



Contractor



Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

Project **FORTH REPLACEMENT CROSSING**

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CONSTRUCTION NOISE MONITORING REPORT: JUNE 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 June 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 June 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 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 June 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 June 2015
M1	Whinny Hill	Network	<ul style="list-style-type: none"> • Earth Works/Fill Placement • New Ferrytoll Road • FT03 & FT04 deck works • FT09 Works • FT19 Retaining Wall • Roadworks
M3	Tigh-Na-Grian	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • North Tower rebar, formwork, concreting works deck table installation works • Pier N1 rebar formwork & concrete works • AVN works
M4	North Leg	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • North Tower rebar, formwork, concreting works deck table installation works • Pier N1 rebar formwork & concrete works
M6	Port Edgar	• Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works • Pier S2 foundation work • Pier S1 rebar, formwork & concrete works
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> • Pier S1, rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • Pier S1, rebar, formwork & concrete works • Pier S2 foundation work • Central Tower rebar, formwork, concreting works deck table installation works • South Tower rebar, formwork, concreting works deck table installation works. • Main carriageway earthworks

M11	Linn Mill	Network (close proximity to Crossing)	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M13	Clufflat Brae	Crossing / Network	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M14	Springfield	Network	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M15	Echline	Network	<ul style="list-style-type: none"> • Launch – snagging and bearing installation • No night time or Sunday construction in the vicinity • Main carriageway earthworks
M16	Scotstoun	Network	<ul style="list-style-type: none"> • Arup Access works • Footpath works • Utility works • Concrete finishing works at 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	<ul style="list-style-type: none"> • Utility works • Concrete finishing works at ESQ04 • B800 South road works including bridge works etc... • Main carriageway works
M18	Newton	Network	<ul style="list-style-type: none"> • 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).

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 June 2015. Wireless connection to the monitor is to be repaired in July 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 June 2015, with the exception of Scotstoun and Newton. For the night time periods, there were no exceedances of monthly average construction noise at any locations. 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 weather, traffic, residential noise and birds. Audio demonstrates that the increased levels were caused by waves and birds at Butlaw Fisheries and birds and resident activity at Inchgarvie, 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 June 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 with the exception of Scotstoun.
- 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.

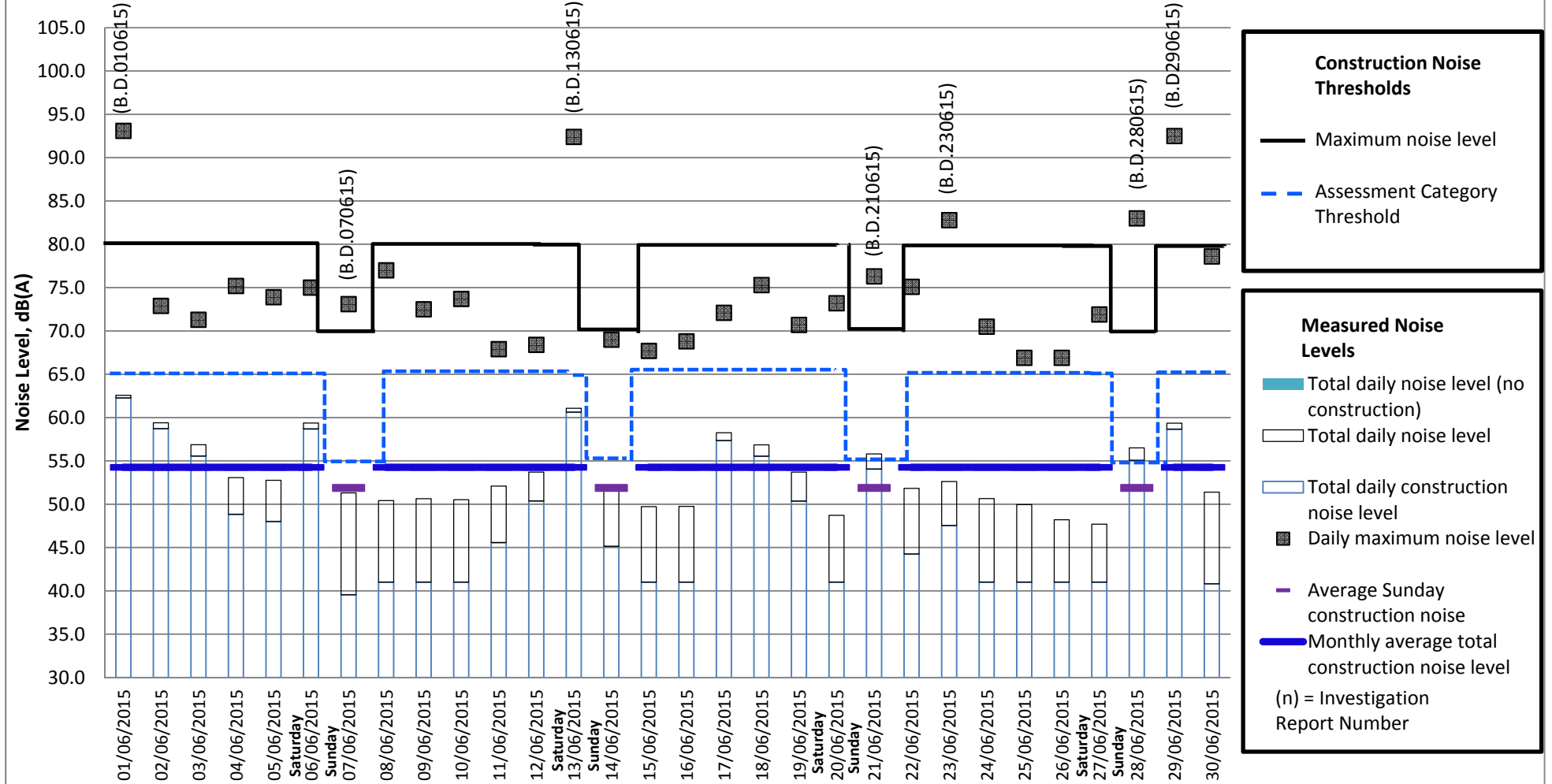
Table 2: Summary of Exceedances at Monitoring Locations

Monitoring Location	Summary of Exceedance Details
Butlaw Fisheries	During June the maximum noise threshold was exceeded on 48 occasions (7 day time, 14 evening and 27 night time). No exceedances were related to construction works. Exceedances were attributed to non-construction factors notably birds, wind, waves and a residential party.
Clufflat Brae	During June the maximum noise threshold was exceeded on 48 occasions (14 daytime, 10 evening and 24 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 June the maximum noise threshold was exceeded on 81 occasions (22 day time, 29 evening and 30 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 June the maximum noise threshold was exceeded on 57 occasions (10 daytime, 19 evening and 28 night time). The majority of exceedances at this location were due to residents, wind and bird songs. All the night time exceedances were attributed to bird song.
Tigh-Na-Grian	During June the maximum noise threshold was exceeded on 39 occasions (10 daytime, 1 evening and 20 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 June the maximum noise threshold was exceeded on 24 occasions. These exceedances were not caused by construction works. The exceedances were due to monitor maintenance, kids playing and birds.
Echline	During June the maximum noise threshold was exceeded on 30 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 June the maximum noise threshold was exceeded on 18 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 June the maximum noise threshold was exceeded on 28 occasions. The majority of these exceedances were due to construction; this is due to the location of the current meter being in the immediate vicinity of on-going works on the B800. However a number of exceedances were attributed to vehicles passing (including Sundays) by on the adjacent road
Whinny Hill	During June the maximum noise threshold was exceeded on 14 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 limited accessibility to this device. Wireless operation is unavailable and awaiting repair which is scheduled for July 2015.
Port Edgar	Recordings taken for data purposes
Newton	Recordings taken for data purposes

APPENDIX A

Measured Daytime Noise Levels at Butlaw Fisheries

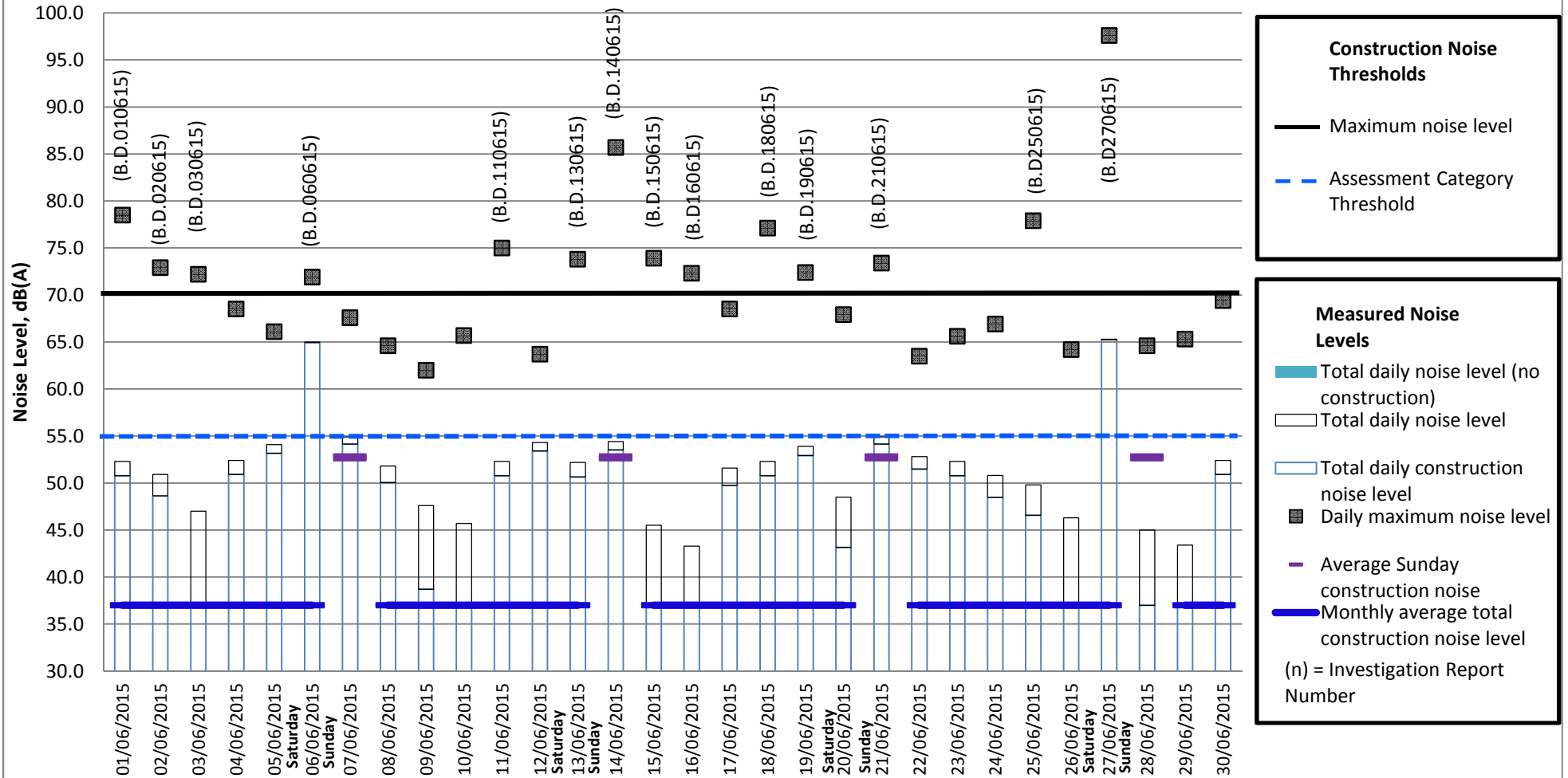
Measurement period: June 2015



Note:

