Contractor

Forth Crossing Bridge Constructors

HOCHTIEF Solutions
American Bridge International
DRAGADOS
Morrison Construction

Project

FORTH REPLACEMENT CROSSING

Document title

CONSTRUCTION NOISE MONITORING REPORT: JULY 2014

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Made by: Euan Lucas	Checked By: David Keable
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Contents

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 July 2014. The objective of this report is to detail the monitoring that has been undertaken across the site during this period and to present the construction noise monitoring results acquired for July 2014.

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 July 2014, construction noise was monitored using permanent, continuous noise monitoring devices at the locations listed in Table 1. The majority of the monitors were installed throughout November and December 2011, with additional monitors installed at Scotstoun Park (Arup's Office) and Newton during March 2012 and a further sound level meter installed at Whinny Hill during March 2012.

2.2 At some monitoring locations, the noise monitoring devices are accompanied by associated weather stations. Weather stations are present 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 July 2014. The main construction activities undertaken in the locality of each of the noise meters during the period have been listed in Table 1.

Table 1: Monitoring Locations

Ref.	Monitoring Location	Crossing or Network	Main Construction Activities During July 2014
M1	Whinny Hill	Network	• Verge filling • Rock excavation • Gantry installations
M3	Tigh-Na-Grian	Crossing	• Central Tower rebar, formwork & concreting works • North Tower rebar, formwork & concreting works • Pier N1 rebar formwork & concrete works
M4	North Leg	Crossing	• Central Tower rebar, formwork & concreting works • North Tower rebar, formwork & concreting works • Pier rebar formwork & concrete works
M6	Port Edgar	Crossing	• Central Tower rebar, formwork & concreting works • South Tower rebar, formwork & concreting works • Pier S1 de-stressing wells work • Pier S2 excavation • Pier S3 excavation • Pier S5 rebar, formwork & concreting works • Pier S6 rebar, formwork & concreting works • Bearing fitting at Piers S7 and S8
M7	Butlaw Fisheries	Crossing	• Central Tower rebar, formwork & concreting works • South Tower rebar, formwork & concreting works • Pier S1 de-stressing wells work • Pier S2 excavation • Pier S3 excavation • Pier S5 rebar, formwork & concreting works • Pier S6 rebar, formwork & concreting works • Bearing fitting at Piers S7 and S8
M10	Inchgarvie Lodge	Crossing	• Central Tower rebar, formwork & concreting works • South Tower rebar, formwork & concreting works • Pier S1 de-stressing wells work • Pier S2 excavation • Pier S3 excavation • Pier S5 rebar, formwork & concreting works • Pier S6 rebar, formwork & concreting works • Bearing fitting at Piers S7 and S8 • Launch – install plates to props, king post works and structural steel works
M11	Linn Mill	Network (close proximity to Crossing)	• Launch – install plates to props, king post works and structural steel works • Pier S5 rebar, formwork & concreting works • Pier S6 rebar, formwork & concreting works • Bearing fitting at Piers S7 and S8 • N.B. No night time or Sunday daytime construction in vicinity.

M13	Clufflat Brae	Crossing	• Launch – install plates to props, king post works and structural steel works • N.B. No night time or Sunday daytime construction in vicinity.
M14	Springfield	Network	• Launch – install plates to props, king post works and structural steel works N.B. No night time or Sunday daytime construction in vicinity.
M15	Echline Field	Network	• Launch – install plates to props, king post works and structural steel works • Gyratory – cut batters/shaping rock • A904 tie in road works, including verge fill, kerbing and placing/trimming of type 1 sub-base for footpath N.B. No night time or Sunday daytime construction in vicinity.
M16	Scotstoun	Network	• Utilities works • Structure works • Brash removal • Gantry installation • Safety Barrier installation
M17	Dundas Home Farm	Network	• Utility works • Fill south bund/landscape • Planting • BP Speciality works N.B. No night time or Sunday daytime construction in vicinity.
M18	Newton	Network	• No works

3 Noise Monitoring Results

3.1 All noise monitoring results for construction days have been presented in charts using the template provided in the Construction Noise Monitoring Information Note, as available on the project website (http://www.transportscotland.gov.uk/files/documents/projects/forth-replacement/FRC_Construction_Noise_Monitoring_Information_Note_2_.pdf). All charts can be found in the appendices of this report.

3.2 With regard to the noise monitoring results charts, 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, however, are undertaken during the daytime only. The inclusion of data in the graphs reflects this. Although Linn Mill is considered as a network location, the potential for marine works near the south shore to be heard has been recognised. As a result, evening and night time data has been included for this location although no network connection construction activities have been undertaken during these periods.

- Noise data for days, evening and nights on which no construction works were conducted have been excluded from the monthly average results presented in the graph. Additionally, no investigations into the L_{AFmax} exceedances during these periods have been made as they would have been caused by non-construction related factors. However, noise results (L_{Aeq} and L_{AFmax}) for any days, evenings and nights 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 on the graphs where applicable; in locations where no Sunday works have been undertaken no average is shown.

- As set out in the CoCP, the assessment time for evening, nights and Sunday daytime is 1 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.

- Where noise data is missing for days, evening or nights during which construction works were conducted, this has been indicated. Results for Northleg are unavailable due to inaccessibility of the location. Due to power issues at Port Edgar there is data missing from 01/07/14 – 05/07/14. These issues have since been resolved.

3.3 Results demonstrate that the monthly average total construction noise results for daytime were within the threshold levels for all monitoring locations for July 2014, with the exception of Scotstoun For the evening period, all monitoring locations were within the threshold levels. For the night time periods, there were exceedances at location; Butlaw Fisheries. With regard to the Sunday averages (for applicable monitoring locations), there were exceedances of night time Sunday averages at Inchgarvie, Butlaw Fisheries, Clufflat and Tigh-Na-Grian.

3.4 The exceedances noted are not thought to have been caused by increased noise levels due to construction. Each of the exceedances of the averages and Sunday averages, with the exception of the daytime averages at Scotstoun, were found to be affected by increased noise levels due to periods of adverse weather and traffic. Audio demonstrates that the increased levels were caused by waves and birds at Butlaw Fisheries and raindrops at Linn Mill and strong wind have also contributing to increased levels at these locations. Inchgarvie Lodge had a number of exceedances due to residential activity. Clufflat has also had increased residential activity on a Sunday. With regard to the averages reported for evening, night time and Sunday 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 The exceedance of the daytime average at Scotstoun is due to increased background noise levels due to the location of the meter directly adjacent to the road. The average for July is consistent with levels for previous months.

3.6 During July 2014, some exceedances of the maximum noise thresholds also 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. Where the exceedances are due to construction works, a detailed NVIR has been completed which details the results of the investigation in addition to any additional mitigation measures required.

3.7 The majority of exceedances at all locations were caused by factors including periods of adverse weather, localised noises at nearby properties and bird calls. 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 high tide.

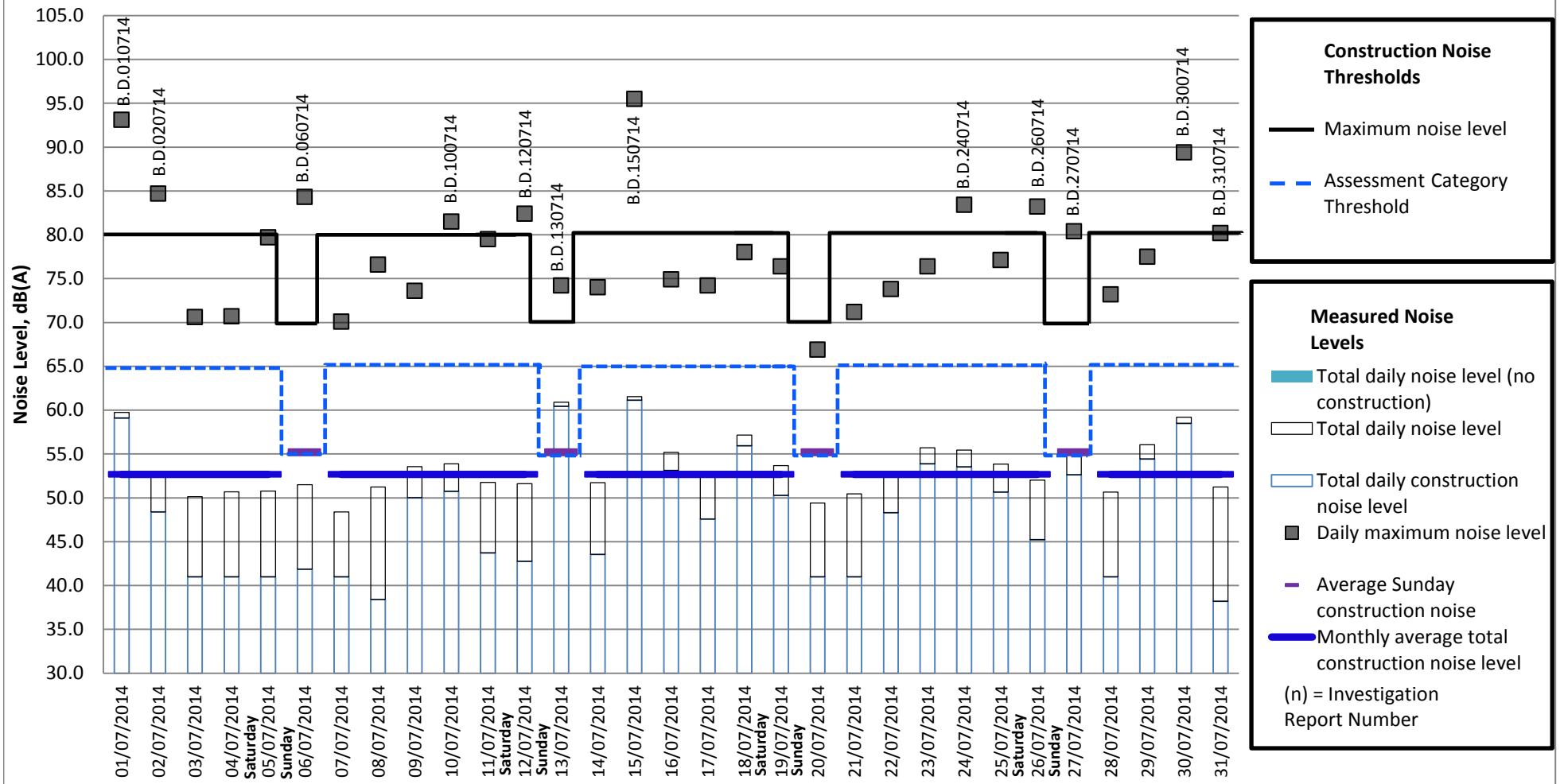
3.8 A summary of the findings for exceedances occurring at each of the locations can be found in Table 2.

