



Contractor



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HOCHTIEF | MORRISON CONSTRUCTION

Project **FORTH REPLACEMENT CROSSING**

Document title

CONSTRUCTION NOISE MONITORING REPORT: JUNE 2016

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Contents

- 1. Introduction**
- 2. Noise Monitoring Locations**
- 3. Noise Monitoring Results**

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 2016. 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 2016, 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, Linn Mill and Whinny Hill.
- 2.3 Various construction works were undertaken across the site during June 2016. **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 2016
M1	Whinny Hill	Network	<ul style="list-style-type: none"> • Earth Works/Fill Placement • Hope Street roadworks • FT03 & FT04 Bridge Works • FT19 Works • FT10 Bridge Demolition • Main carriageway roadworks • Rock breaking / crushing
M3	Tigh-Na-Grian	Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works, deck lifting & stay cable installation works • North Tower rebar, formwork, concreting works, deck lifting and stay cable installation works • Pier N1 & N2 works • AVN Rebar and concrete works
M6	Port Edgar	• Crossing	<ul style="list-style-type: none"> • Central Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works • South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works. • Pier S3 Hydro demolition • Pier S2 works • Pier S1 works • AVS rebar & concrete deck works
M7	Butlaw Fisheries	Crossing	<ul style="list-style-type: none"> • Pier S1,works • Pier S2 work • Pier S3 Hydro demolition • Central Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works • South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works • AVS rebar & concrete deck works
M10	Inchgarvie Lodge	Crossing	<ul style="list-style-type: none"> • AVS rebar & concrete deck works • Pier S1 works. • Pier S2 work • Pier S3 Hydro demolition • Central Tower rebar, formwork, concreting works , deck section lifts and stay cable installation works. • South Tower rebar, formwork, concreting works, deck section lifts and stay cable installation works. • Main carriageway roadworks • South Abutment works



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M11	Linn Mill	Network (close proximity to Crossing)	<ul style="list-style-type: none"> • AVS rebar & concrete deck works • South Abutment works • Main carriageway roadworks • Excavating SUDS detention basin
M13	Clufflat Brae	Crossing / Network	<ul style="list-style-type: none"> • AVS rebar and concrete deck works • South Abutment works • Main carriageway roadworks
M14	Springfield	Network	<ul style="list-style-type: none"> • AVS rebar and concrete deck works • South Abutment works • Main carriageway roadworks
M15	Echline	Network	<ul style="list-style-type: none"> • AVS rebar and concrete deck works • South Abutment works • Main carriageway roadworks
M16	Scotstoun	Network	<ul style="list-style-type: none"> • Footpath works • Utility works • ESQ11 works • B800 roadworks including bridge works (these works are directly in the location of the meter which sits within the construction boundary). • Main carriageway roadworks
M17	Dundas Home Farm	Network	<ul style="list-style-type: none"> • Utility works • ESQ11 works • B800 Roadworks • Main carriageway roadworks
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 generally undertaken during the daytime only.
- Beam lifts at FT03 and FT04 took place during evening and nighttime periods on the Thursday 23rd – Saturday the 25th June.
- 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, 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.
- Programmed works at the SUDS pond adjacent to Linn Mill were modified to reduce disturbance to a resident who was on night shift during the period.

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 June 2016. For evening and night time periods, there were exceedances of monthly average noise at Butlaw and Linn Mill during the night-time period. There were also exceedances of Sunday averages at Butlaw and Linn Mill during the night.
- 3.4** Most exceedances noted are not thought to have been caused by increased noise levels due to construction. Each exceedance was found to be influenced by increased noise levels due to periods of adverse weather, traffic, residential noise or bird noise. Audio recordings demonstrate 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.
- 3.5** 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.
- 3.6** Construction related noise at Linn Mill. The L_{AFmax} exceedances throughout June occurred during the day and were caused by excavation/rock breaking works at the Suds detention basin along with the moving of the scaffold yard. This work is in close proximity to the monitor and mitigation measures have been put in place to minimise noise. The environmental team will continue to monitor this closely.
- 3.7** 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 64 occasions (15 day time, 19 evening and 30 night time). Exceedances were attributed to non-construction factors notably birds and waves.
Clufflat Brae	During June the maximum noise threshold was exceeded on 56 occasions (16 daytime, 11 evening and 29 night time). Exceedances were mainly found to be due to birds and residents
Inchgarvie Lodge	During June the maximum noise threshold was exceeded on 75 occasions (22 day time, 23 evening and 30 night time). Residential work to the property was found to be the main contributing factors to the exceedances in this location. Other factors included birds.
Linn Mill	During June the maximum noise threshold was exceeded on 84 occasions (30 daytime, 24 evening and 30 night time). The majority of exceedances at this location were due to birds. There were twenty-three instances of construction noise exceeding the threshold (see 3.6)
Tigh-Na-Grian	During June the maximum noise threshold was exceeded on 55 occasions (18 daytime, 15 evening and 22 night time). Exceedances were mainly due to birds
Dundas Home Farm	During June the maximum noise threshold was exceeded on 15 occasions. The main exceedances were due to residents and birds.
Echline	During June 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 and wind.
Springfield	During June the maximum noise threshold was exceeded on 21 occasions. These exceedances were due to local residents..
Scotstoun	During June the maximum noise threshold was exceeded on 30 occasions. These exceedances were attributed to general traffic on the adjacent road.
Whinny Hill	During June the maximum noise threshold was exceeded on 18 occasions during the daytime. No exceedances at this location were attributed to construction activities. Most exceedances were due to birds and trains.
Port Edgar	Recordings taken for data record purposes
Newton	Recordings taken for data record purposes