Measured Evening Noise Levels at Butlaw Fisheries

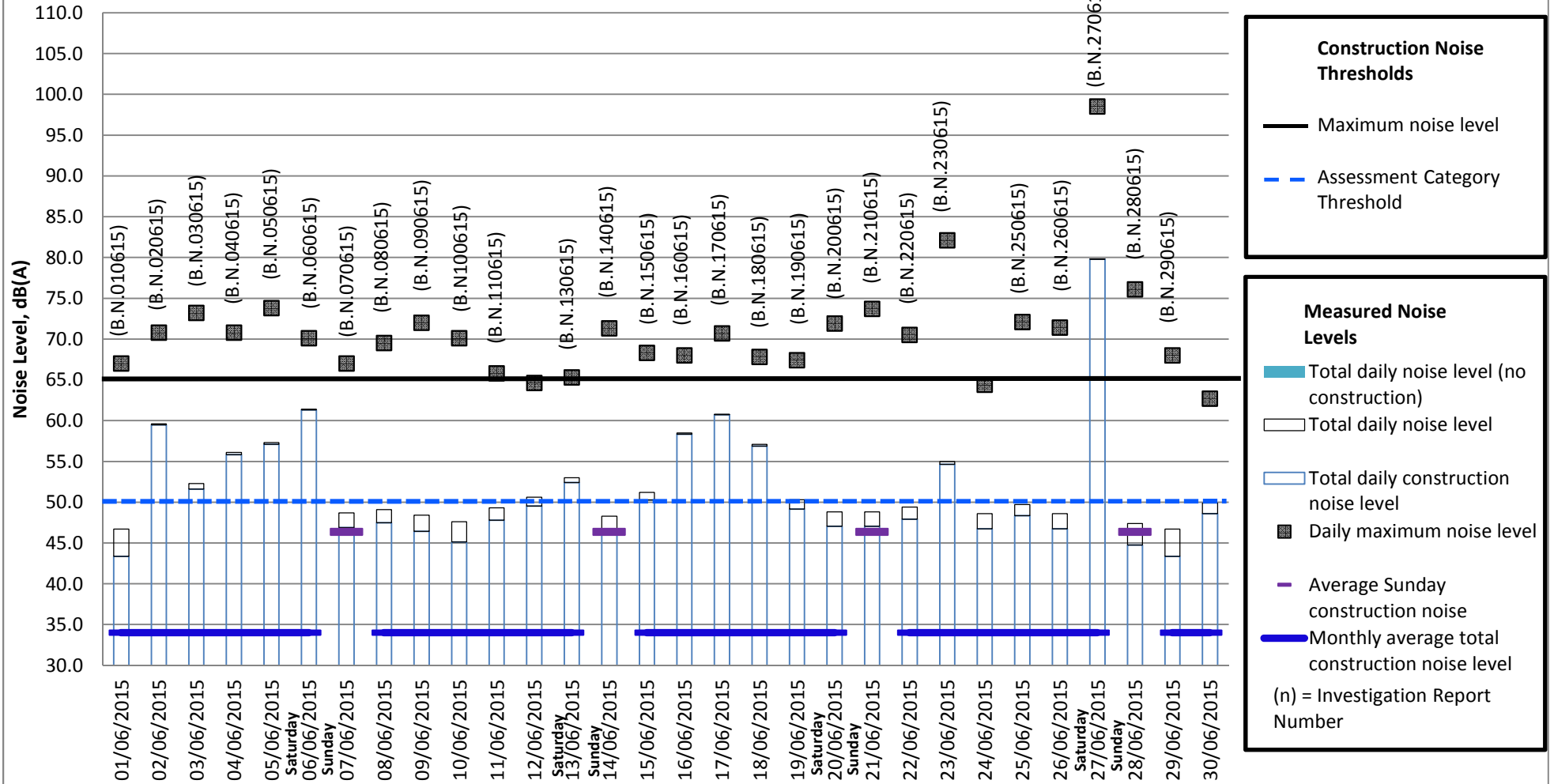
Measurement period: June 2015



Note:

Measured Night time Noise Levels at Butlaw Fisheries

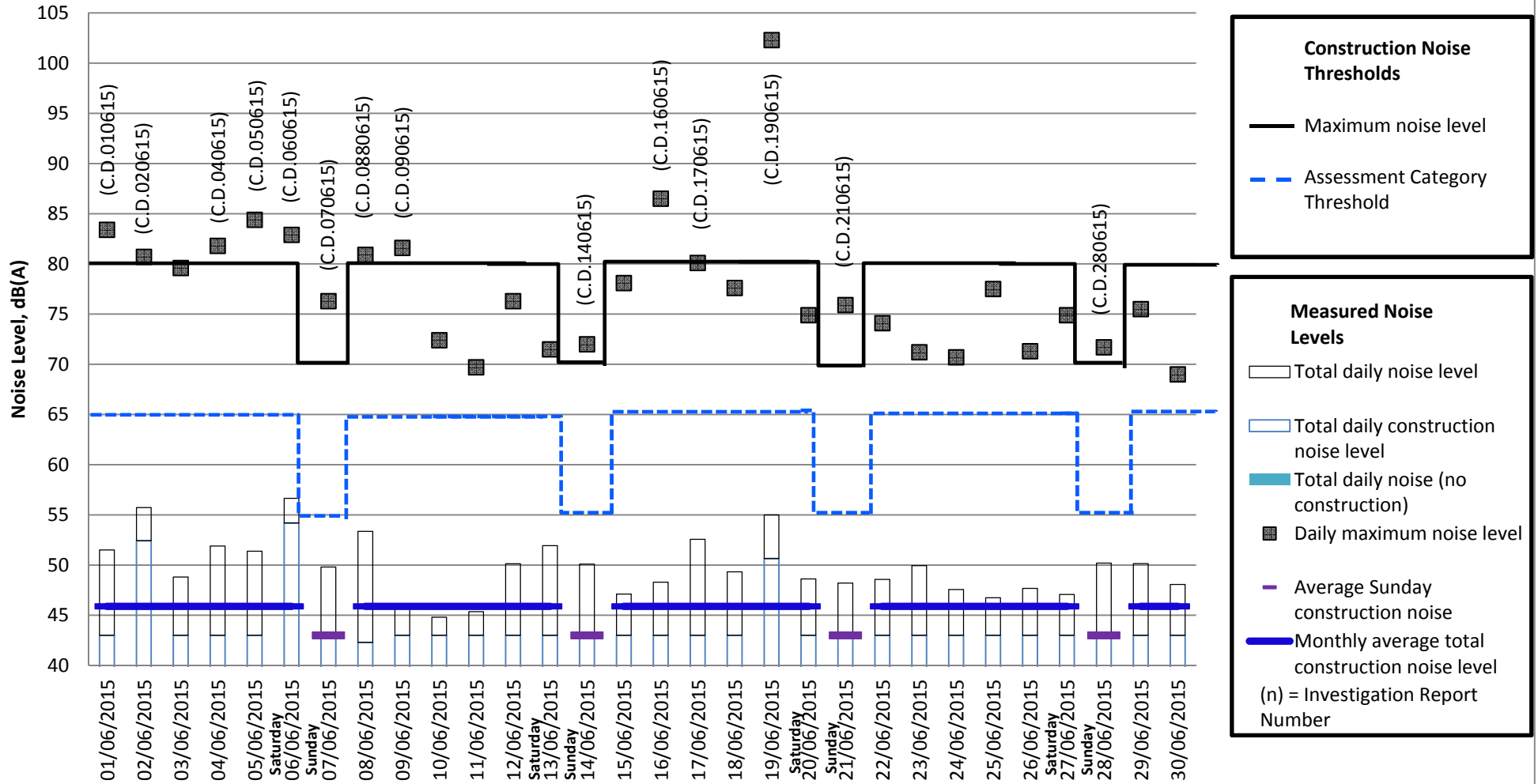
Measurement period: June 2015



Note:

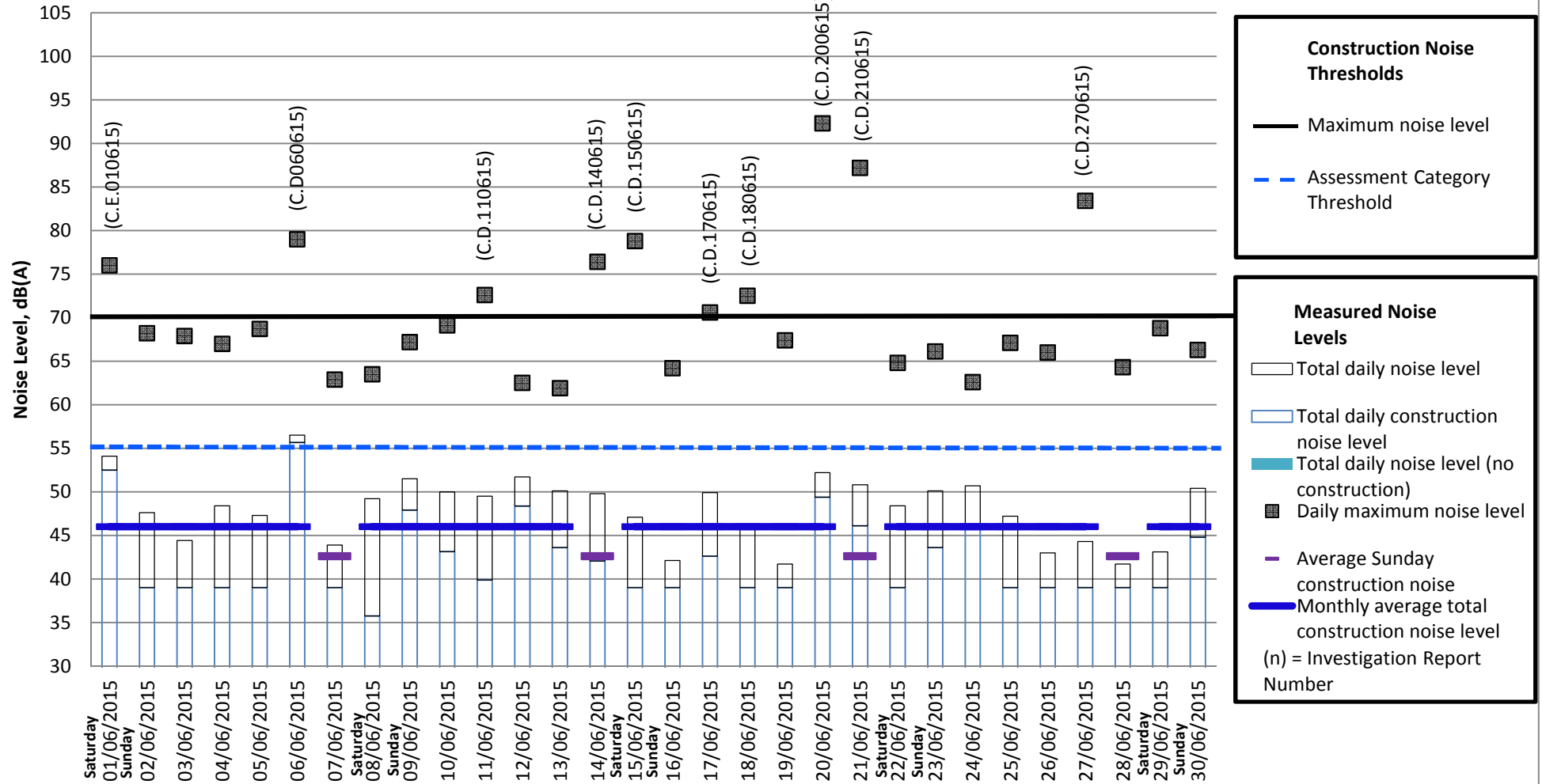
Measured Daytime Noise Levels at Clufflat Brae

