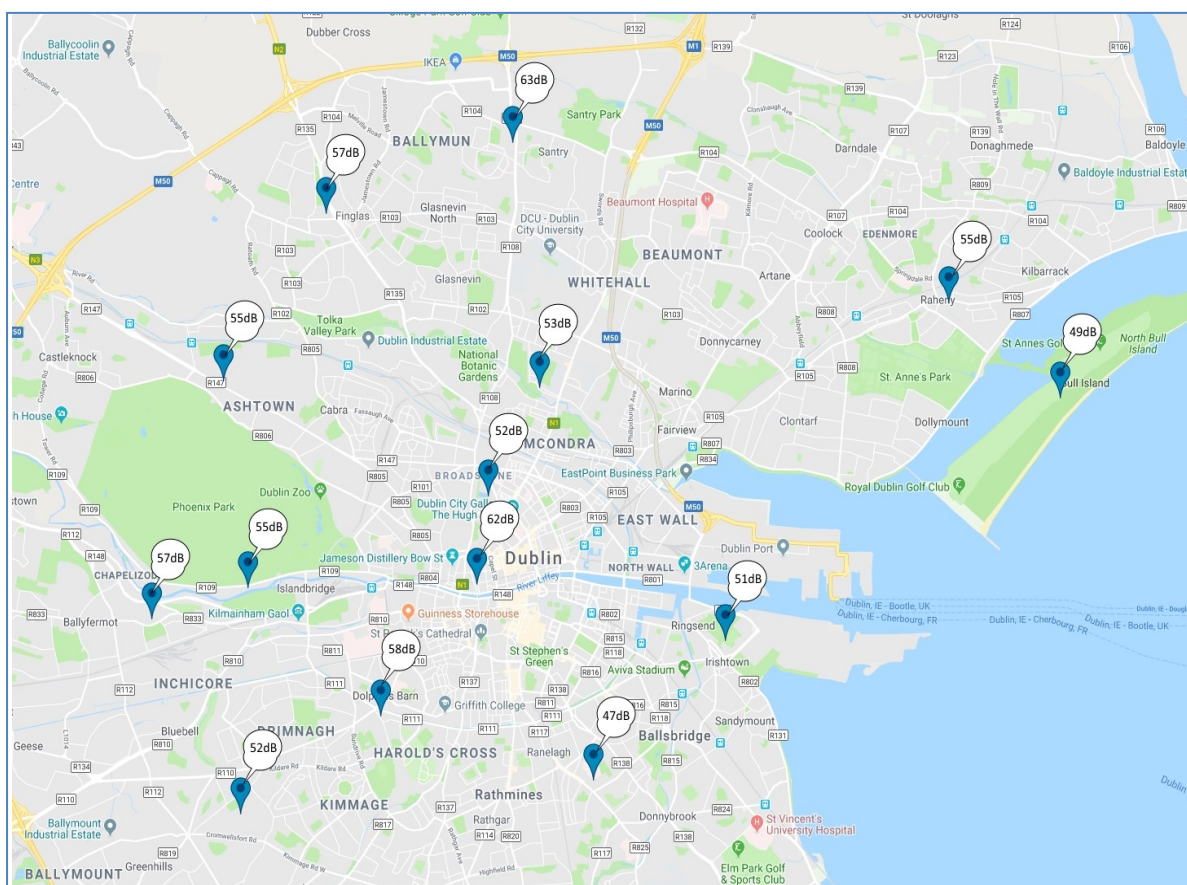


DUBLIN CITY COUNCIL

AMBIENT SOUND MONITORING NETWORK

Annual Report 2017



Annual Hourly Sound Level Measurements
Dublin City Ambient Sound Monitoring Website
WWW.DublinCityNoise.com

Produced by
Traffic Noise & Air Quality Unit,
Environment and Transportation Department,
Dublin City Council.
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Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

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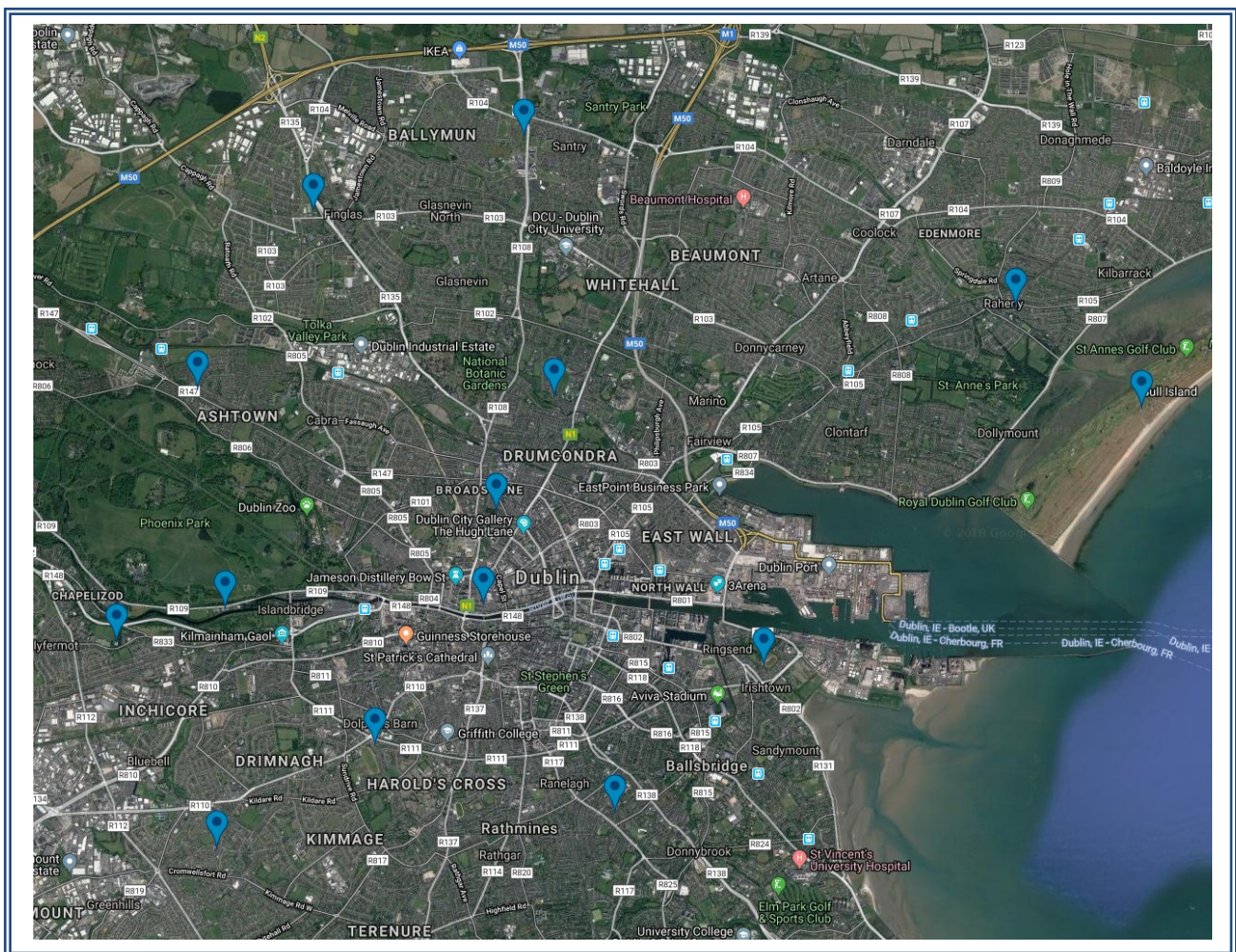
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Introduction

Dublin City Council commenced installation of the ambient sound monitoring network in 2009. This is the ninth Annual Report in relation to this monitoring. The number of monitoring sites has increased over the years from eight to fourteen sites. The purpose of the network is to measure outdoor ambient sound levels in the City, at sites which are representative of typical sound levels to which citizens are being exposed. The monitoring sites operate continuously, recording sound levels and statistical information to allow analysis of trends in sound emissions. The units are equipped with a Class 2 microphone, specifically designed for long term outdoor use. The measurement network does not measure 'Noise Levels' – See 'What is Noise?'

Fig. 1 Sound Monitoring Sites -



Along with the availability of our ambient sound measurements '24/7' at our website <http://dublincitynoise.sonitussystems.com/>, hourly 'tweets' were also commenced with a 'twitter handle' @dublincitynoise. This is an effort to further promote the site and provide more information on the environment for those who wish to receive it.

Sites are selected so that, in so far as is possible, no single dominant sound source, such as major roads, road junctions, industrial sources etc. have a disproportionate influence on the outdoor ambient sound levels being measured. The network currently consists of 14 monitoring locations.

These are:-

- Ashtown, off Navan Rd. D7, Private House.
- Ballyfermot Road, D10, Civic Centre
- Ballymun Road, D11, Library.
- Bull Island, D3, Interpretative Centre
- Chapelizod Road, DCC Council Rowing Club.
- Howth Road, D5, Raheny Library.
- Ringsend, D4, Irishtown Stadium.
- Woodstock Gardens, Ranelagh, D6.
- Chancery Park, Dublin 1, Public Park.
- Dolphin's Barn, Crumlin Rd, Dublin 8.
- Mellows Park, Finglas, Dublin 11
- Blessington St, D1, Blessington Basin
- Millmount Avenue, D9, Library.
- Percy French Road, D12, Walkinstown

Links to these sites are provided on the WWW.DublinCityNoise.com website. Information on what the various measurement parameters mean and information on acoustics in general can also be found there. We hope to continue to look for opportunities to increase the number of monitoring sites should appropriate siting locations become available.

What is Noise?

There is a subtle difference, which can lead to misunderstanding, in relation to noise and the actual sound we hear. Noise is often defined as unwanted sound. As such, it is a subjective response or value judgement in relation to a sound stimulus. This 'judgement' can be influenced by the sound level of the acoustic stimulus, the time of its occurrence, its time domain, its frequency spectrum and its informational content. Therefore the loudness of a noise may not be the only measure used in assessing as to whether it will give rise to annoyance or complaint.

What turns a 'physical sound measurement' into a 'subjective noise level' causing annoyance is dependent on the context within which the observer hears the sound/noise. As such, quoting sound levels without putting them into context is somewhat meaningless. This report provides a site location map for each site in order to enable the reader to put the site and its measurements into the context of its physical surroundings i.e. – is it close to a main road, is it in the City or suburbs, is it a Quiet Area? It also defines the time periods over which the measurements are taken.

The results of a sound measurements can be expressed in different ways depending on the method of assessment. Each method is represented by its own 'sound indicator'. So for example an average measurement over a 24 hour period is called a 24 LEQ (pronounced L, E, Q), whilst measurements of sound from traffic over an 18hr period is designated by an L10 18 Hour value. Other common indicators are Lmax – maximum sound level over a specific period; and L95 – the sound level exceeded for 95% of the measurement period – also called the 'background level'. However, whatever the method of assessment, the unit of measurement for all sound measurement is the decibel (dB).

BOX 1.

The Decibel and Guidance Exposure Levels

Noise is measured in decibels (dB). It is also referred to in A-weighted decibels (dB (A)).

The A-weighting filter is a method of summing sound energy across the frequency spectrum of sounds audible to humans, and is used to estimate the human ear's response to sound.

There are two important indicators of noise:

Lden: The day, evening and night noise indicator. A measure of all the averaged (continuous equivalent) sound pressure level over a year, and

Lnight: The night time noise indicator, which averages (continuous equivalent) sound pressure level over one year, focussing on the hours between 23:00 and 07:00.

This corresponds to 8 hours, the recommended period of sleep for adults.

A natural environment (birds, trees and wind) is associated with a typical average Lden value of 40 dB and an Lnight of 30 dB.

An Lnight value of 40 dB is the limit suggested by the World Health Organization(WHO) to avoid negative health effects on humans.

Exposure of people to day time noise levels above 65dB(A) can cause severe health problems according to WHO. In general, sound levels in cities can range between 60-70 dB(A), with suburban levels between 50-60 dB(A). The World Health Organisation has set guideline levels for annoyance at 55dB(A) representing daytime levels below which a majority of the adult population will be protected from a moderate or serious annoyance.

EU Member States are required to report noise above an Lden of 55 dB and Lnight of 50 dB, under the Environmental Noise Directive.

3 dB is the minimum sound level typically considered perceptible by humans, and starting from 5–10 dB humans can clearly acknowledge a different acoustic environment.

***Extract from Science for Environment Policy: Noise Abatement approaches. – issue 17
European Commission***

Monitoring Network

The Dublin City Council's monitoring network continuously measures 5 minute parcels of sound right throughout the year. These periods of 5 minute sound levels are then converted and presented as average hourly sound levels in decibels (dB (A)). This enables the compilation of day, evening, night, and Lden statistics.

The averaging of measured data has been carried out logarithmically rather than normal arithmetical averaging. This is in line with the International Standards Organisation 'Recommendation 1996' in relation to long term measurements. The use of this method tends to assign a greater influence on the overall average by higher sound levels for the period being measured. For example, an arithmetical average of four sound levels such as 50dB, 50dB, 50dB and 70dB will result in a 55dB average. Averaged logarithmically these values produced a result of 64.1dB. Therefore it is critical that our sound monitors are so located that no one sound source dominates the sound measurements that could unduly skew the average ambient measurements.

Guidelines\ Standards for exposure to Ambient Sound levels

Sound emission criteria for certain sources, outside of the work environment, can be applied and enforced through Integrated Pollution Prevention Control licences, Planning Control, or Section 107-108 of the Environmental Protection Agency Act 1992. There are no legally binding statutory limits for ambient sound levels, similar to those that currently exist for air quality.

Measurement Parameters

The European Commission requires the use of a parameter called the Lden (Sound Level for Day, Evening and Night) for population exposure assessment. This measurement parameter of Day-evening-night level is a descriptor of average daily sound levels throughout a full year, with the addition of a penalty of 5 dB (A) for evening sound (i.e. 19.00-23.00) and a penalty of 10 dB (A) for night time sound (23.00-7.00). Lden has been put forward as a single value parameter for the quantification of annoyance caused by noise. Its one drawback is that it is based on annual average calculations. Therefore, one has to have annualised data before one can use it in any assessments. Our monitoring network fulfils this criteria. Therefore, our assessments of Dublin's environmental acoustic quality is not solely dependent on mathematical computer modelling. However the Lden parameter is not a suitable parameter for the assessment of local noise complaints. Average values, or maximum\ minimum values over specific periods of time are more suited for this use.

Areas with desirable\undesirable or low\high sound levels

The Dublin City Council Noise Action Plan December 2013 – November 2018 proposes that areas with undesirable high sound levels are areas with a night time sound level greater than 55 decibels and a daytime level greater than 70 decibels. It also proposes that areas with desirably low sound levels are defined as areas with a night time level less than 50 decibels and\or a daytime level less than 55 decibels.

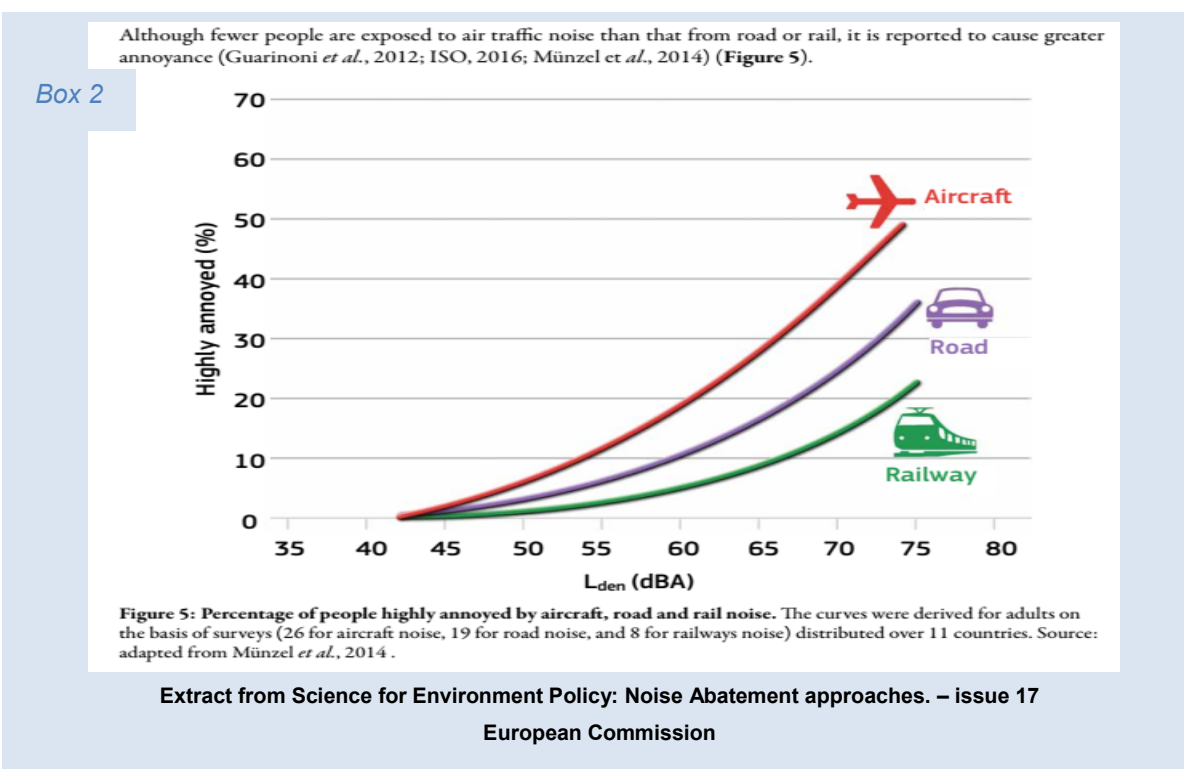
The World Health Organisation Night Noise Guidelines (NNGL) for Europe guidelines propose a Night Noise Guideline (NNGL) ultimate target of 40dB L_{night} outside. An interim target (IT) of 55 dB L_{night}, outside is recommended 'in situations where the achievement of the NNG is not feasible in the short run for various reasons' - WHO.

Data Loss

Loss of data is mainly due to the drifting of the calibration of the microphones or power failure at a site. Data which could not be verified with monitor calibration was discarded. There was no instance of vandalism at any of the sites. We currently aim to have a 95% data capture rate, which we have successfully achieved over the current year.

Sound Sources

Different sources of noise cause different reactions for the same sound level due to the context within which the sound is heard. Box 2 displays people's response to different sources and levels of sound.