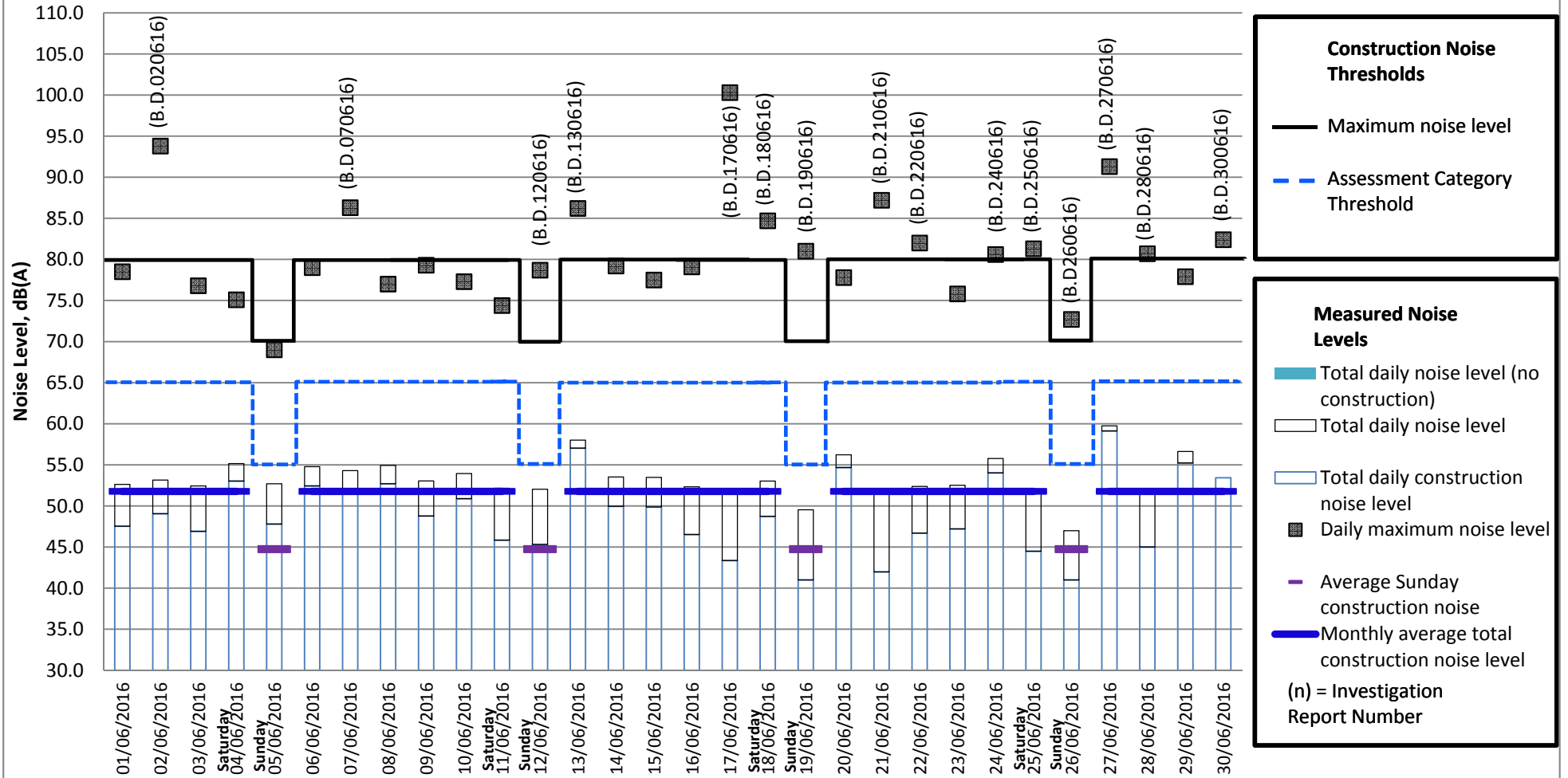


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APPENDIX A

Measured Daytime Noise Levels at Butlaw Fisheries

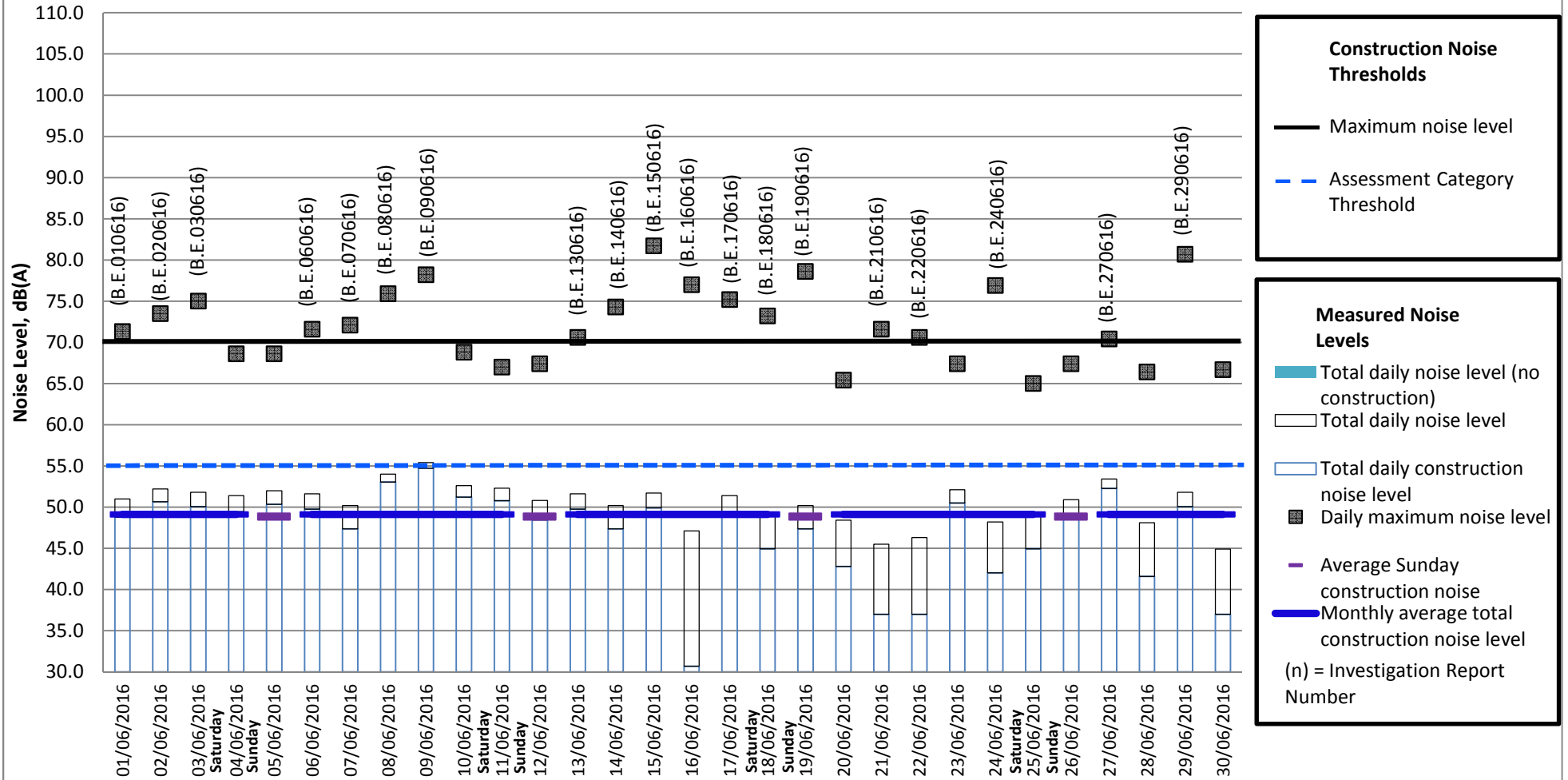
Measurement period: June 2016



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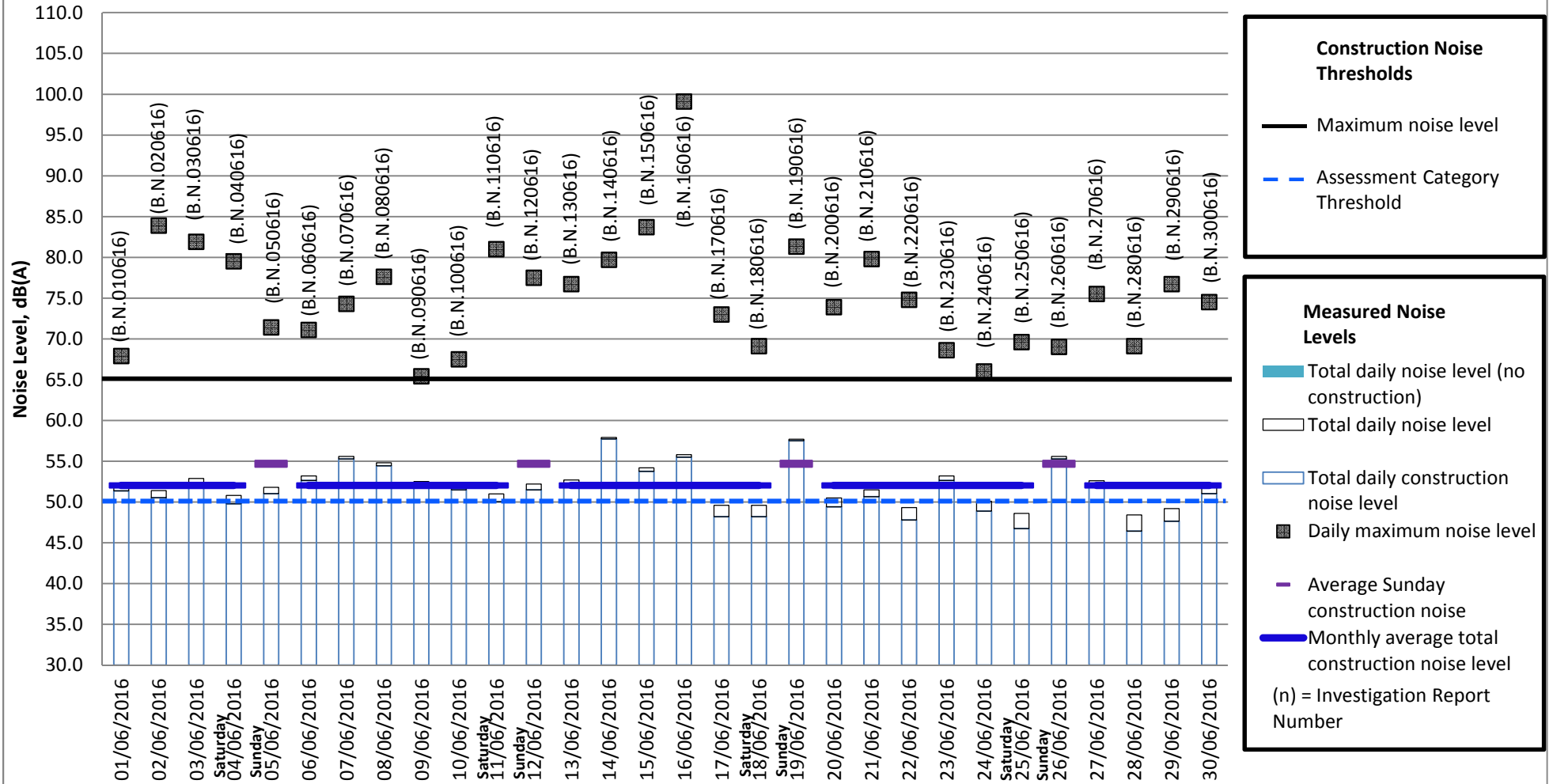
Measured Evening Noise Levels at Butlaw Fisheries

Measurement period: June 2016



Note:

Measured Night time Noise Levels at Butlaw Fisheries Measurement period: June 2016



Construction Noise Thresholds

- Maximum noise level
- Assessment Category Threshold

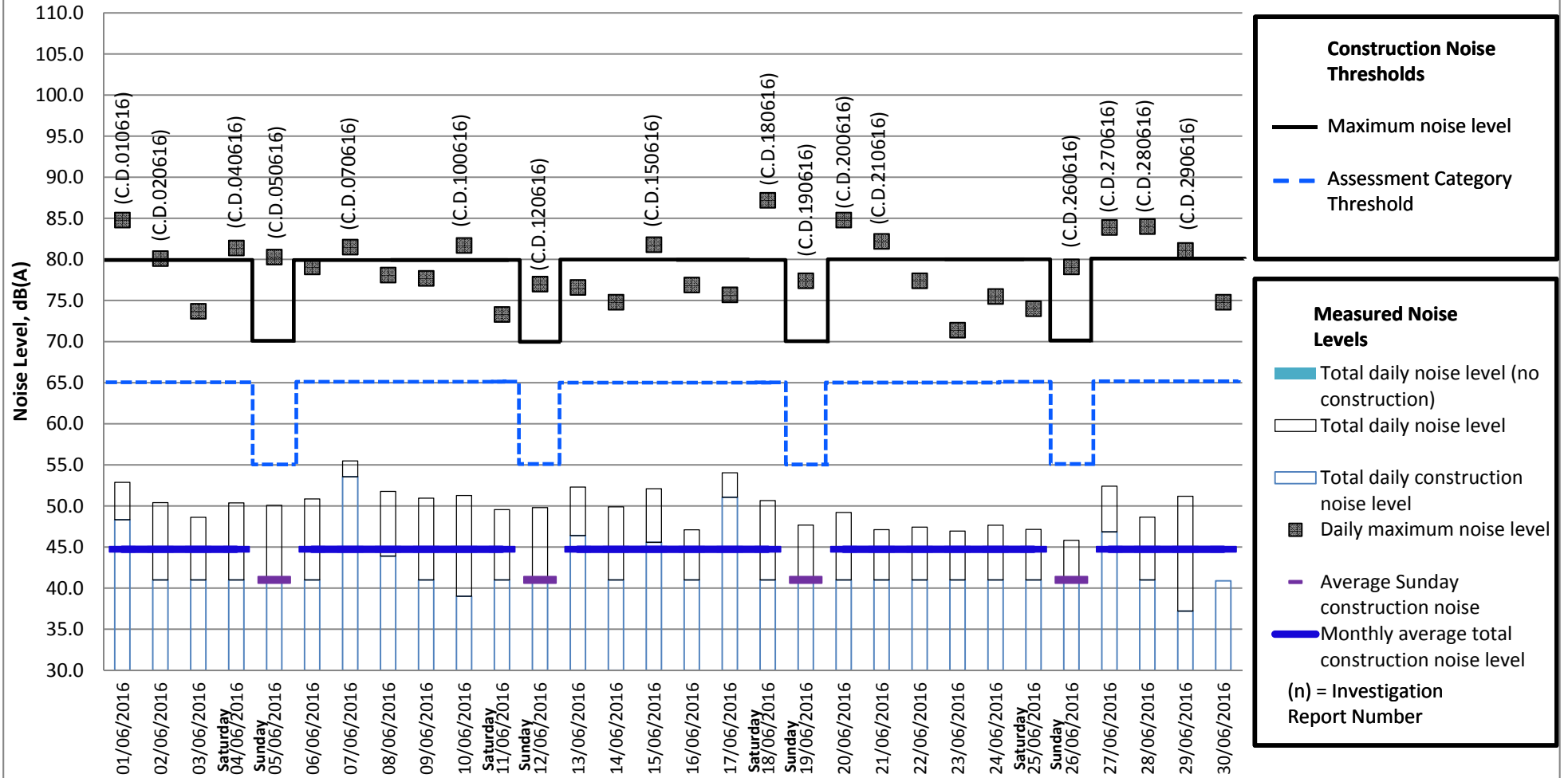
Measured Noise Levels

- 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

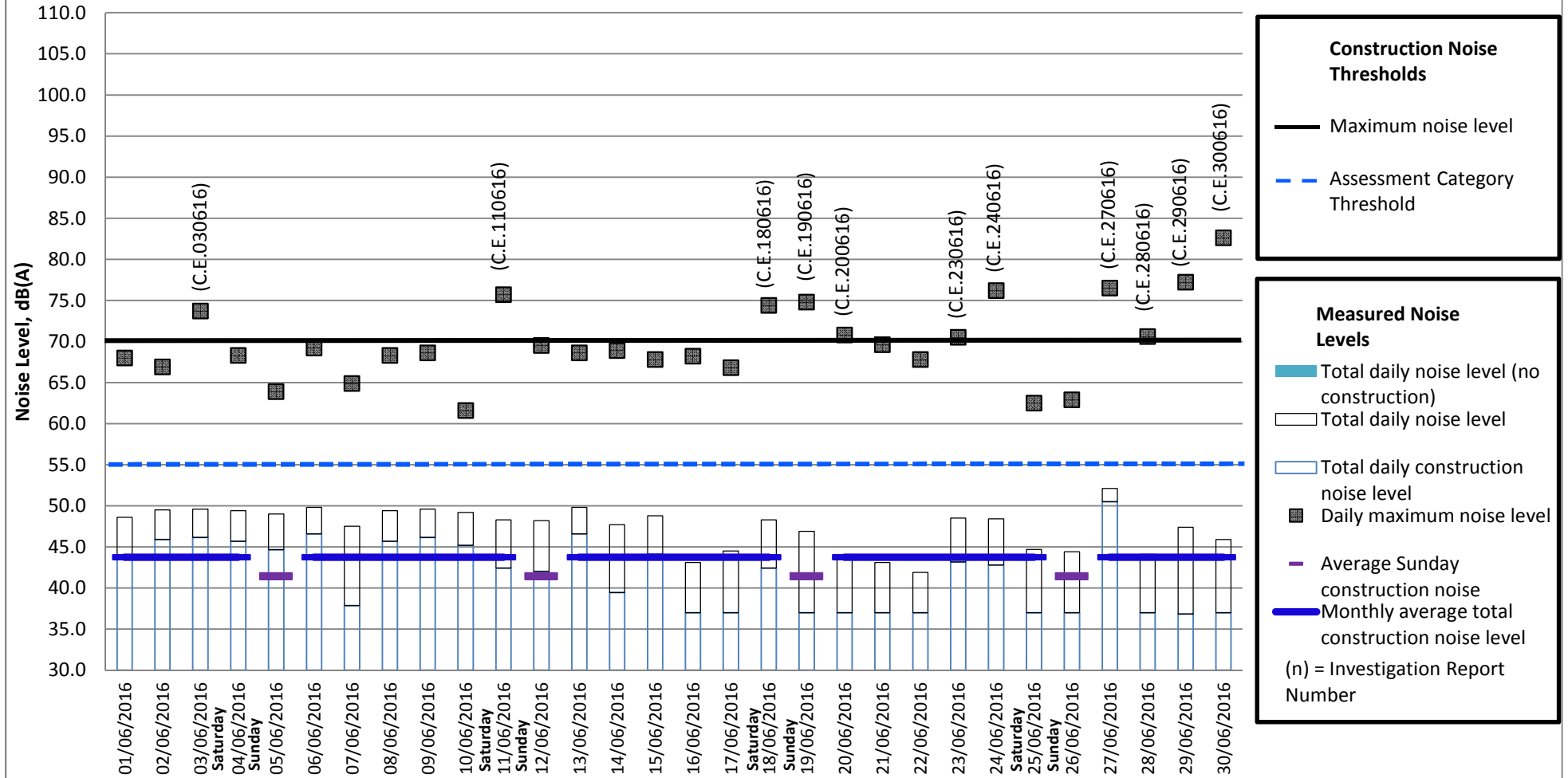
Note: After investigation, it was concluded that the exceedance of the LAeq 'Total Daily Construction' throughout the month were caused by birds and waves

Measured Daytime Noise Levels at Clufflat Measurement period: June 2016



Note:

Measured Evening Noise Levels at Clufflat Measurement period: June 2016



Construction Noise Thresholds

- Maximum noise level
- Assessment Category Threshold

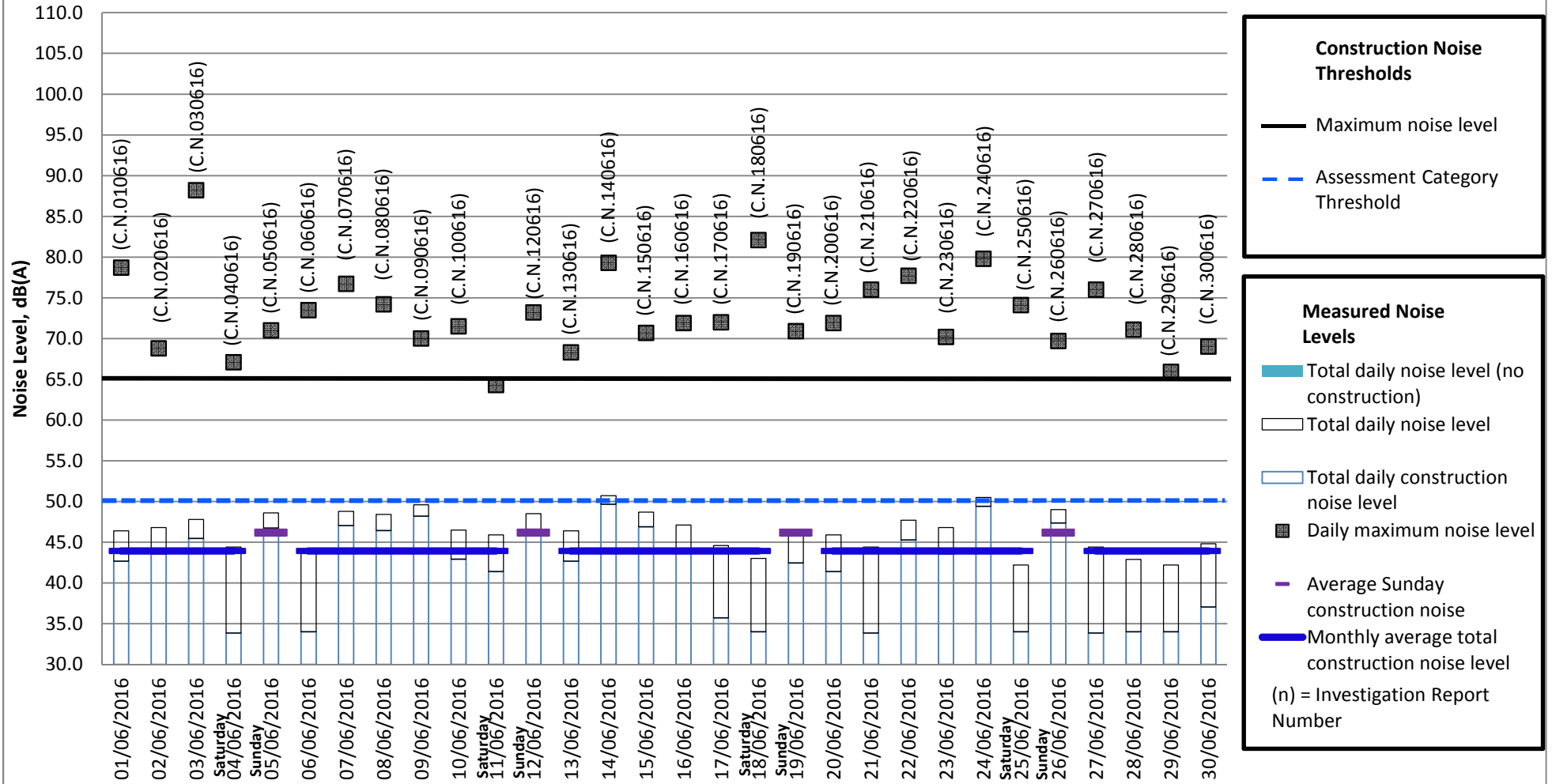
Measured Noise Levels

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

(n) = Investigation Report Number

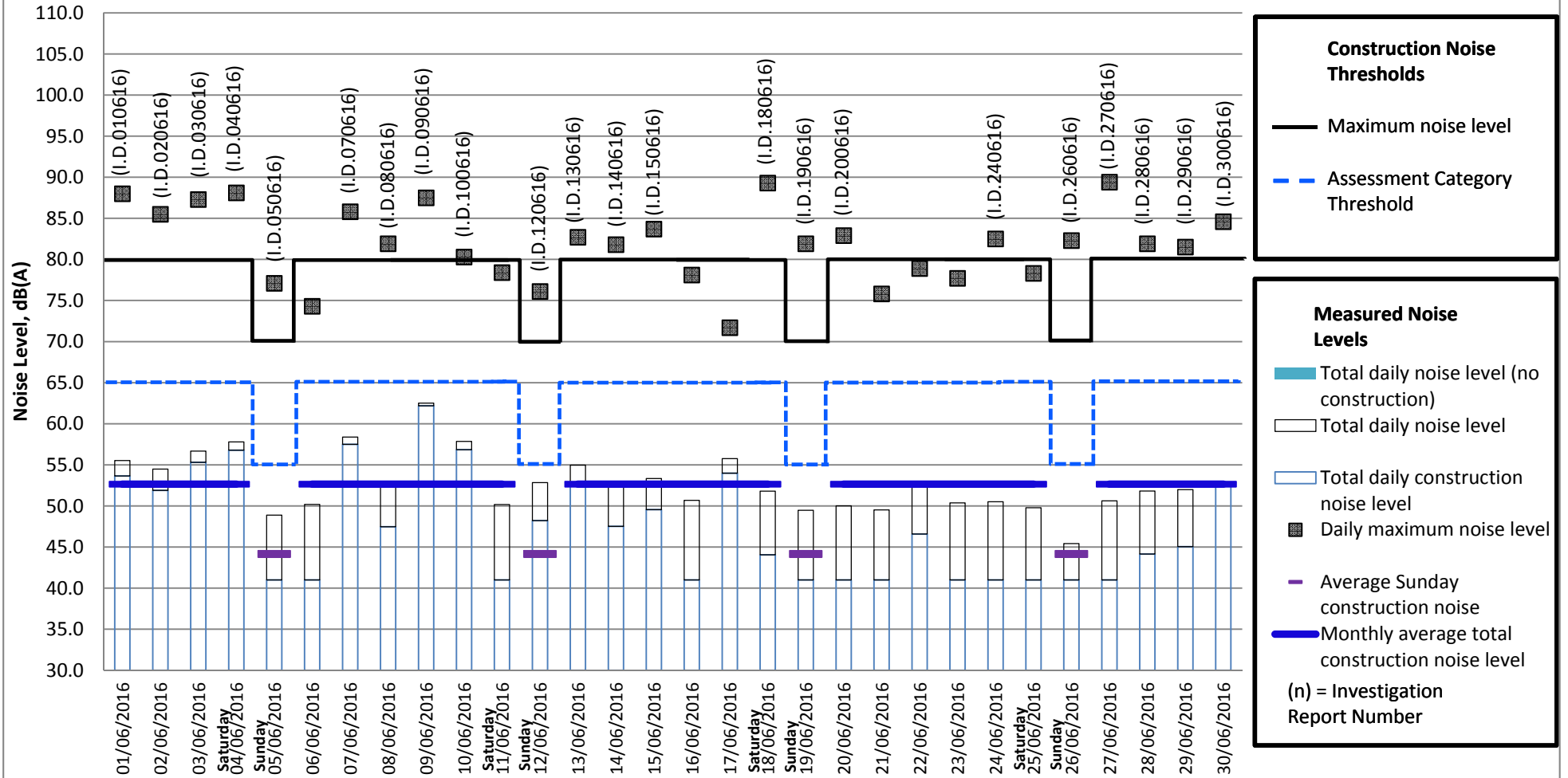
Note:

Measured Night time Noise Levels at Clufflat Measurement period: June 2016



Note:

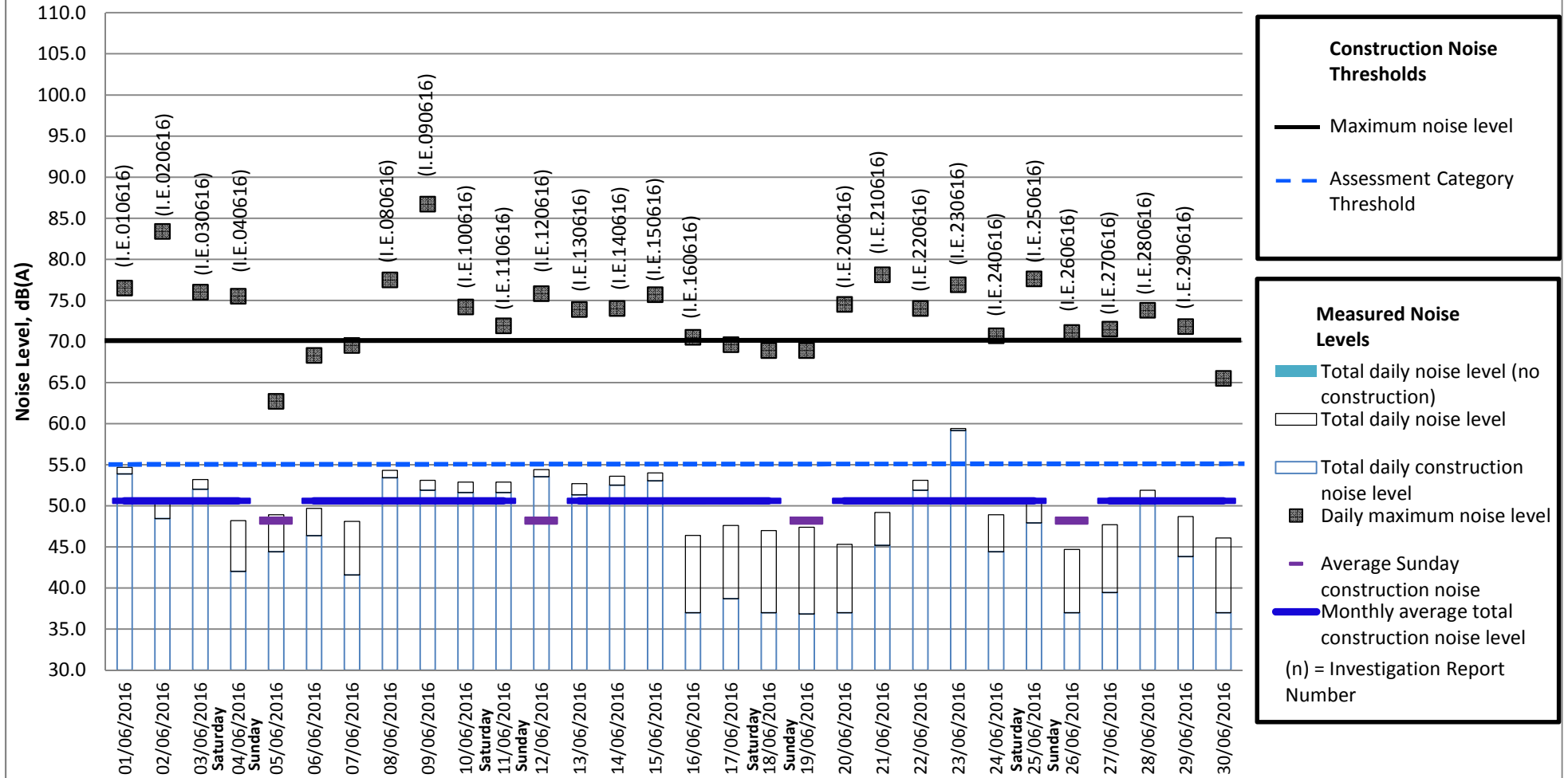
Measured Daytime Noise Levels at Inchgarvie Measurement period: June 2016



Note:

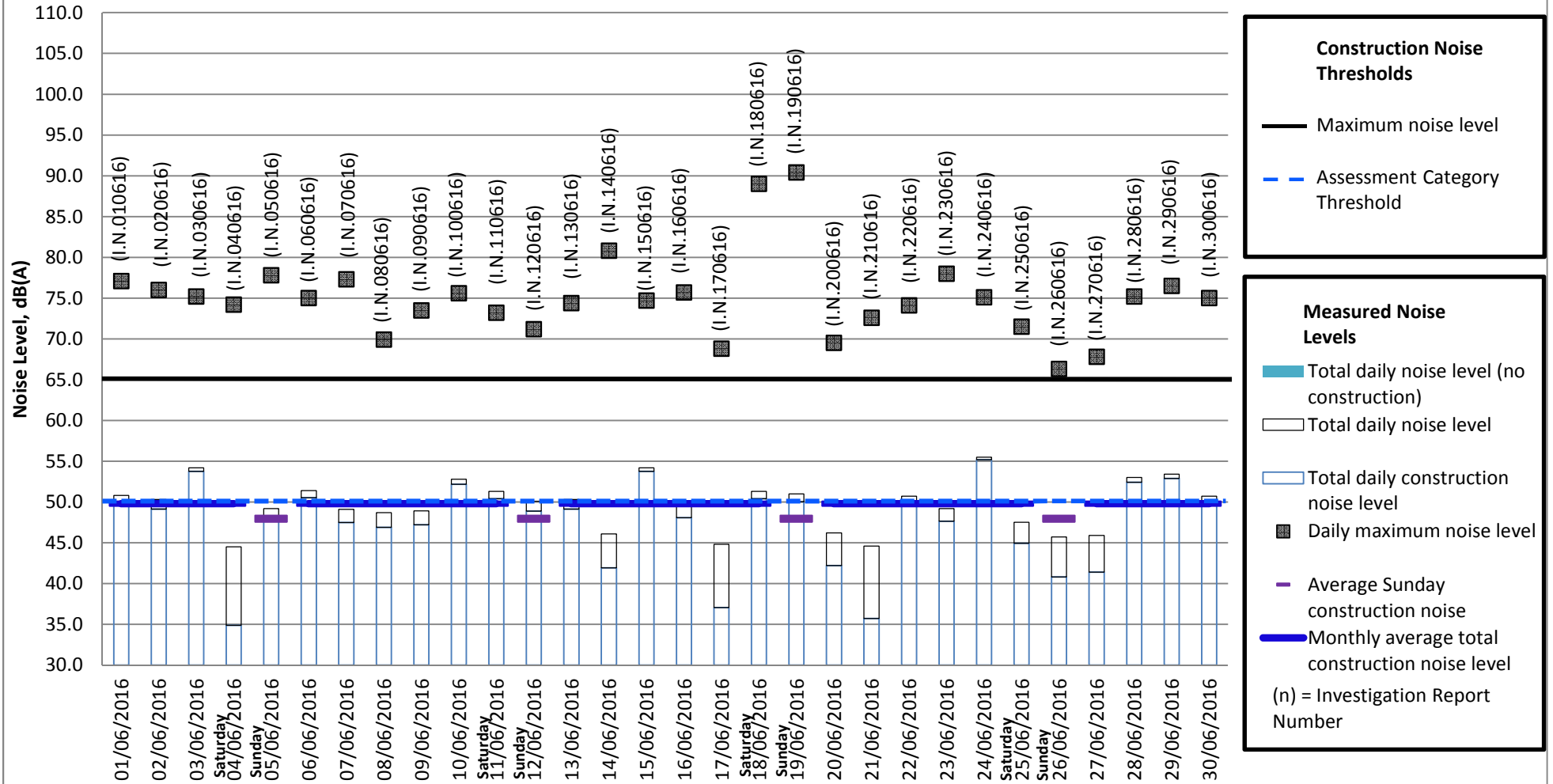
Measured Evening Noise Levels at Inchgarvie