Table 2: Summary of Exceedances at Monitoring Locations

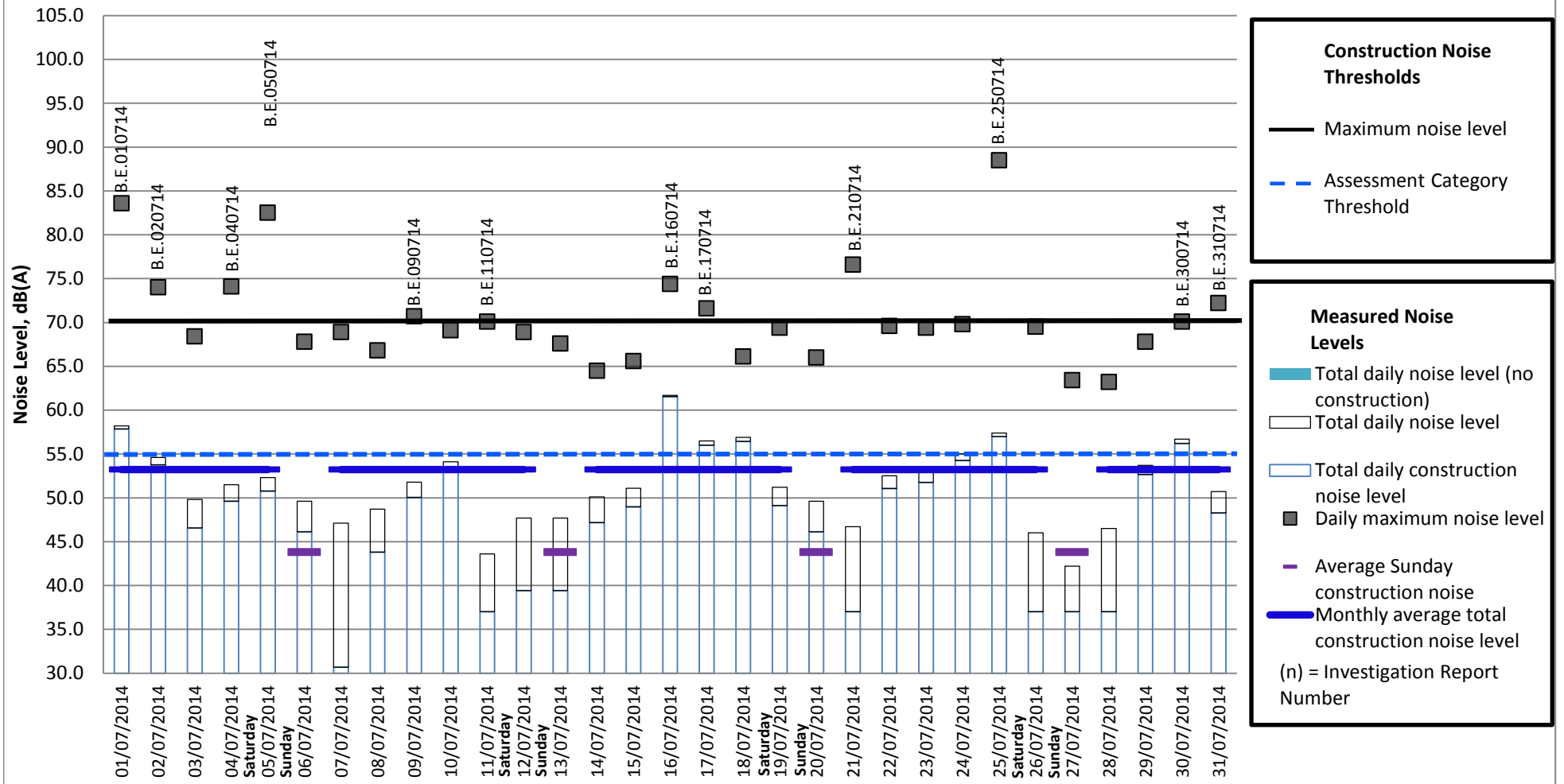
Monitoring Location	Summary of Exceedance Details
Butlaw Fisheries	During July the maximum noise threshold was exceeded on 53 occasions (daytime, 12; evening, 12; night time, 29). The majority of exceedances were attributed to non-construction factors, including waves, planes, cars and birds. There were 3 isolated metallic bangs during the Night period most likely caused by excavation at S3. As the nearest sensitive receptor has shown to have a 5dB decrease it would not cause an exceedance.
Clufflat Brae	During July the maximum noise threshold was exceeded on 45 occasions (daytime, 5; evening, 18; night time, 22). No exceedances were found to be due to construction works. Exceedances were found to be largely due to birds and residential activity.
Inchgarvie Lodge	During July the maximum noise threshold was exceeded on 54 occasions (daytime, 14; evening, 18; night time, 22). No exceedances were attributed to construction works. Investigations found residential activities and birds to be the main contributing factors to the exceedances at this location.
Linn Mill	During July the maximum noise threshold was exceeded on 41 occasions (daytime, 3; evening, 7; night time, 31). 2 construction related exceedance was recorded at this location during the day time due to movement of material opposite the monitor. However, the exceedances at this location were largely due to birds.
Tigh-Na-Grian	During July the maximum noise threshold was exceeded on 38 occasions (daytime, 14; evening, 2; night time, 22). Exceedances were due to non-construction factors, mainly birds.
Dundas Home Farm	During July the maximum noise threshold was exceeded on 9 occasions. These exceedances were not caused by the works. The exceedances were due to lawnmowers, helicopters, airplanes, and residents.
Echline	During July the maximum noise threshold was exceeded on 24 occasions. Exceedances were largely attributed to vehicles passing by on the adjacent roads and local residents. However, 1 exceedance was recorded on 04/07/14 due to line marking activity on the A904 East.
Scotstoun	During July the maximum noise threshold was exceeded on 27 occasions. No exceedances were due to construction. Exceedances were largely attributed to vehicles passing by on the adjacent road.
Whinny Hill	During July the maximum noise threshold was exceeded on 13 occasions. Exceedances were not due to construction activities. Exceedances were due to a range of factors such as different vehicles of transportation and birds.

APPENDIX A

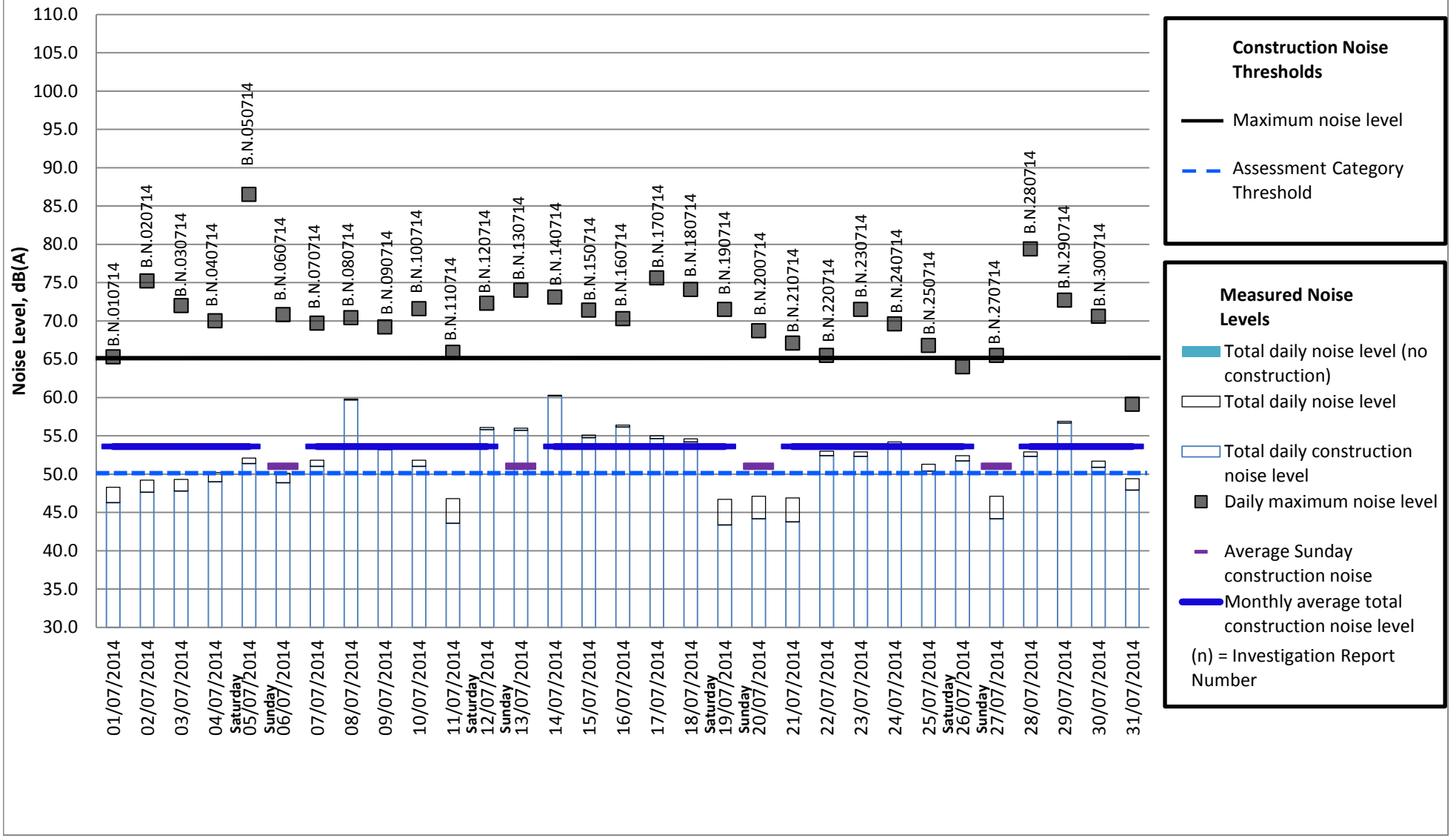
Measured Daytime Noise Levels at Butlaw Fisheries
Measurement period: July 2014



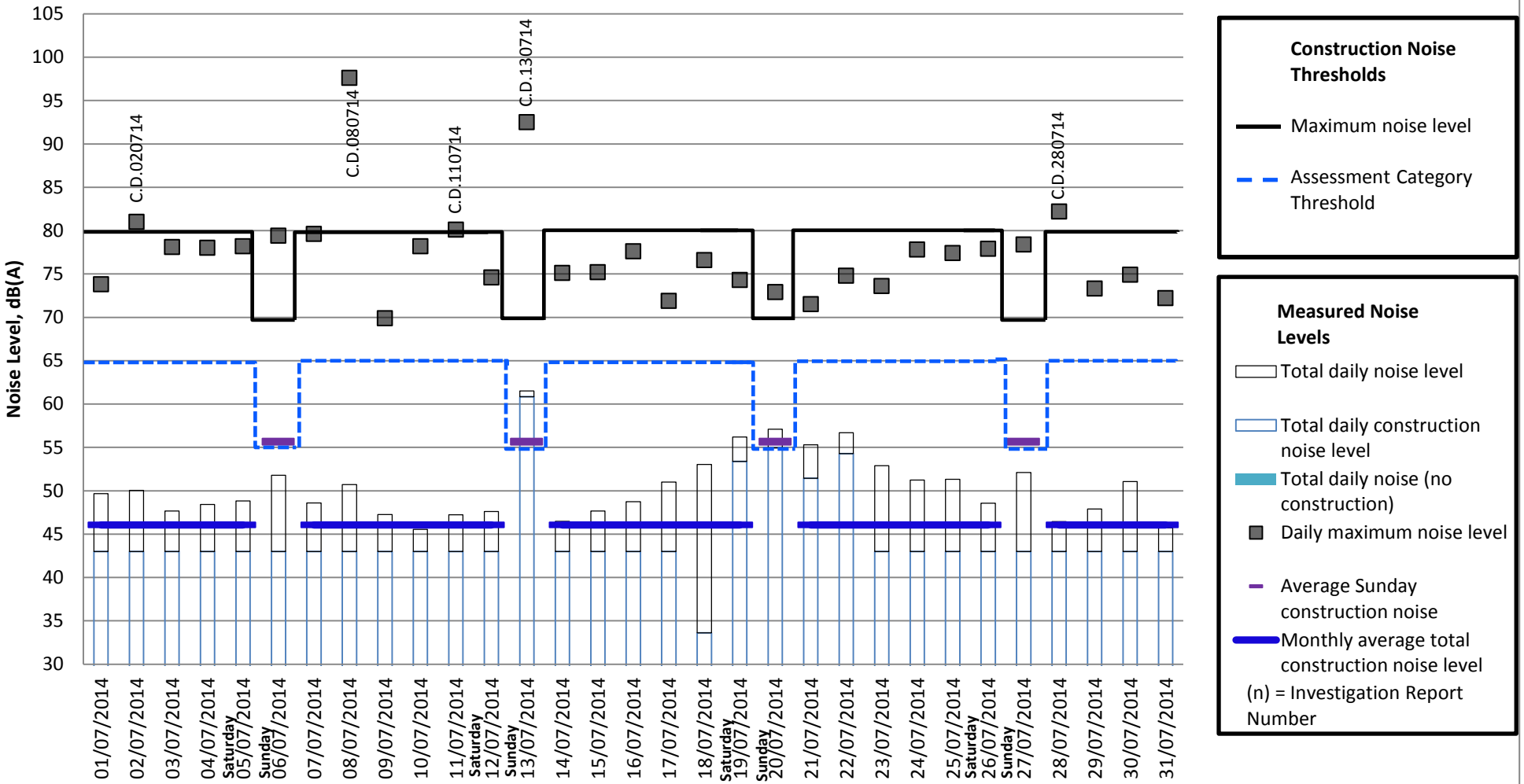
Measured Evening Noise Levels at Butlaw Fisheries
Measurement period: July 2014