Measurement period: June 2015



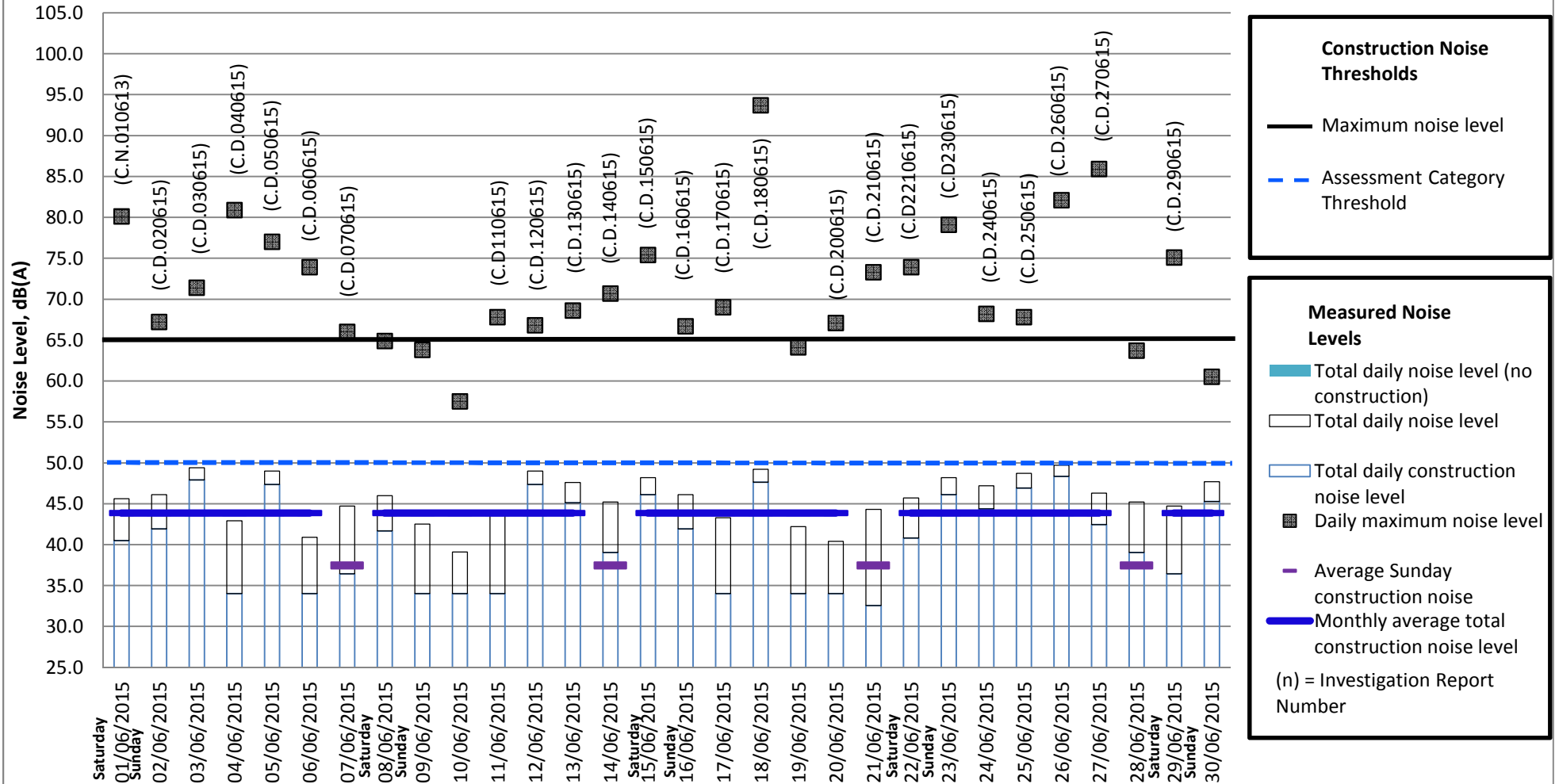
Measured Evening Noise Levels at Clufflat Brae

Measurement period: June 2015

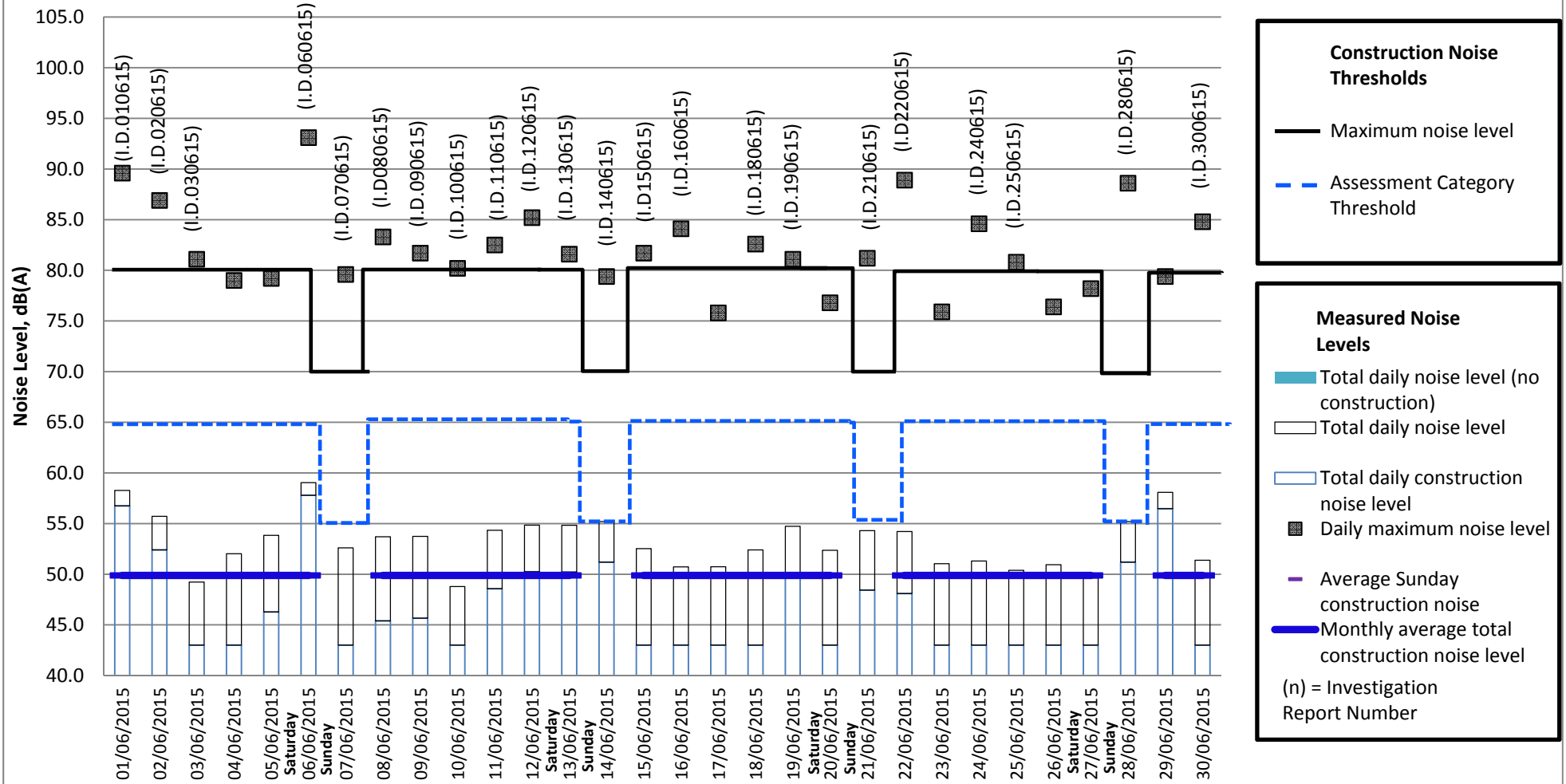


Measured Night-time Noise Levels at Clufflat Brae

Measurement period: June 2015



Measured Daytime Noise Levels at Inchgarvie Measurement period: June 2015



Construction Noise Thresholds

- Maximum noise level
- - - Assessment Category Threshold

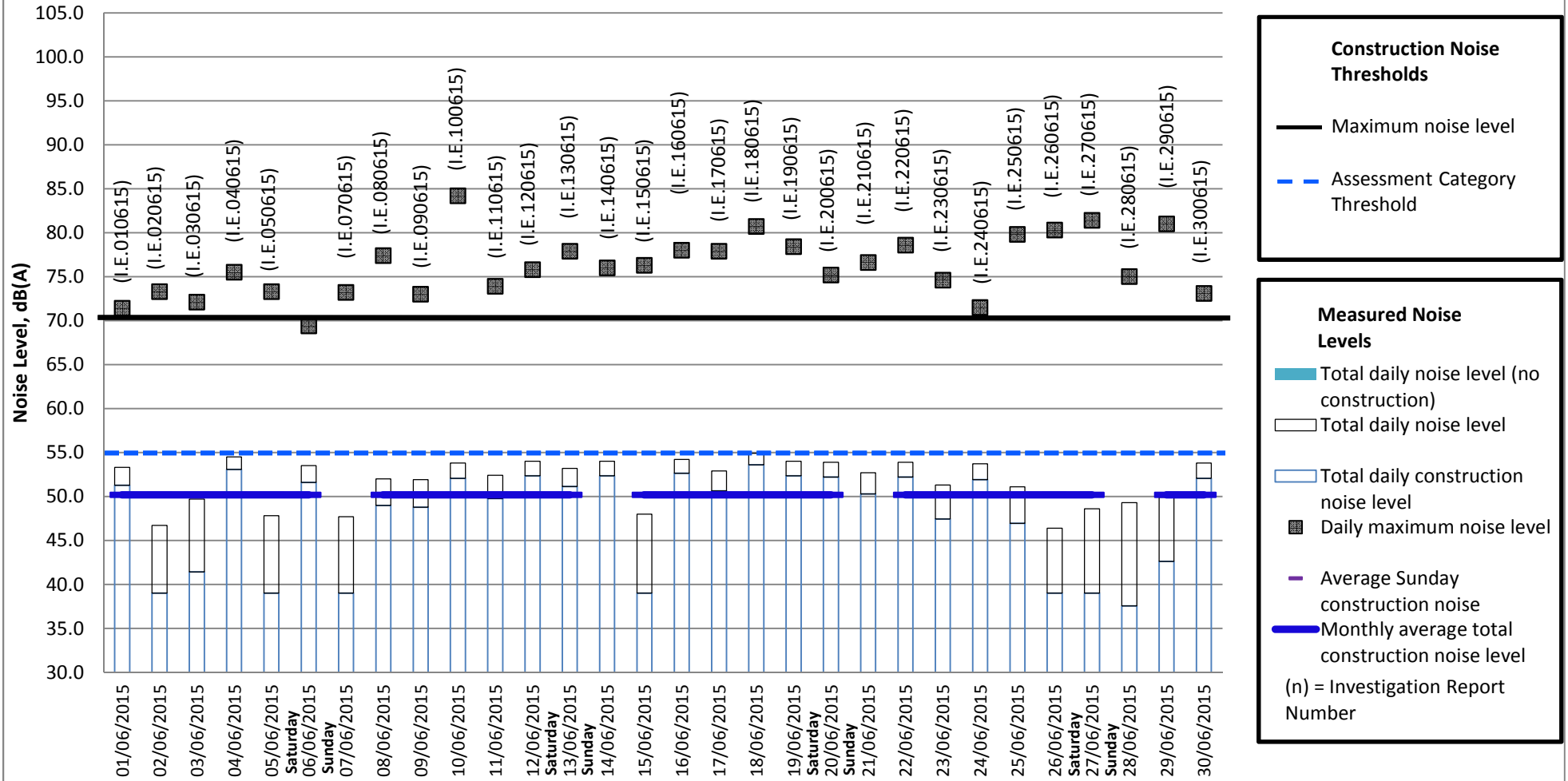
Measured Noise Levels

- 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:

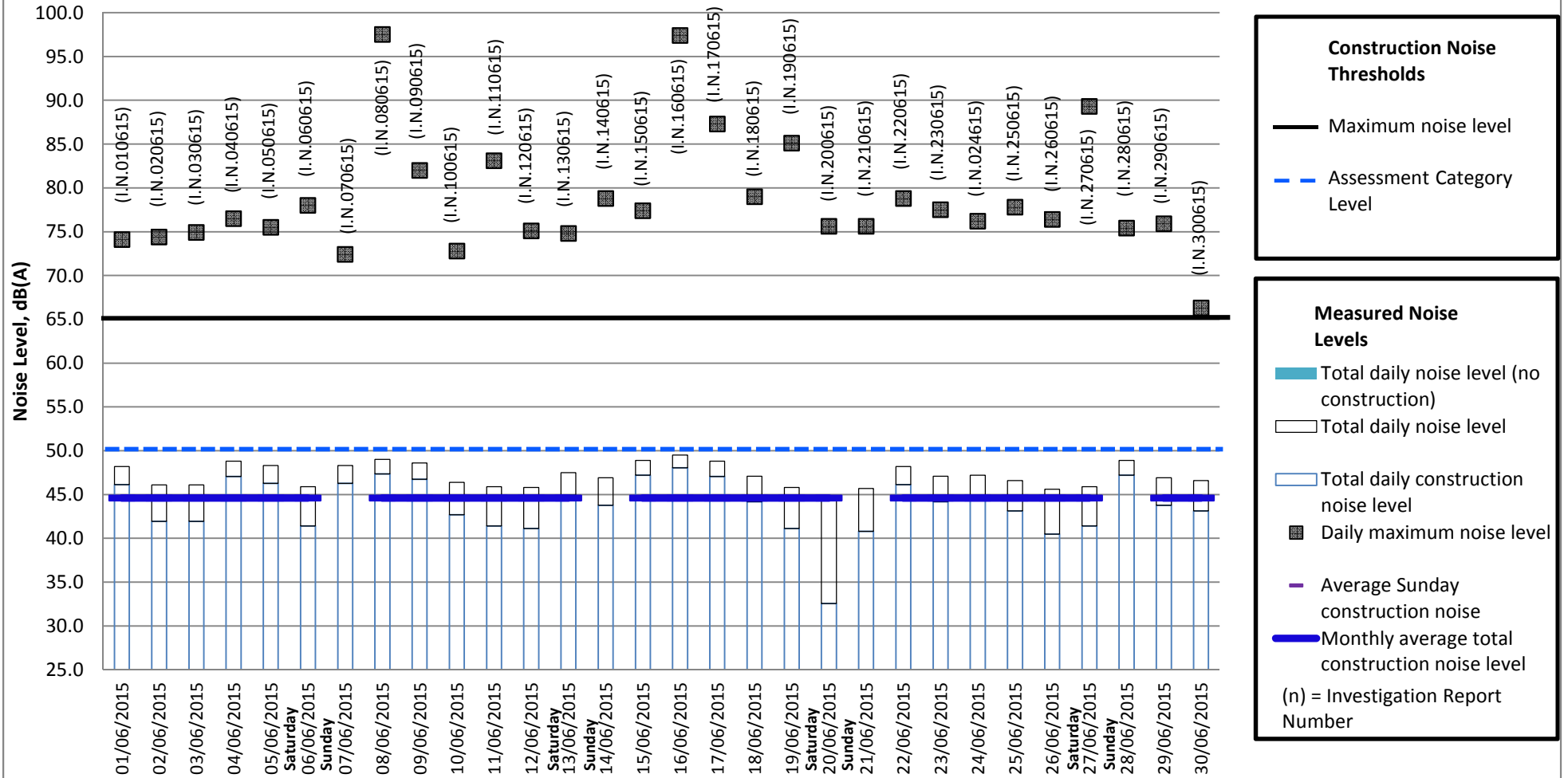
Measured Evening Noise Levels at Inchgarvie Measurement period: June 2015



Note:

Measured Night-time Noise Levels at Inchgarvie

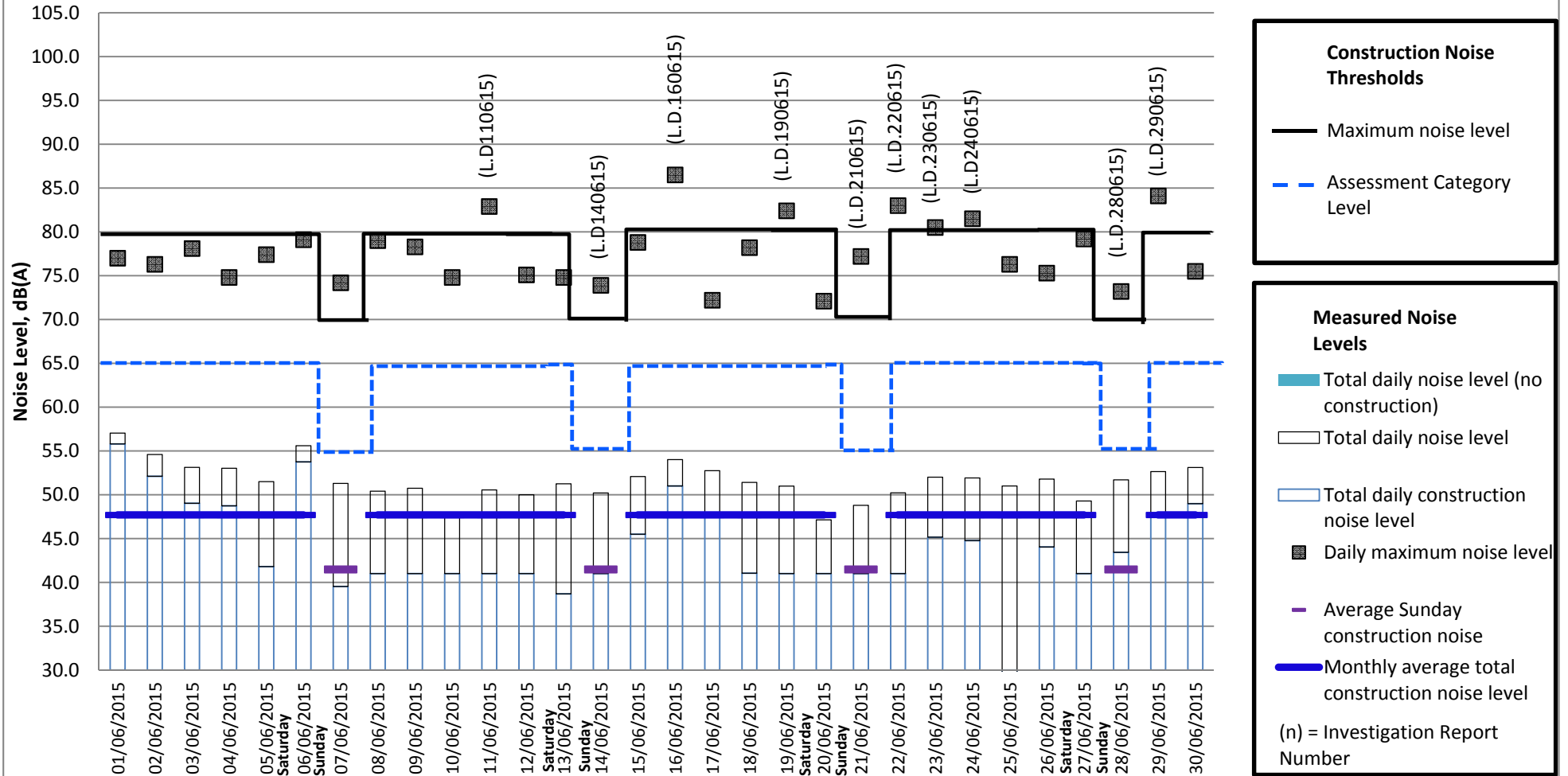
Measurement period: June 2015



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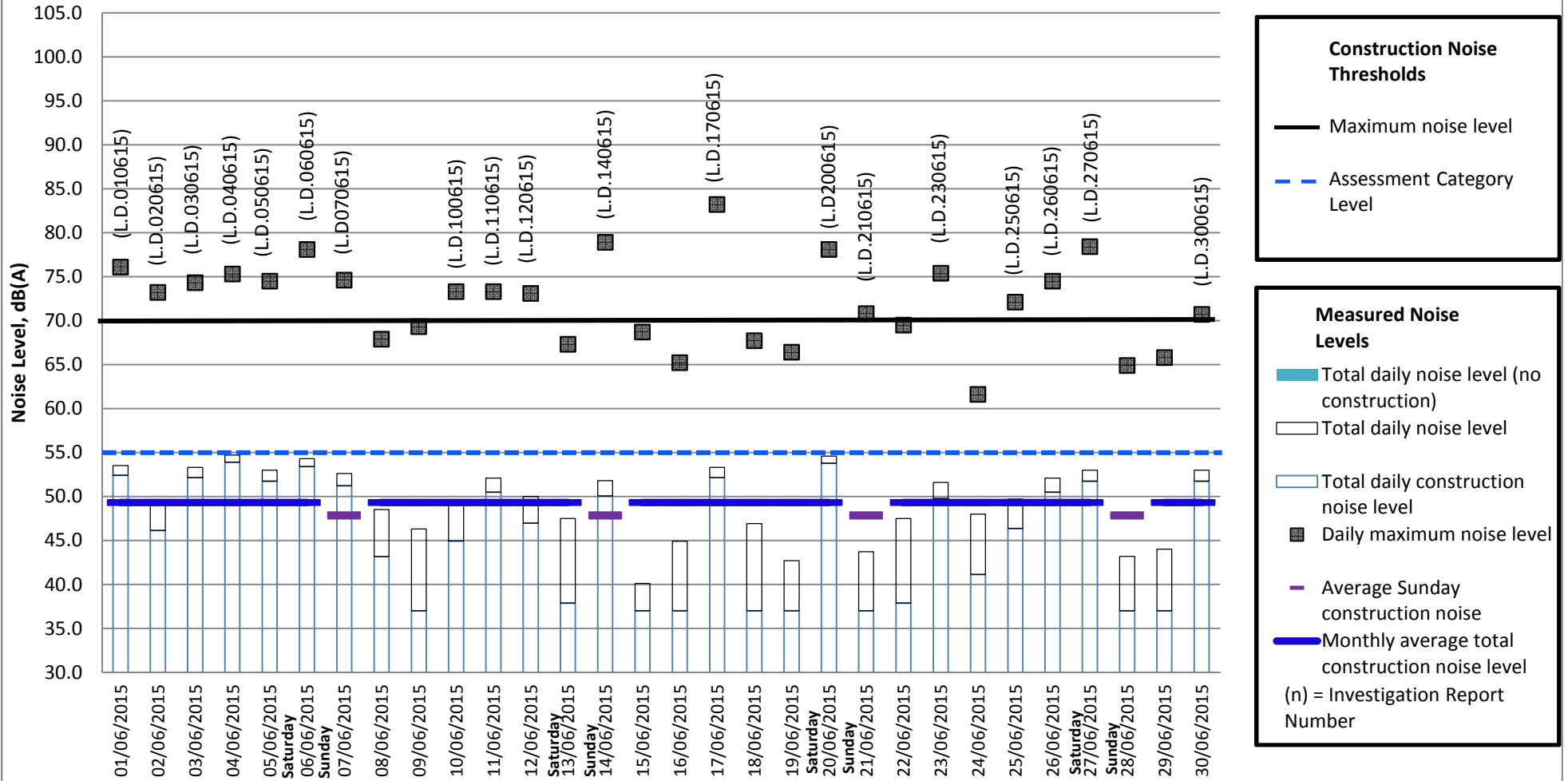
Measured Daytime Noise levels at Linn Mill

Measurement period: June 2015



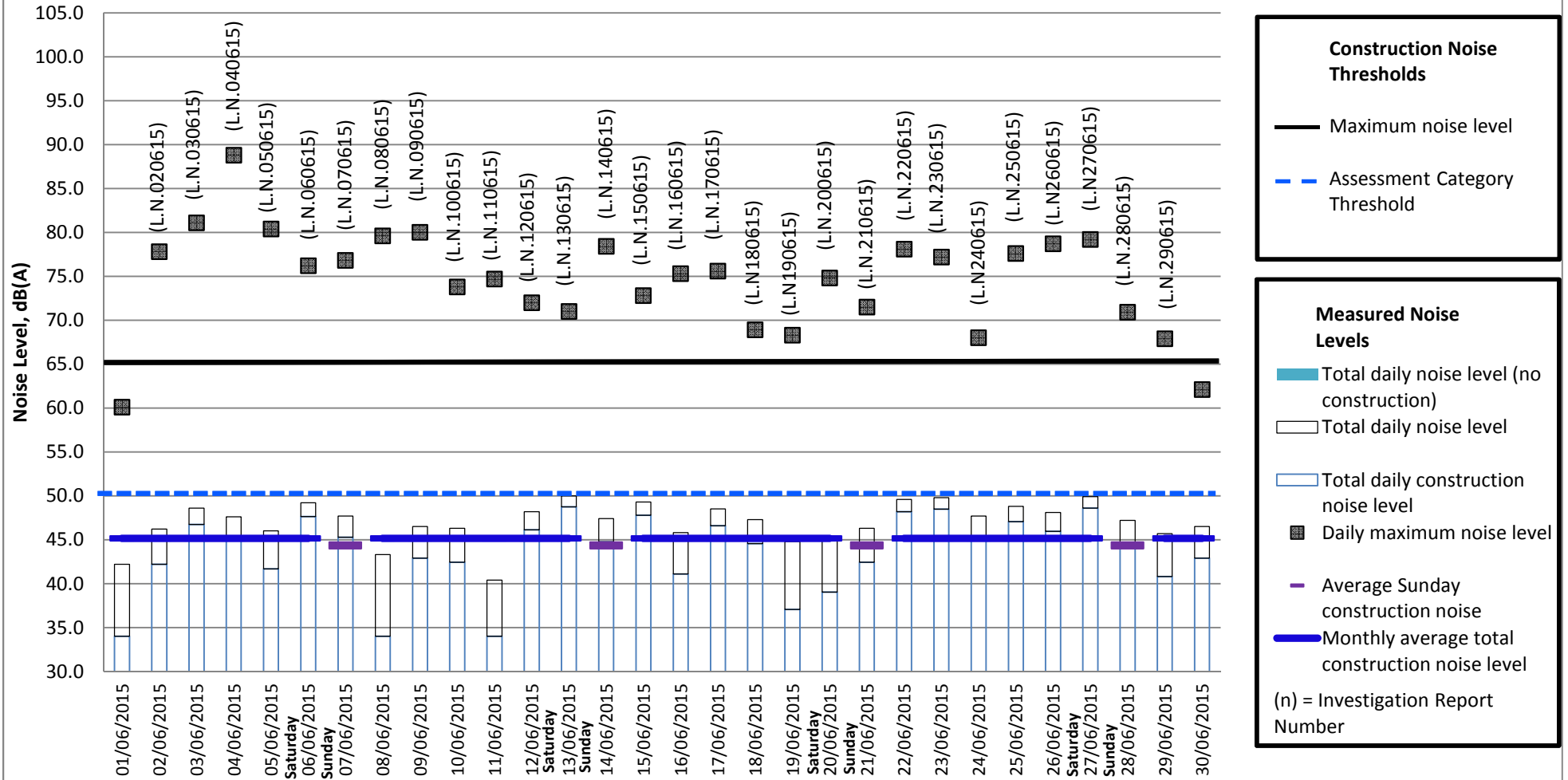
Measured Evening Noise Levels at Linn Mill