Since commissioning our network in 2009, the measurements indicate that under normal conditions the dominant sound source in Dublin is traffic. This sound comes from two aspects of traffic – the road surface i.e. wheel\tyre interface where sound levels increase with speed and secondly, engine\ gear change and body rattle sound, normally observed at lower speeds. Most of the average daily summary charts (pages 13 - 22) display double peaks, one between 7-9 a.m. and one between 5-7p.m. These characteristics are similar to traffic flow patterns on major roads. The charts that do not

reflect these characteristics represent areas that are influenced by more natural sounds – sites such as Blessington Basin or Bull Island which are both designated ‘Quiet Areas’.

Weather has a major influence on sound measurements. In order to take into account the impact windy and wet weather can have on sound measurements, the annual hourly median was compared across all individual sites and across the network as a whole. The median value is defined as the middle number in a sorted list of numbers. It is used for comparison purposes as it is not affected by outliers – i.e. abnormally high sound levels caused by high winds and rain. As can be seen in Table 1 the median has remained remarkably stable over the years compared to the average day, evening and night time levels (Fig.2).

Median of Annual Hourly Sound Levels

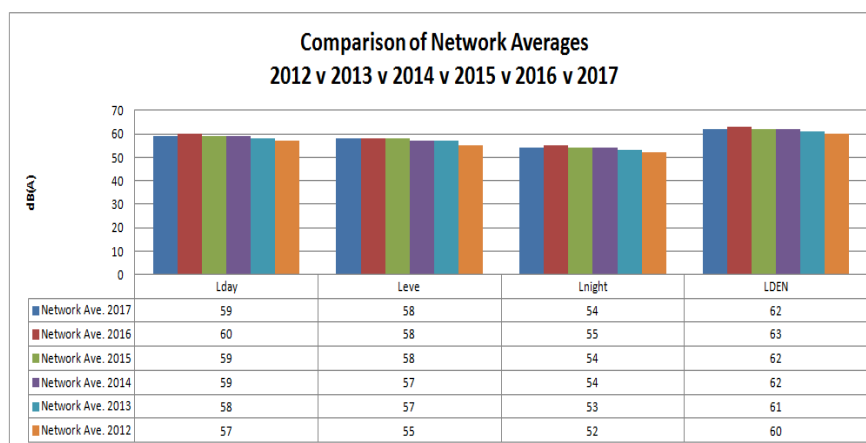
Table 1

Site	2012	2013	2014	2015	2016	2017
Ballymun	62	63	63	63	63	63
DCC Rowing Club	54	55	55	55	54	55
Navan Rd	54	54	54	55	54	55
Ballyfermot	56	56	56	56	56	57
Drumcondra	53	55	55	55	54	53
Raheny	55	56	53	54	55	55
Ringsend	49	51	50	50	50	51
Bull Island	48	50	50	49	50	49
Walkinstown	51	53	53	53	52	52
Woodstock Gdns	46	47	47	47	46	47
ChanceryPk	59	61	61	61	60	62
Blessington Basin	50	51	51	51	51	52
Dolphins Barn	0	0	57	57	57	58
Mellowes Park	0	0	57	57	57	57
Network Ave.	53	54	55	55	54	55

These weather episodes are picked up as high sound levels in the hourly and monthly summary charts, (pages 23 -107). The measurements for Bull Island and Blessington Basin, which are designated as ‘Quiet Area’ displayed relatively high sound levels during these weather episodes. It is therefore important to note comments already made in relation to the difference between noise levels and sound levels. The monitoring site locations are displayed on maps to the rear of this report and provide an indication

as to the type of areas in which they are situated. Ringsend, Bull Island and Blessington Basin, tend to display more erratic sound levels. This could possibly be due to the lesser influence of traffic sound sources

Fig. 2

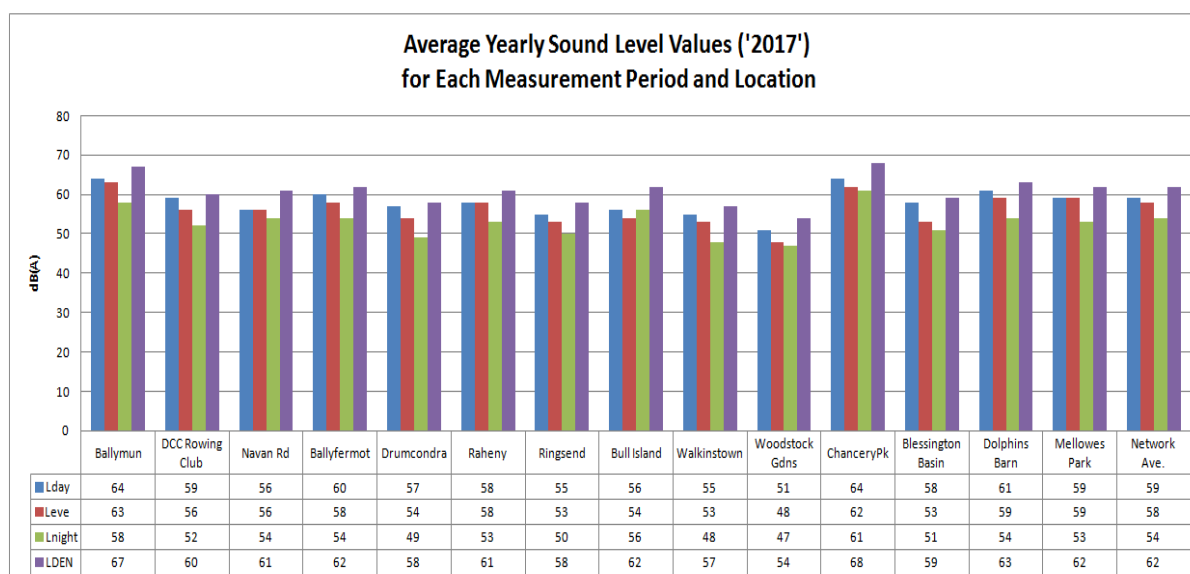


in these areas which allows for weather to be more of a dominant influence. As they are both 'Quiet Areas', monitoring at both the Bull Island and Blessington Basin locations will continue into the foreseeable future in order to assess any deterioration in ambient sound levels.

Summary of Results

Set out in fig.2 is a comparison of the Network averages from 2012 to 2017. There was a decrease of one decibel in day time, night time and LDEN levels for 2017. Fig. 3 provides more detail on individual site measurements. The measurements for 2017 indicate that three locations – Ballymun, Chancery Pk. and Bull Island exceeded the 'undesirable values; of 55dB night, with night time values of 58dB(A), 61dB(A) and 56dB(A) respectively. This also meant that the WHO NNGL interim target for exterior night time level of 55dB(A) was also exceeded at these sites, although the network average did not exceed this level. Three sites – Woodstock Gardens in Ranelagh, Walkinstown and Drumcondra met the desirable criteria for night time levels. All sites were substantially below the undesirable daytime levels of 70dB(A).

Fig. 3



Measurement Results

As mentioned previously, the monitoring network is not a 'noise monitoring' network. The network measures and monitors actual sound - from all sources. No assessment is made as to whether it is unwanted or not. Only when a comparison is made, for instance in this report, with some valid criteria, can a judgement be made as to whether the sound levels are desirable or not. Bull Island is a case in point. It has produced some of the highest measured sound levels of all the monitoring locations. This is due to natural sounds such as high winds and rolling waves. Therefore it has to be borne in mind that the ambient sound monitoring network measures all sound from all sources thus giving an indication of the amount of sound - not noise, the general population is exposed to from the hustle and bustle of daily life. The continuous measurements from all sites over the past nine years have consolidated the view that traffic is the dominant sound source within Dublin. Hourly sound values

'shadow' traffic volumes as they vary throughout the day. This can be seen in the daily summary charts (pages 13 - 22).

Comparison of the Network Lden values with last year shows a one decibel decrease in 2017 values over 2016 - back to 2015 levels. On an individual site by site comparison, the Lden for Ballymun, Chapelizod, Walkinstown, and Mellows Park was identical to last year, (2016). The Lden for Navan Road, Ballyfermot, Raheny, Woodstock Gardens, Chancery Park and Dolphins Barn increased whilst the Lden at the remaining 4 sites decreased. The average difference between day time and night time levels across the network is 5dB (A) – a consistent difference since 2010.

The average daily summaries 'Average LAeq' (sound levels) provide a more detailed view of how sound levels vary from hour to hour throughout the average day and between the different days of the week. During the average weekday sound levels (along with traffic levels) start rising at 6 a.m. After approximately 9 a.m. sound levels at most sites level off until 8 - 9pm when they start to fall. It is interesting to note the more 'erratic' sound levels at Chapelizod, Ranelagh, Bull Island, Ringsend and Blessington Basin, where weather seemed to have a greater impact on measurements at the traditionally quieter areas. - see charts on pages 13 - 22.

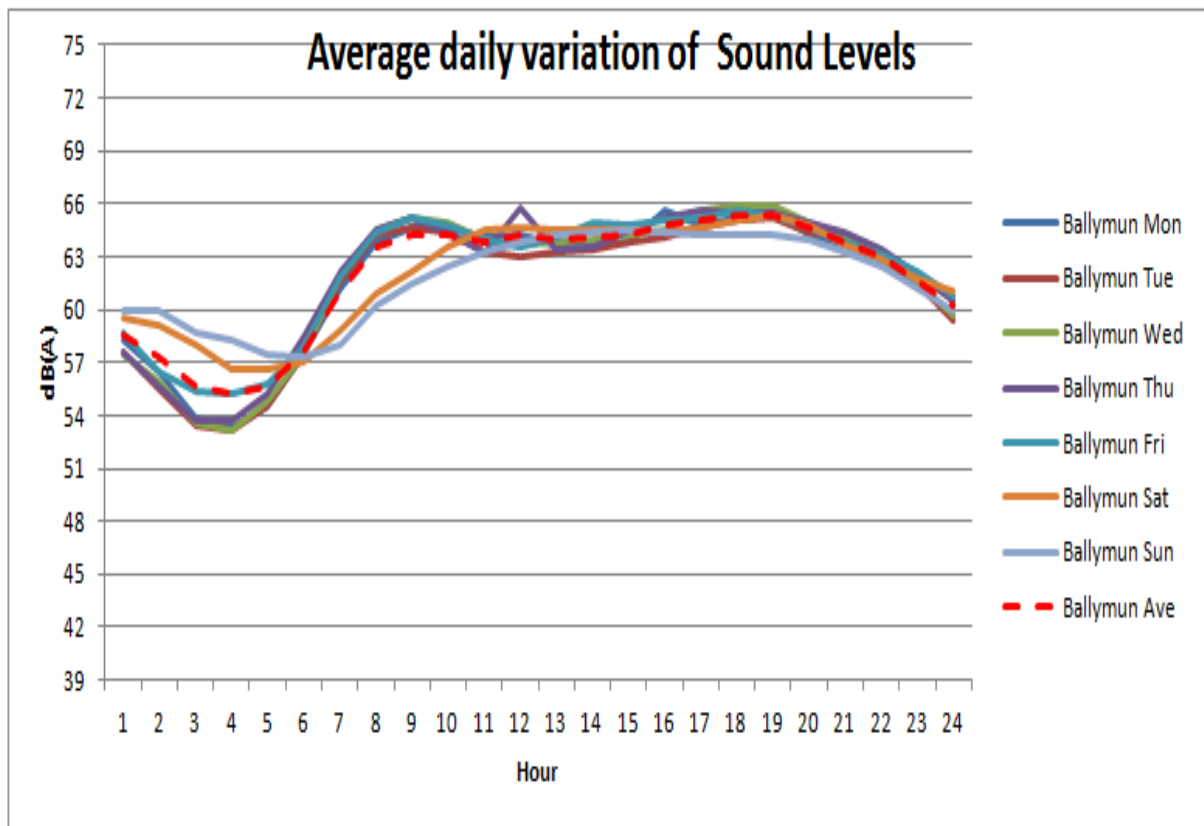
The site with the lowest daytime sound values was Woodstock Gardens followed by Ringsend and Walkinstown, both tying for second spot. The three sites with the highest daytime sound values were Ballymun, Chancery Park and Dolphins Barn. The site with the lowest night time sound value was Woodstock Gardens followed by Walkinstown and Drumcondra. The sites with the highest night time sound values were, Chancery Park, followed by Ballymun and Bull Island.

The 'Monthly Charts' presented to the rear of this report provide a detailed view of how average daily sound levels change from day to day and month to month. In 2017 the Network's highest average monthly sound levels occurred in January, followed by February and March similar to last year. The Network's average monthly lowest levels were experienced from April to September

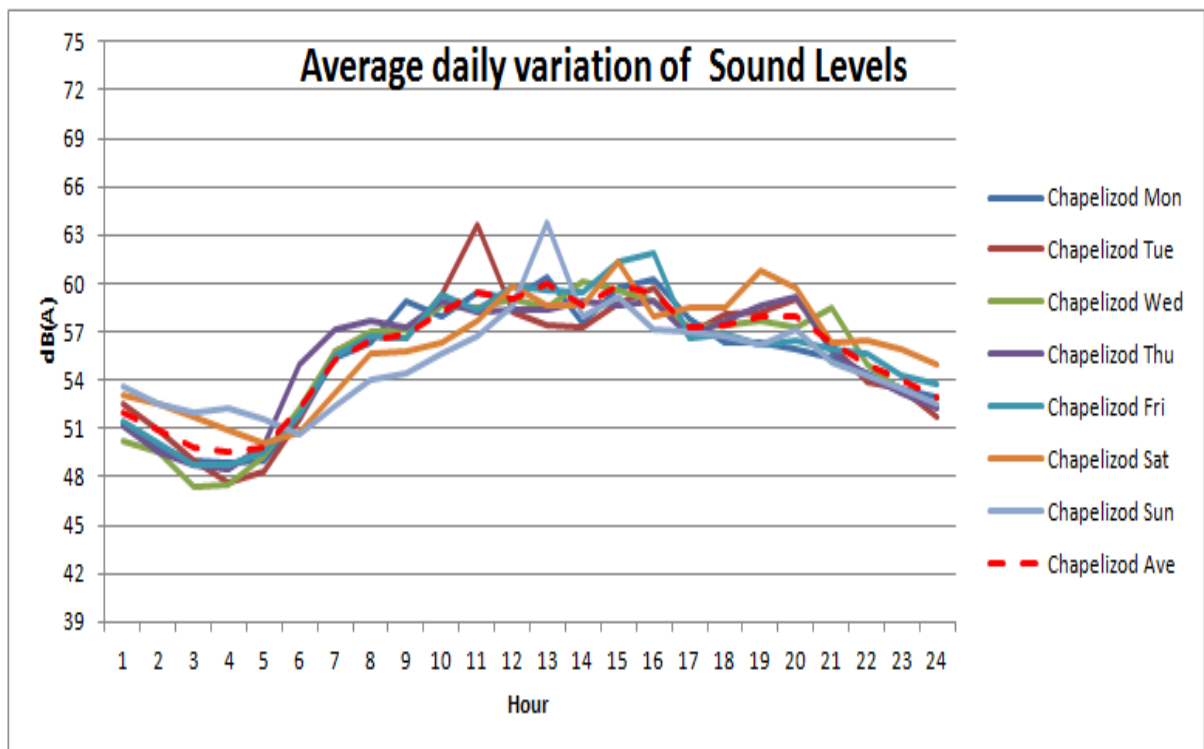
The median value is provided in the 'Hourly Value Charts'. This is represented by a red horizontal line which marks the mid-point of the hourly data above and below which 50% of the data resides, when arranged from the lowest value to the highest value. As already stated extreme values have less of an impact on median values than on mean (average) values. The Network annual hourly median value is 55dB(A) decibels, one dB higher than 2016, where as the 2017 annual hourly average value was 58dB(A).