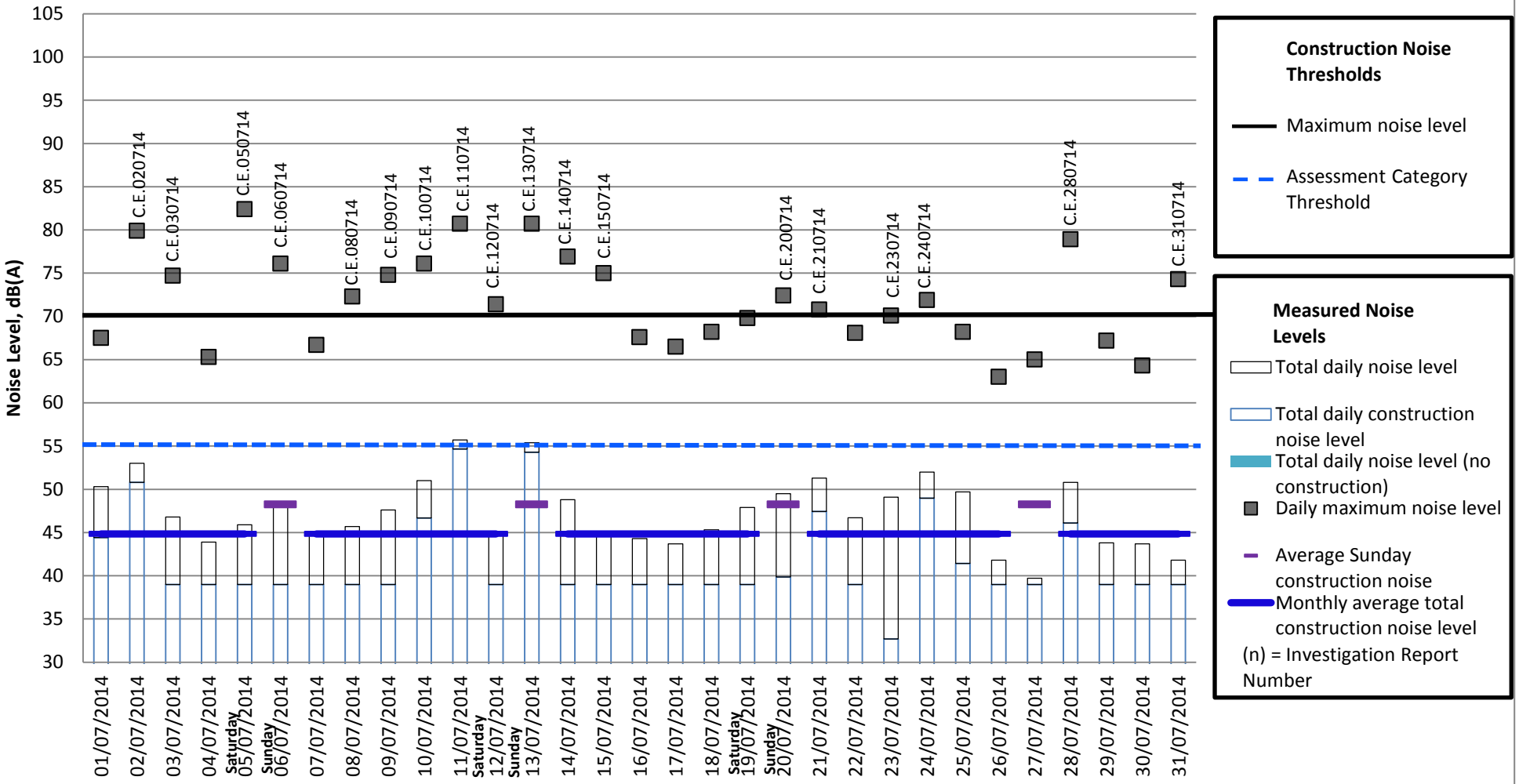
Measured Night time Noise Levels at Butlaw Fisheries
Measurement period: July 2014



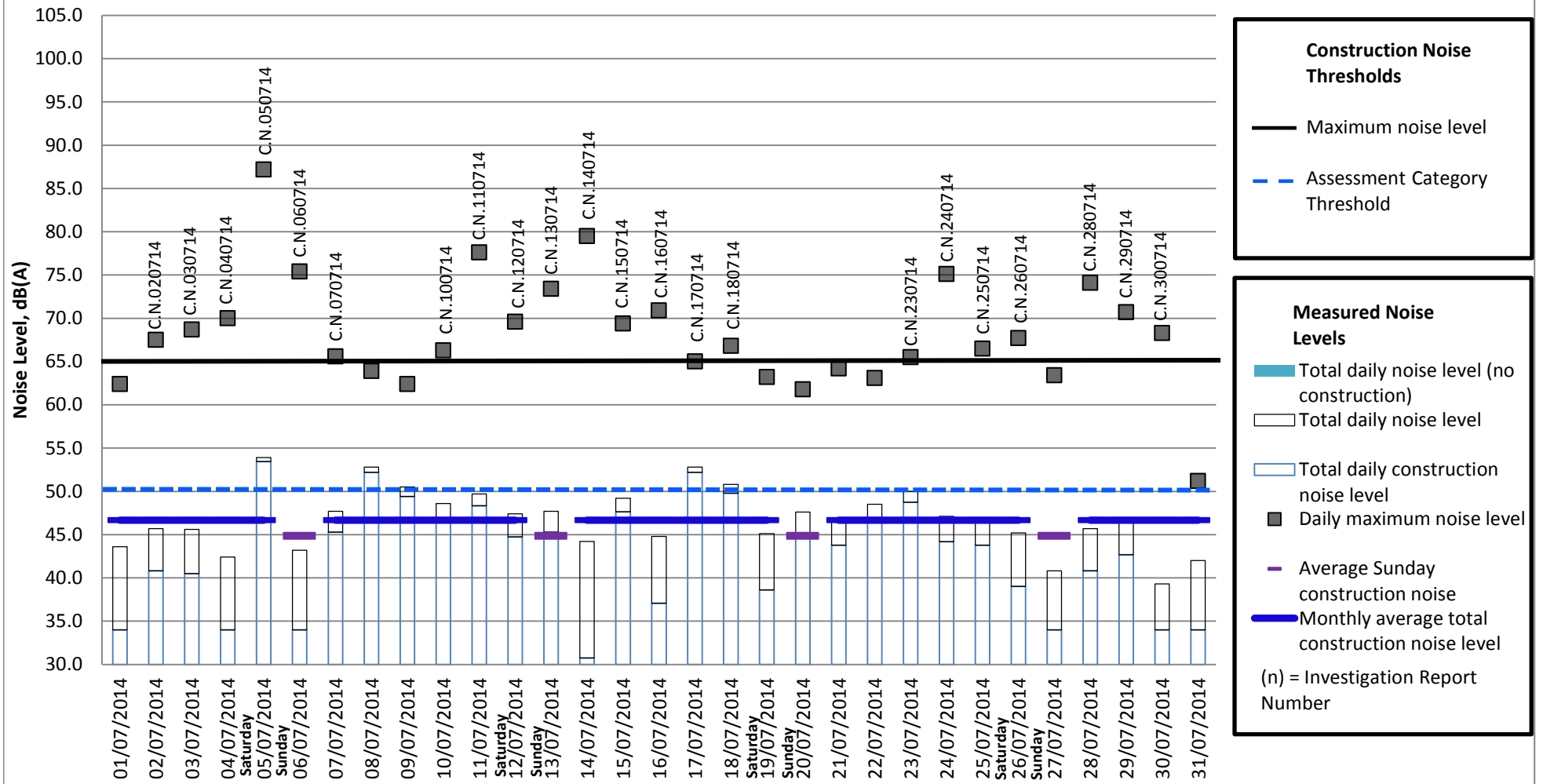
Measured Daytime Noise Levels at Clufflat Brae
Measurement period: July 2014



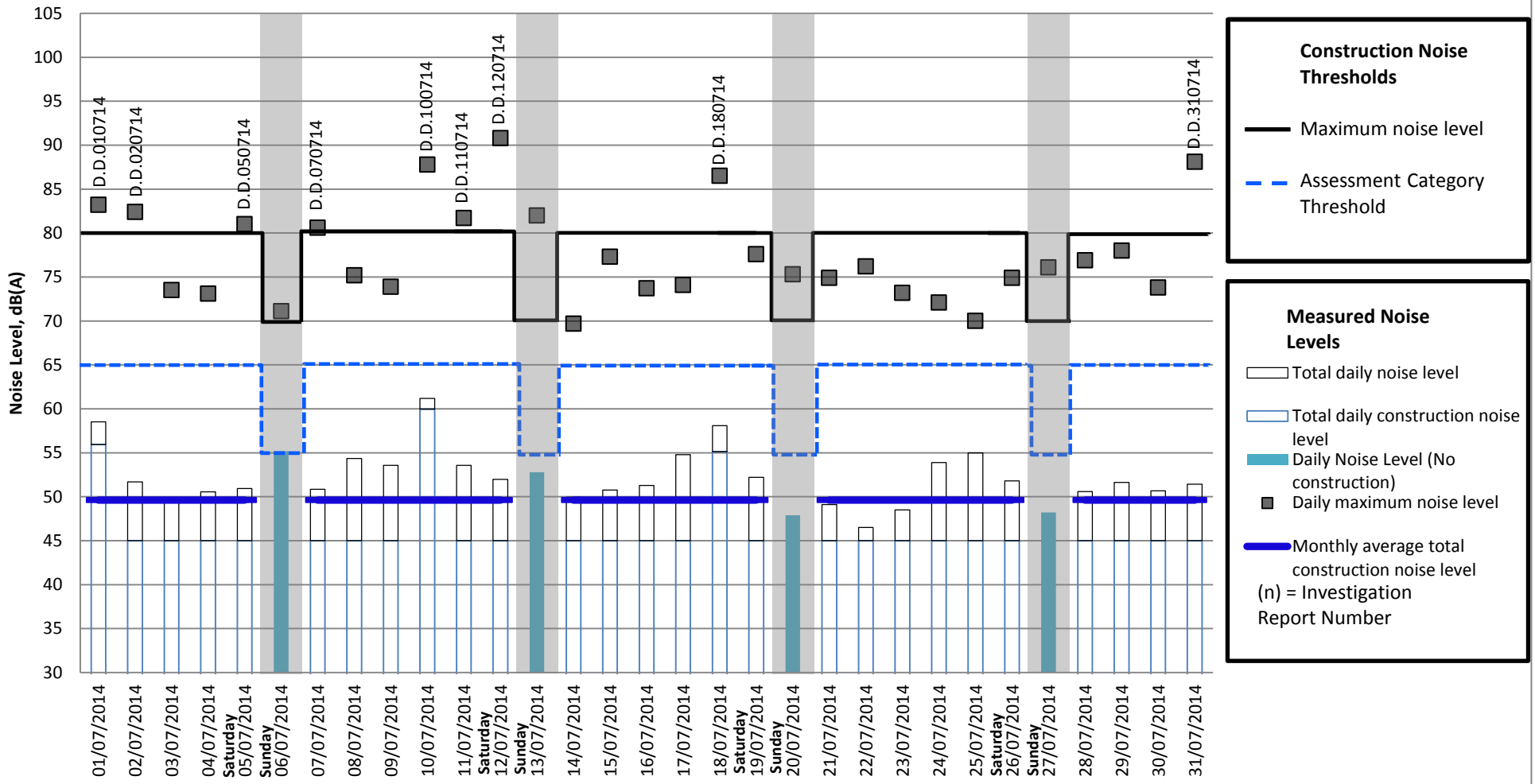
Measured Evening Noise Levels at Clufflat Brae
Measurement period: July 2014