Measurement period: June 2015

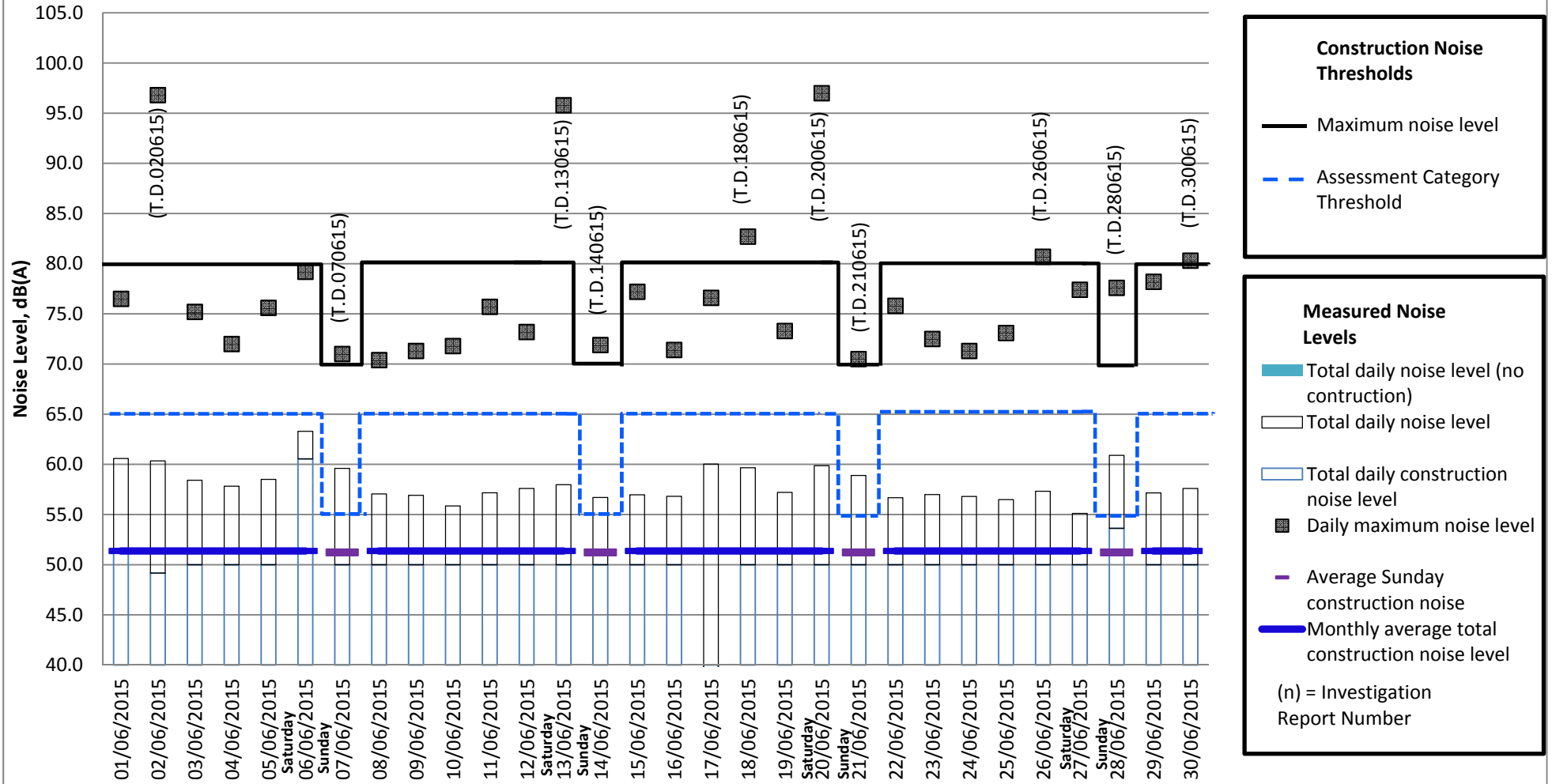


Measured Night-time Noise Levels at Linn Mill

Measurement period: June 2015

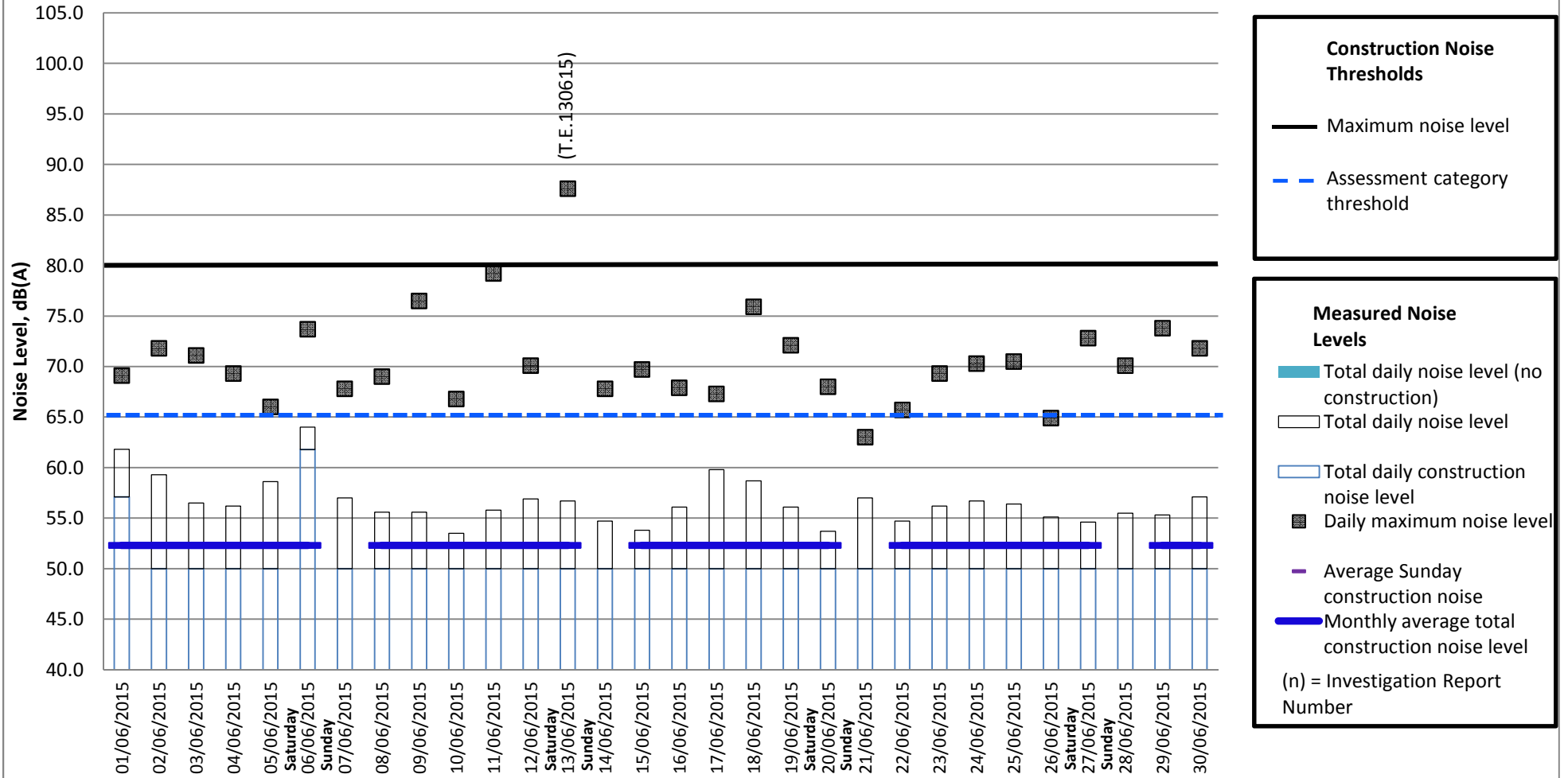


Measured Daytime Noise Levels at Tigh-Na-Grian Measurement period: June 2015



Note:

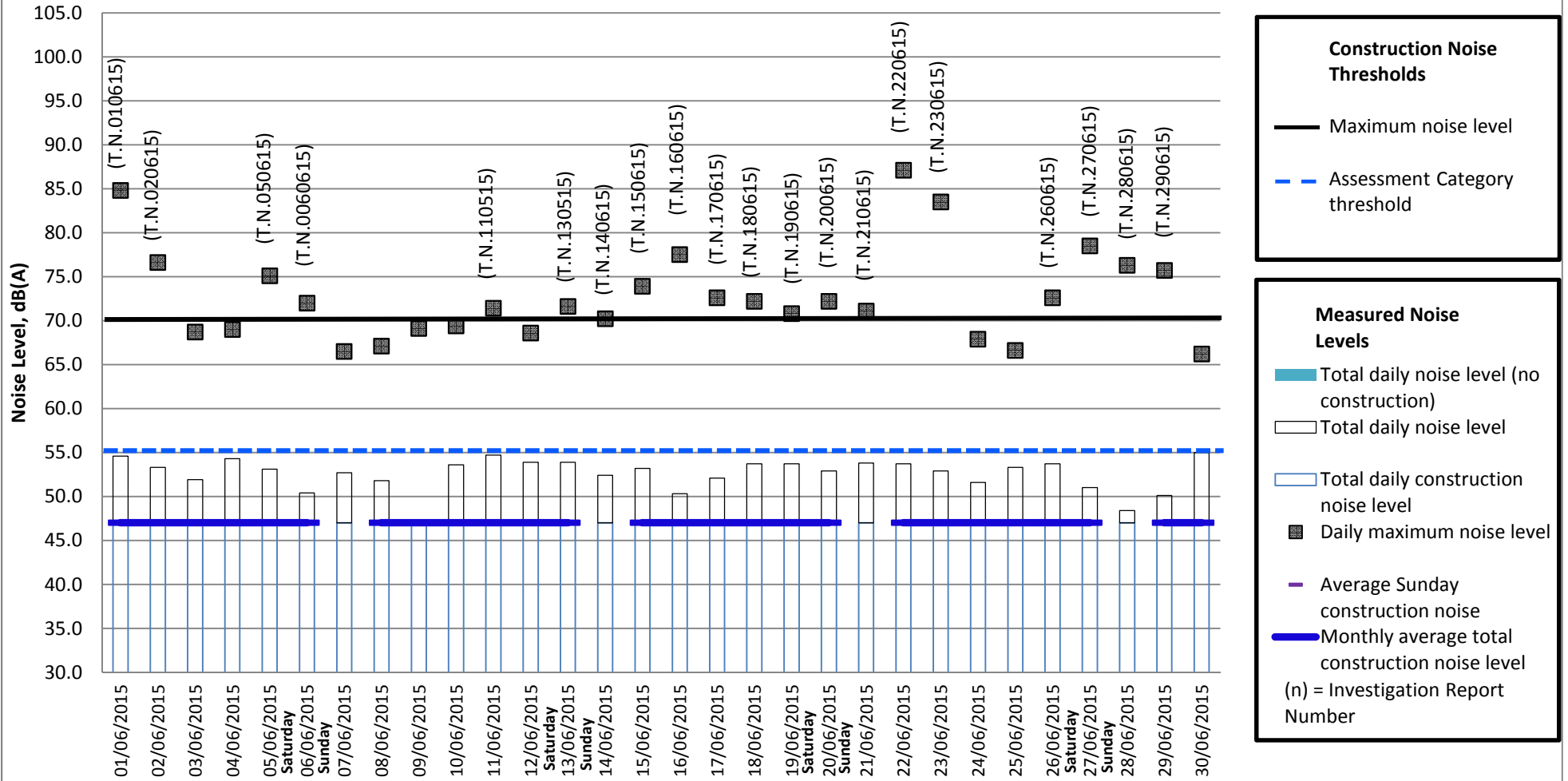
Measured Evening Noise Levels at Tigh-Na-Grian Measurement period: June 2015