Average Daily Summary Charts

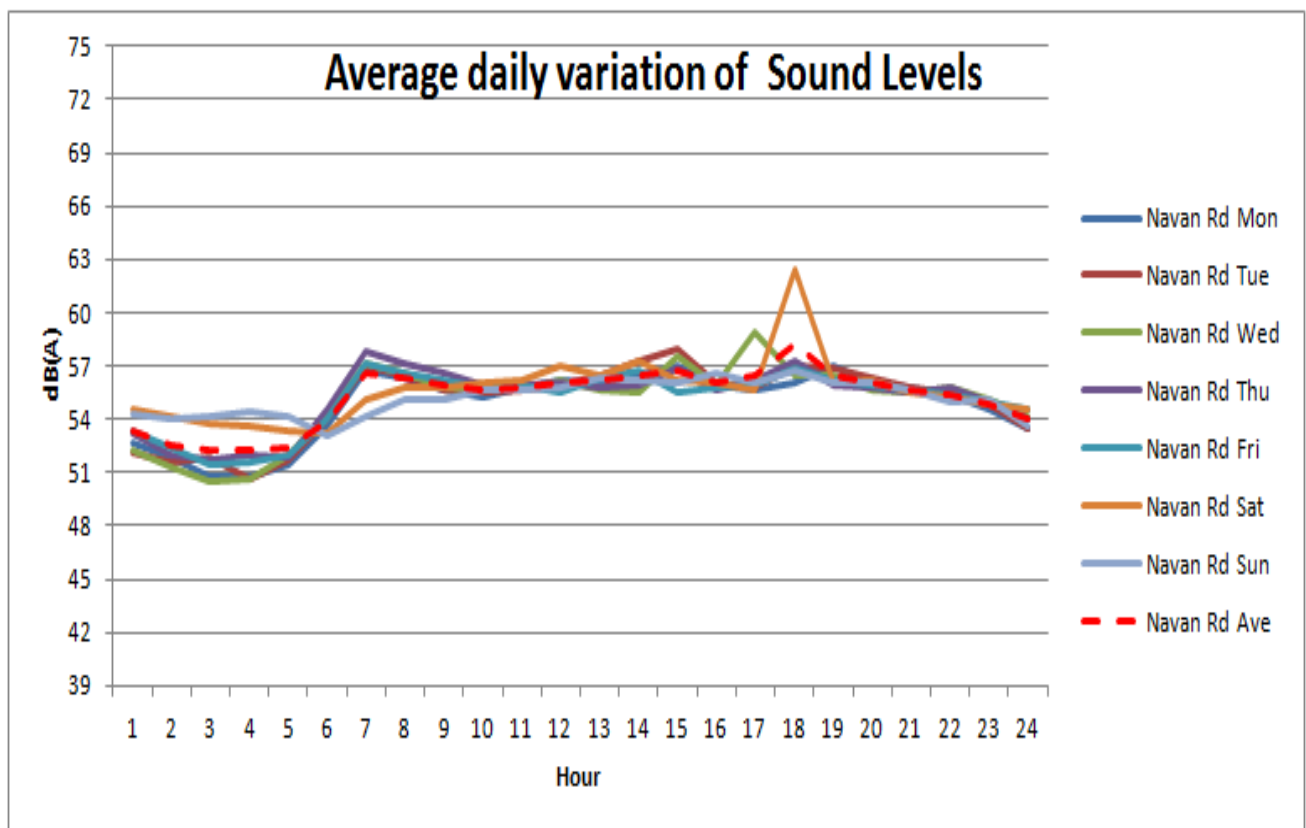
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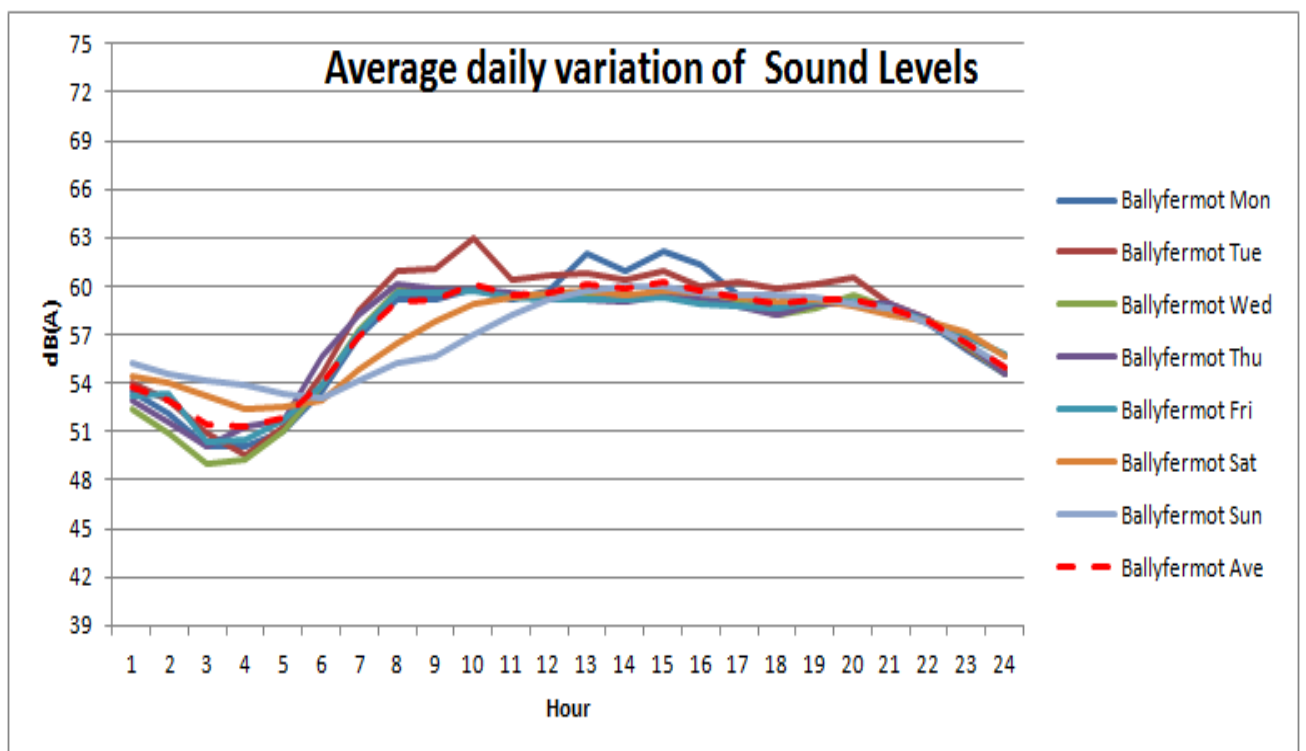
CHAPELIZOD



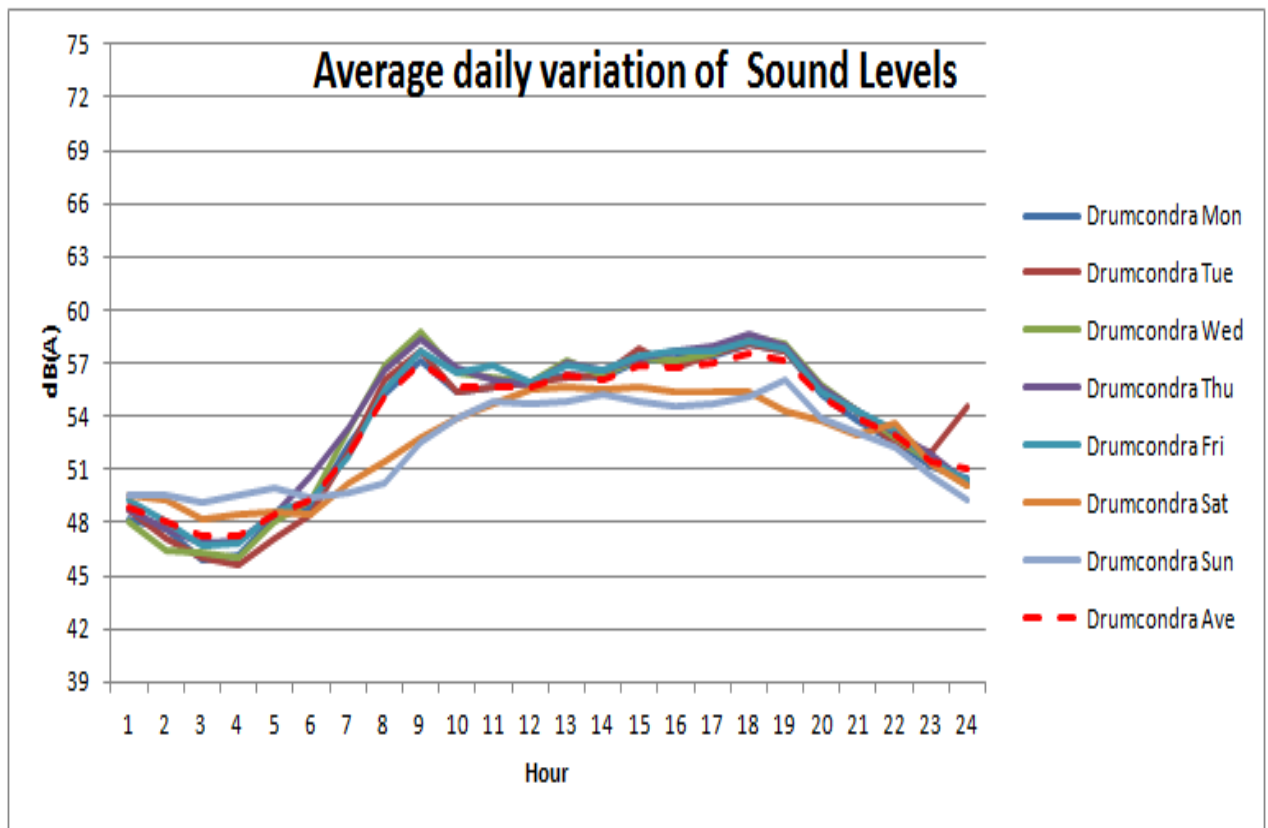
NAVAN RD.