Measured Night-time Noise Levels at Clufflat Brae
Measurement period: July 2014

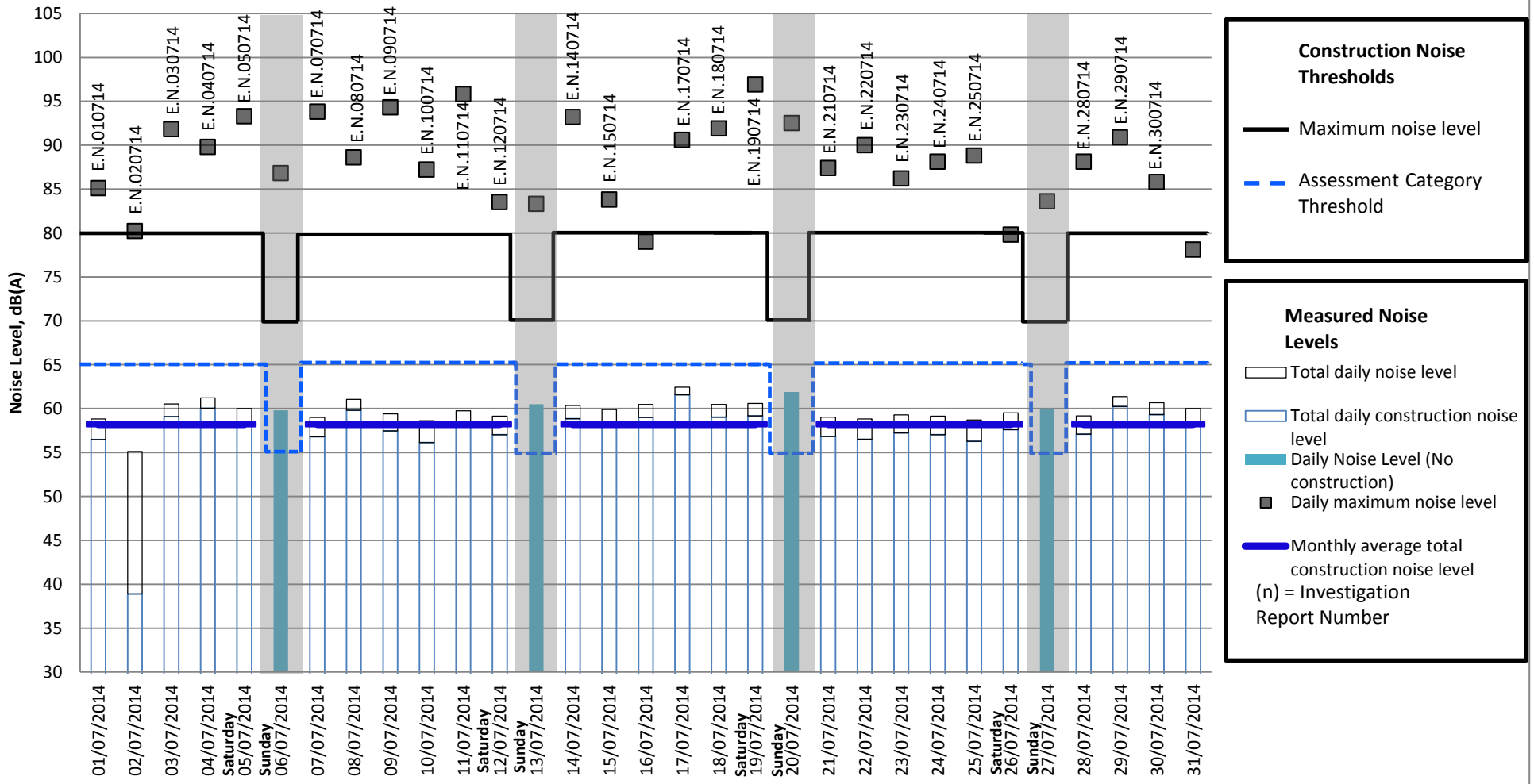


Measured Daytime Noise Levels at Dundas Home Farm
Measurement period: July 2014



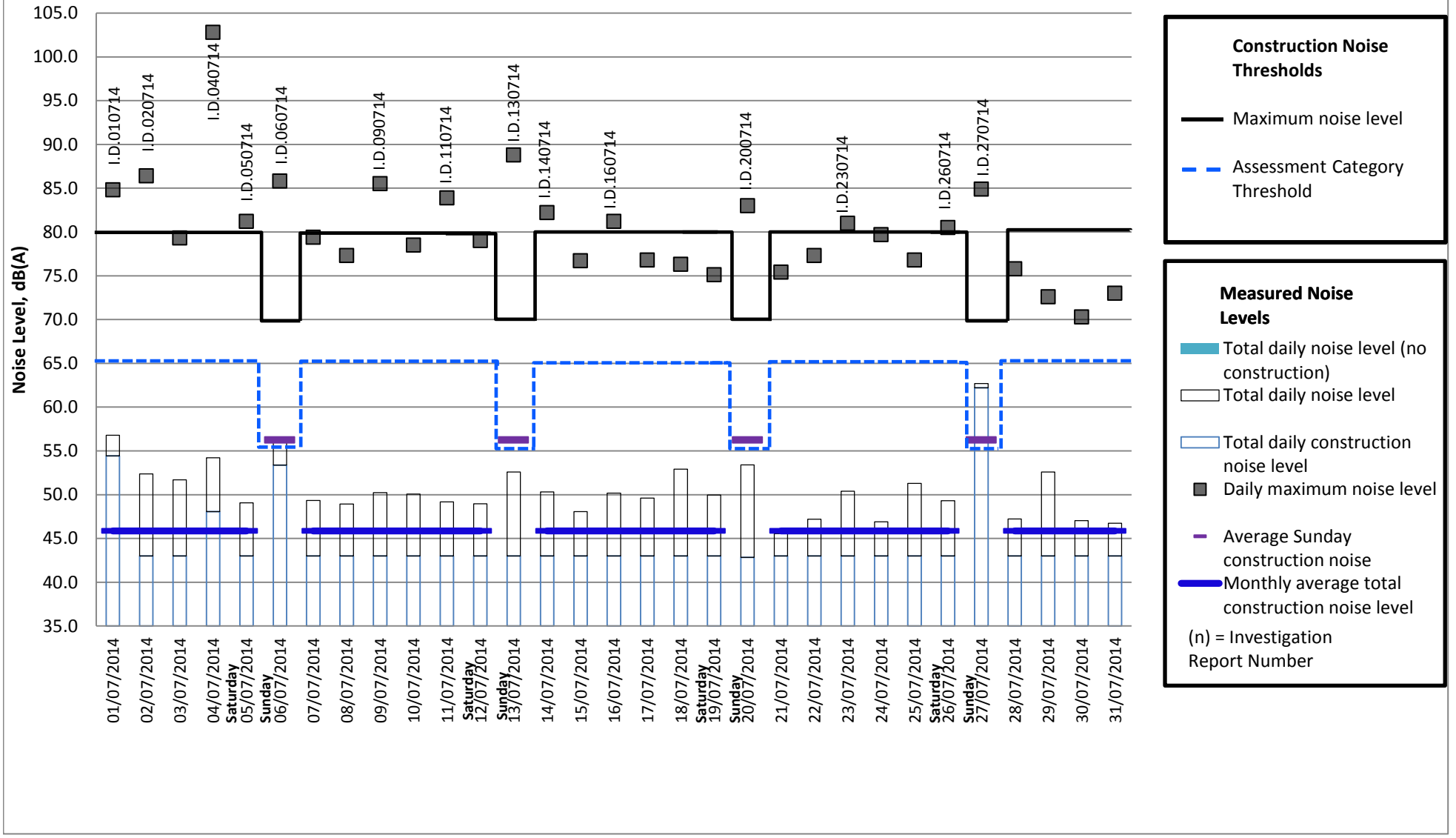
Note: The grey areas of the chart represent days on which no construction works have been conducted. The Sunday average has not been included as no Sunday works have been conducted at this location.

Measured Daytime Noise Levels at Echline
Measurement period: July 2014

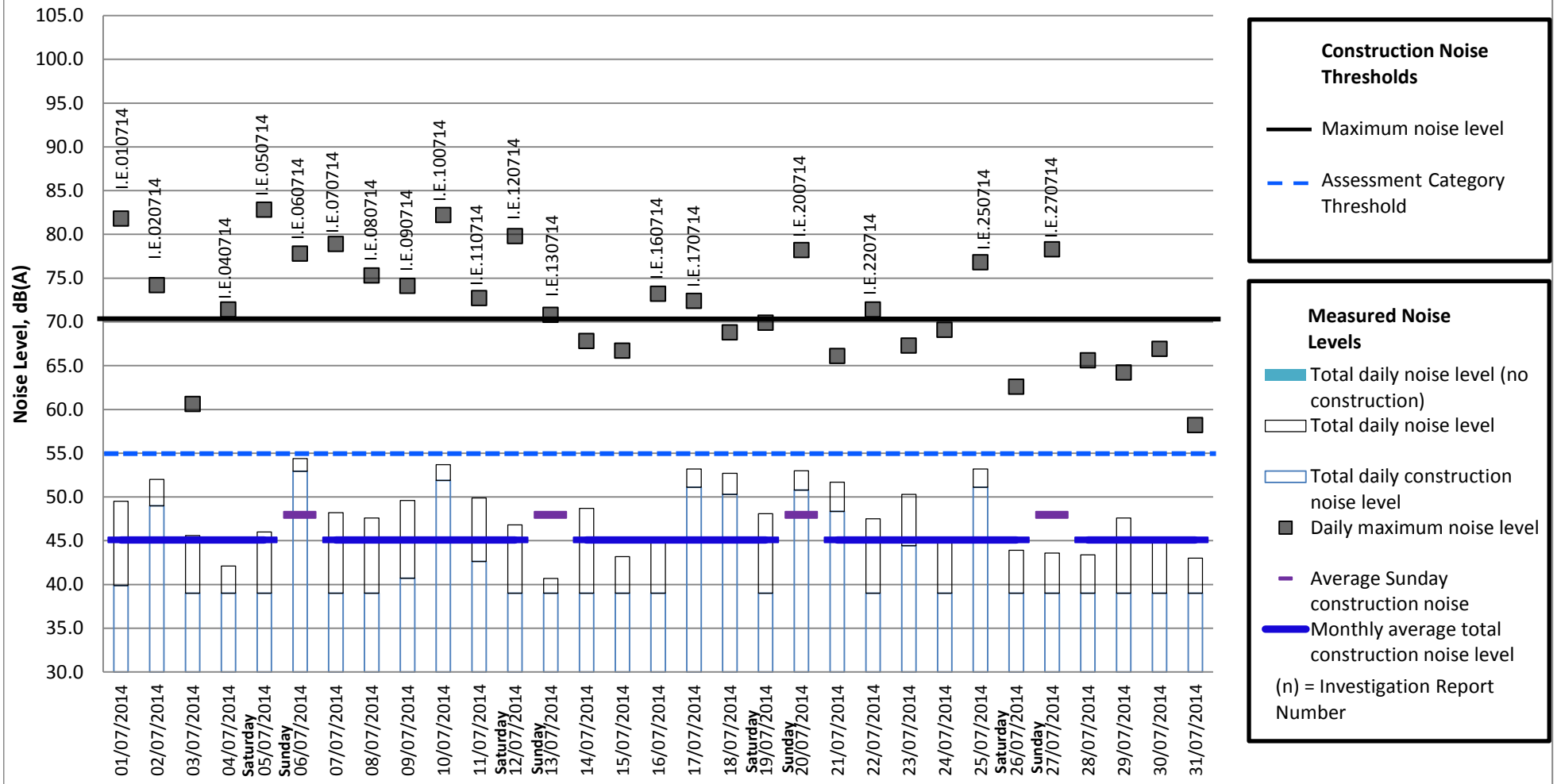


Note: The grey areas of the chart represent days on which no construction works have been conducted. The Sunday average has not been included as no Sunday works have been conducted at this location.