Measurement period: June 2016



Note:

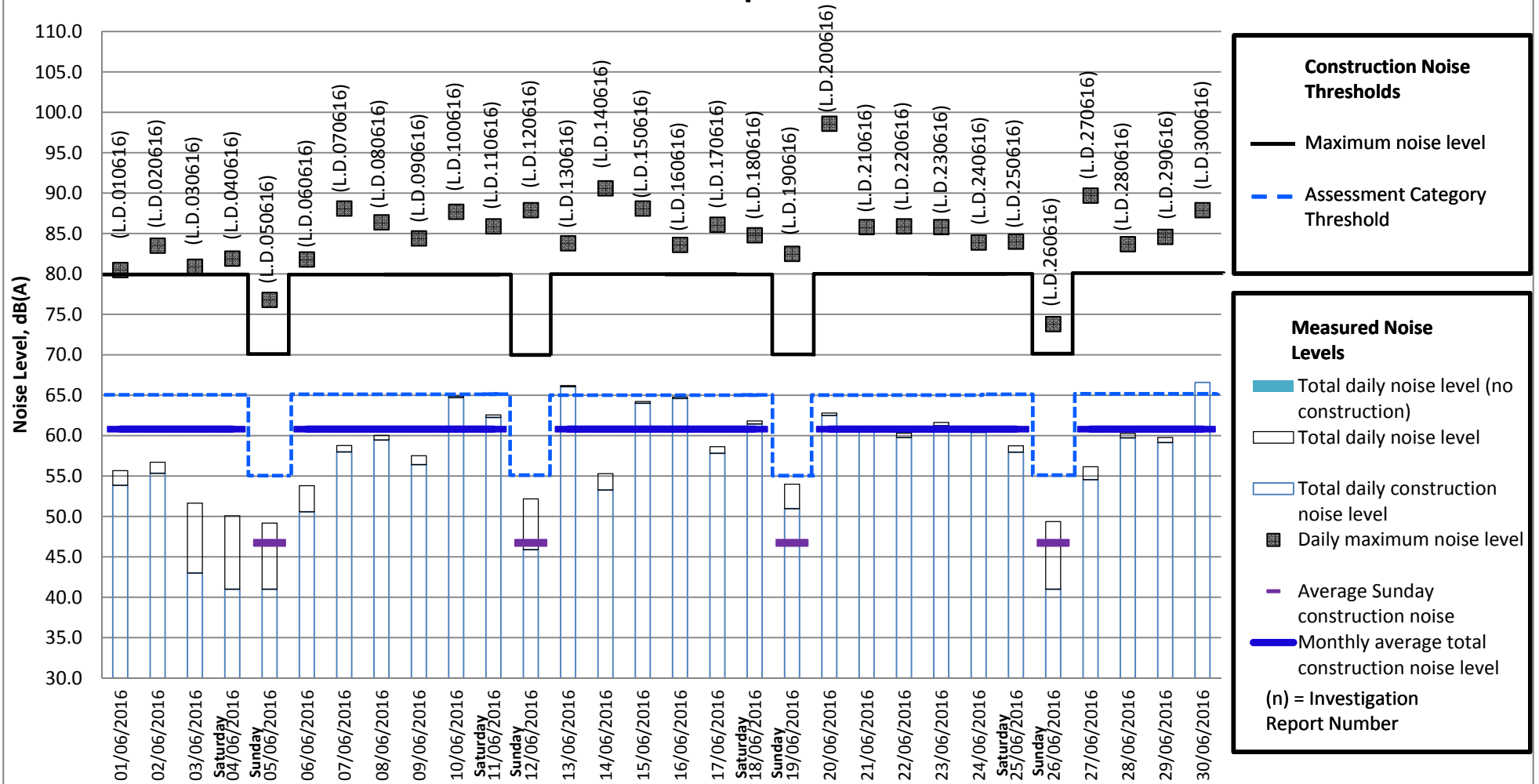
Measured Night time Noise Levels at Inchgarvie Measurement period: June 2016



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 Linn Mill

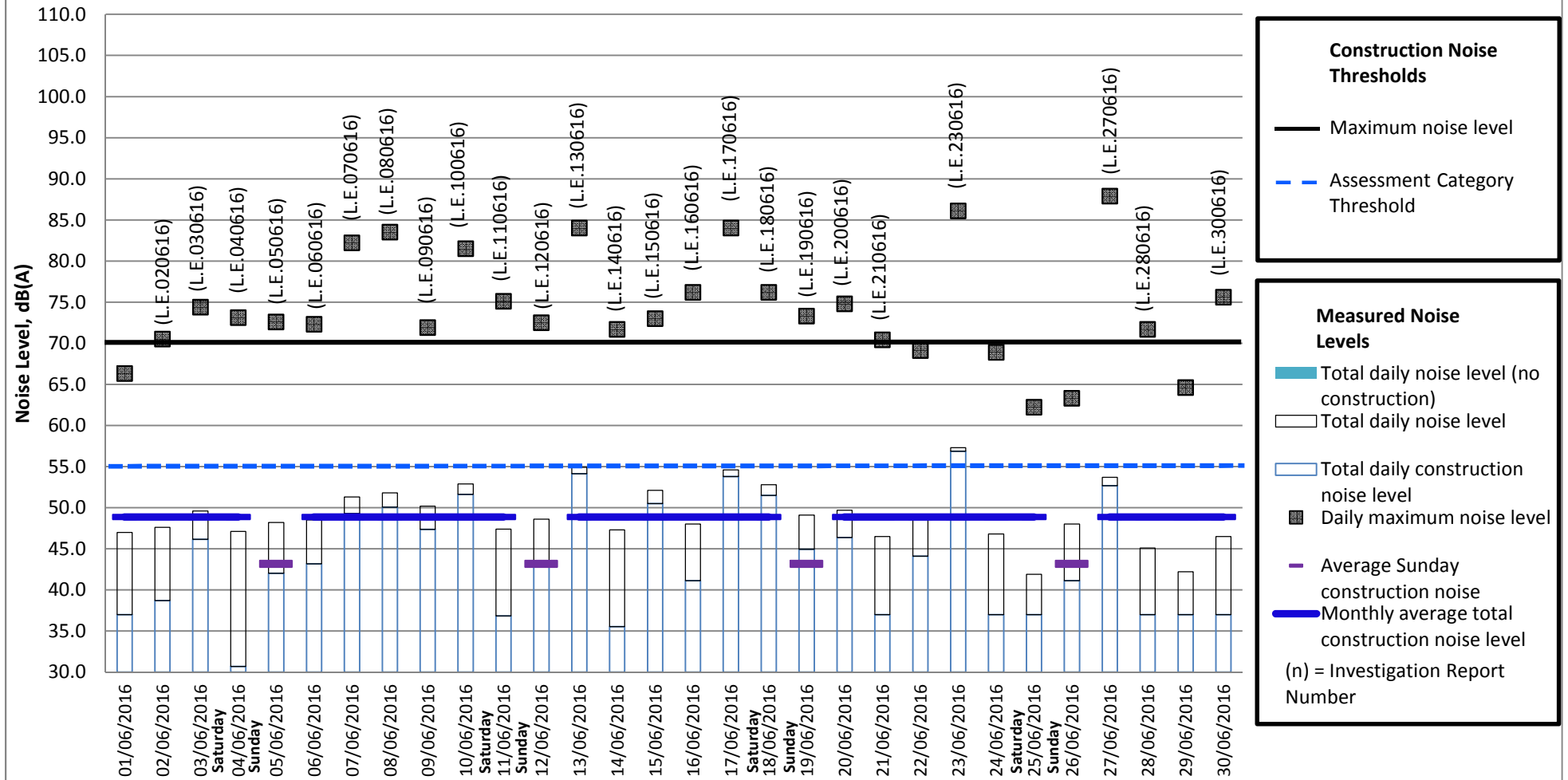
Measurement period: June 2016



Note:

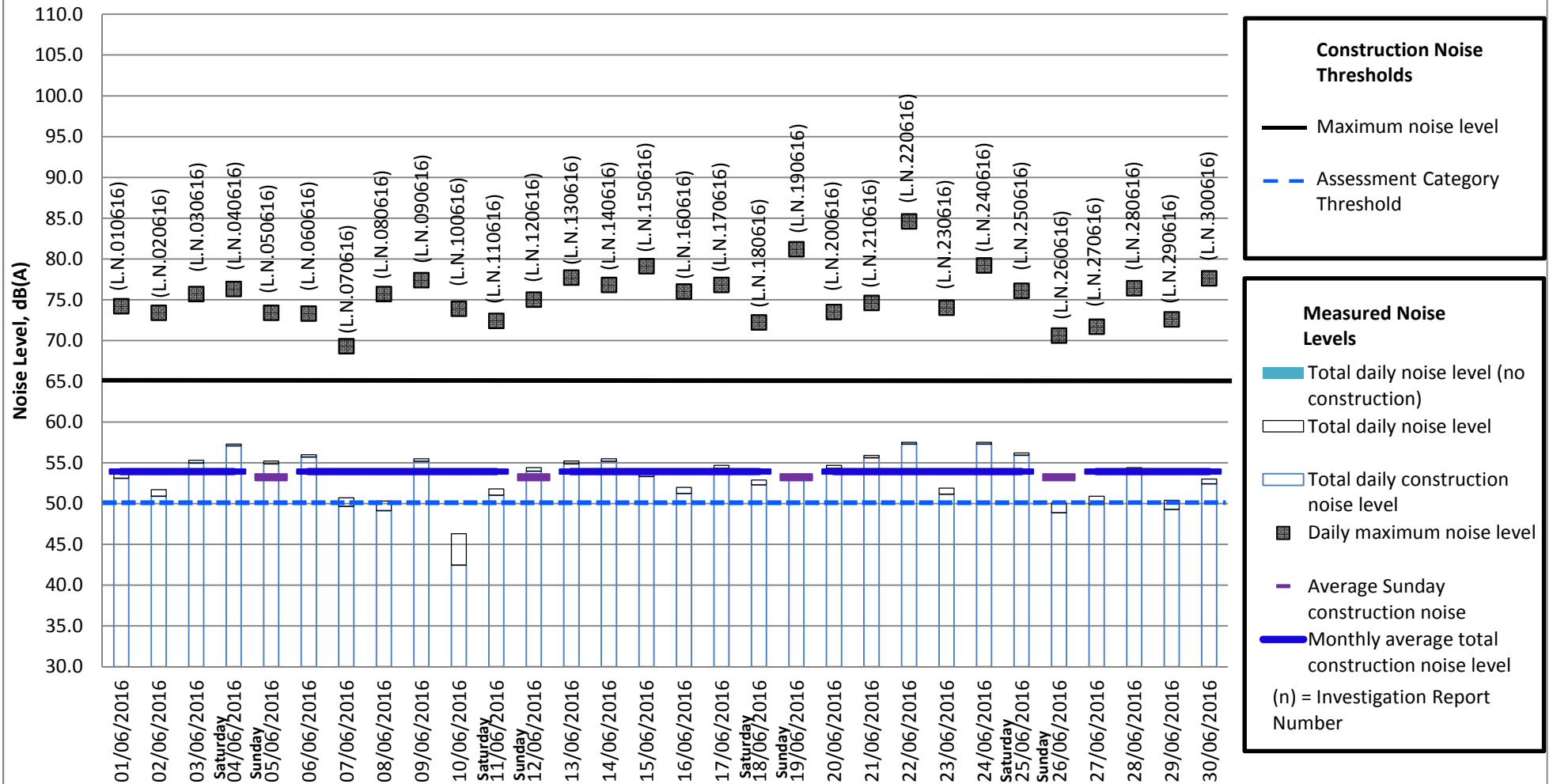
Measured Evening Noise Levels at Linn Mill