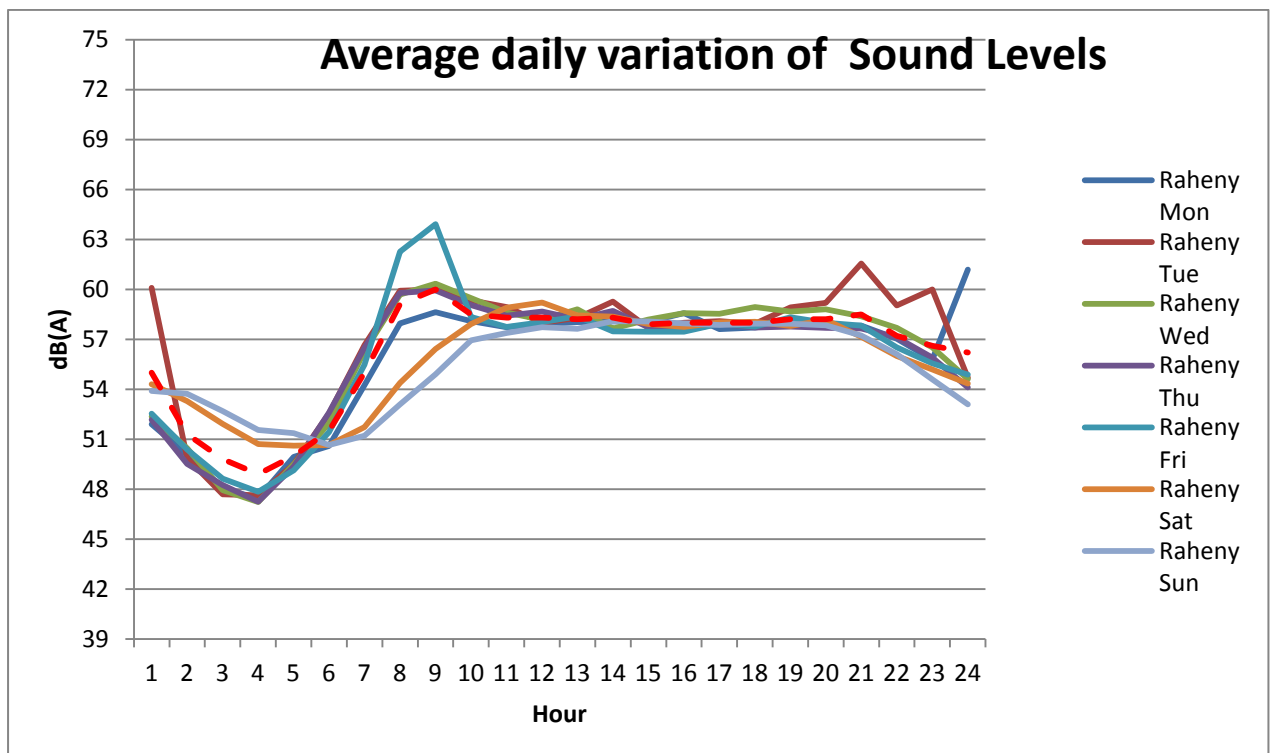
BALLYFERMOT



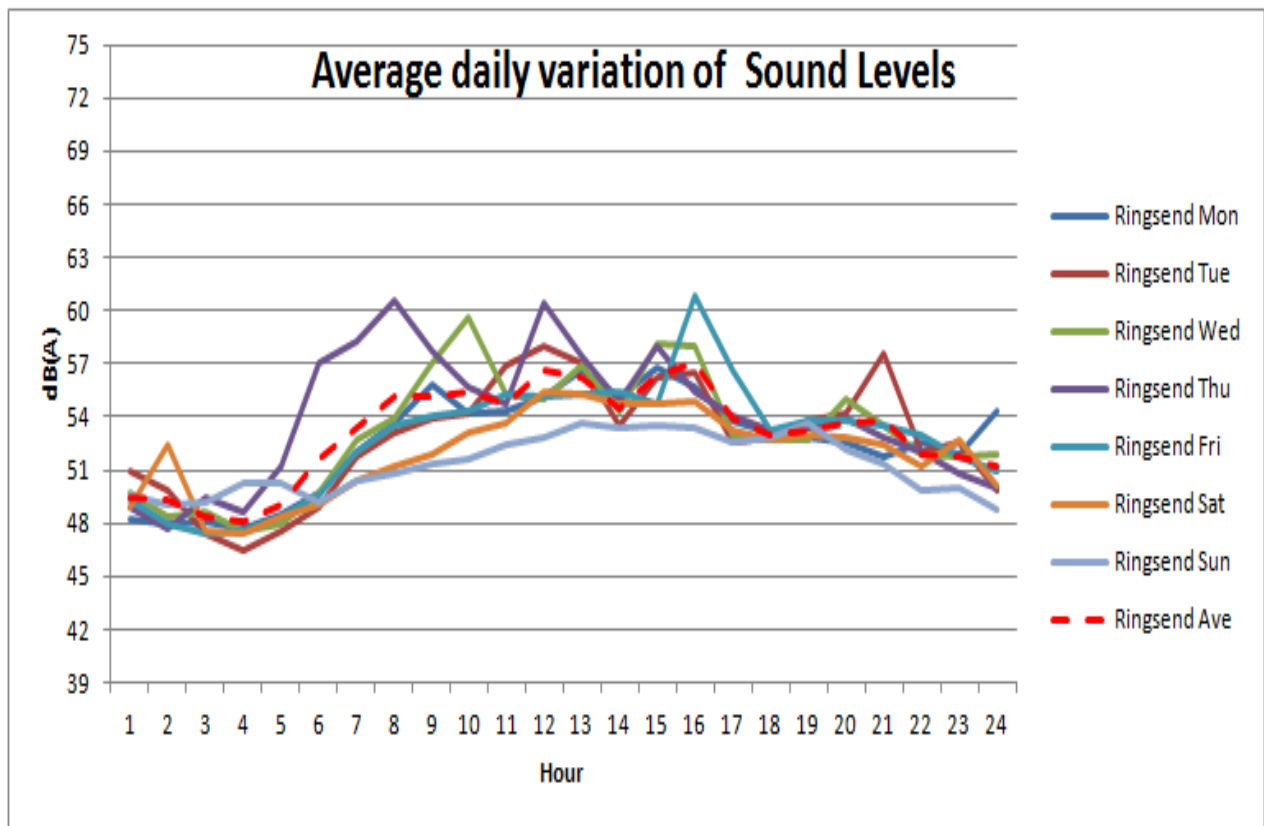
DRUMCONDRA



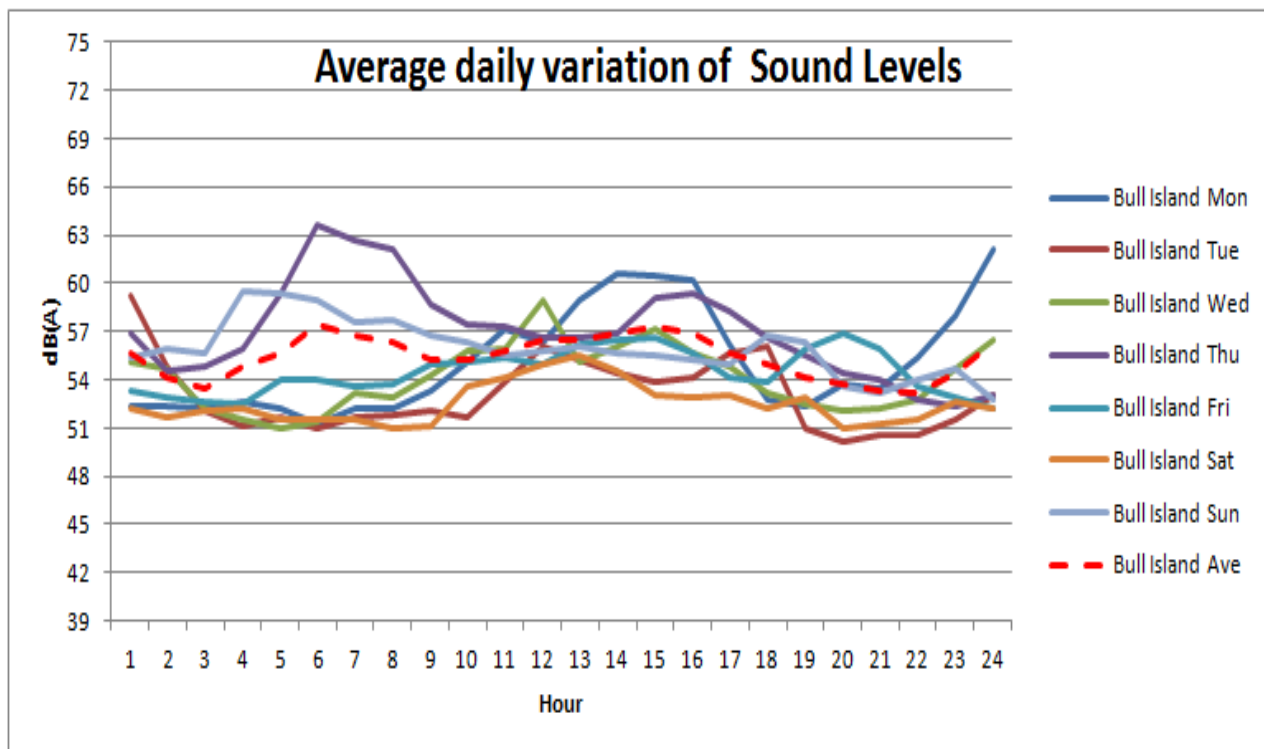
RAHENY



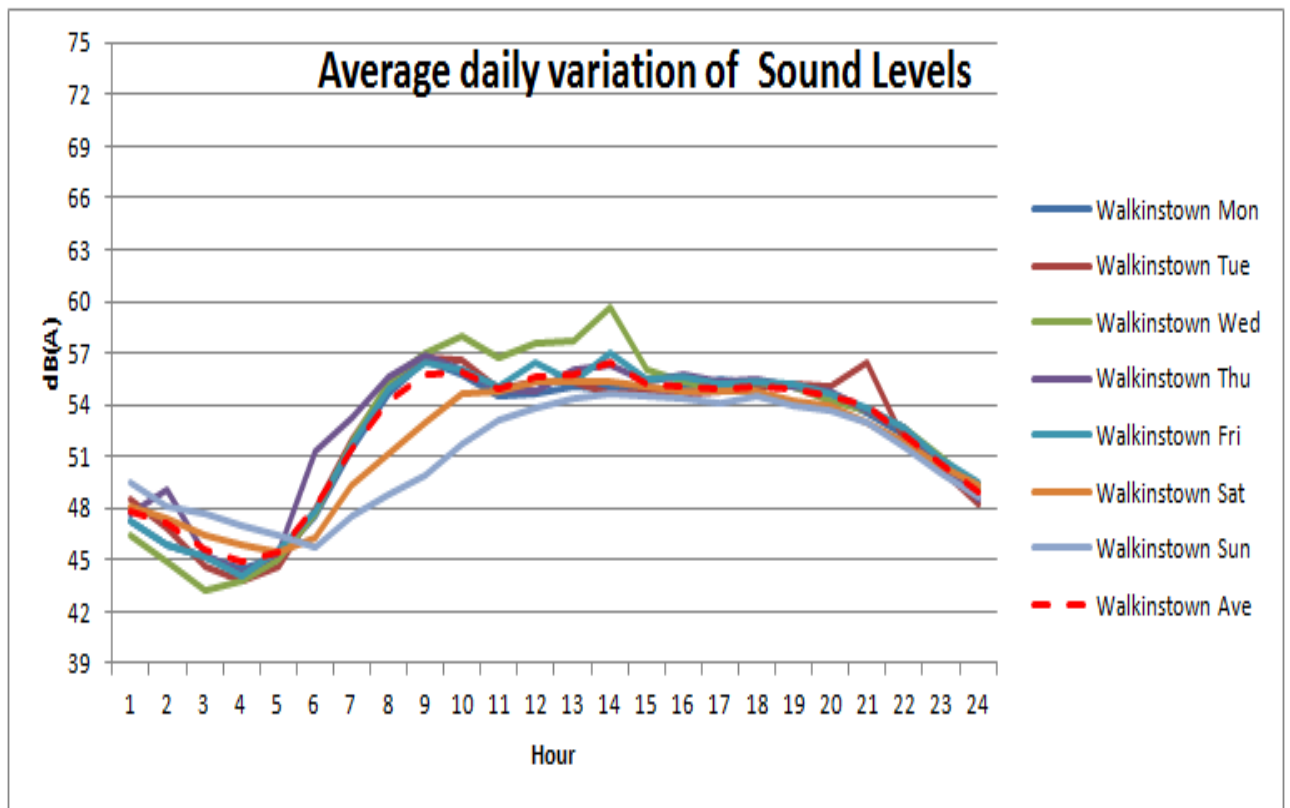
RINGSEND



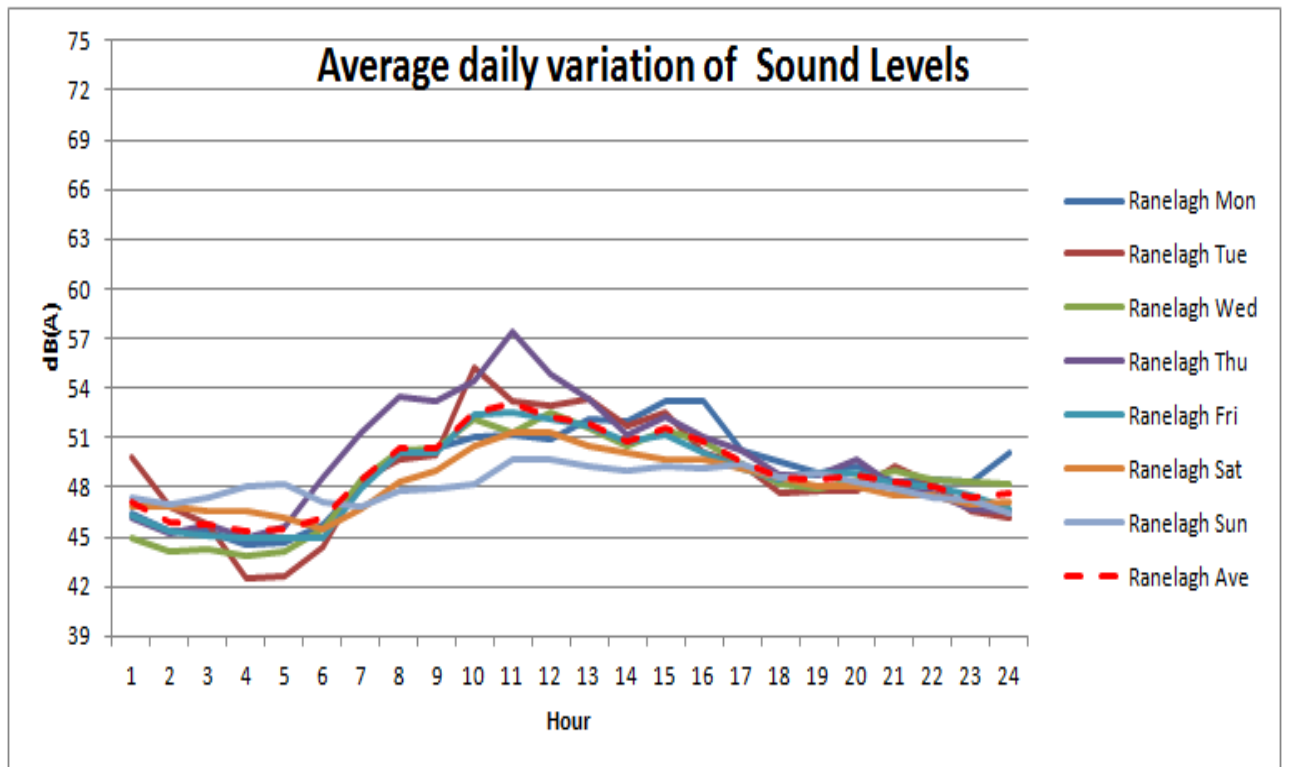
BULL ISLAND



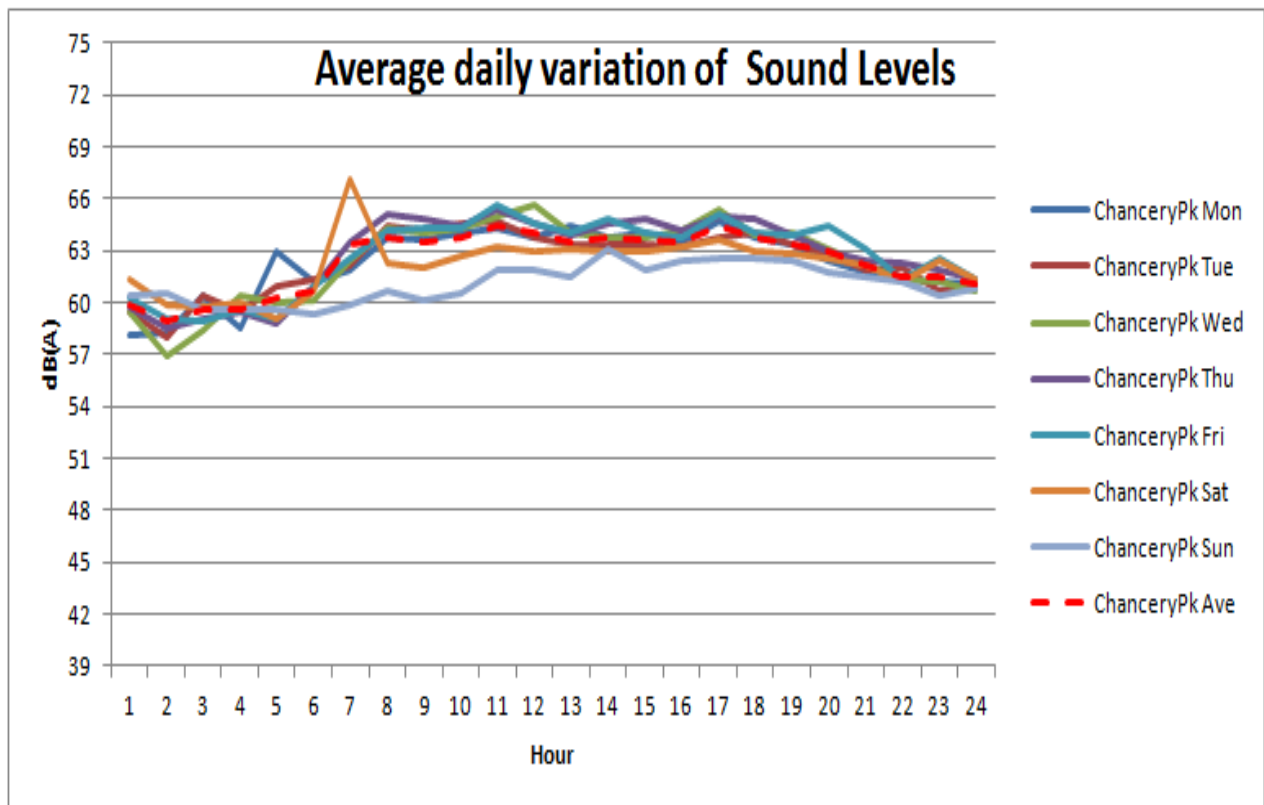
WALKINSTOWN



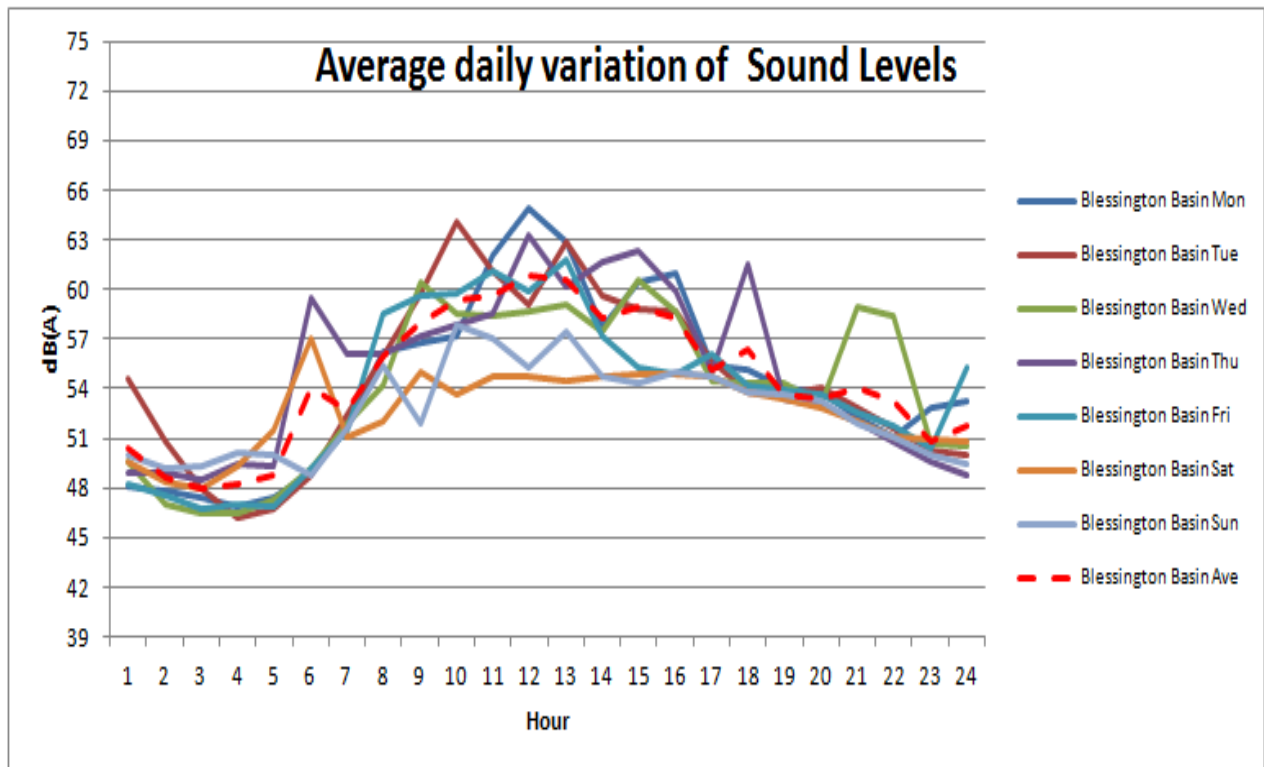
RANELAGH



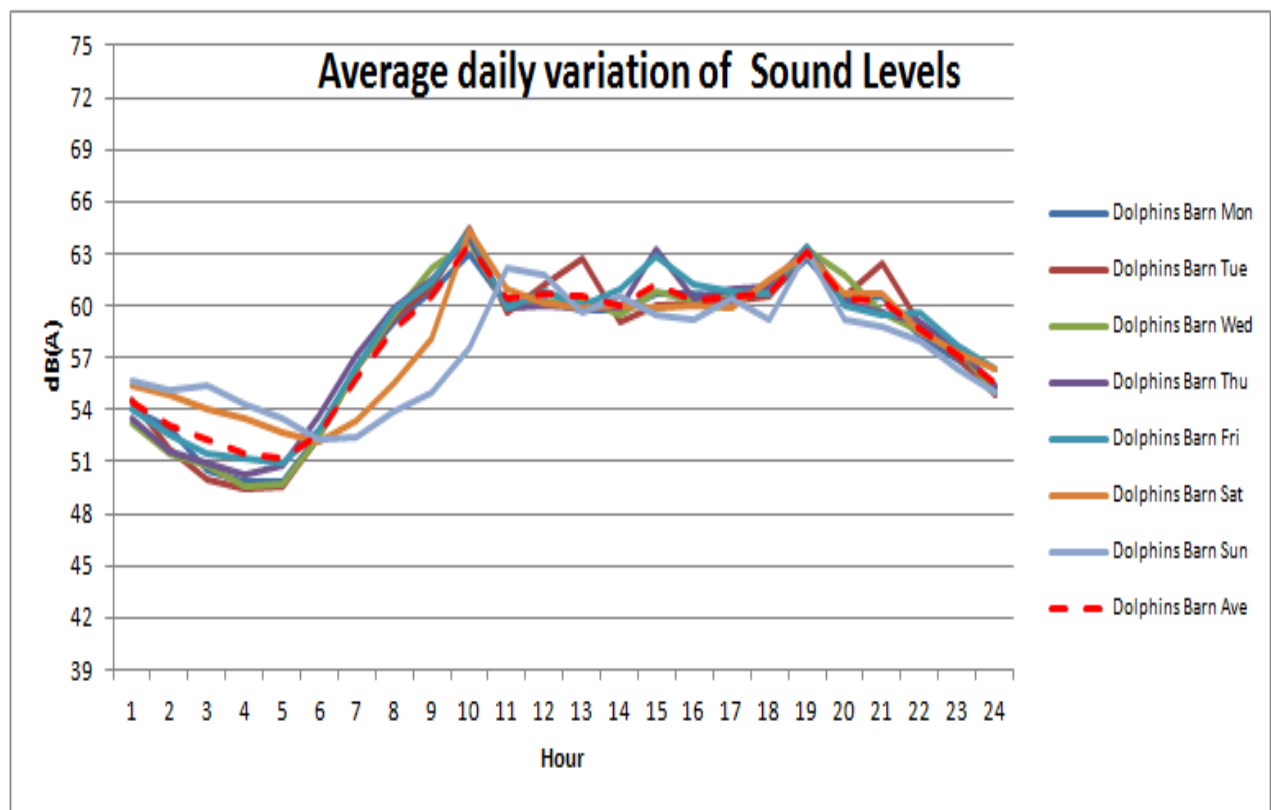
CHANCERY PARK