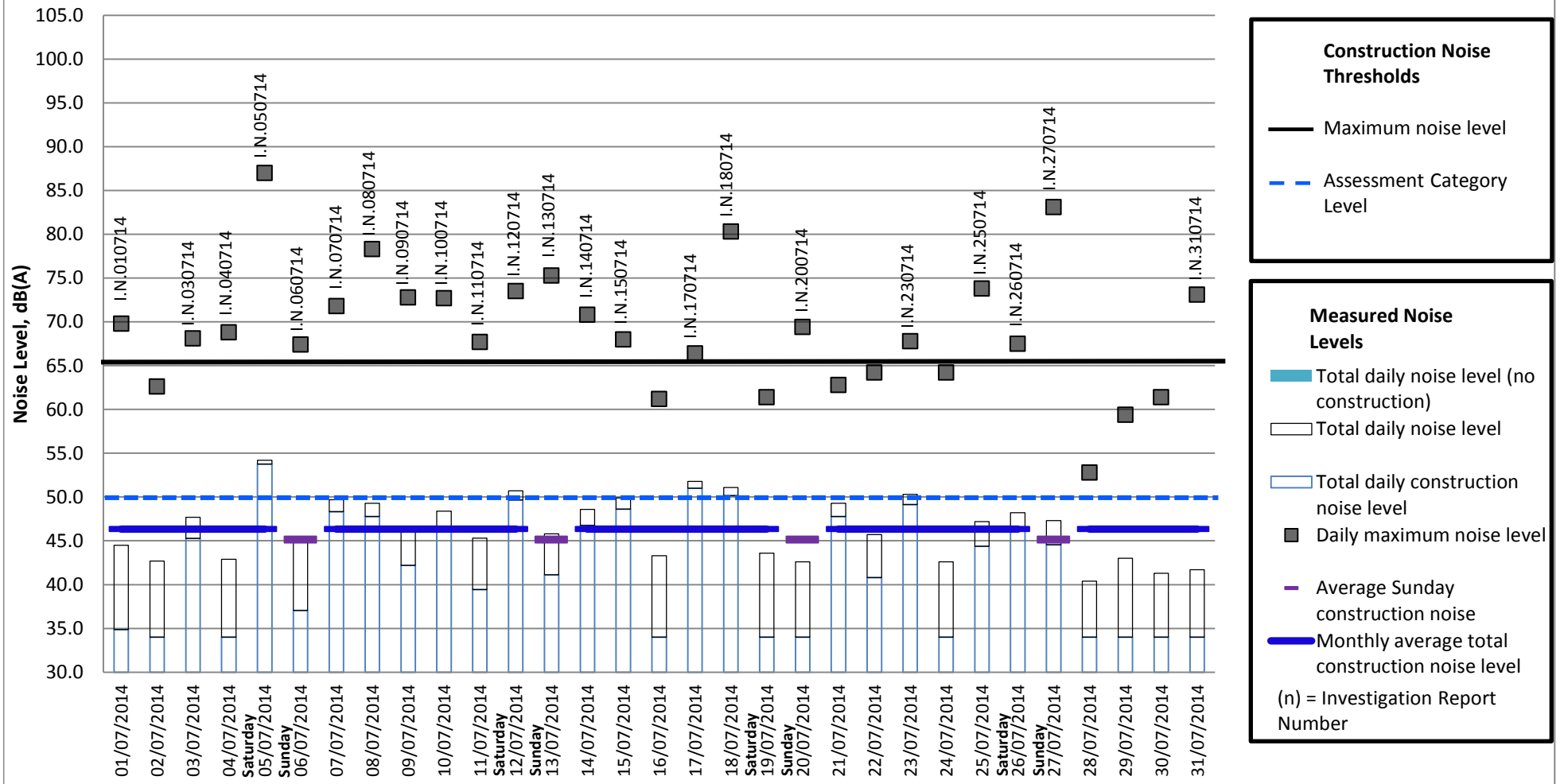
Measured Daytime Noise Levels at Inchgarvie
Measurement period: July 2014



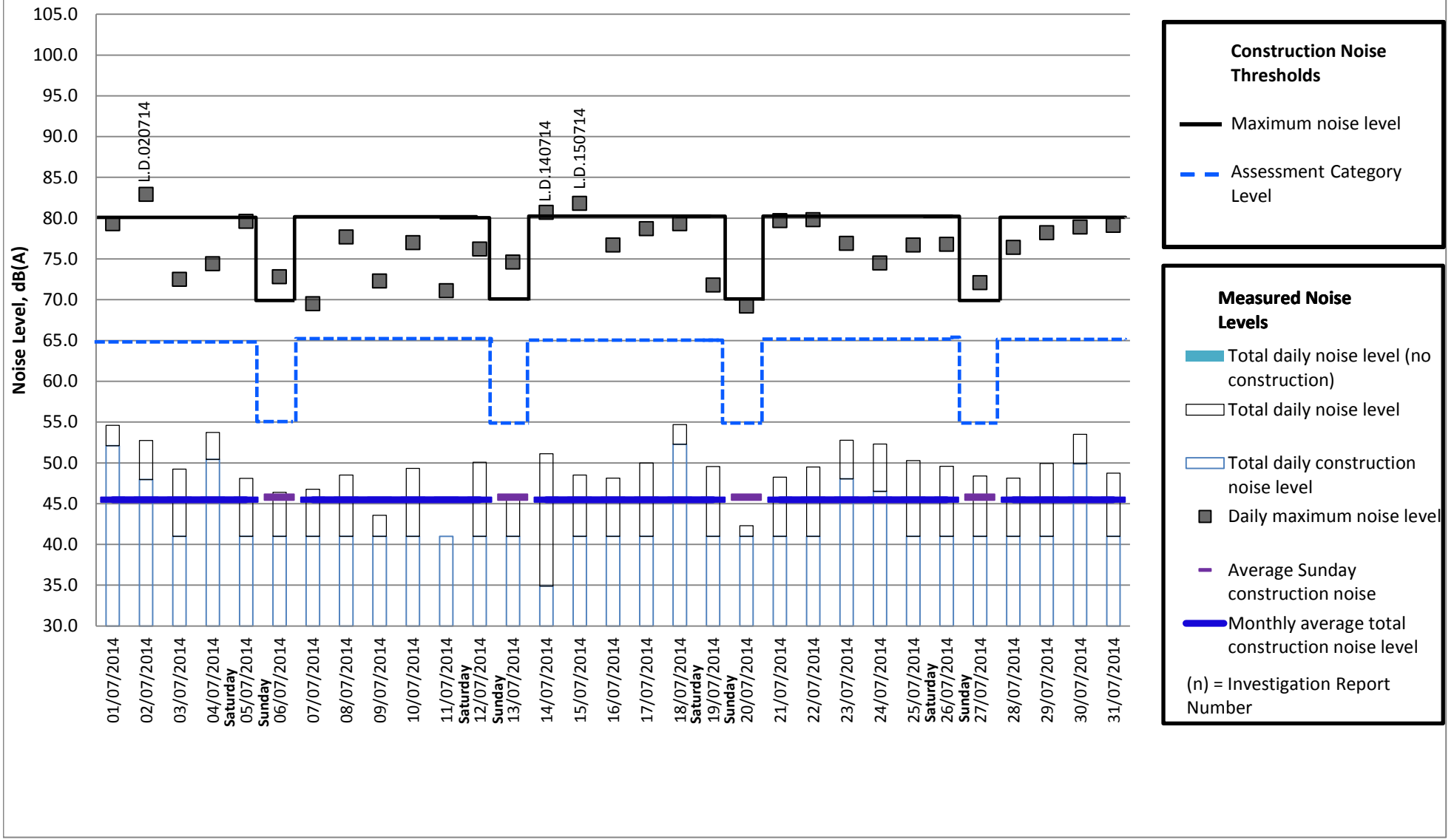
Measured Evening Noise Levels at Inchgarvie
Measurement period: July 2014



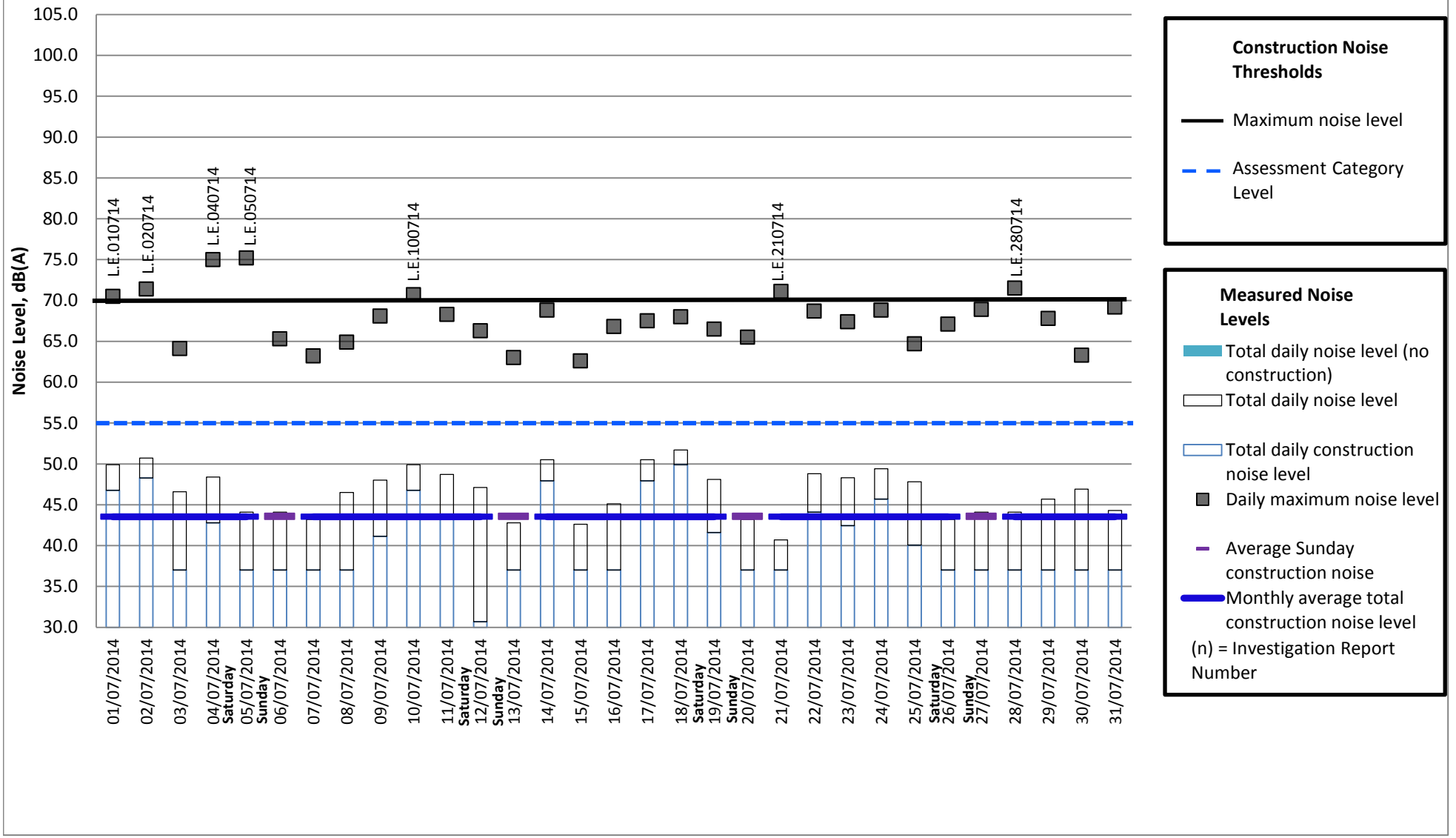
Measured Night-time Noise Levels at Inchgarvie
Measurement period: July 2014



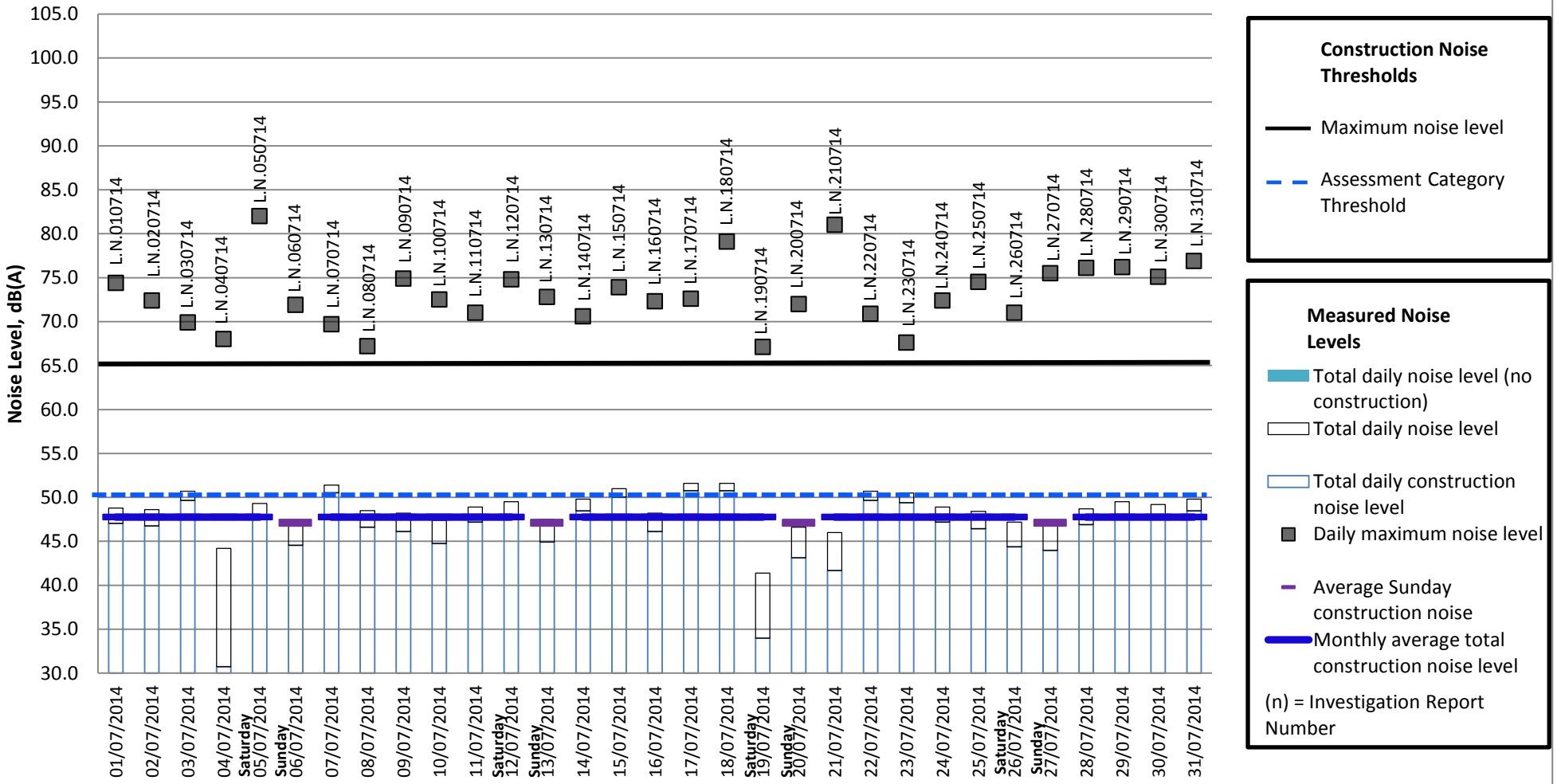
Measured Daytime Noise levels at Linn Mill
Measurement period: July 2014