Measurement period: June 2016



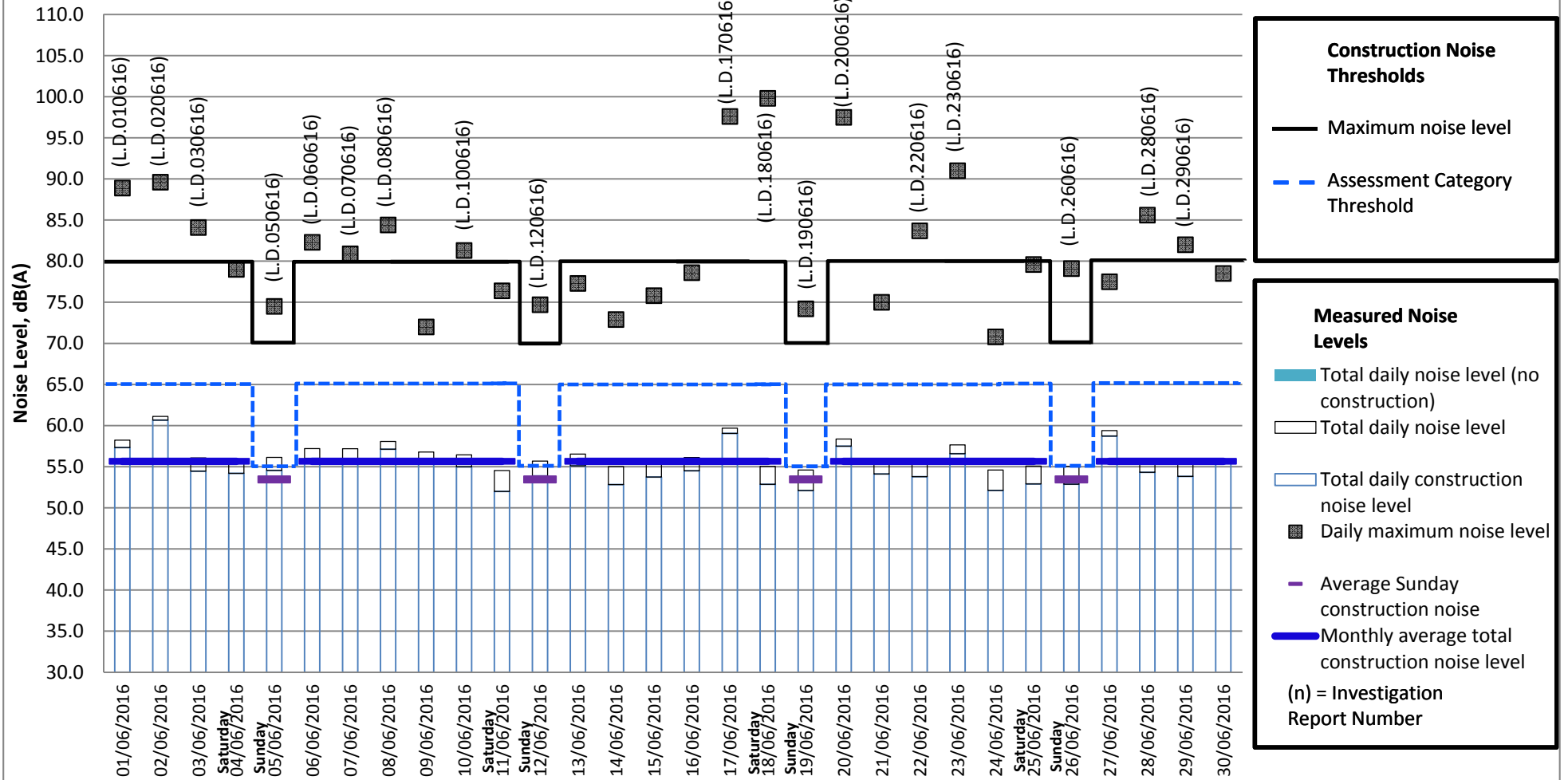
Note:

Measured Night time Noise Levels at Linn Mill Measurement period: June 2016



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: June 2016



Construction Noise Thresholds

- Maximum noise level
- Assessment Category Threshold

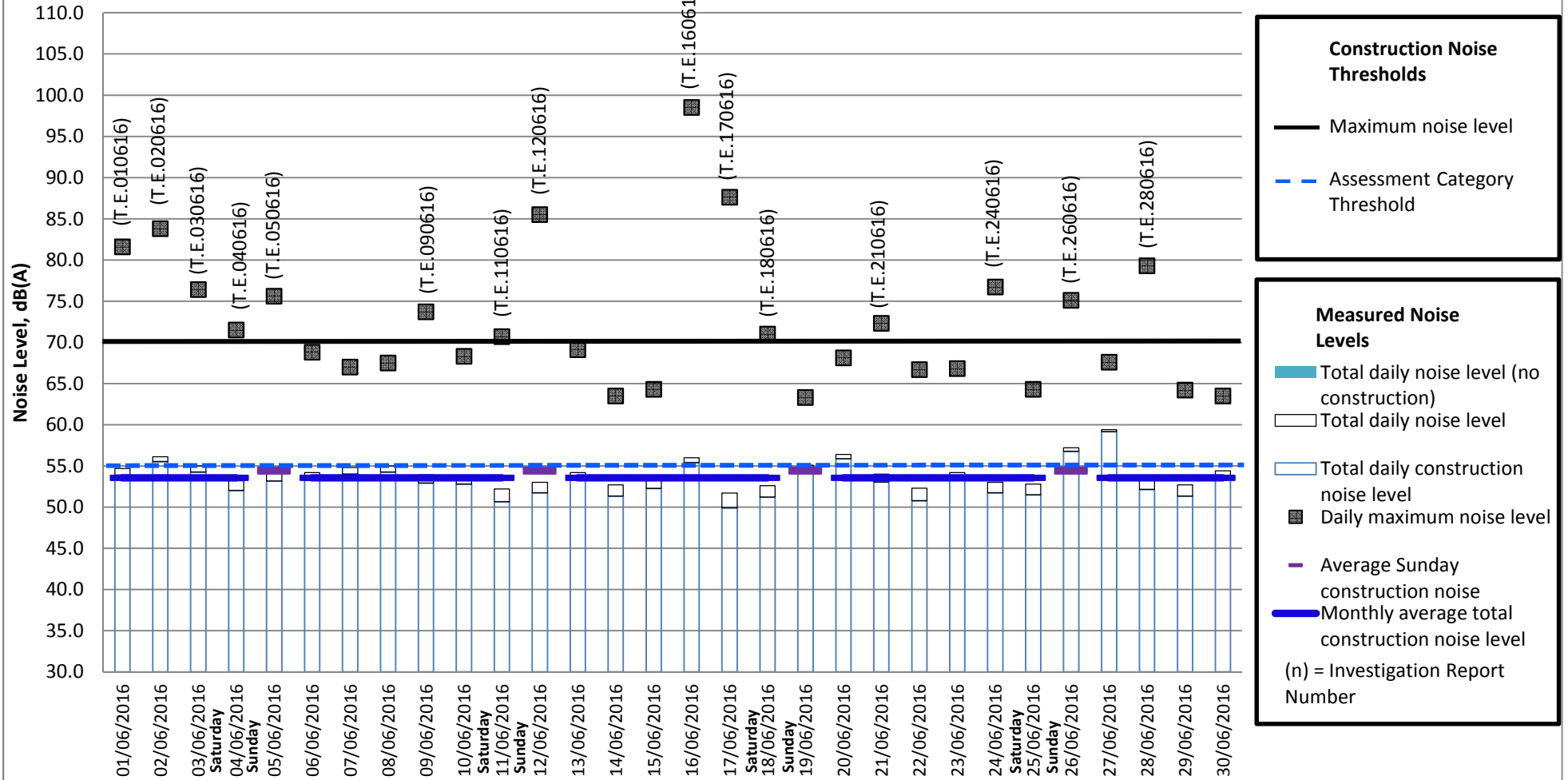
Measured Noise Levels

- 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

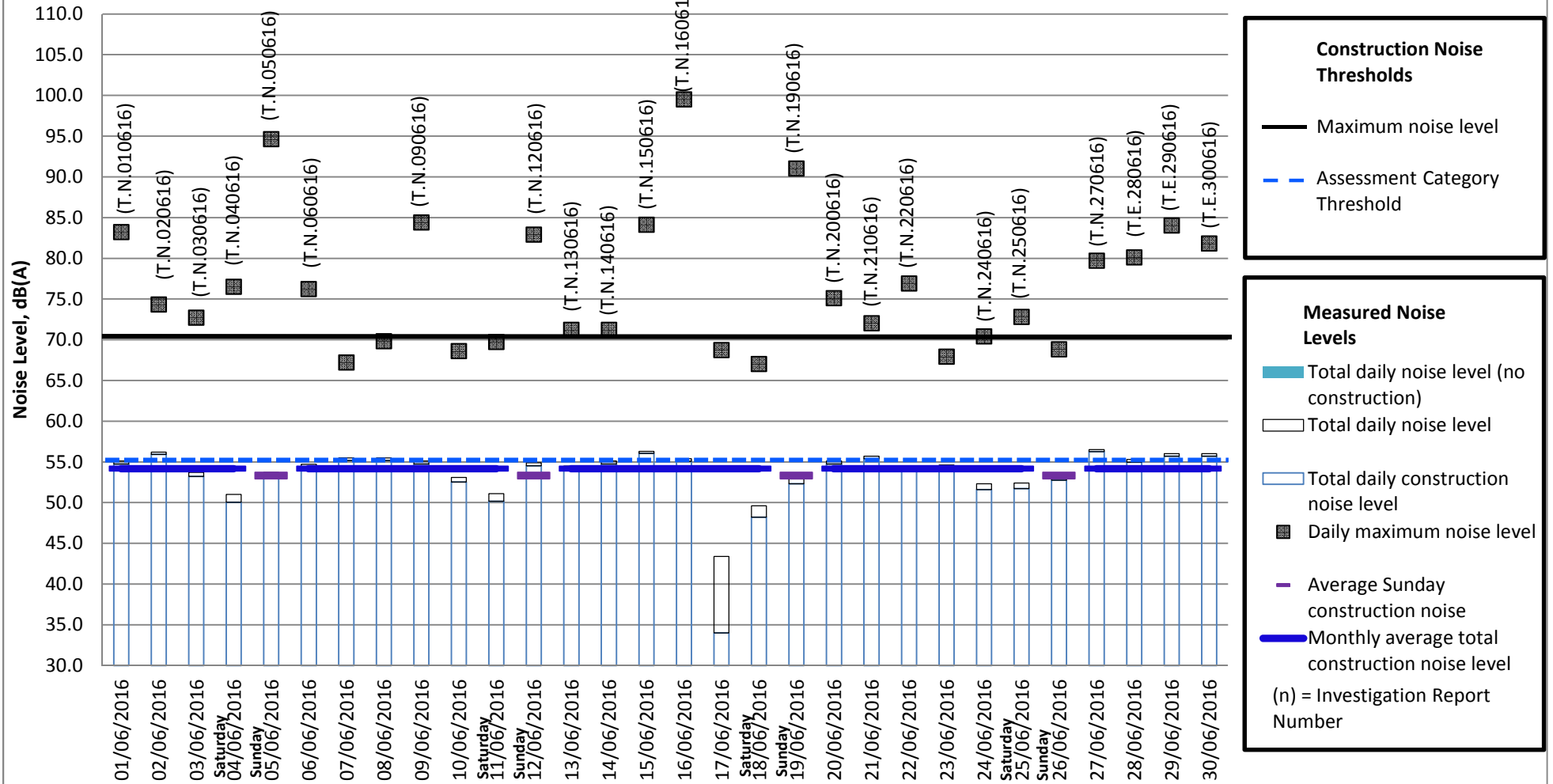
Note:

Measured Evening Noise Levels at Tigh-Na-Grian Measurement period: June 2016



Note:

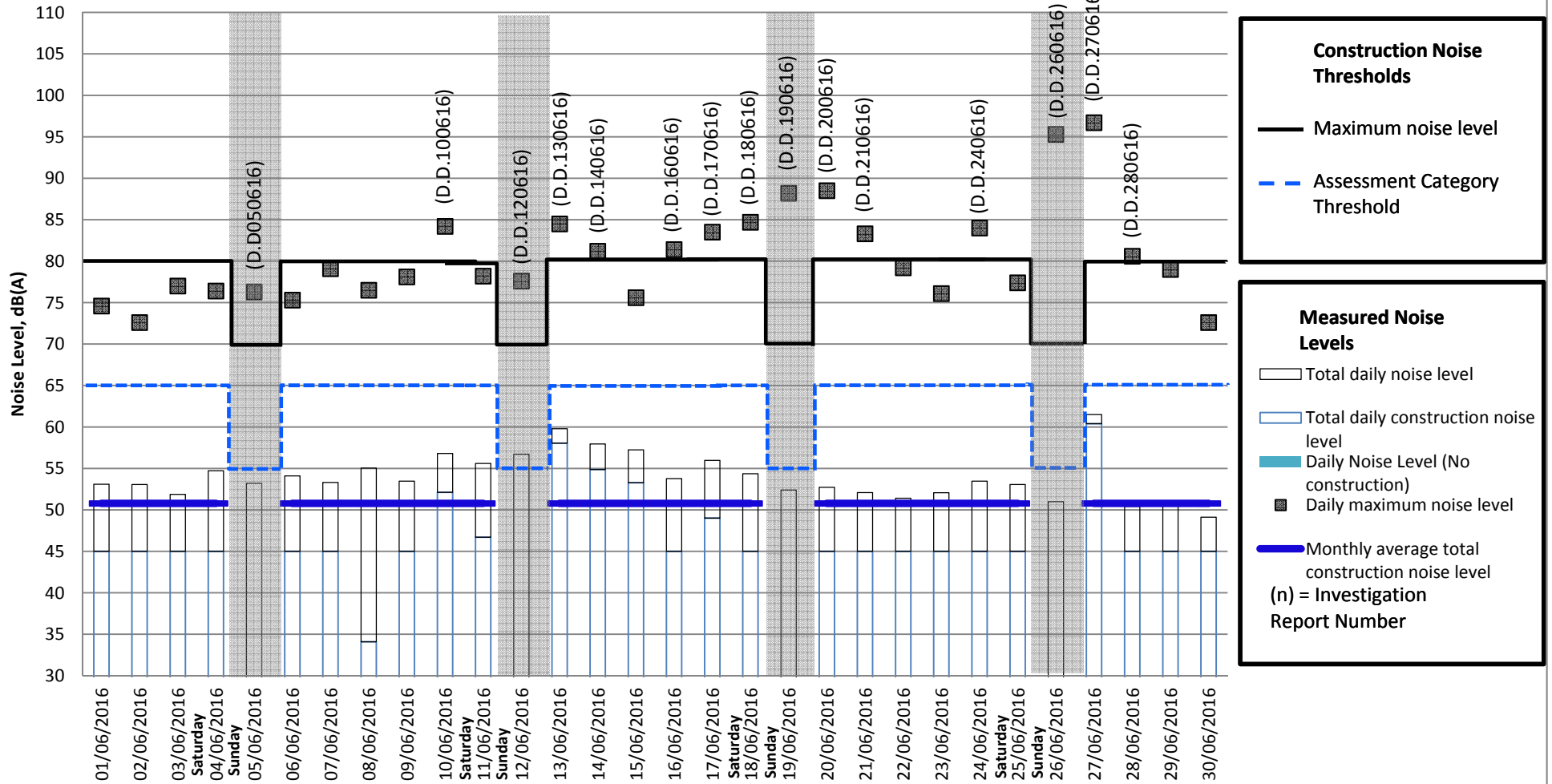
Measured Night time Noise Levels at Tigh-Na-Grian Measurement period: June 2016