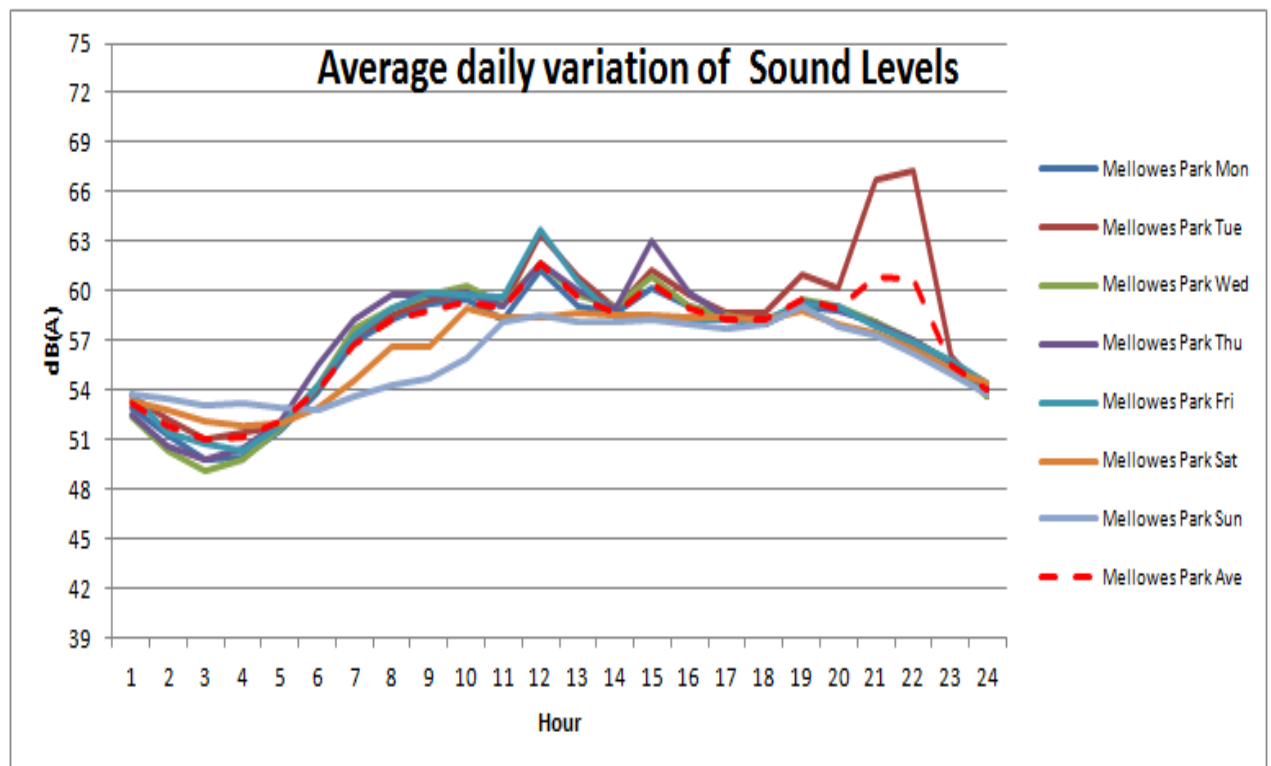
BLESSINGTON BASIN



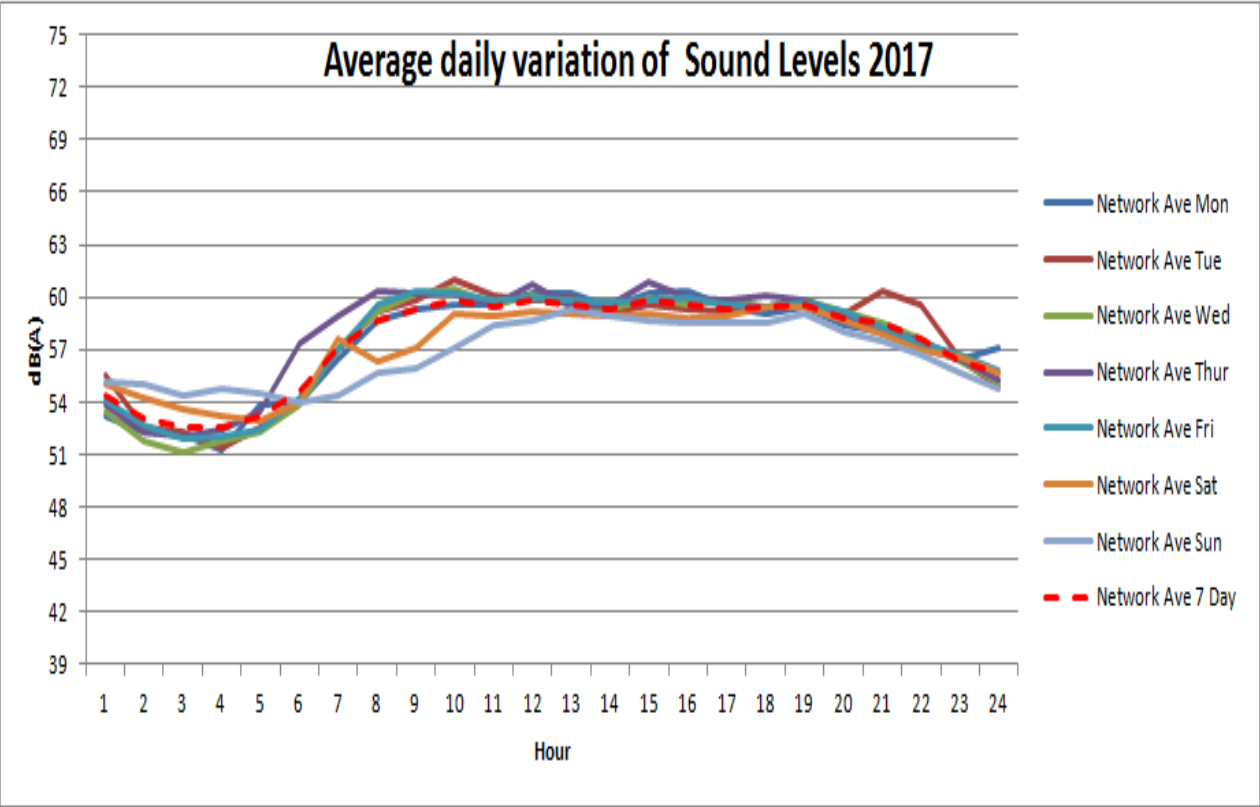
DOLPHIN'S BARN



MELLOW'S PARK



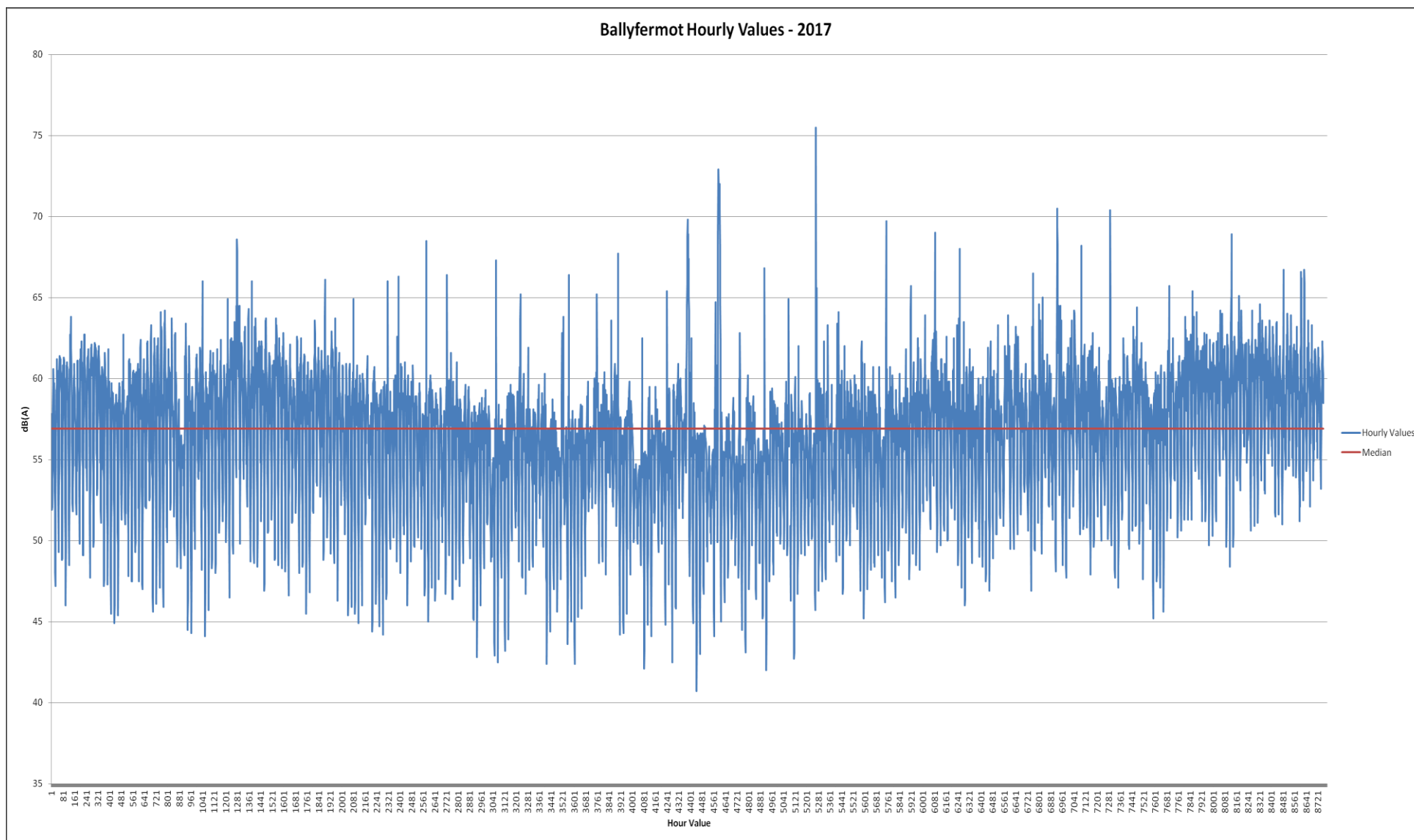
NETWORK

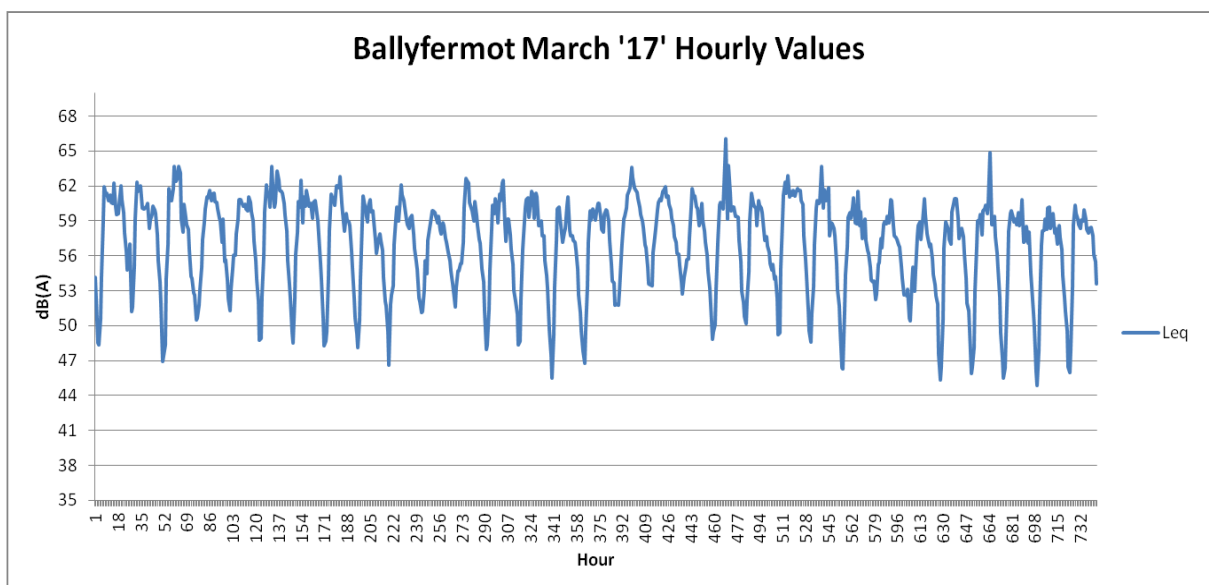
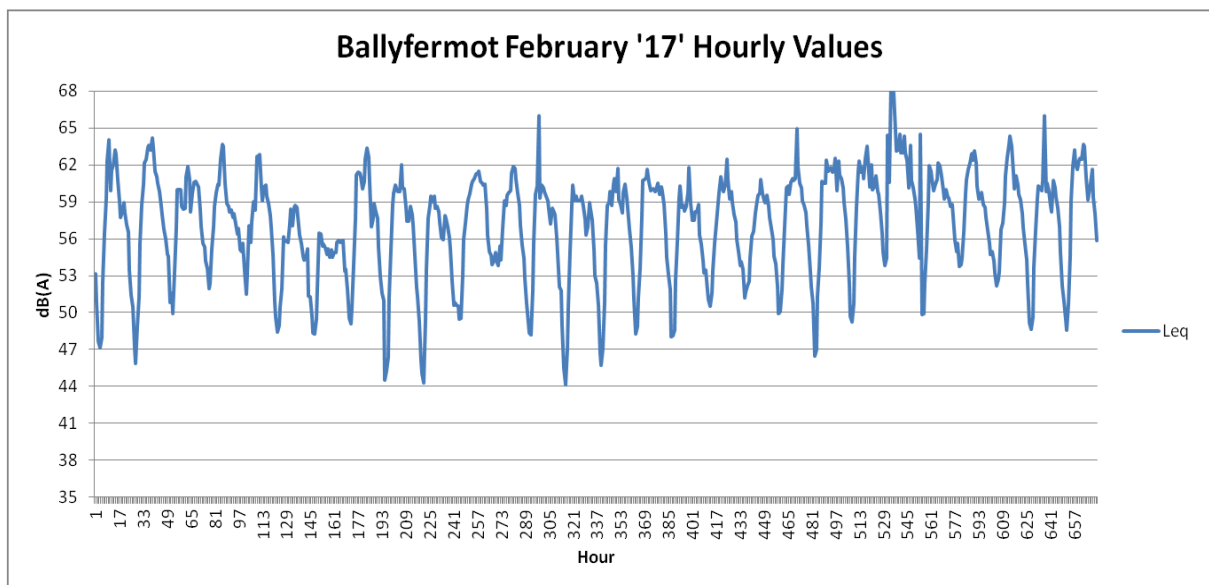
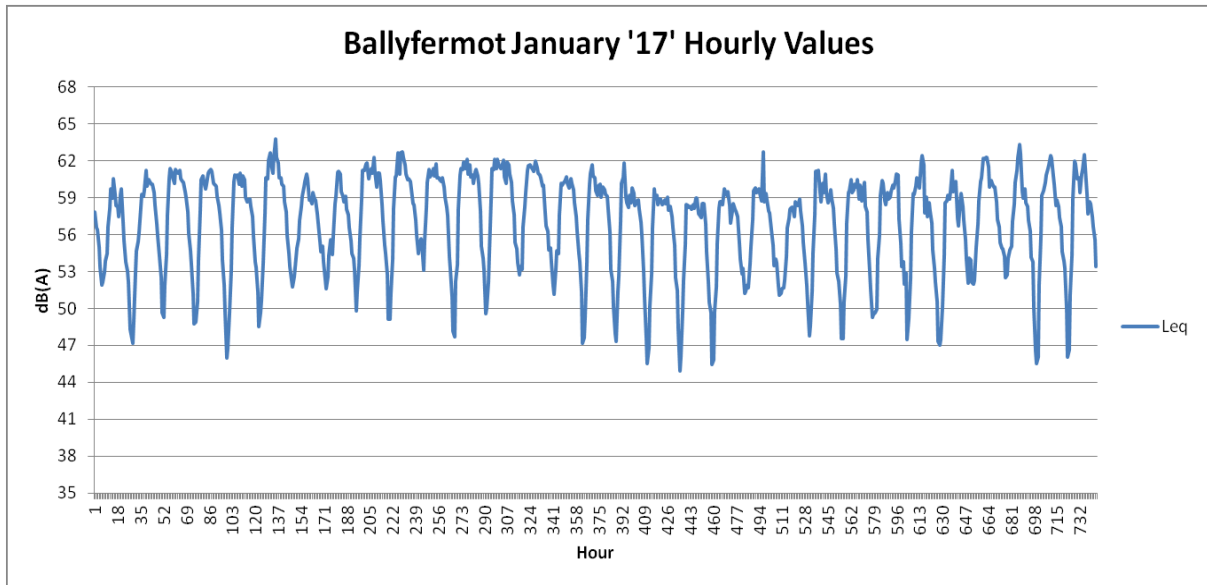


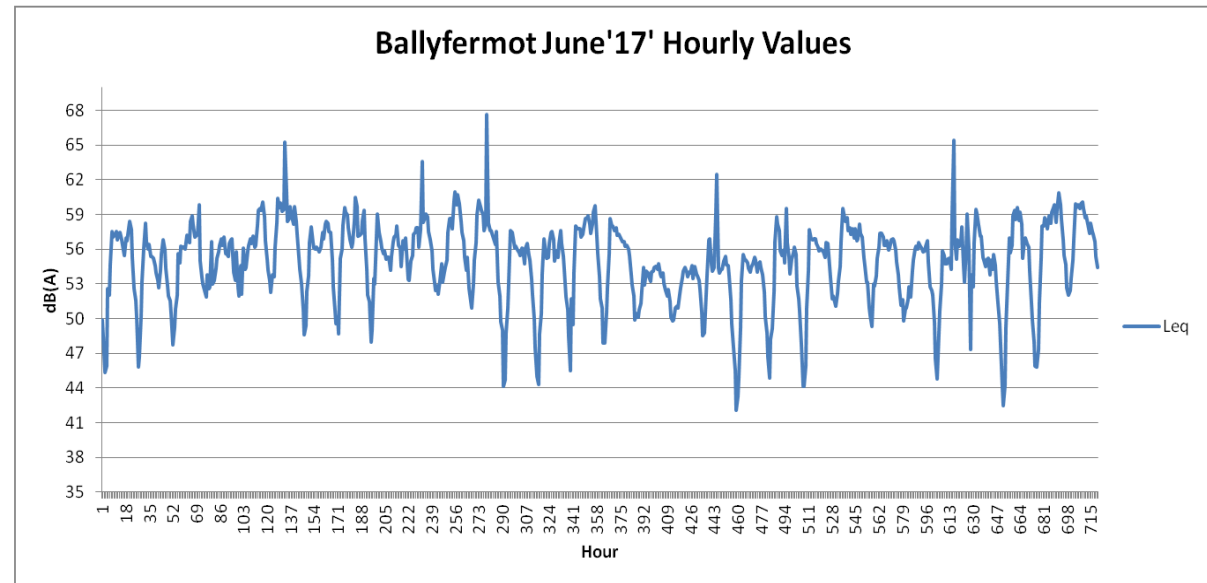
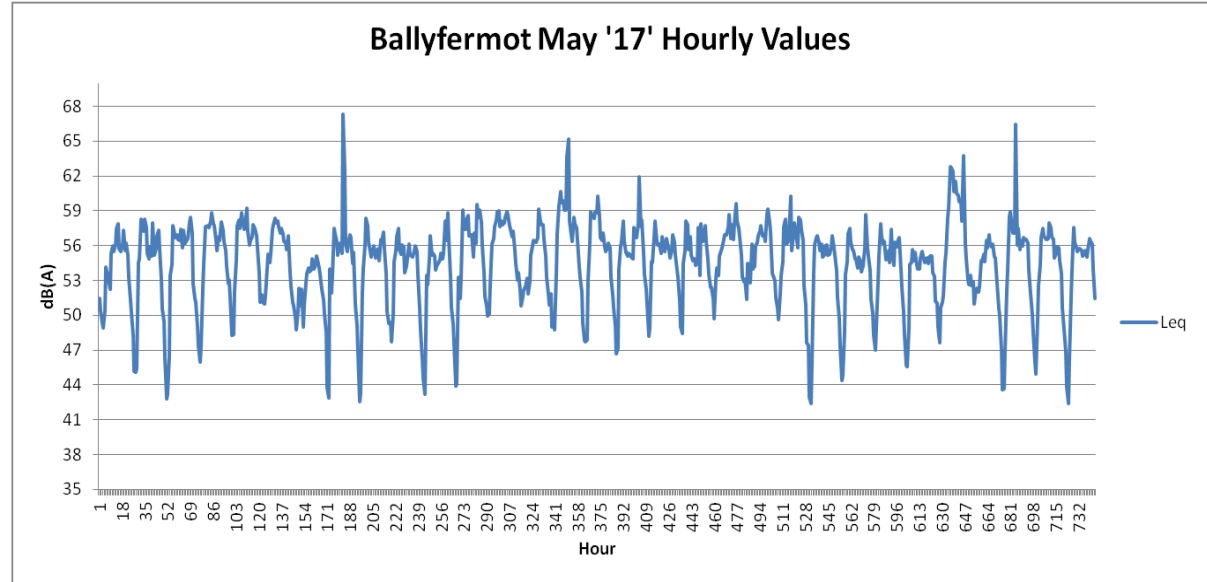
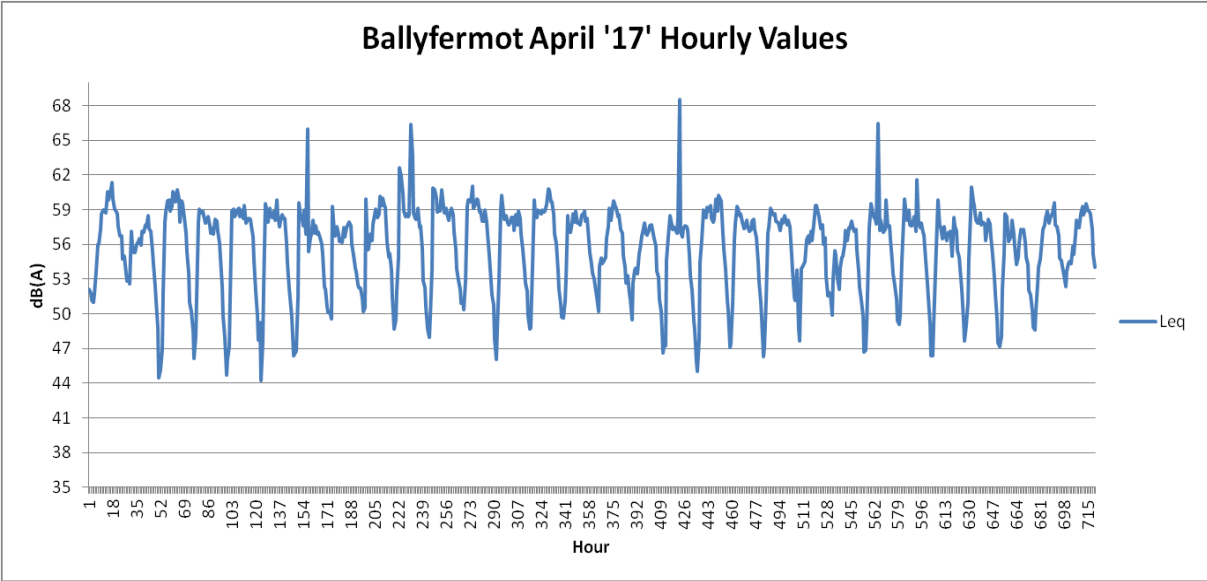
Monthly Summary Charts