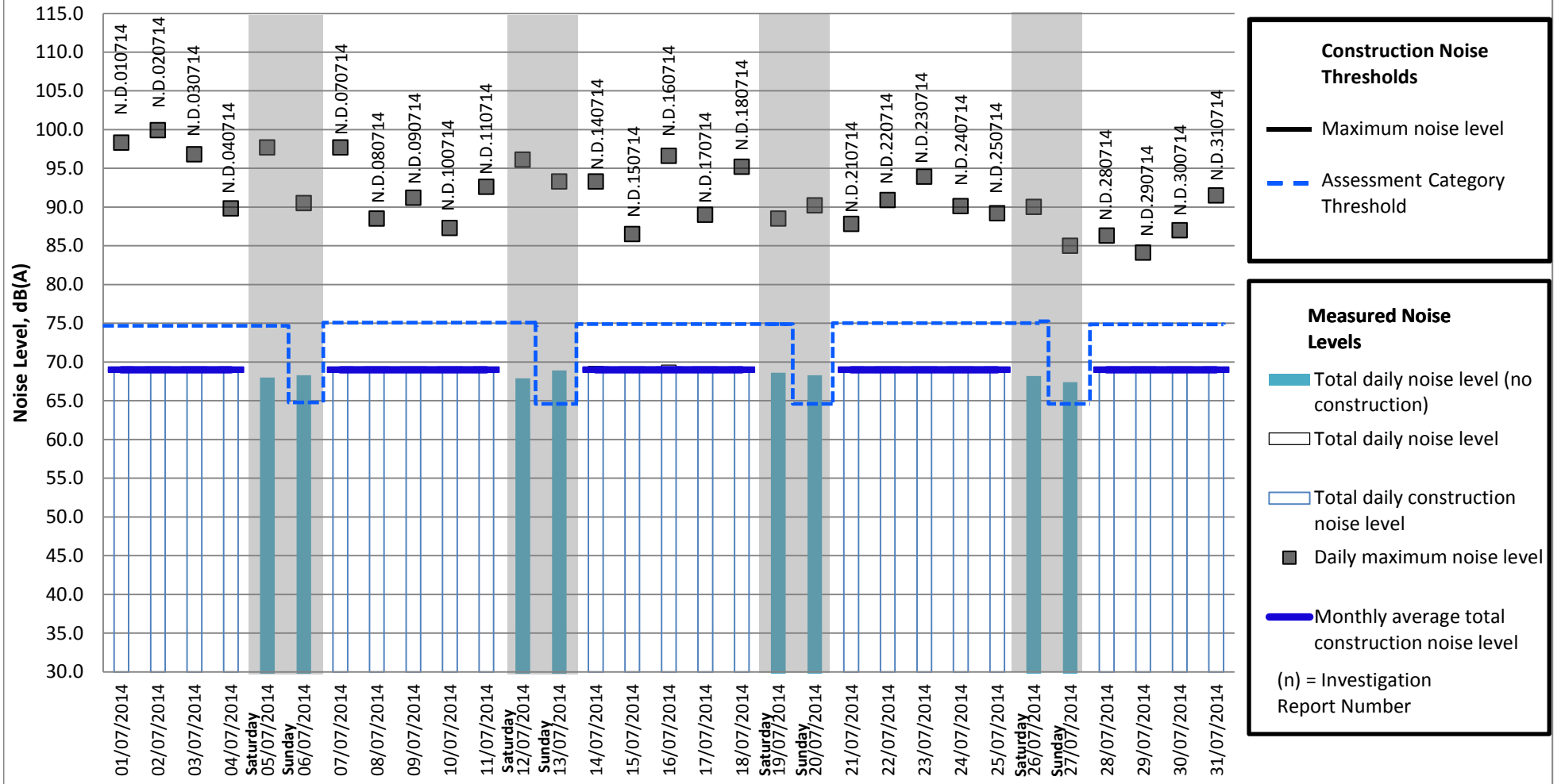
Measured Evening Noise Levels at Linn Mill
Measurement period: July 2014



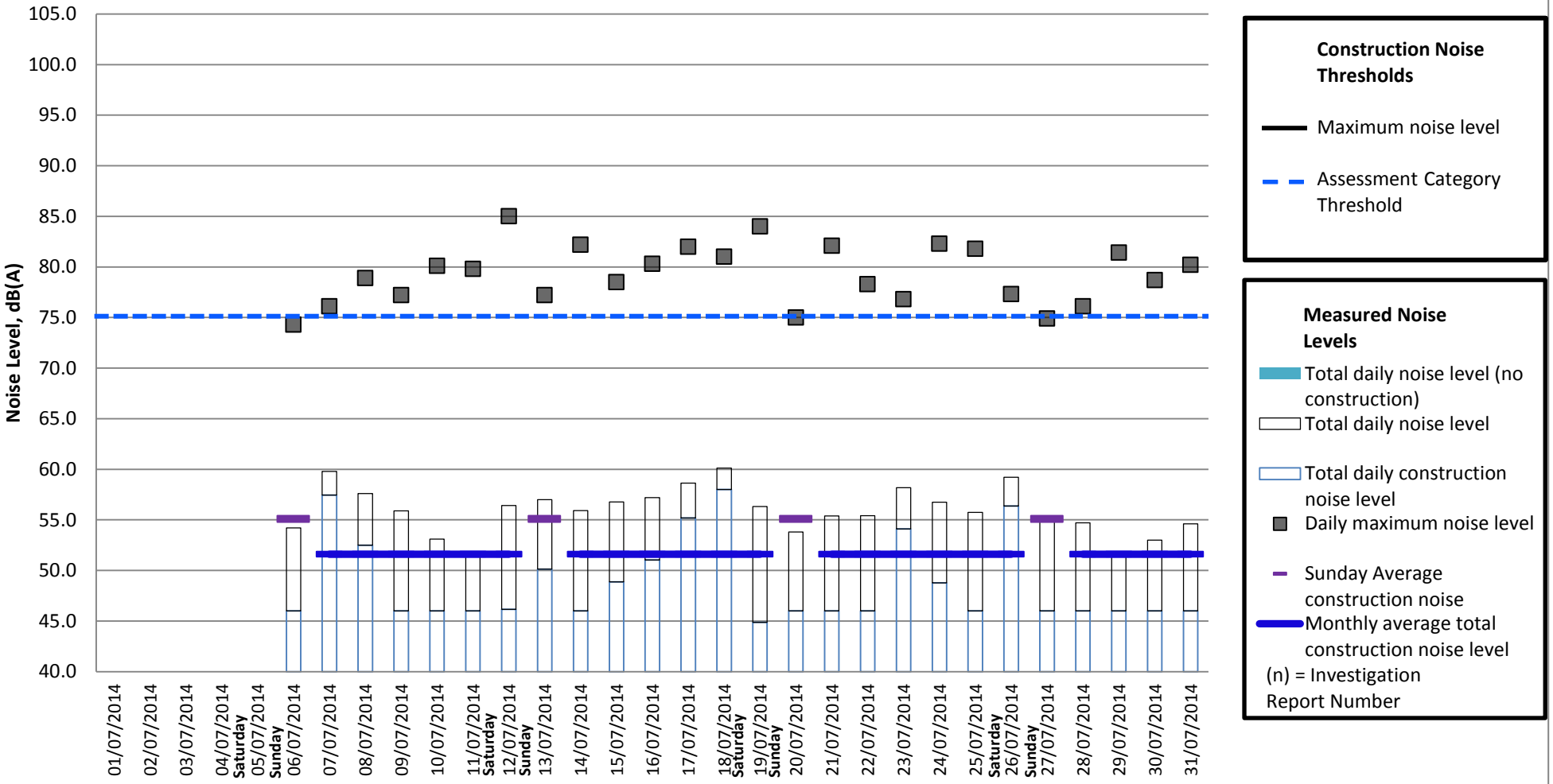
Measured Night-time Noise Levels at Linn Mill
Measurement period: July 2014