Note:

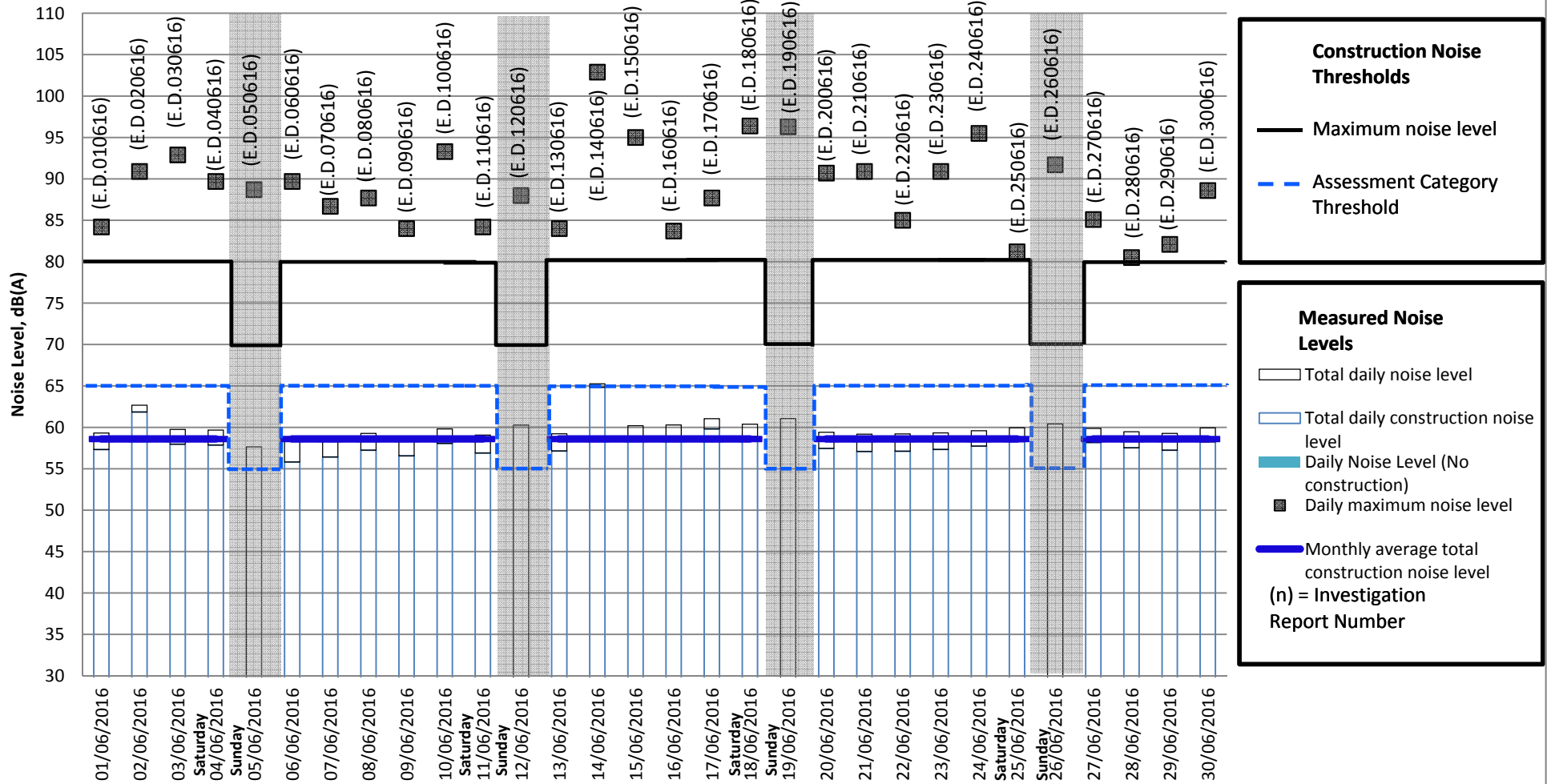
Measured Daytime Noise Levels at Dundas Home Farm

Measurement period: June 2016



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

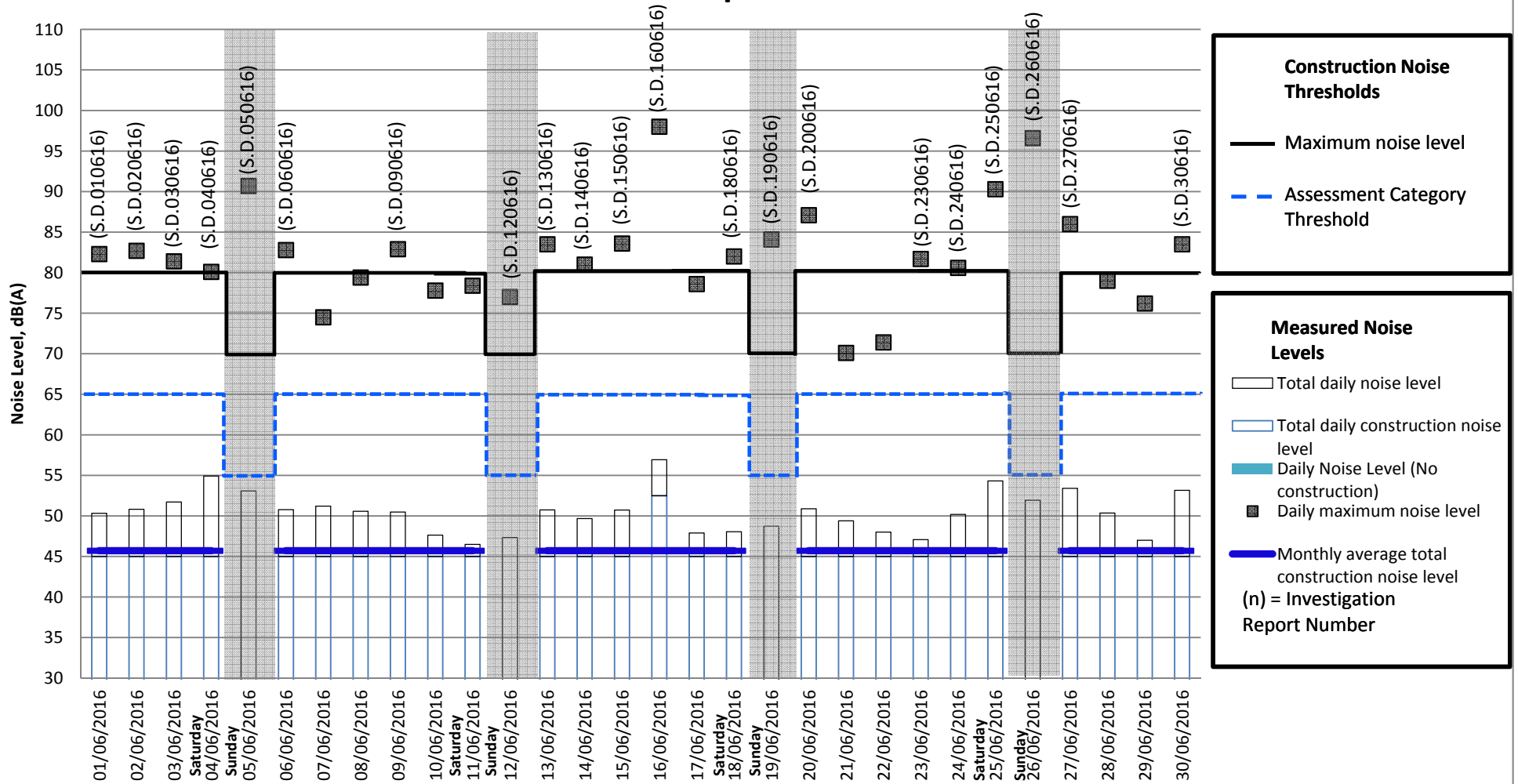
Measured Daytime Noise Levels at Echline Measurement period: June 2016