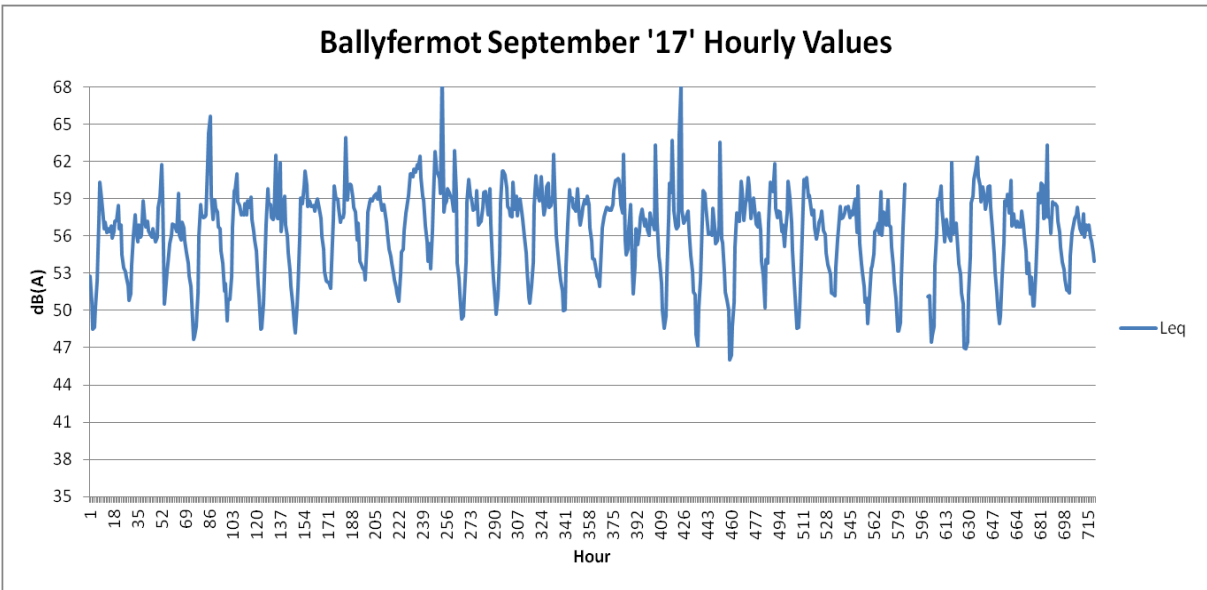
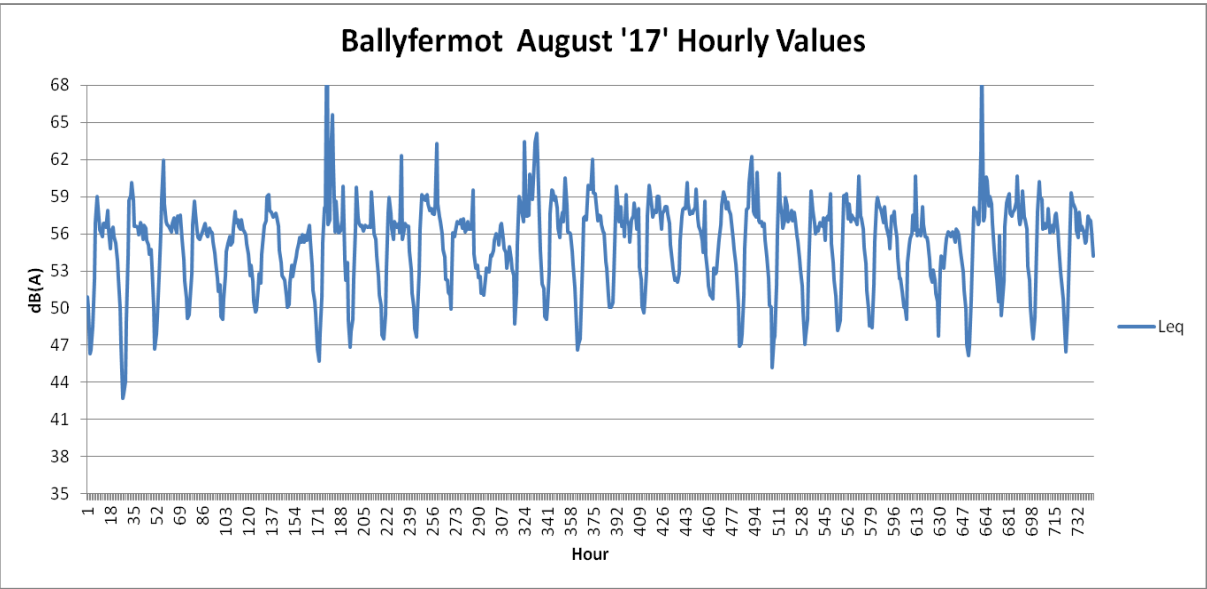
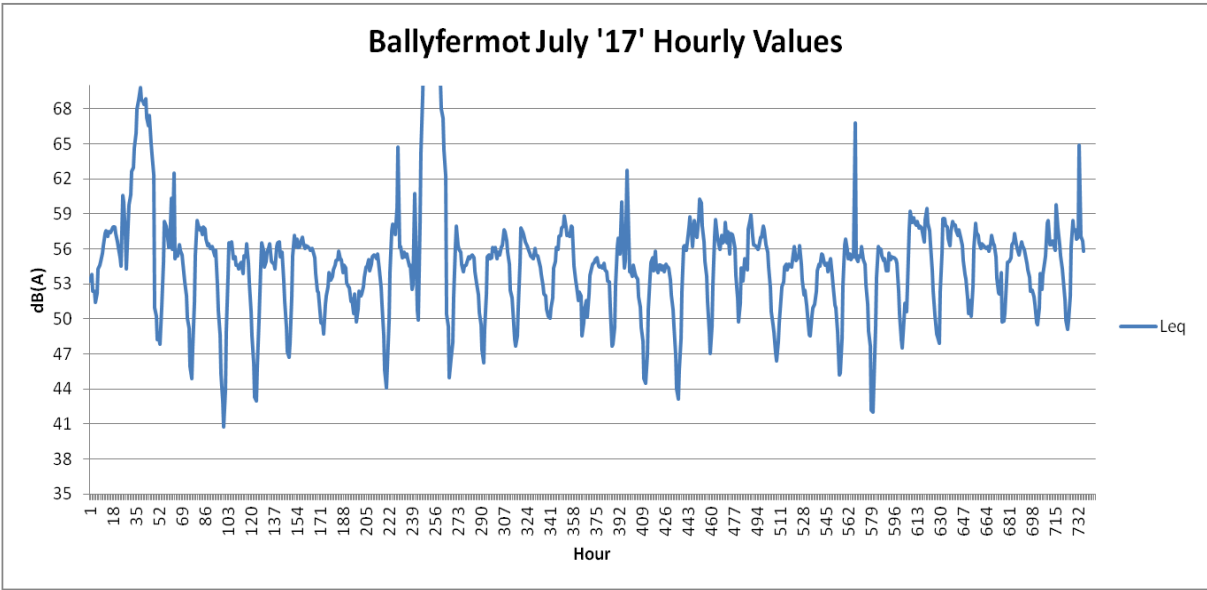
BALLYFERMOT CIVIC CENTRE
BALLYFERMOT ROAD
DUBLIN 10

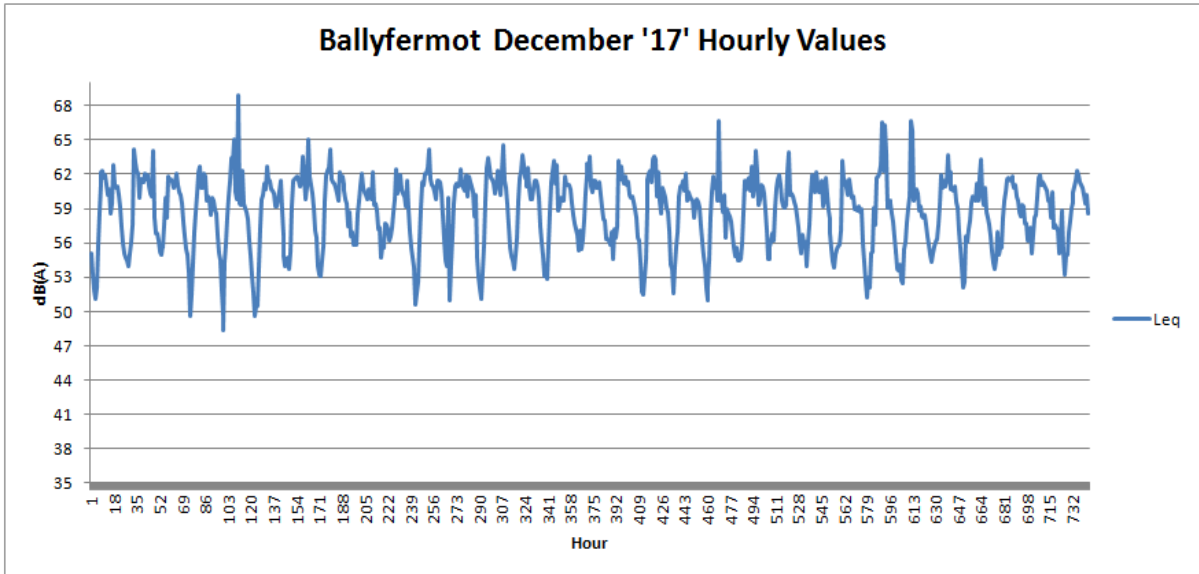
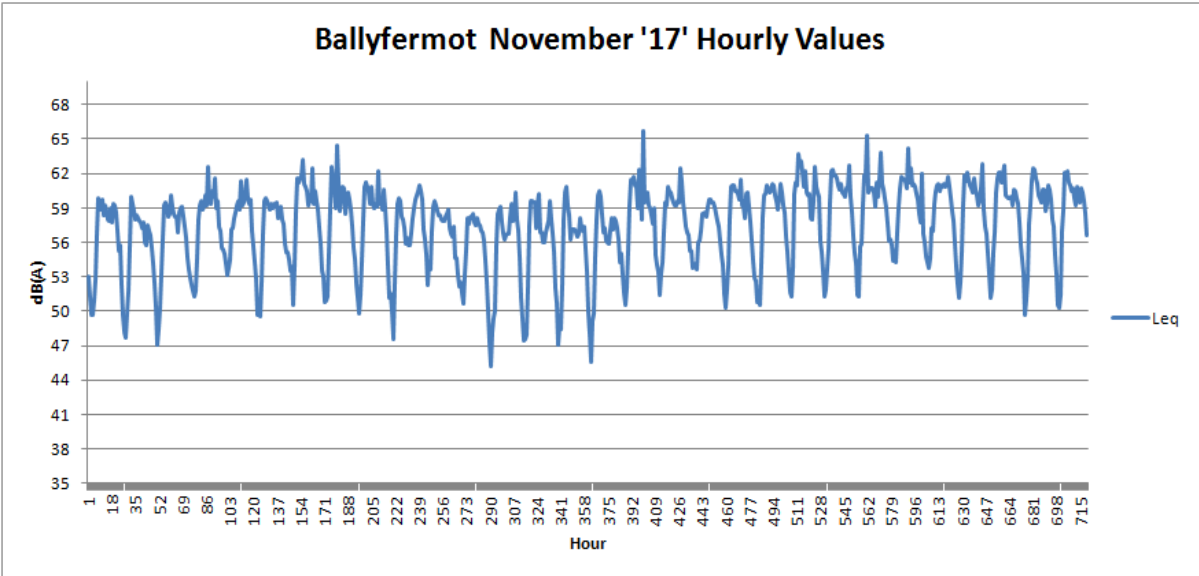
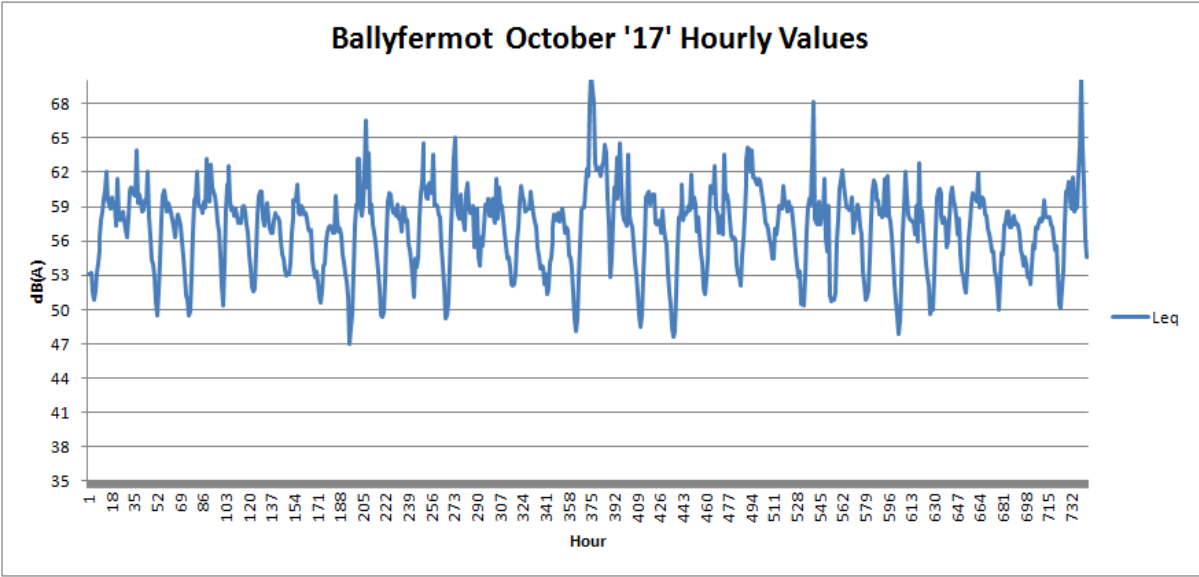