Measured Daytime Noise Levels at Newton
Measurement period: July 2014

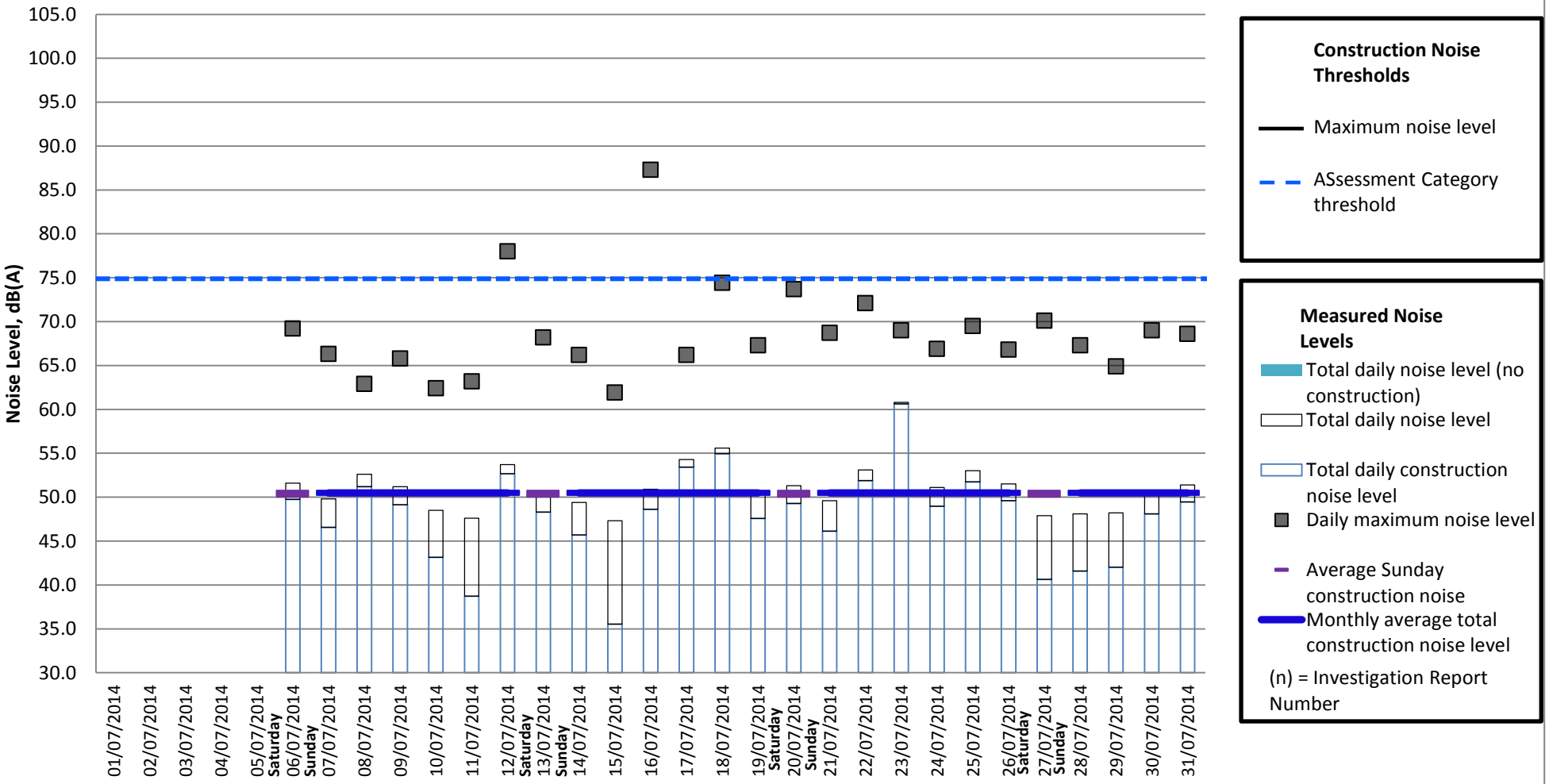


Measured Daytime Noise Levels at Port Edgar
Measurement period: July 2014



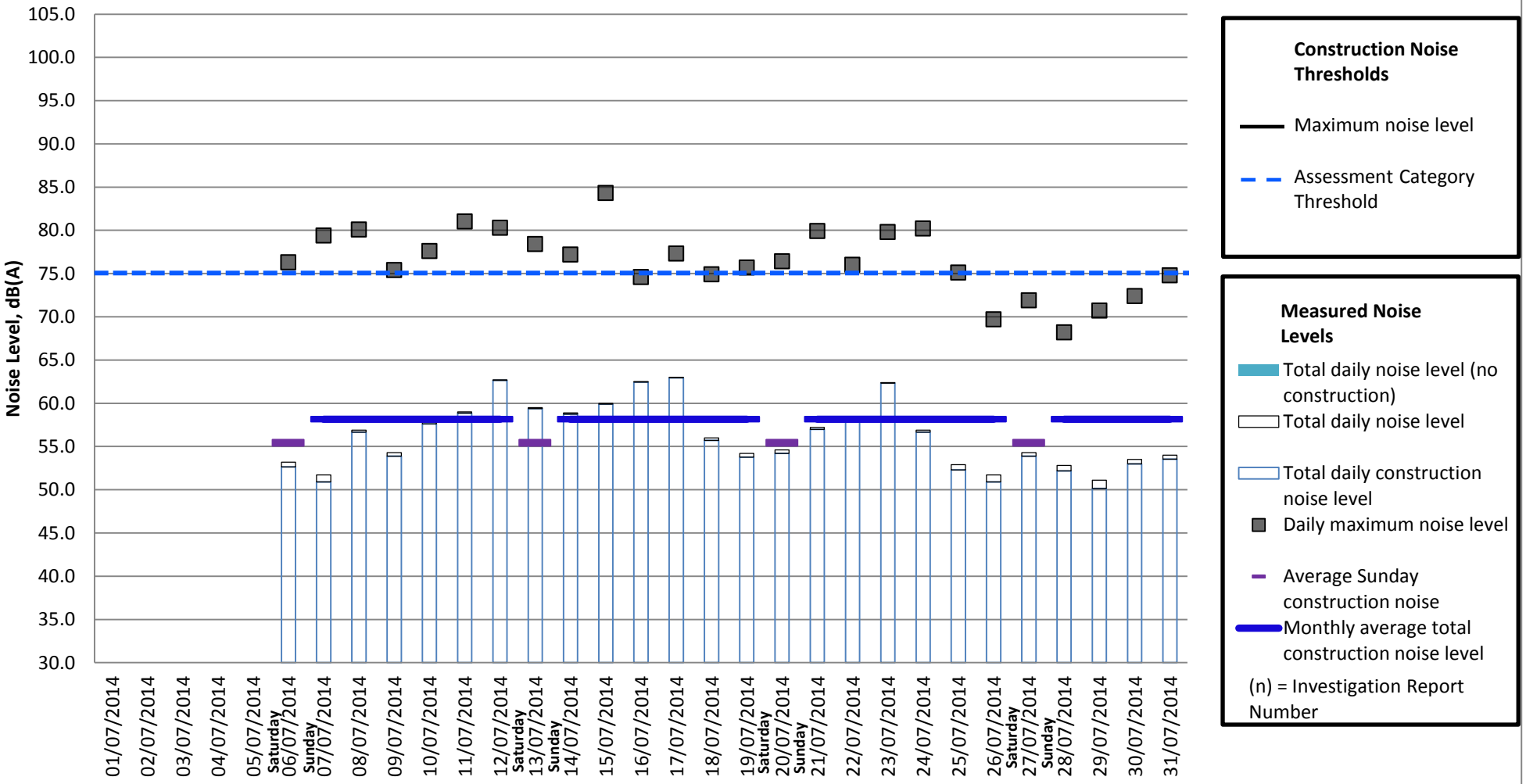
Note: Data is missing from 01/07/14 - 05/07/14 due to a power issue. This has now been resolved.

Measured Evening Noise Levels at Port Edgar
Measurement period: July 2014



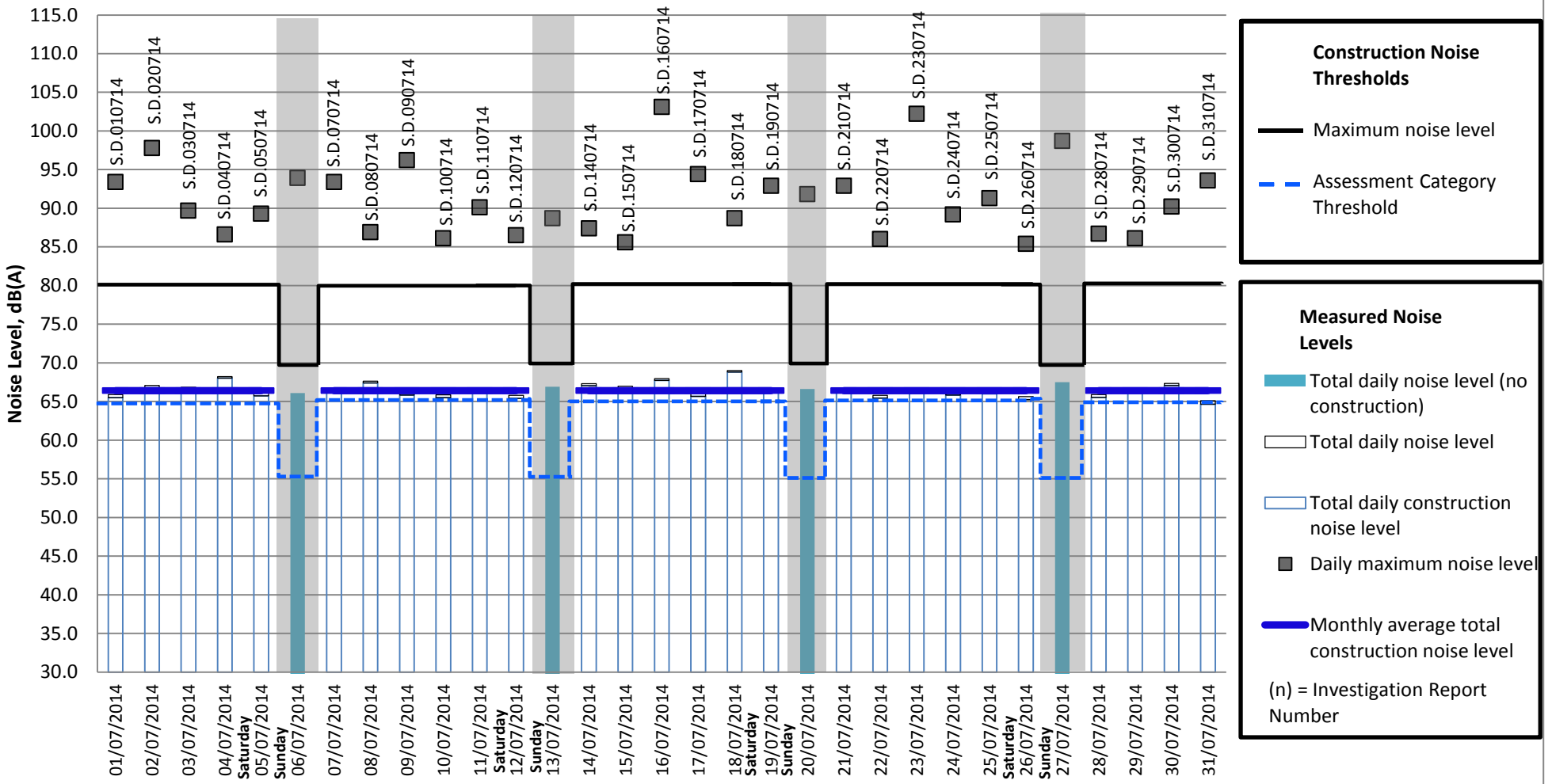
Note: Data is missing from 01/07/14 - 05/07/14 due to a power issue. This has now been resolved.

Measured Night-time Noise Levels at Port Edgar
Measurement period: July 2014



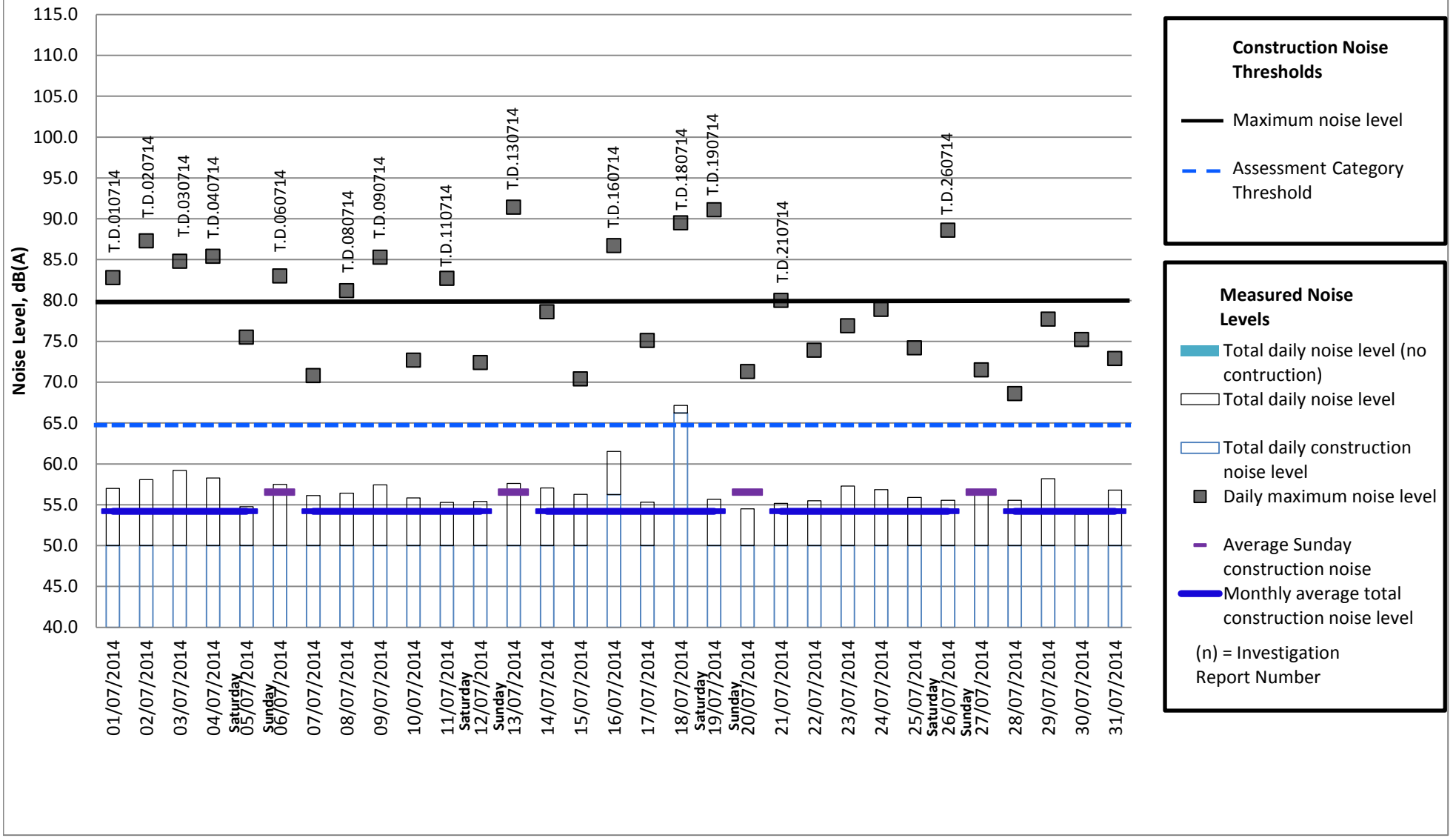
Note: Data is missing from 01/07/14 - 05/07/14 due to a power issue. This has now been resolved.