Note:

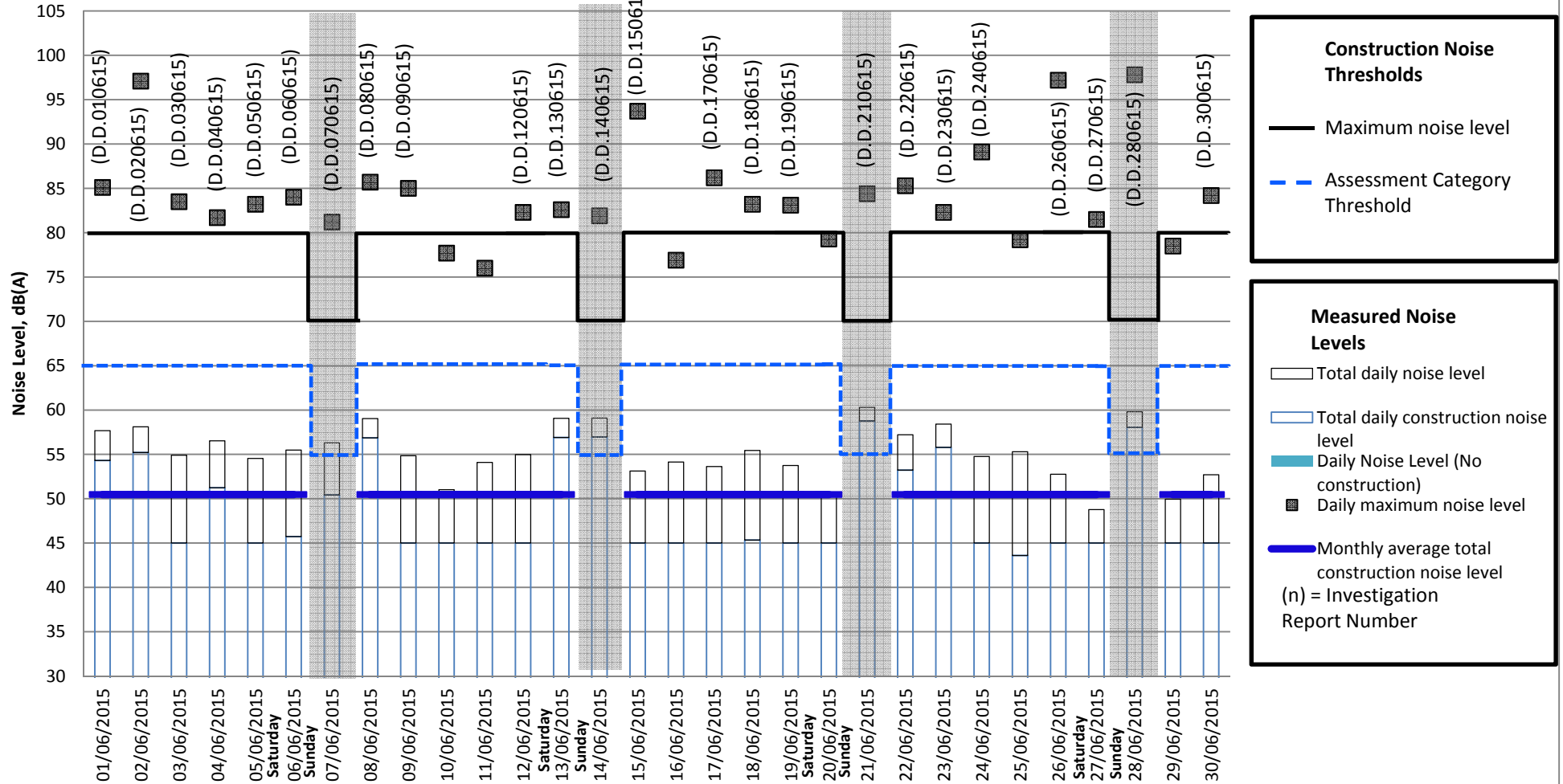
Measured Night-time Noise Levels at Tigh-Na-Grian

Measurement period: June 2015



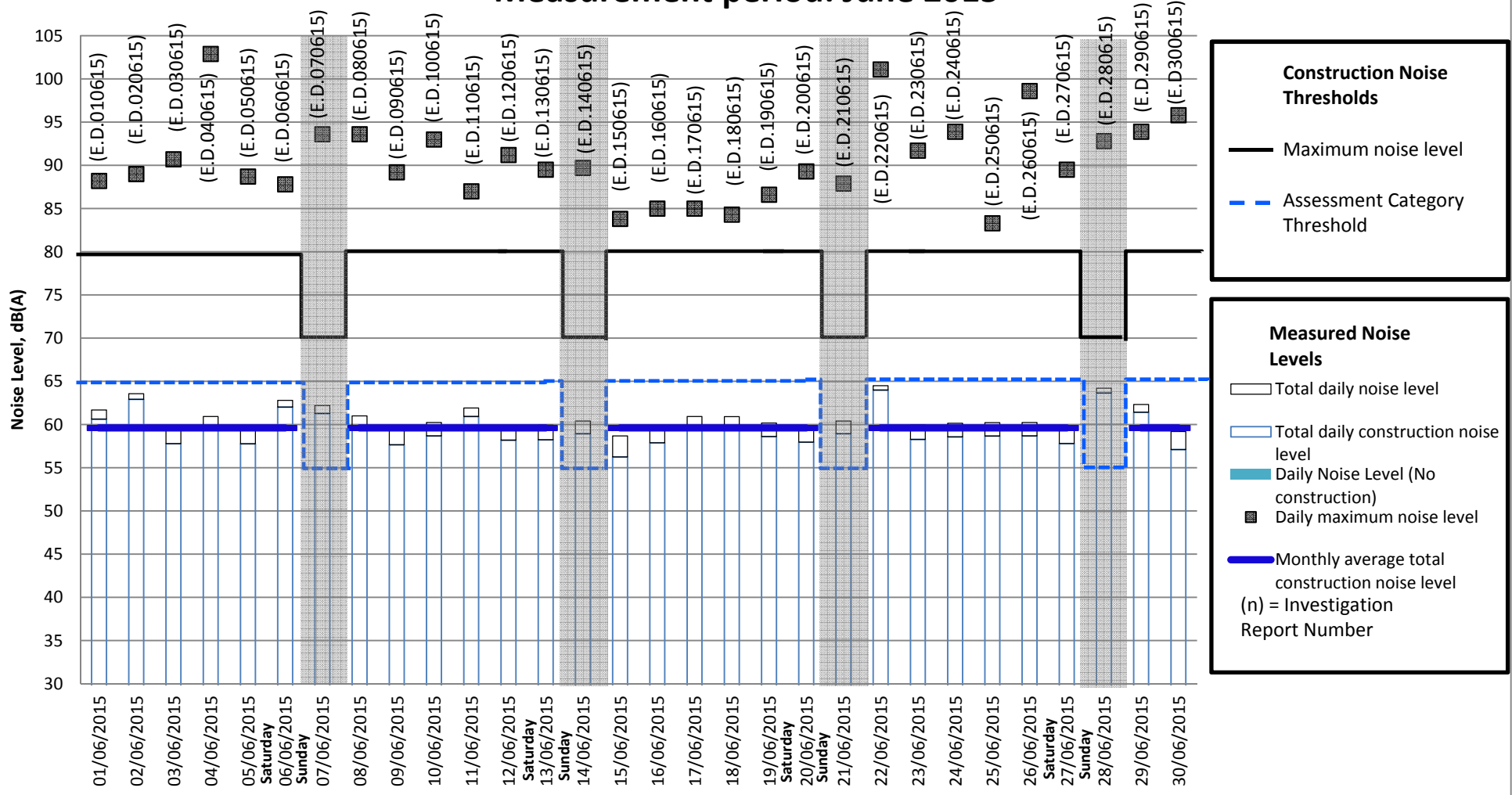
Note:

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



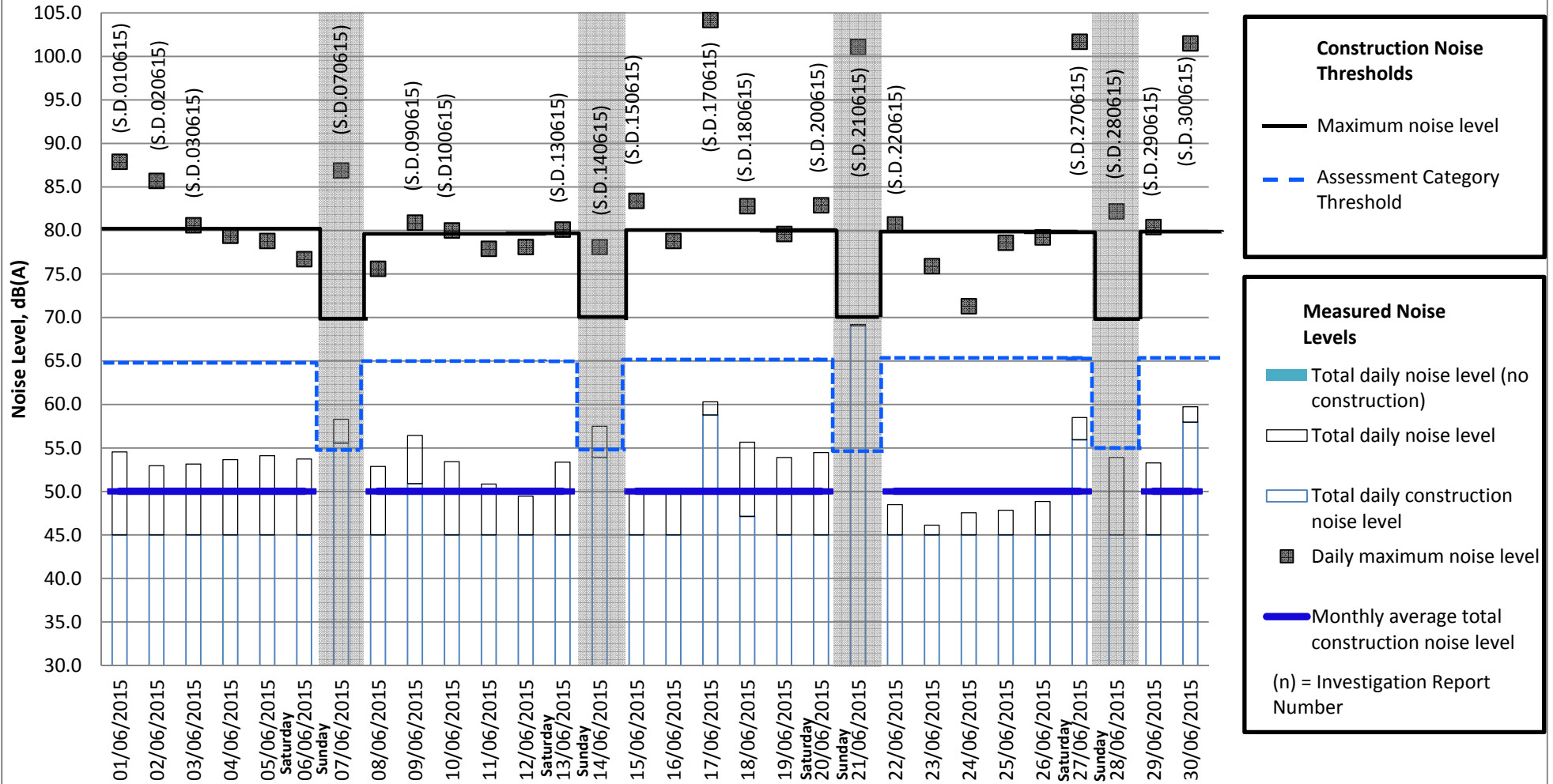
Note: The grey areas of the chart represent days on which no construction works have been undertaken at this location; no Sunday works have been undertaken at this location

