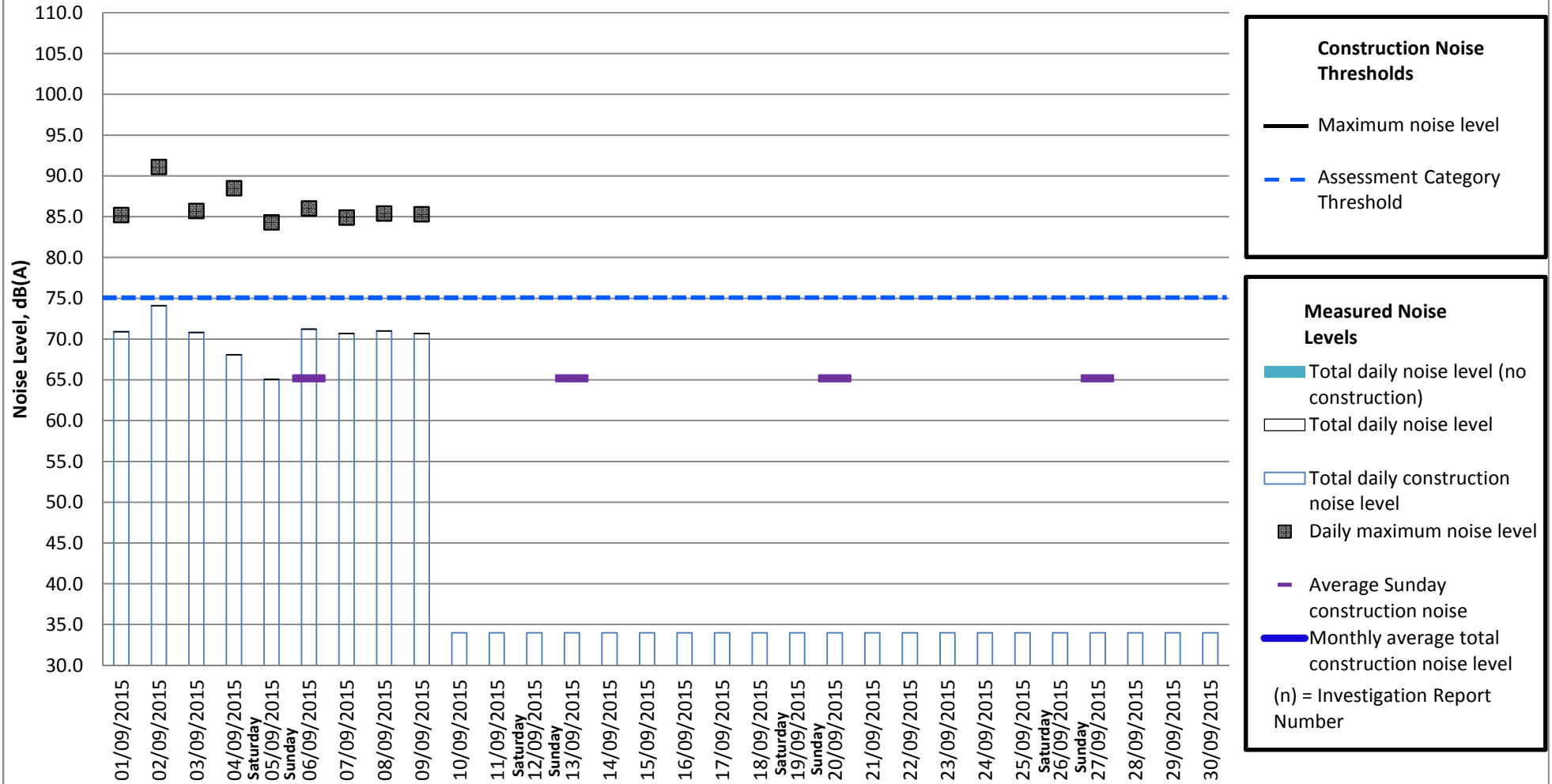
**Measured Noise Levels**

- 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

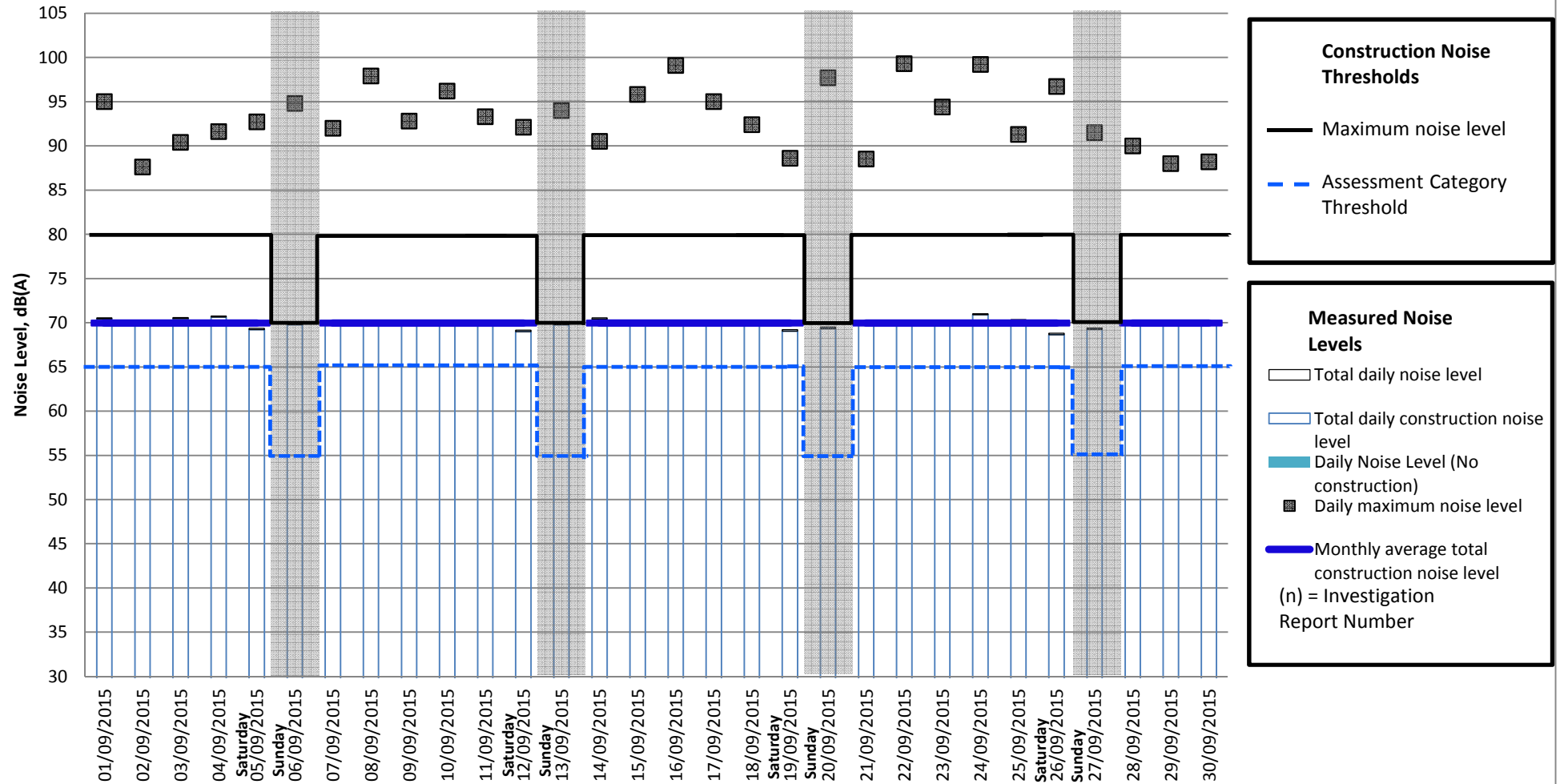
**Note: There is no data after 09/09/2015 due to error with monitor.**

## Measured Night time Noise Levels at North Leg Measurement period: September 2015



**Note: There is no data after 09/09/2015 due to error with monitor.**

## Measured Daytime Noise Levels at Newton Measurement period: September 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