Measured Daytime Noise Levels at Scotstoun
Measurement period: July 2014

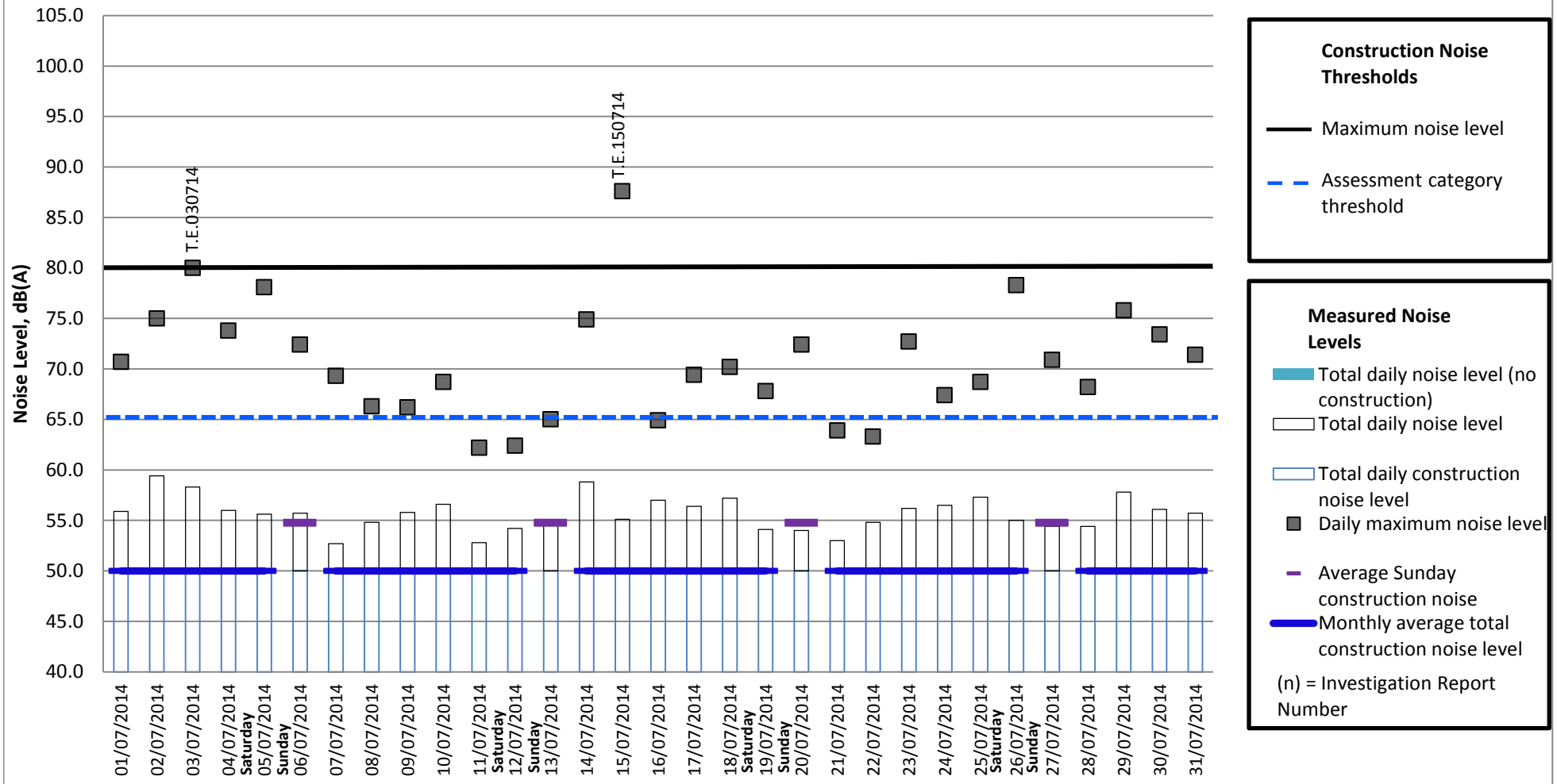


Note: The grey areas of the chart represent days on which no construction works have been conducted. The monthly average construction noise for Sunday has not been included as no Sunday works have been conducted at this location .

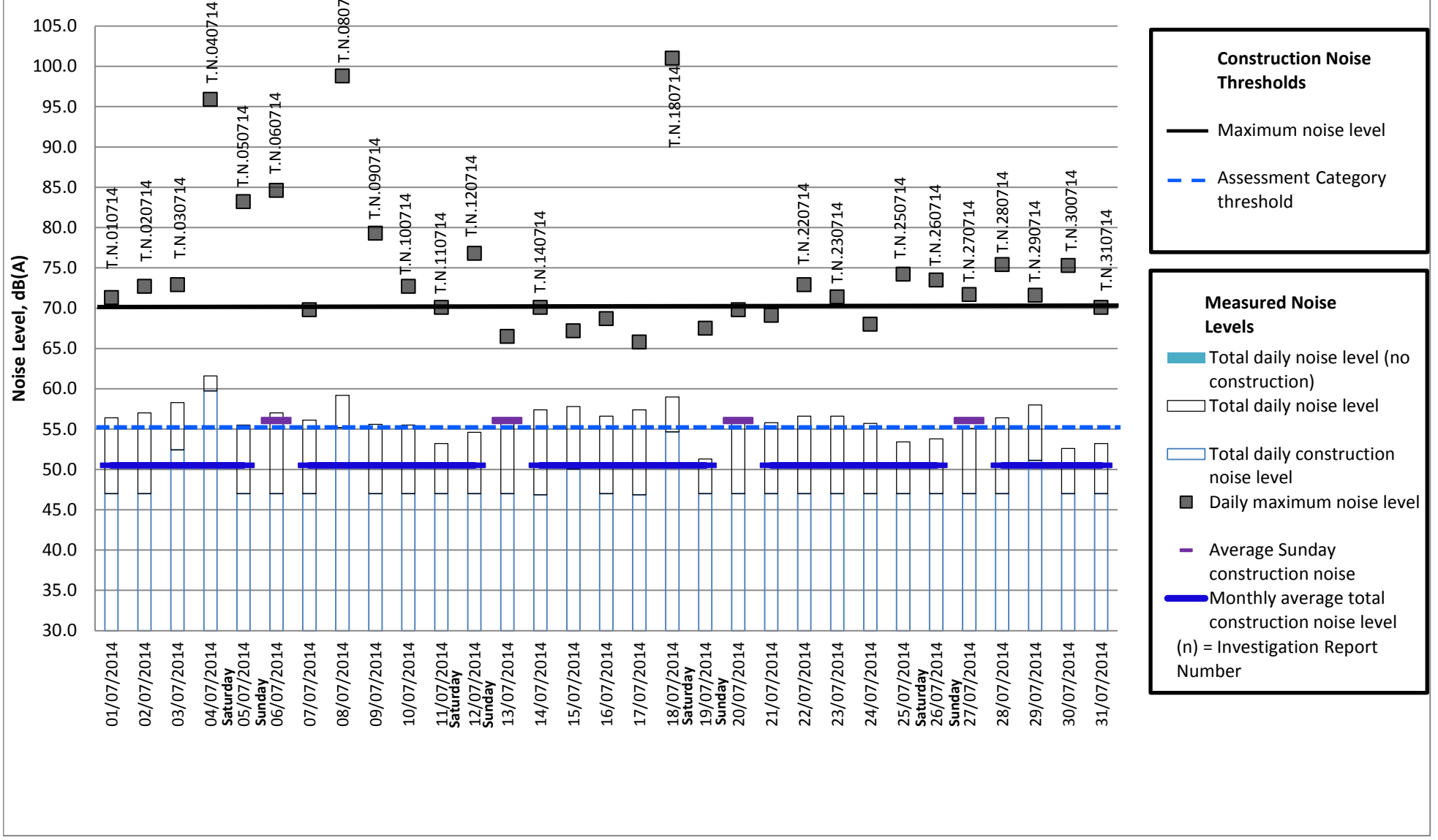
Measured Daytime Noise Levels at Tigh-Na-Grian
Measurement period: July 2014



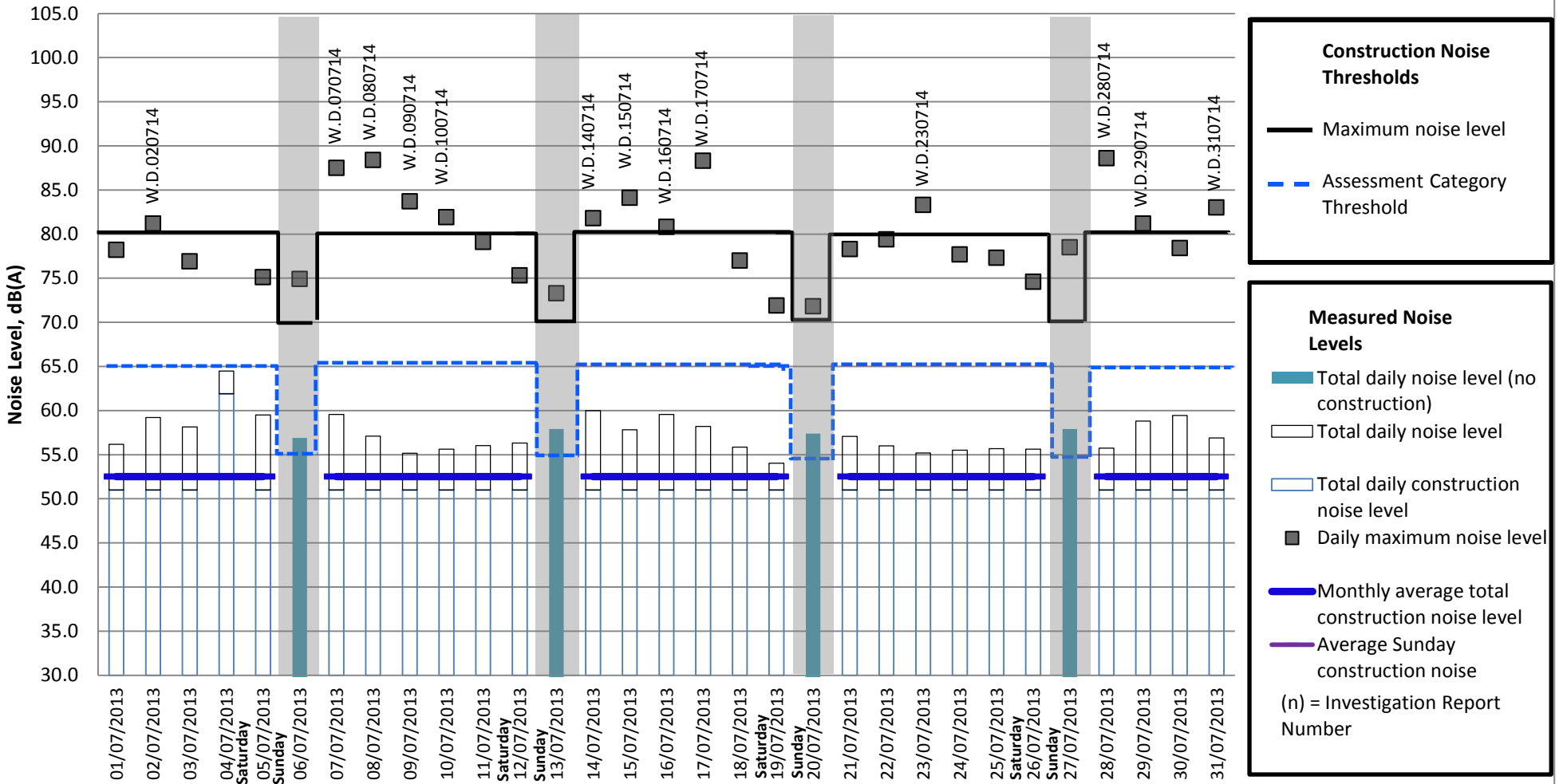
Measured Evening Noise Levels at Tigh-Na-Grian
Measurement period: July 2014



Measured Night-time Noise Levels at Tigh-Na-Grian
Measurement period: July 2014



Measured Daytime Noise Levels at Whinny Hill
Measurement period: July 2014



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