Measured Daytime Noise Levels at Echline Measurement period: June 2015



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

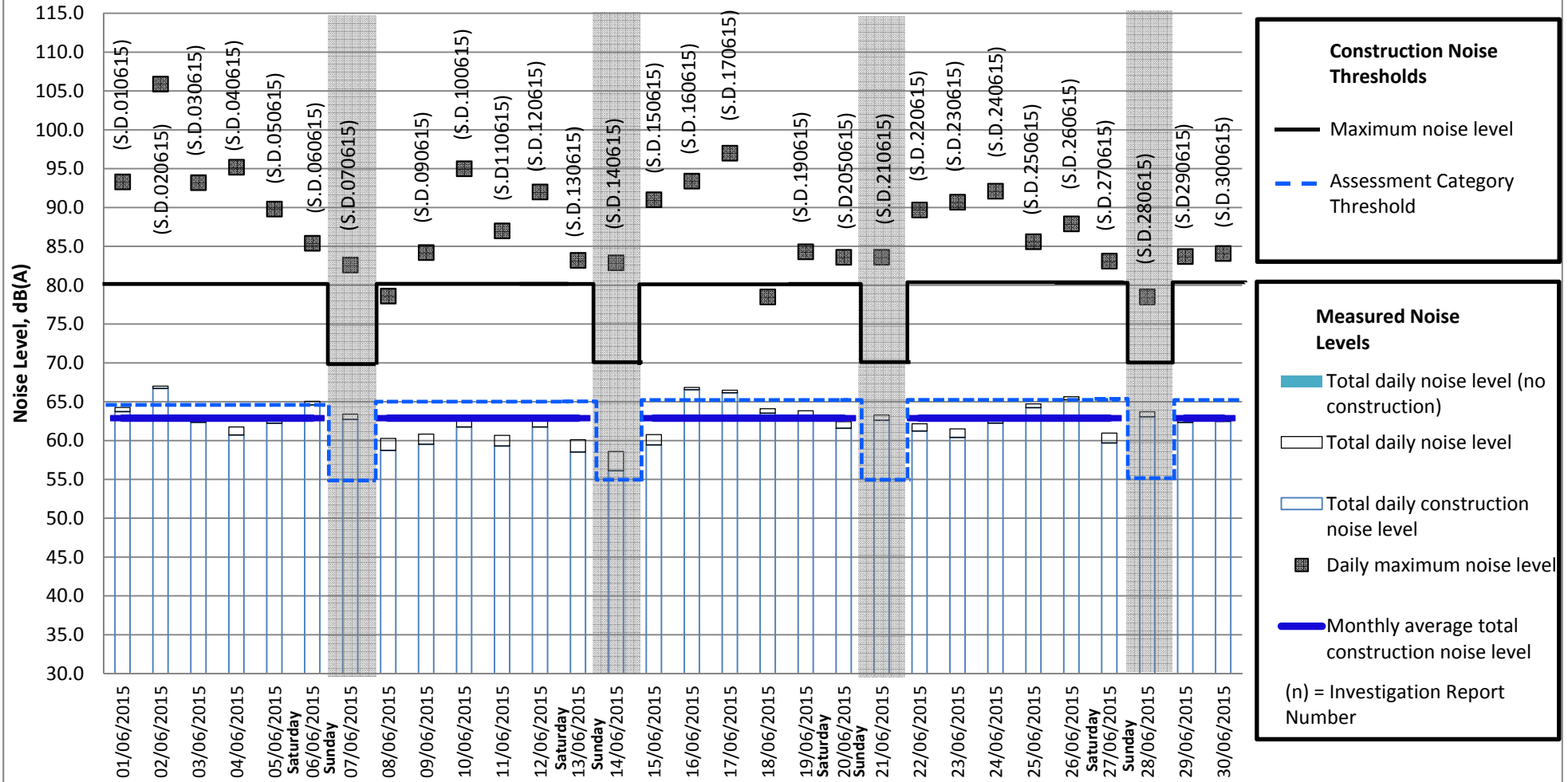
Measured Daytime Noise Levels at Springfield Measurement period: June 2015



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: June 2015



Construction Noise Thresholds

- Maximum noise level
- Assessment Category Threshold

Measured Noise Levels

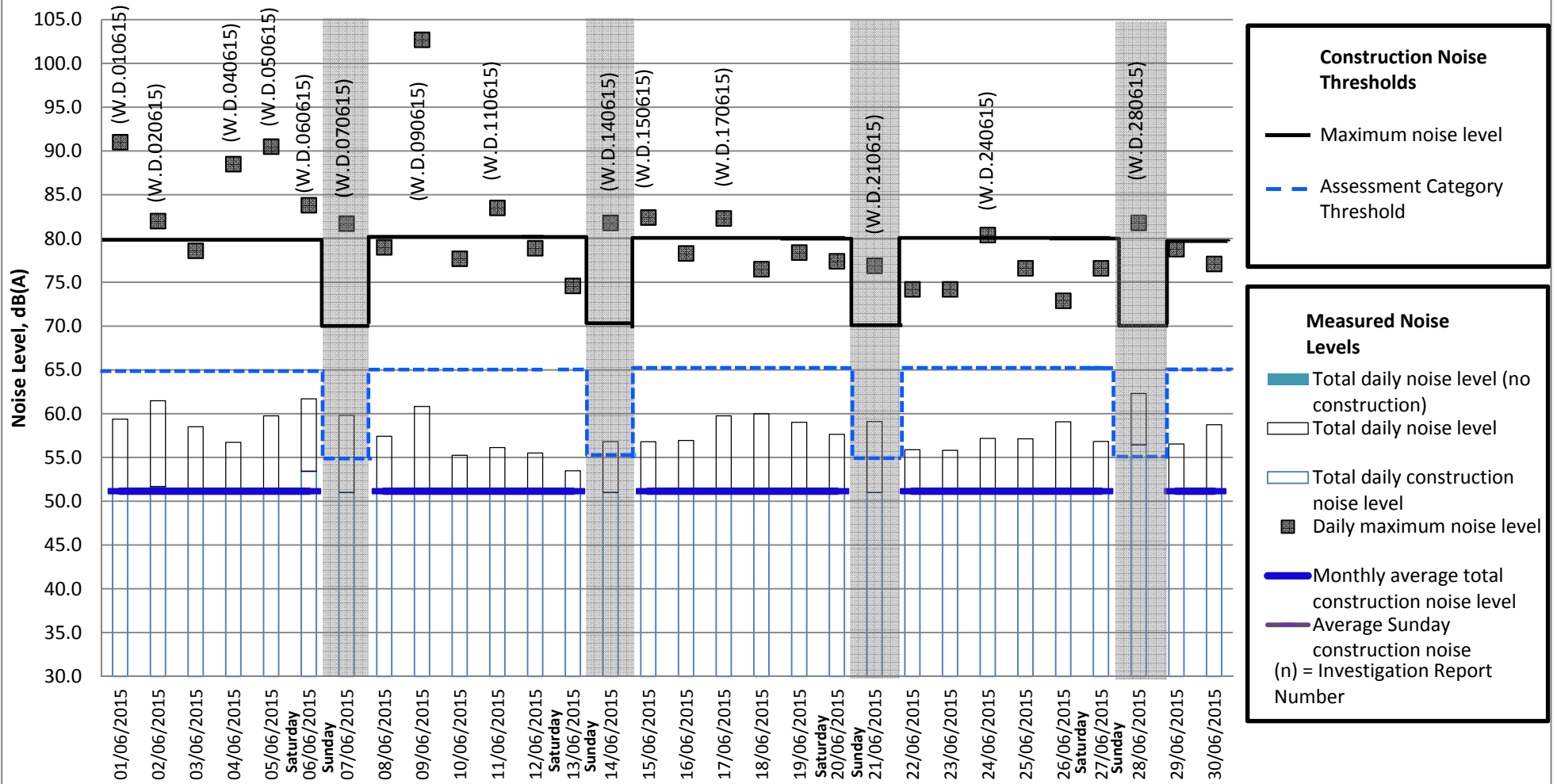
- Total daily noise level (no construction)
- Total daily noise level
- Total daily construction noise level
- Daily maximum noise level
- Monthly average total construction noise level