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

Measured Daytime Noise Levels at Springfield

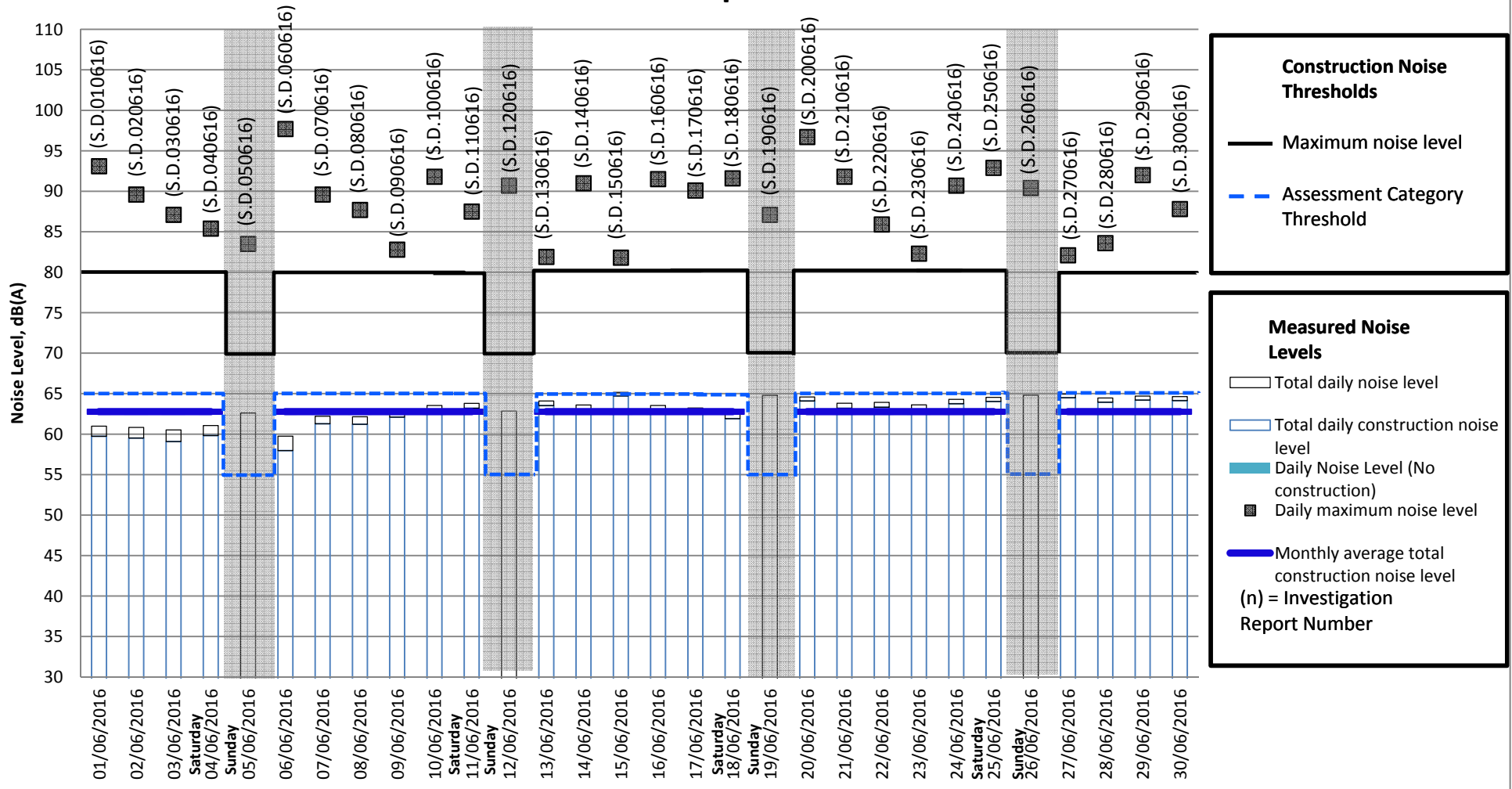
Measurement period: June 2016



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

Measured Daytime Noise Levels at Scotstoun

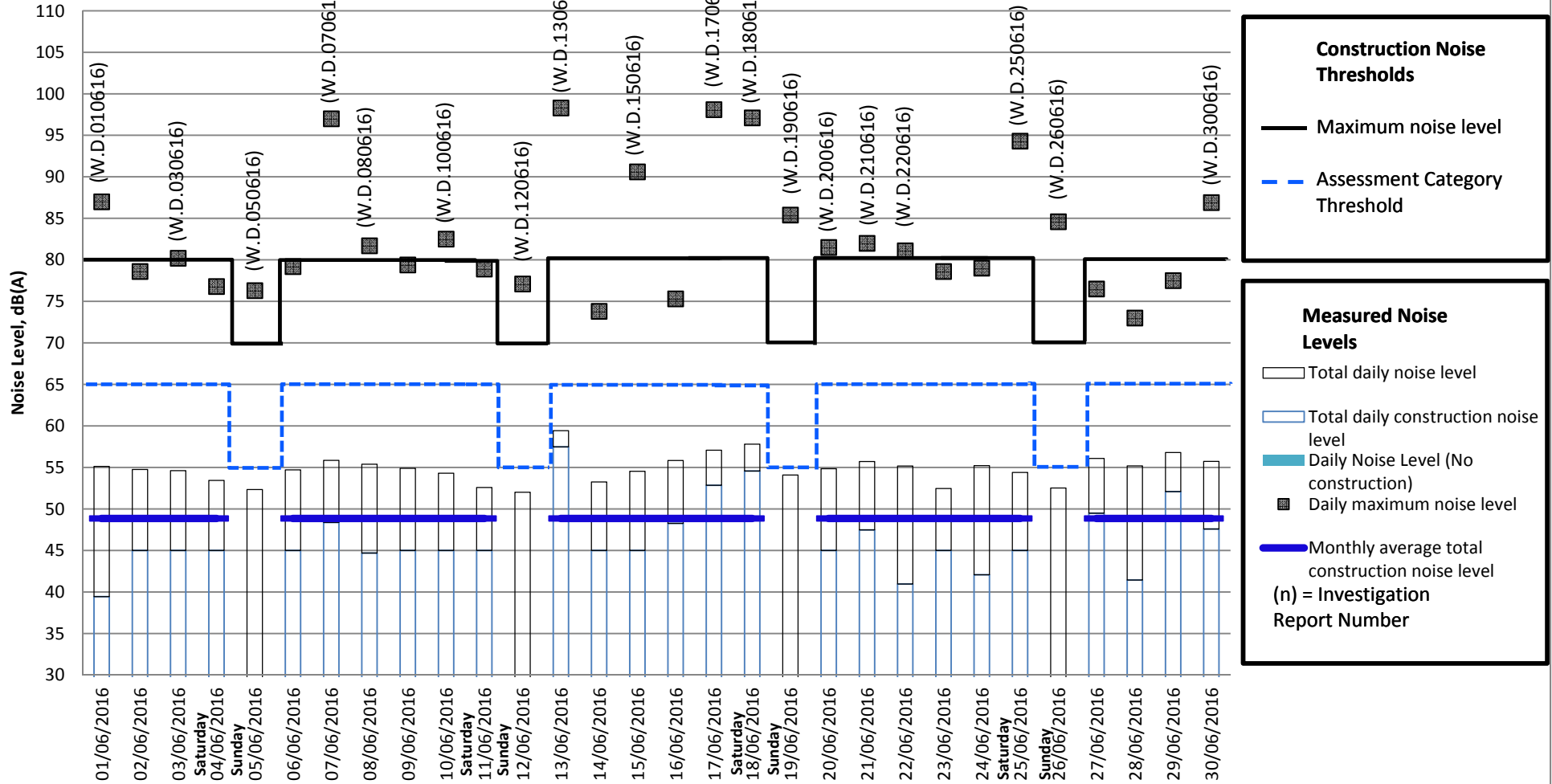
Measurement period: June 2016



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

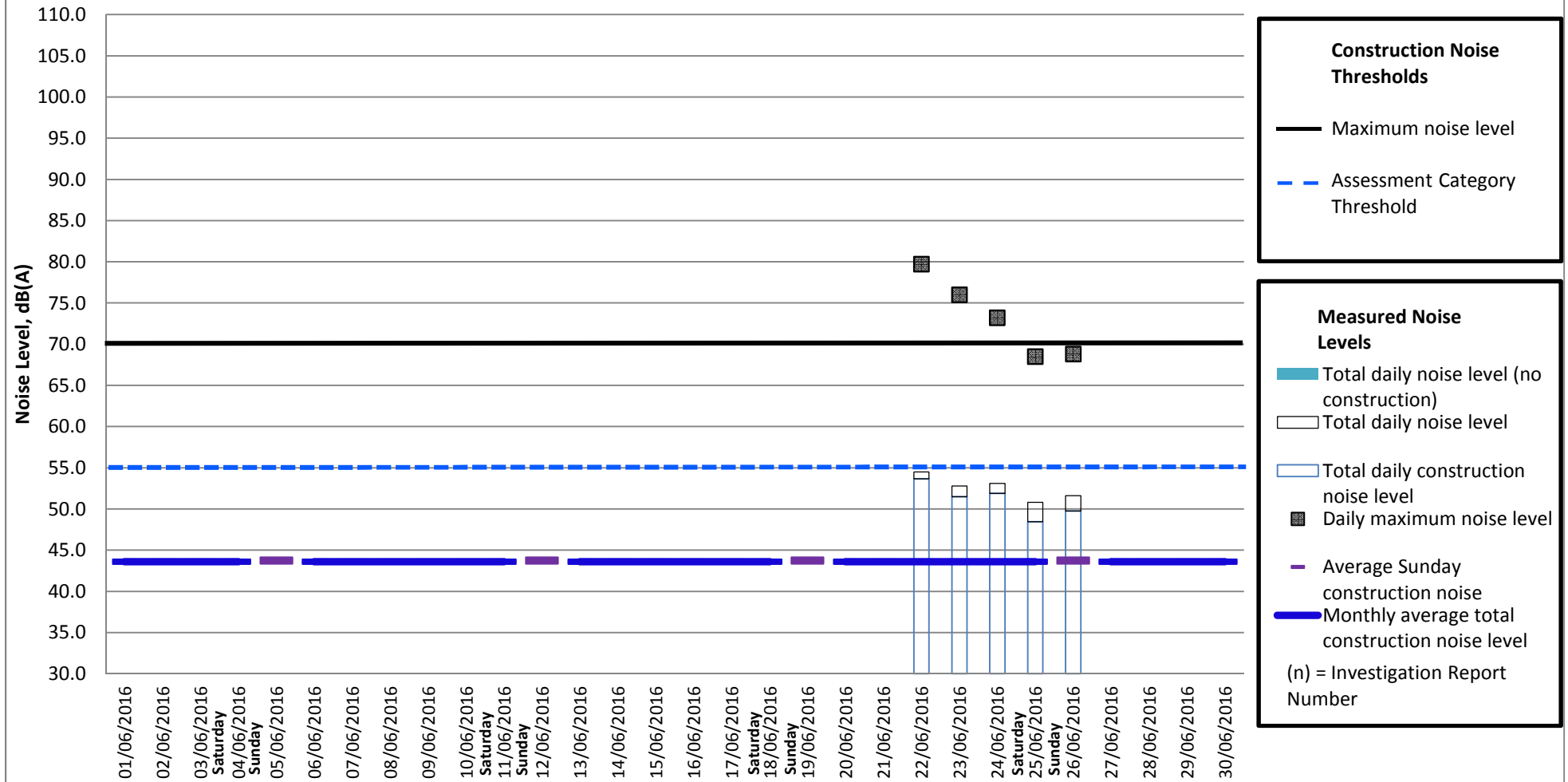
Measured Daytime Noise Levels at Whinnyhill

Measurement period: June 2016



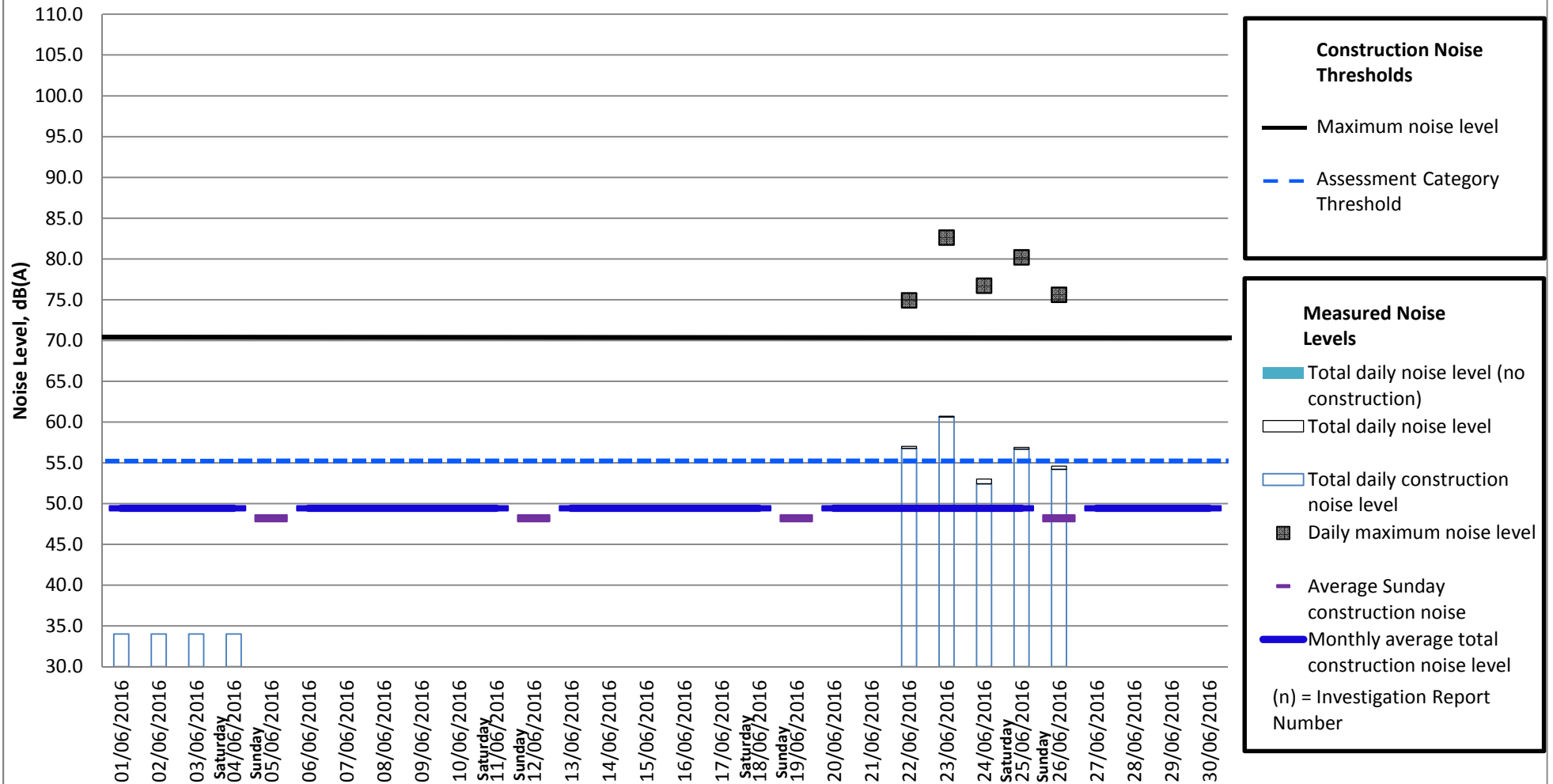
Note:

Measured Evening Noise Levels at Whinnyhill Measurement period: June 2016



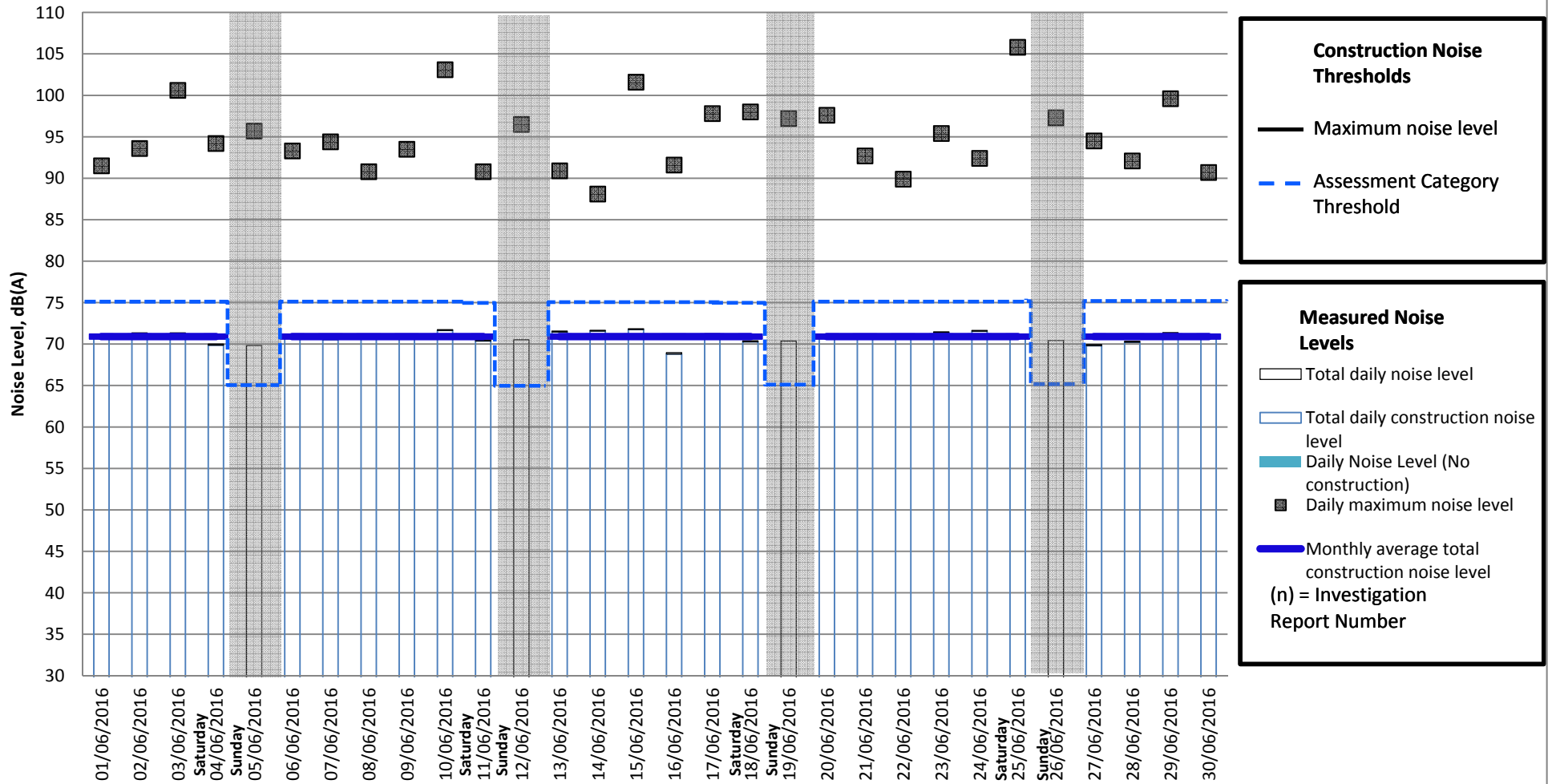
Note: Beam lifts at FT03 and FT04 took place during evening and nighttime periods on the Thursday 23rd – Saturday the 25th June. Exceedances noted were caused by birds