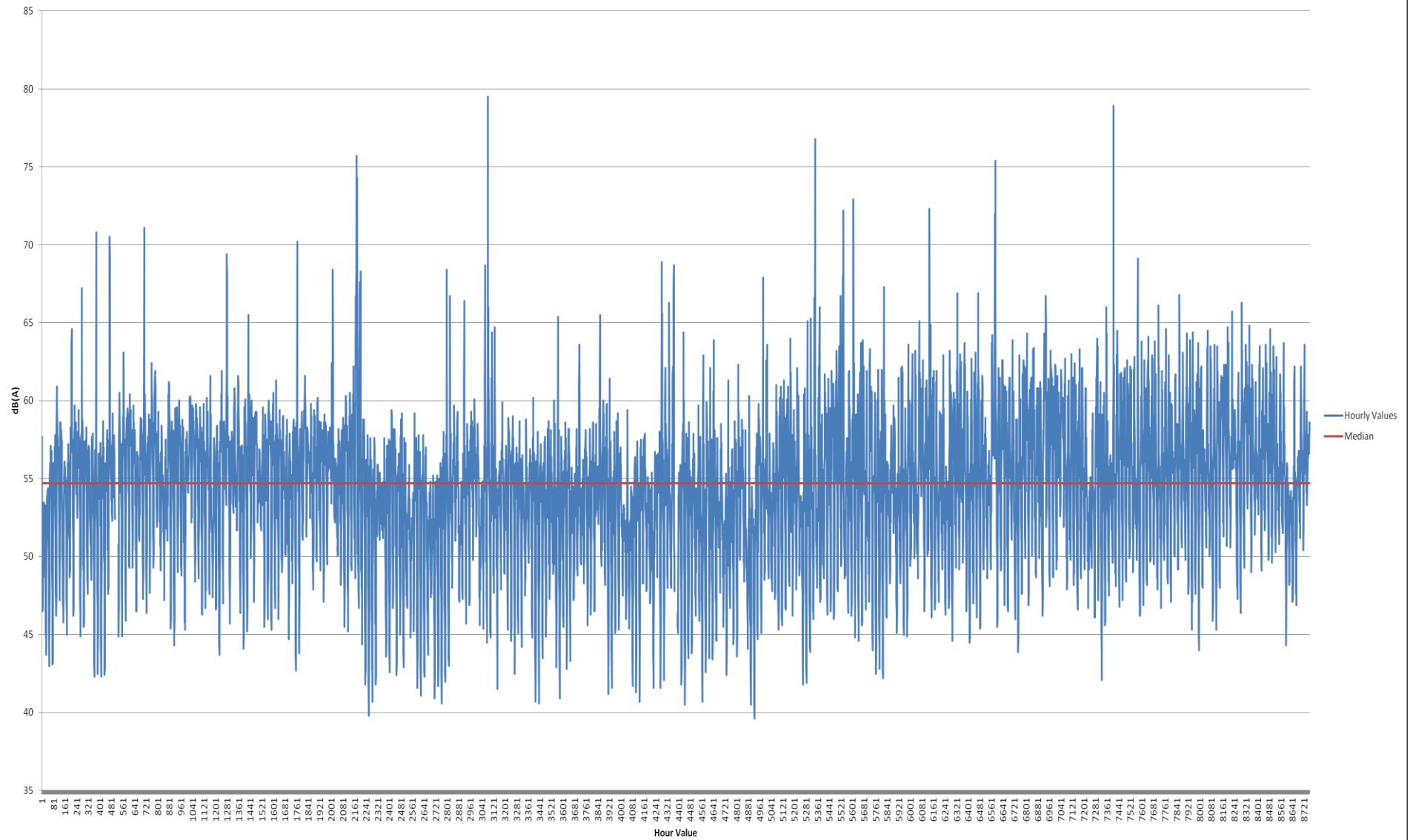


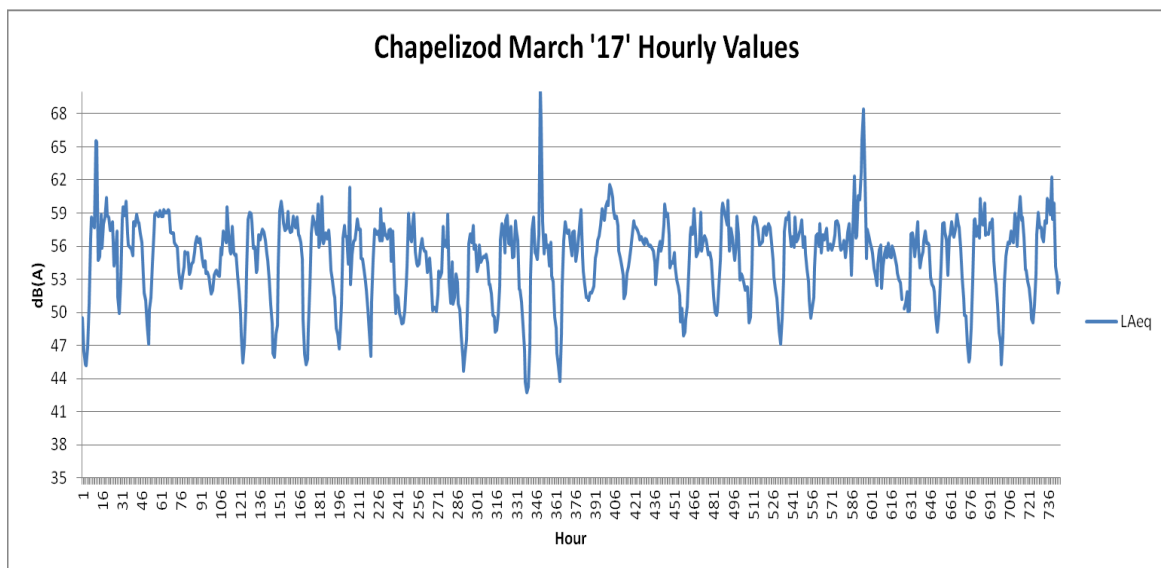
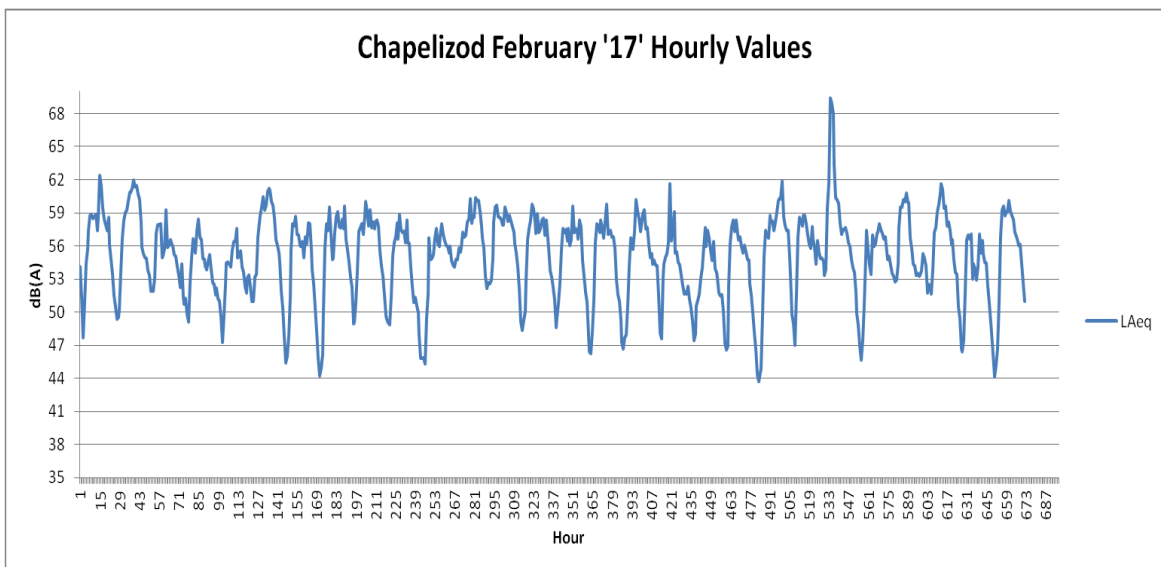
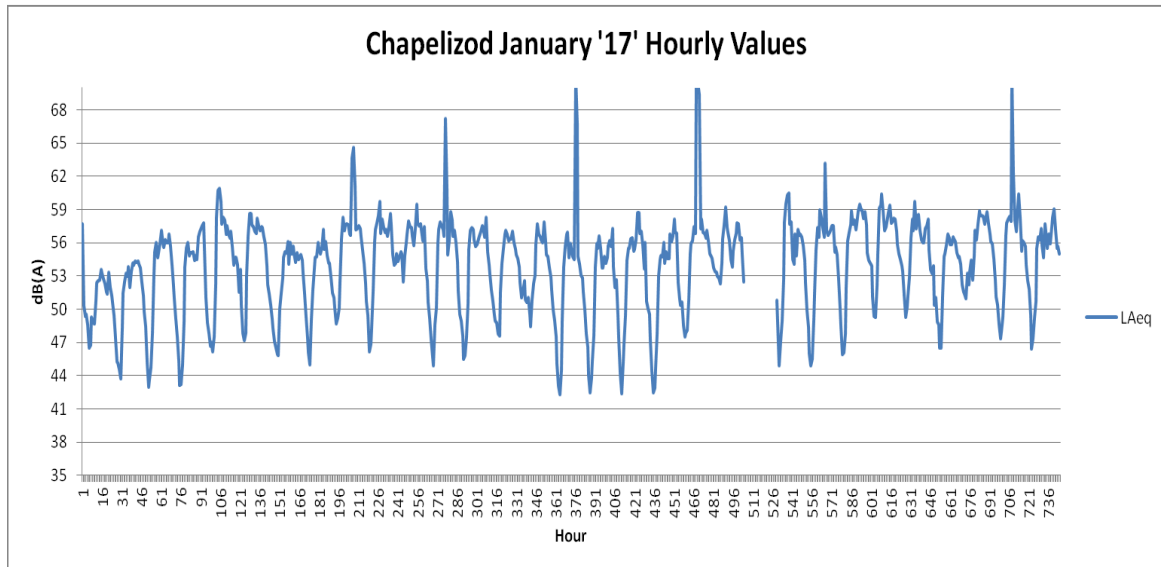


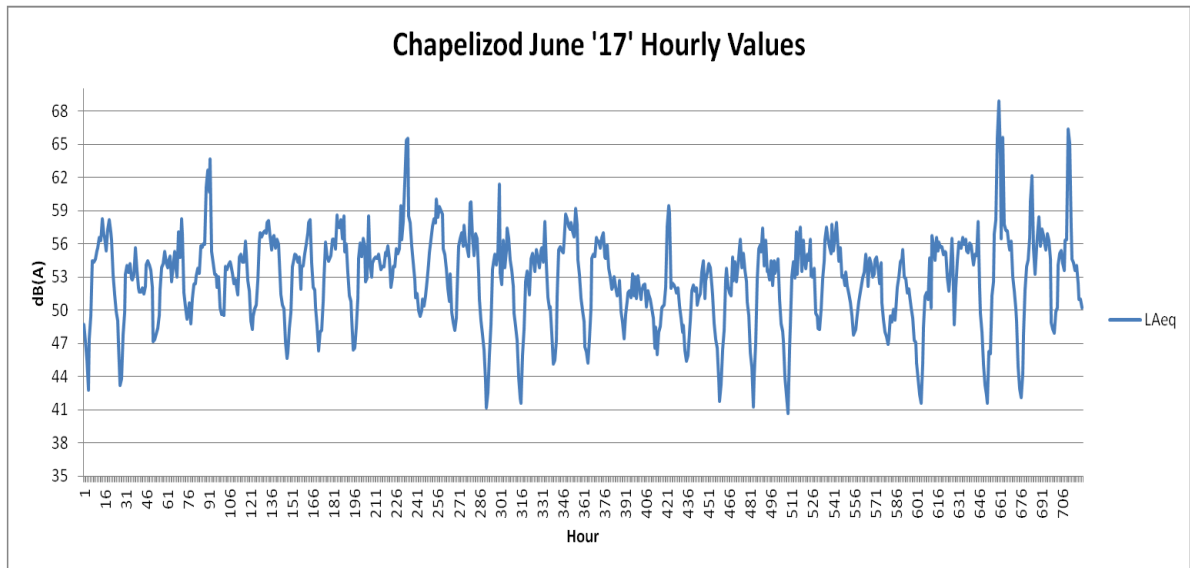
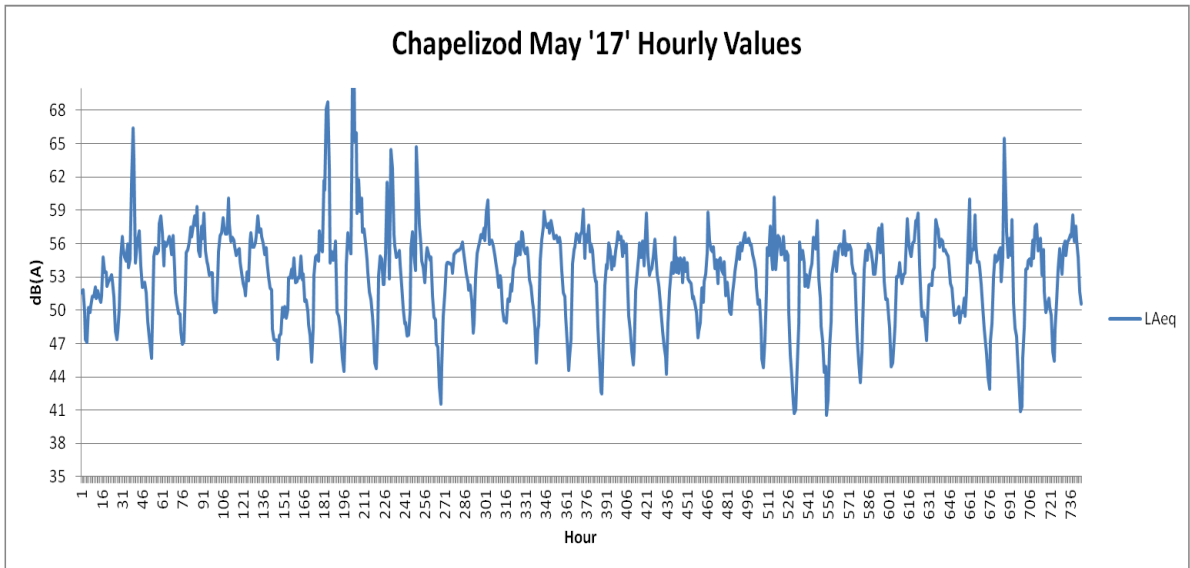
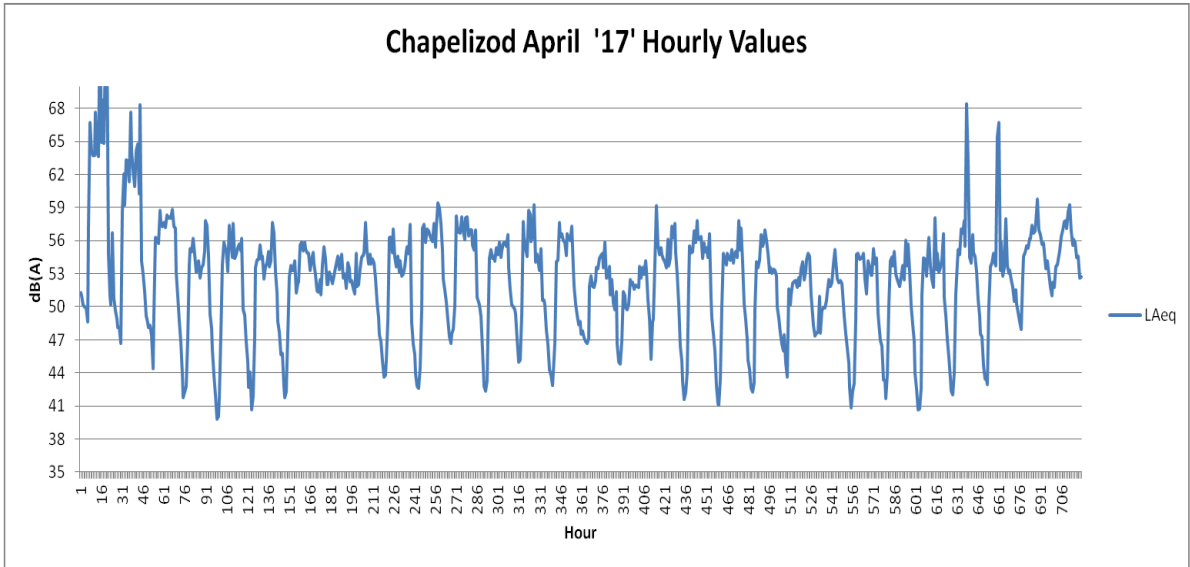
DUBLIN CITY COUNCIL ROWING CLUB
CHAPELIZOD ROAD
DUBLIN 8

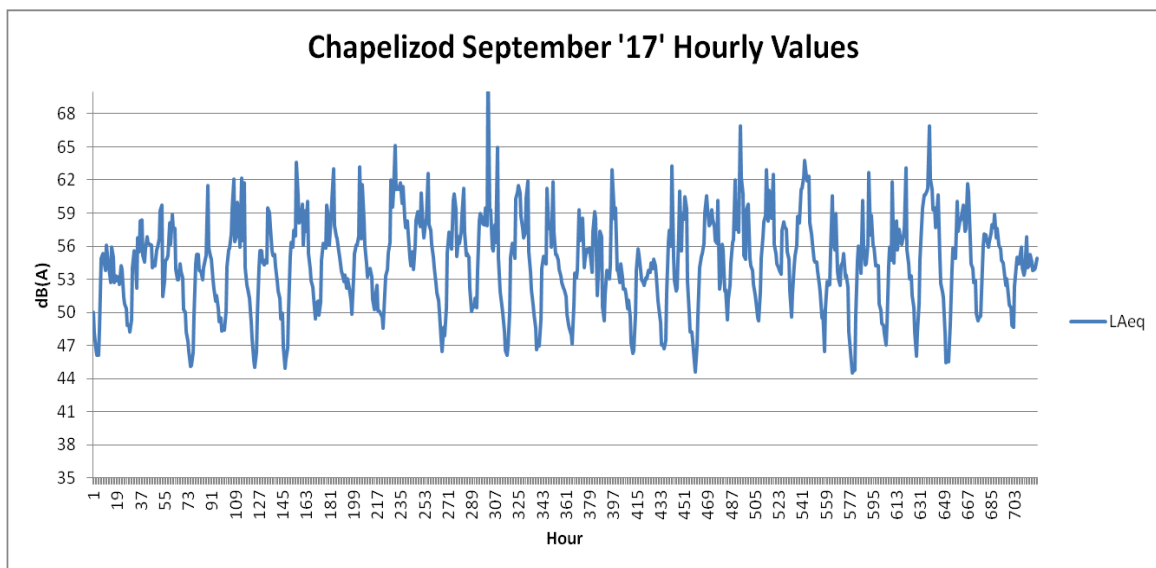
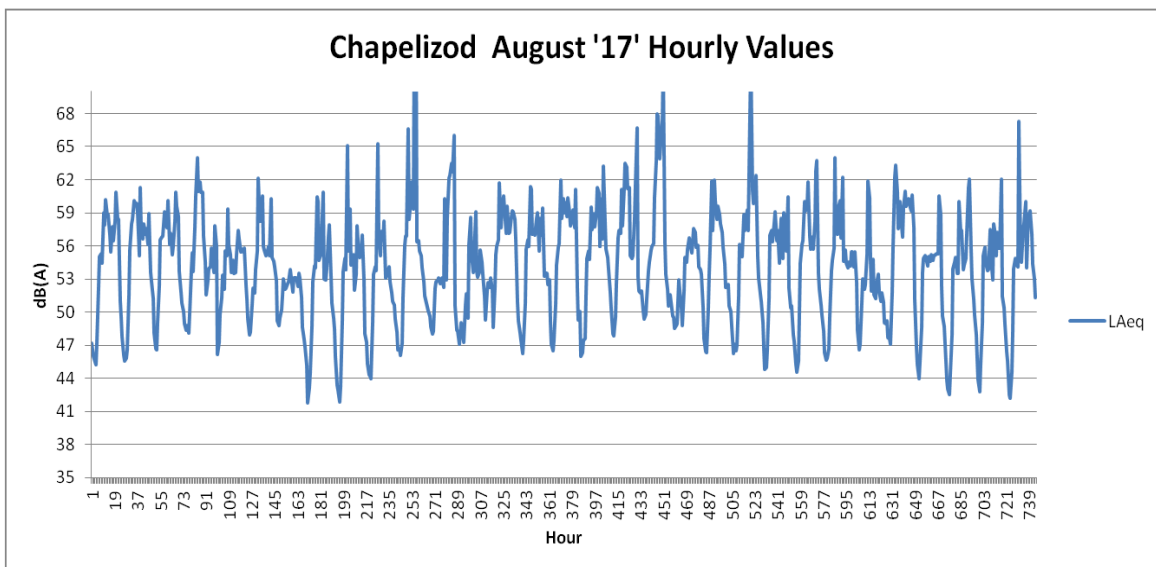
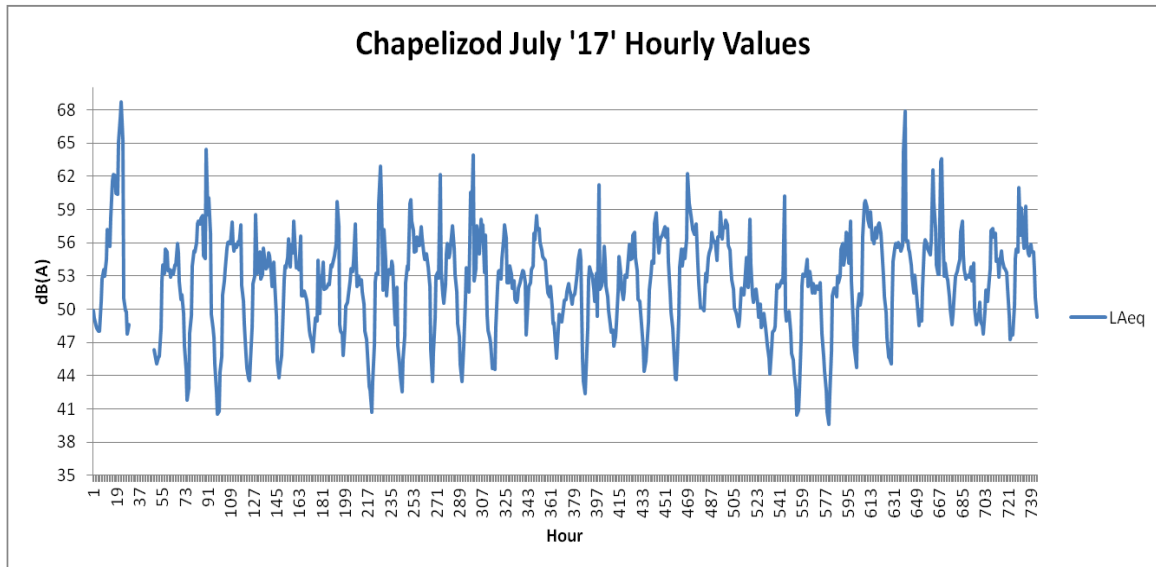