(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 Whinny Hill

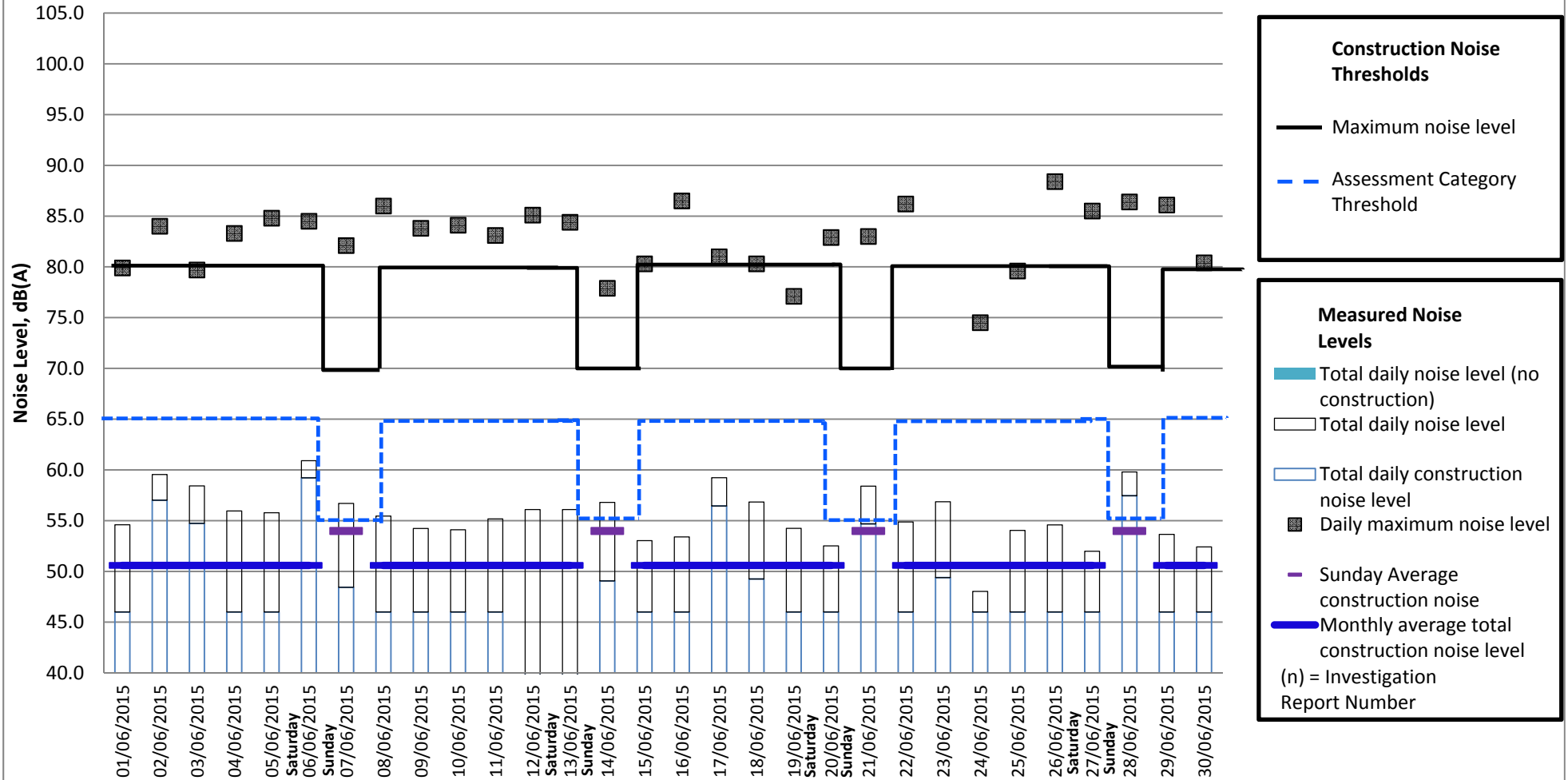
Measurement period: June 2015



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

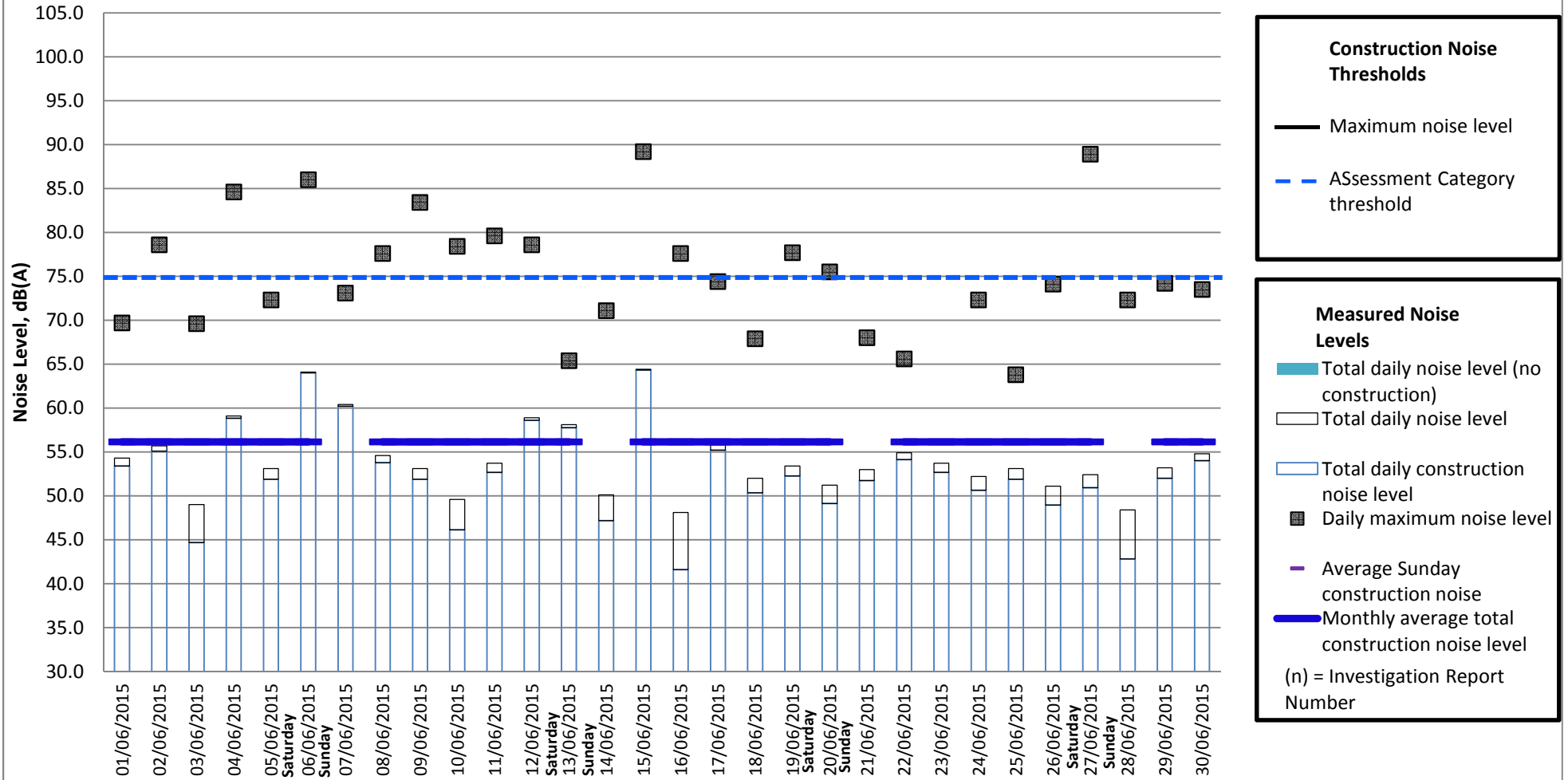
Measured Daytime Noise Levels at Port Edgar

Measurement period: June 2015



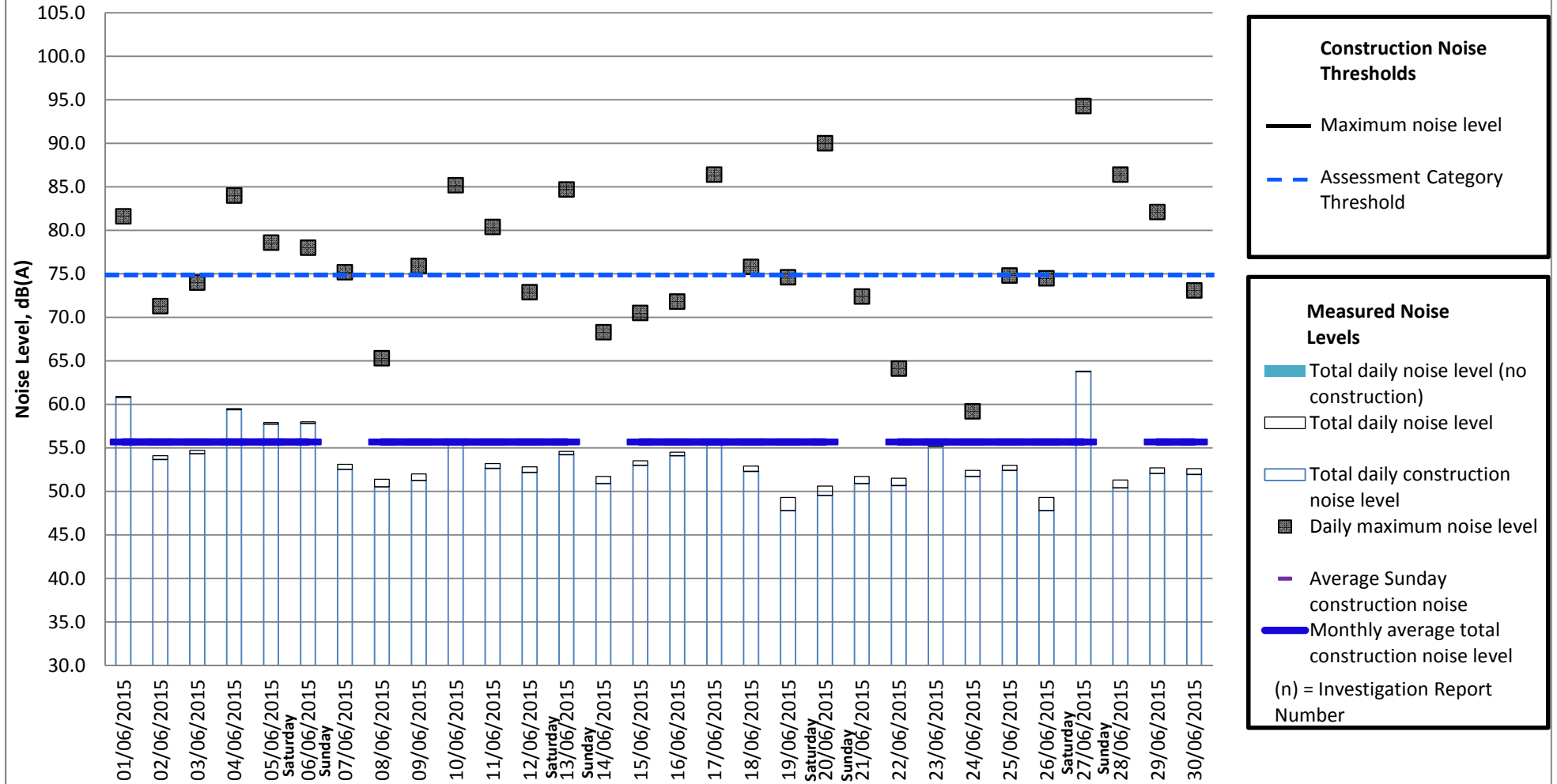
Measured Evening Noise Levels at Port Edgar

Measurement period: June 2015



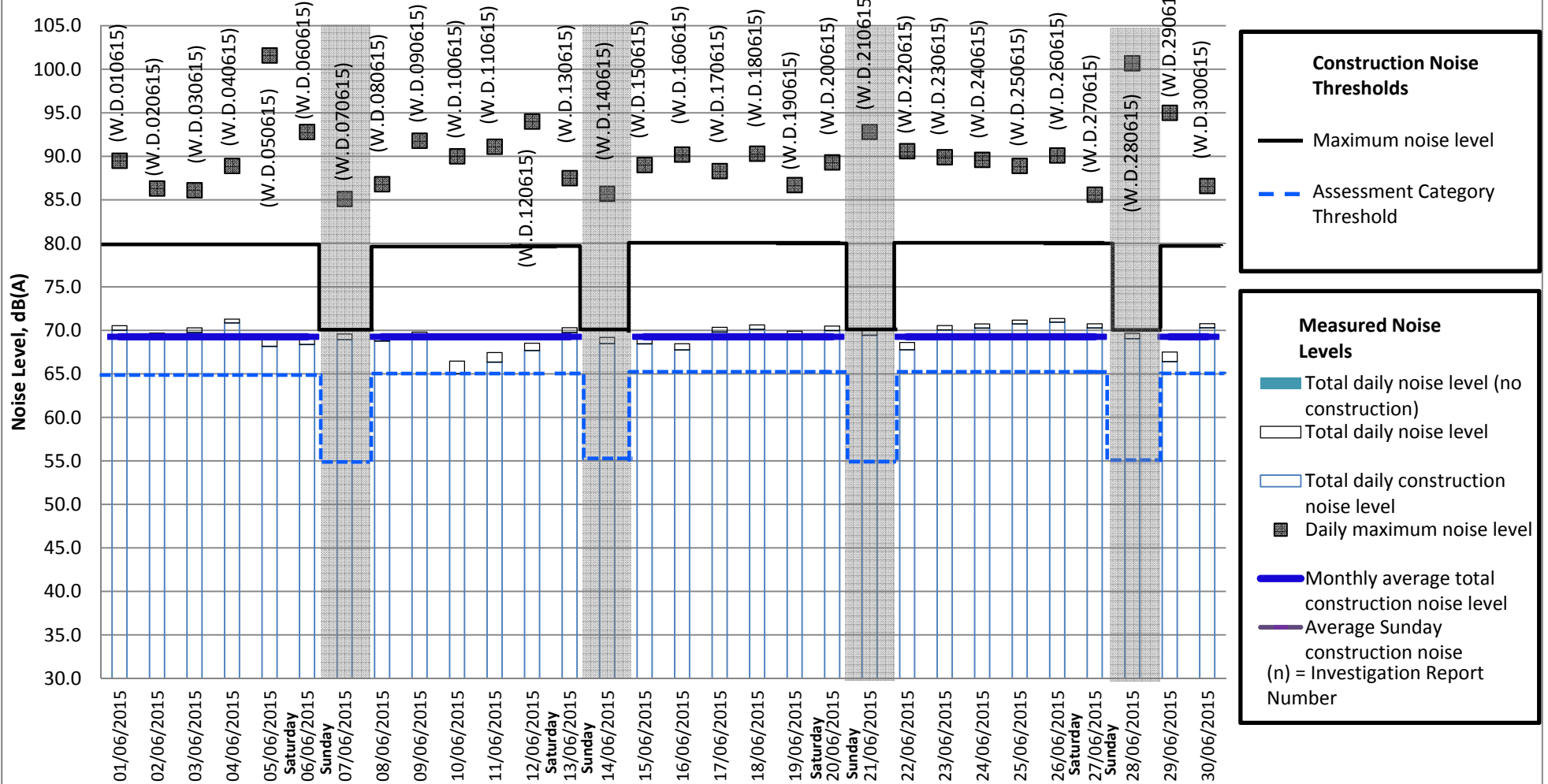
Measured Night-time Noise Levels at Port Edgar

Measurement period: June 2015



Measured Daytime Noise Levels at Newton

Measurement period: June 2015



Note: The grey areas of the chart represent days on which no construction works have been conducted. It should be noted that the measured noise levels Mon - Fri can not be attributed to construction works due to the considerable distance (1.75 kilometers) between this monitoring location and the closest construction works.