Measured Night time Noise Levels at Whinnyhill Measurement period: June 2016



Note: Beam lifts at FT03 and FT04 took place during evening and nighttime periods on the Thursday 23rd – Saturday the 25th June. Exceedances noted were caused by birds and trains

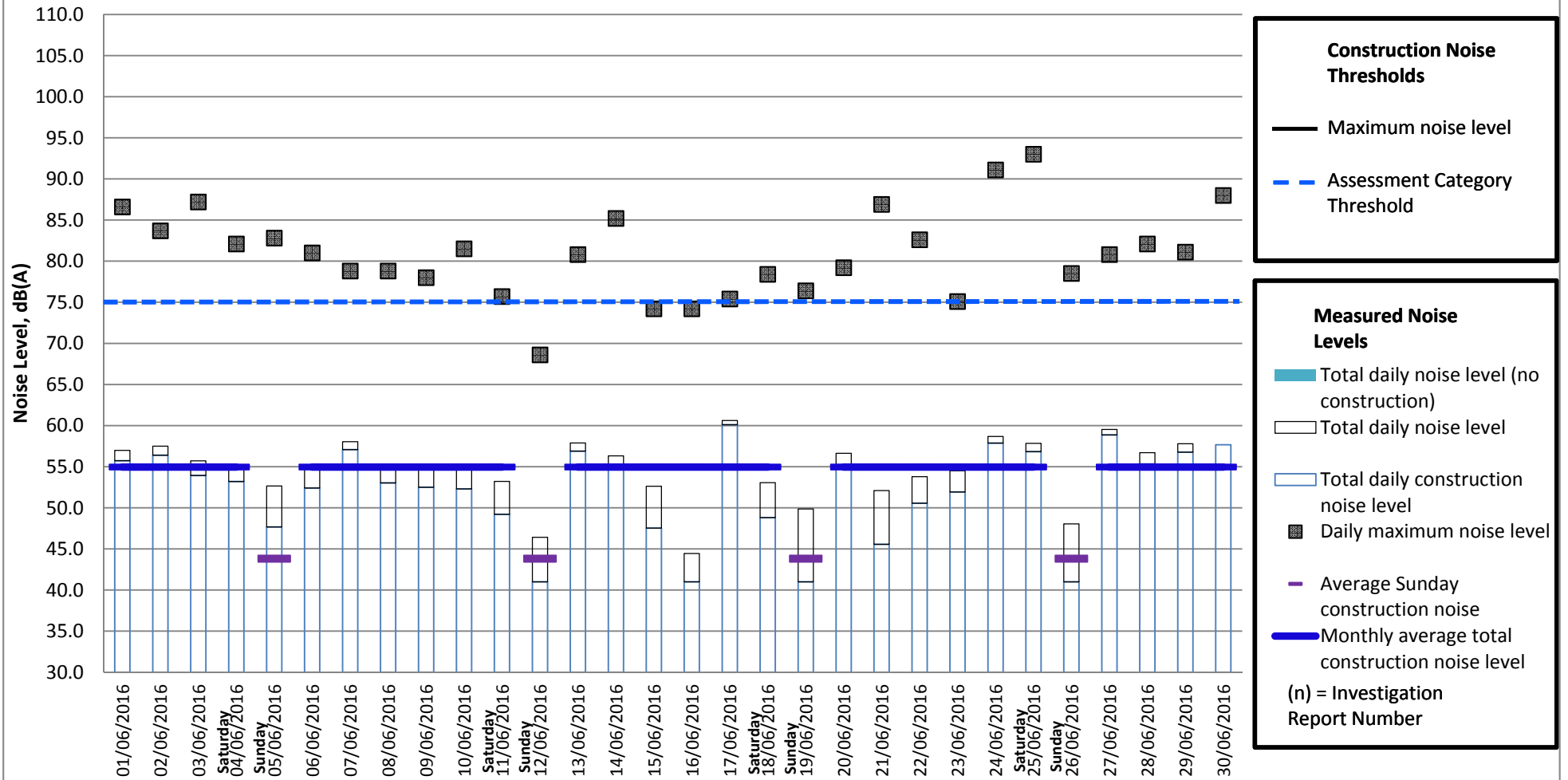
Measured Daytime Noise Levels at Newton Measurement period: June 2016



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.

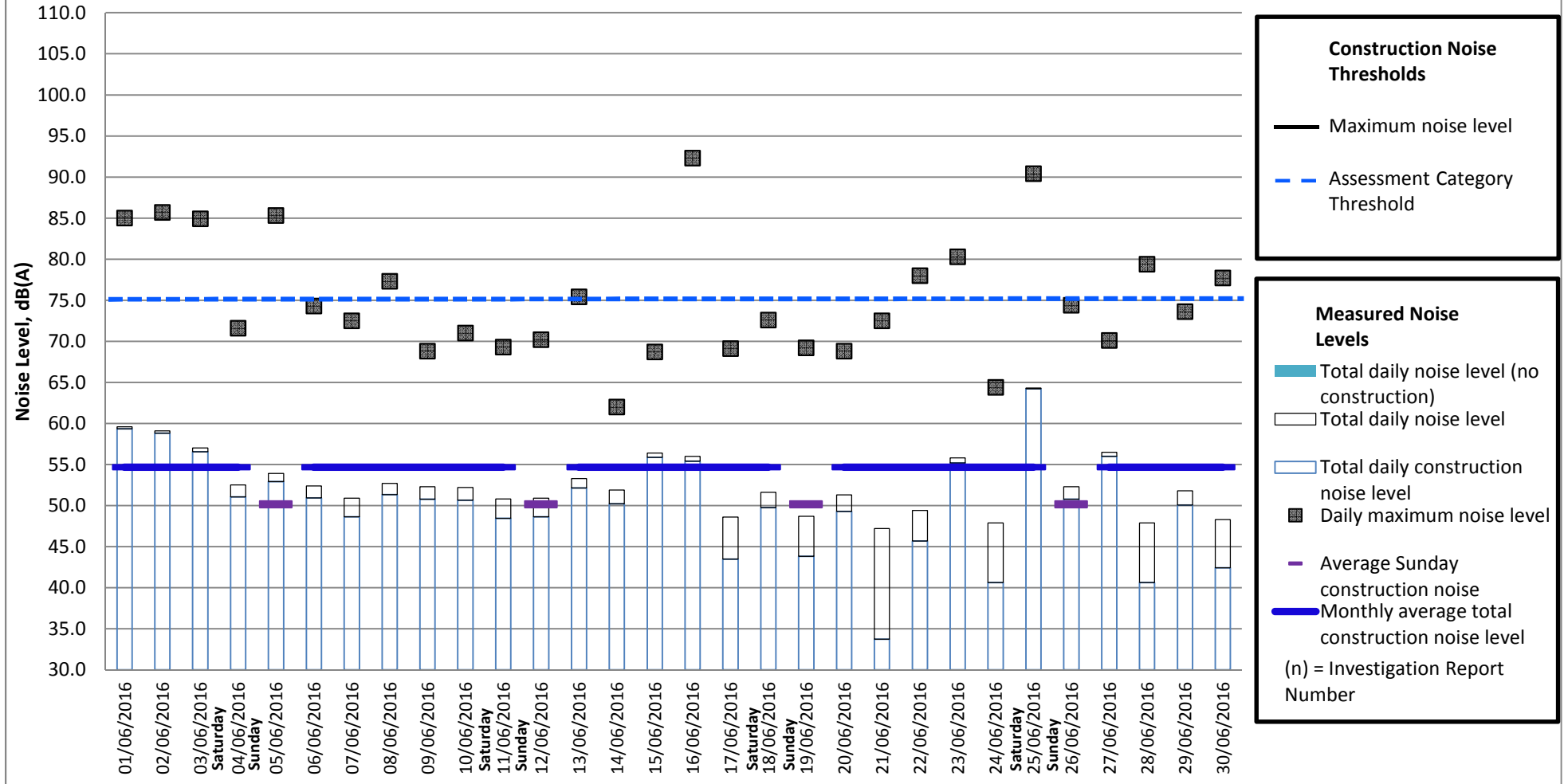
Measured Daytime Noise Levels at Port Edgar

Measurement period: June 2016



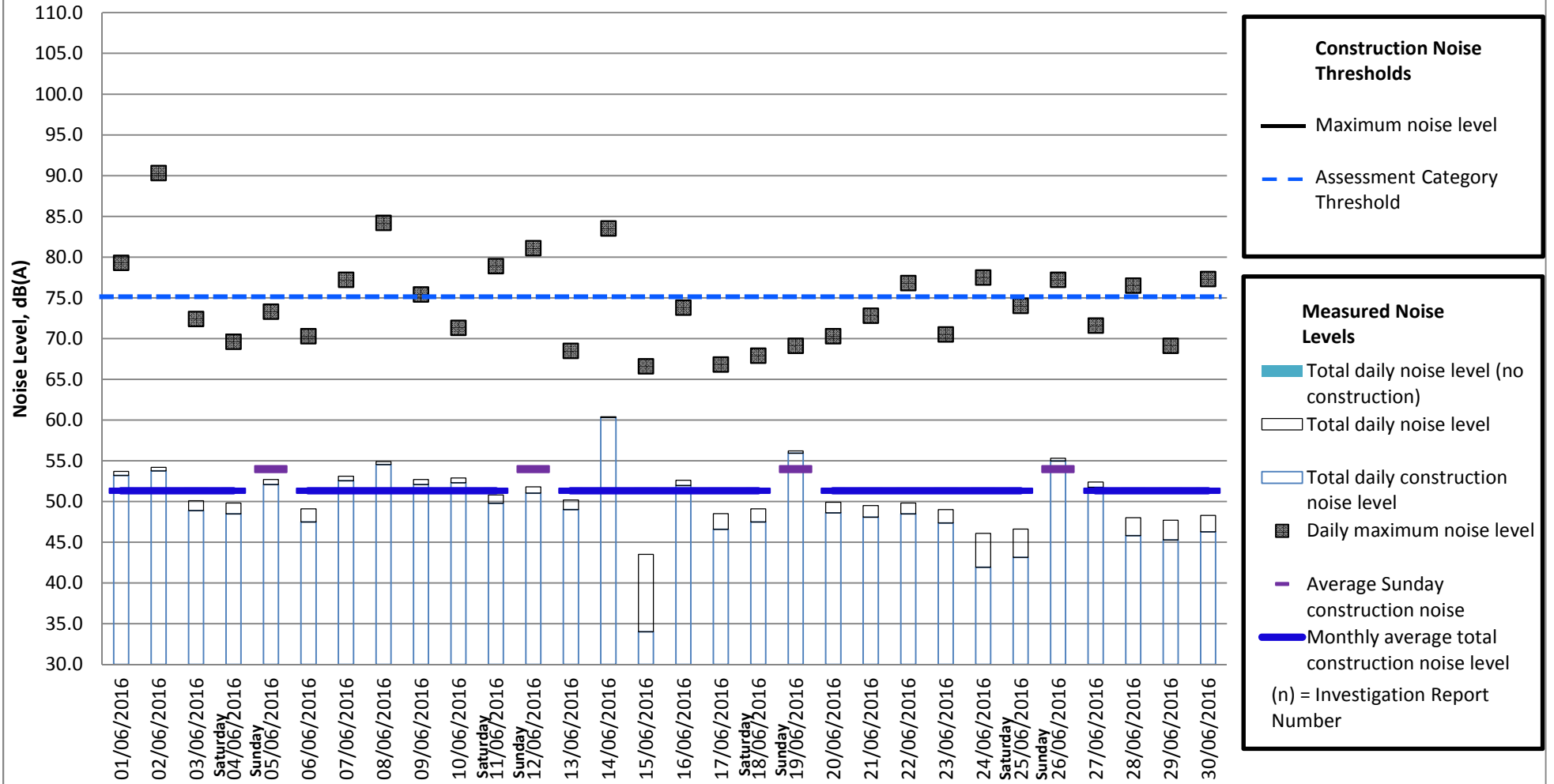
Note:

Measured Evening Noise Levels at Port Edgar Measurement period: June 2016



Note:

Measured Night time Noise Levels at Port Edgar Measurement period: June 2016



Note:

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