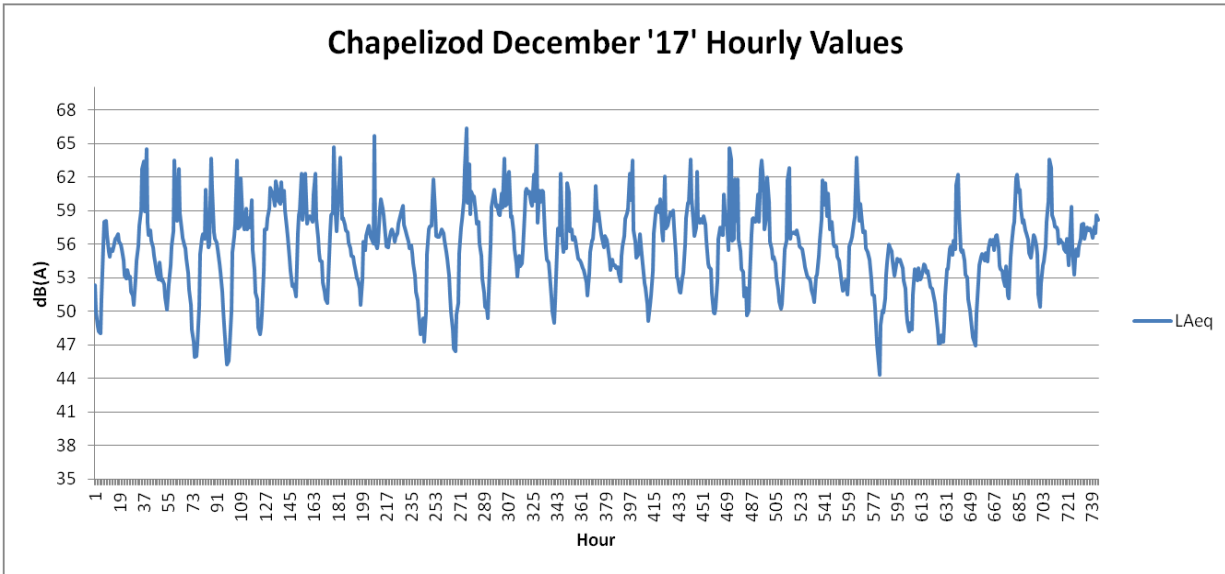
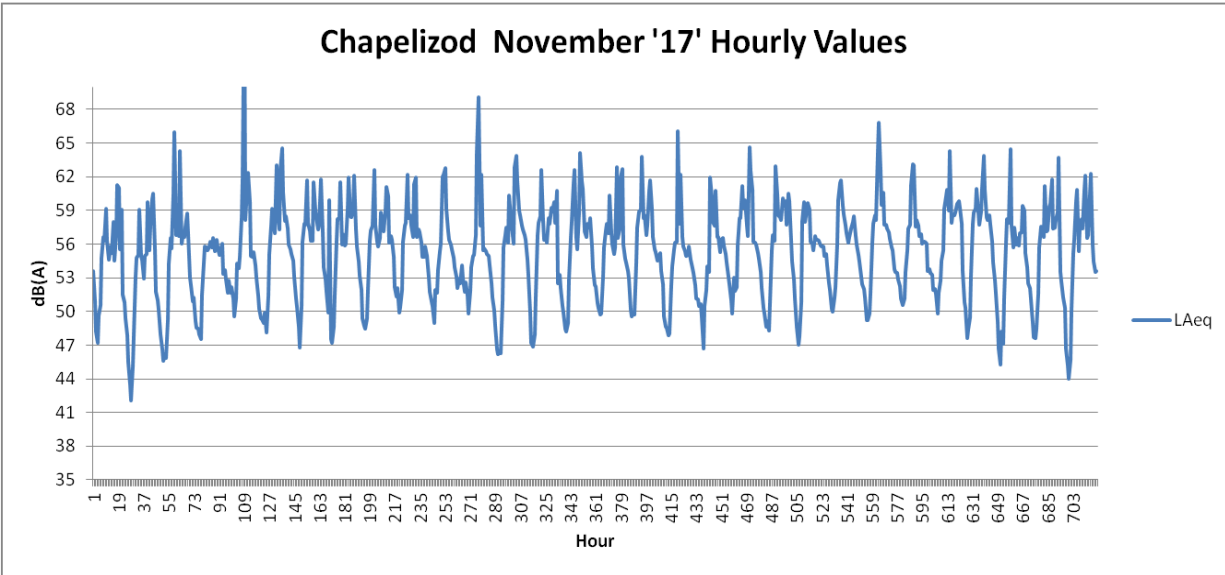
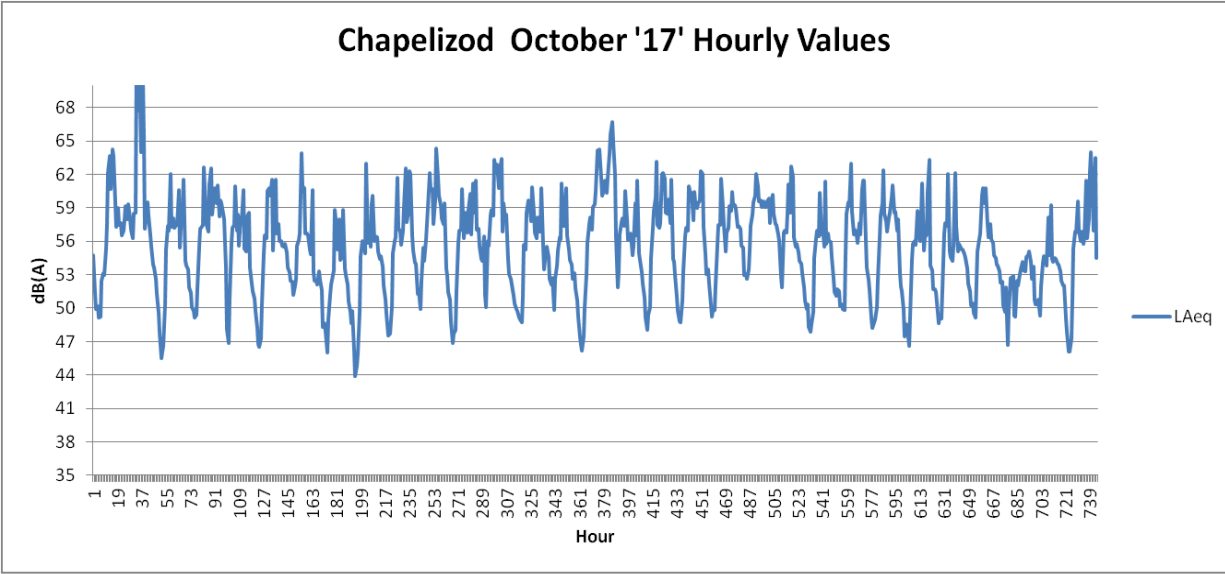
Chapelizod Hourly Values - 2017





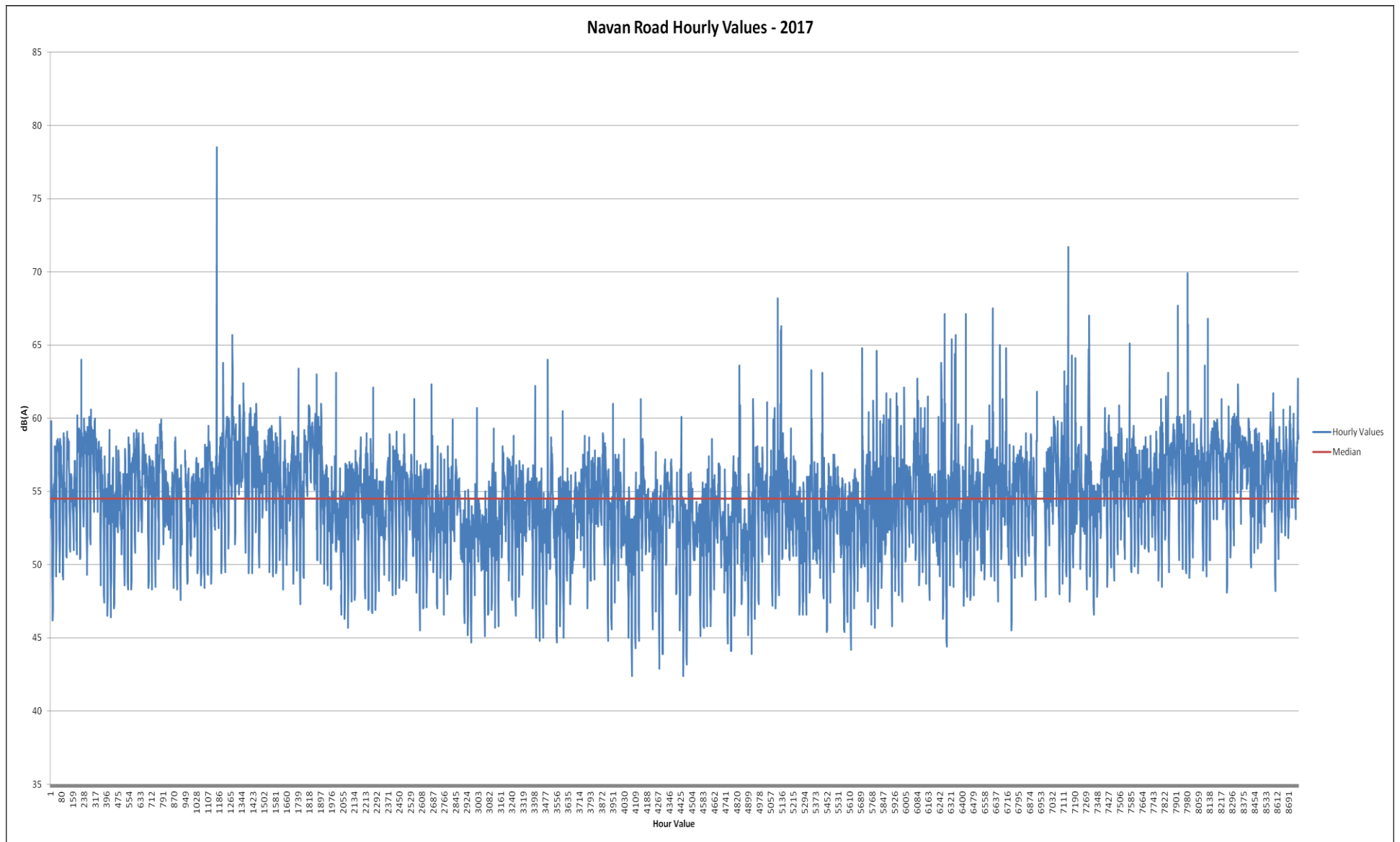


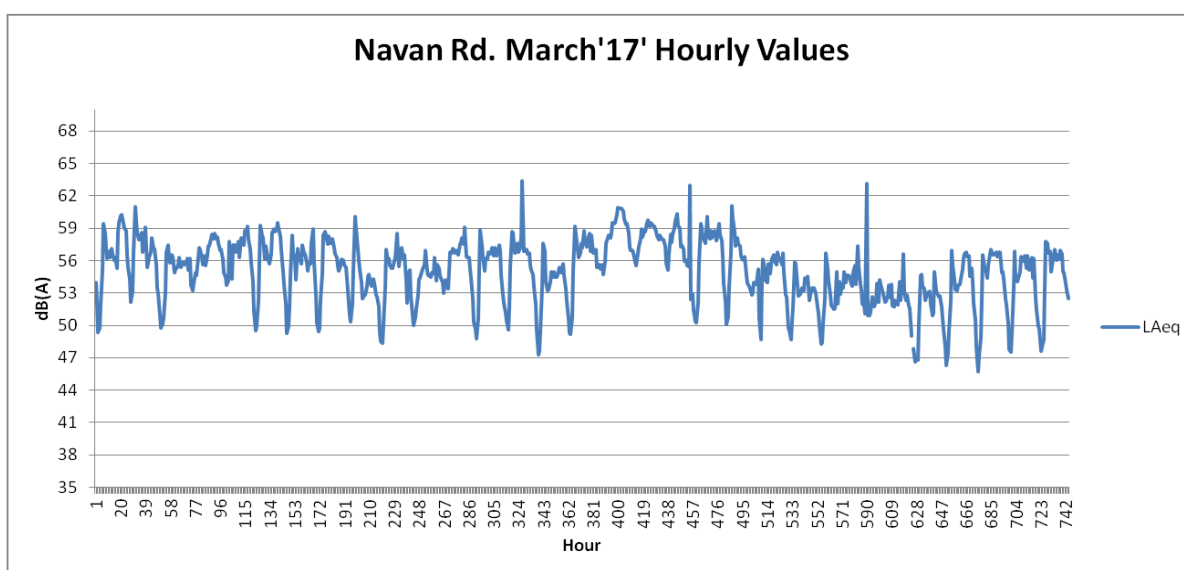
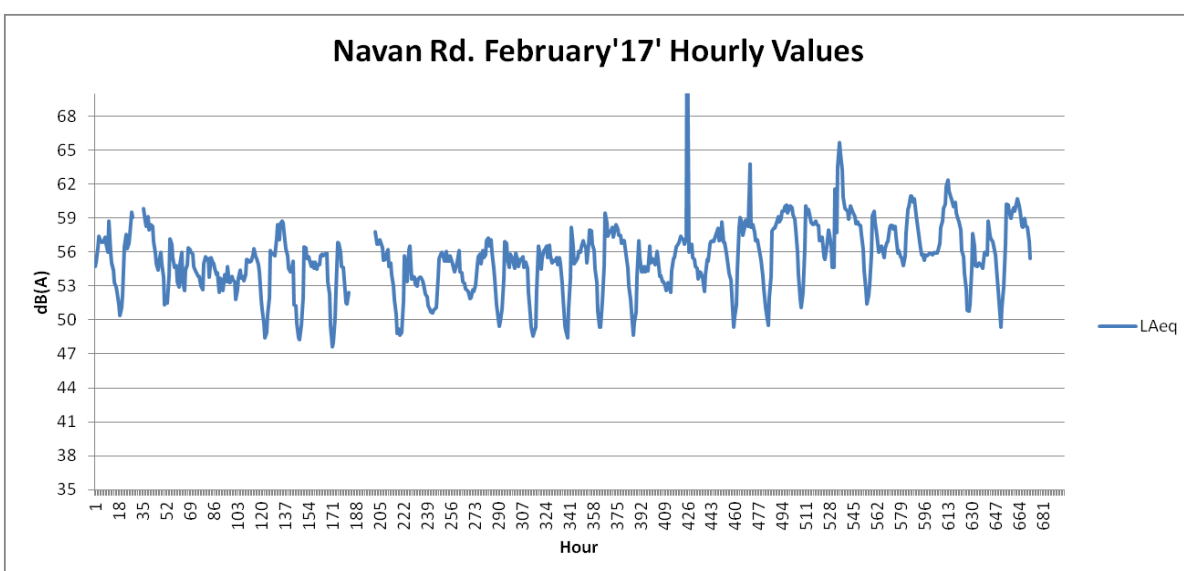
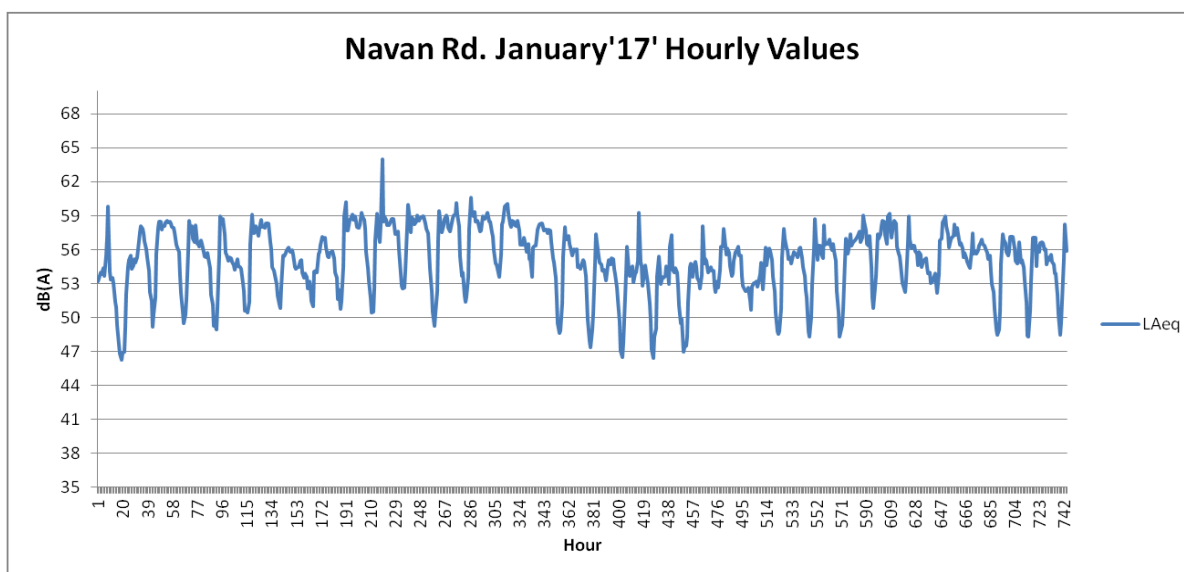




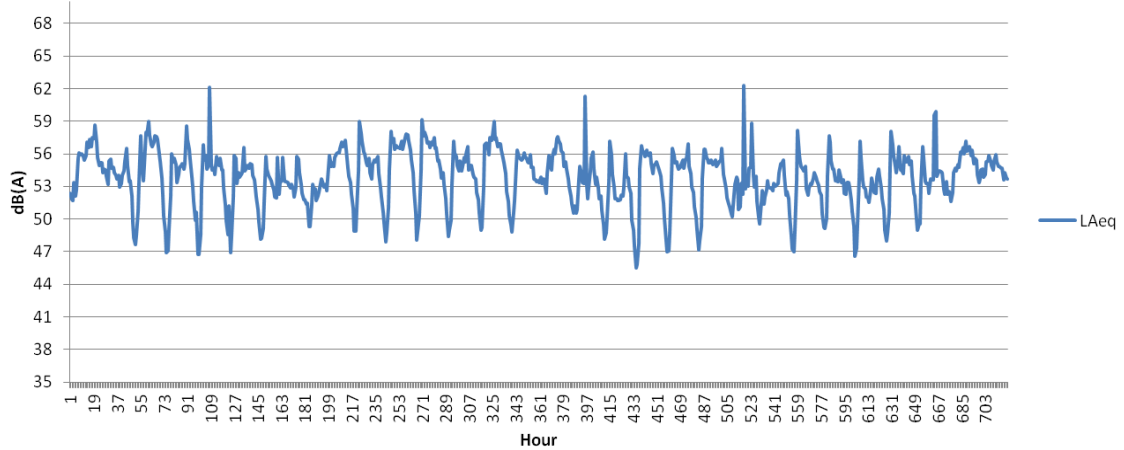
ASHTOWN GROVE
NAVAN ROAD
DUBLIN 7



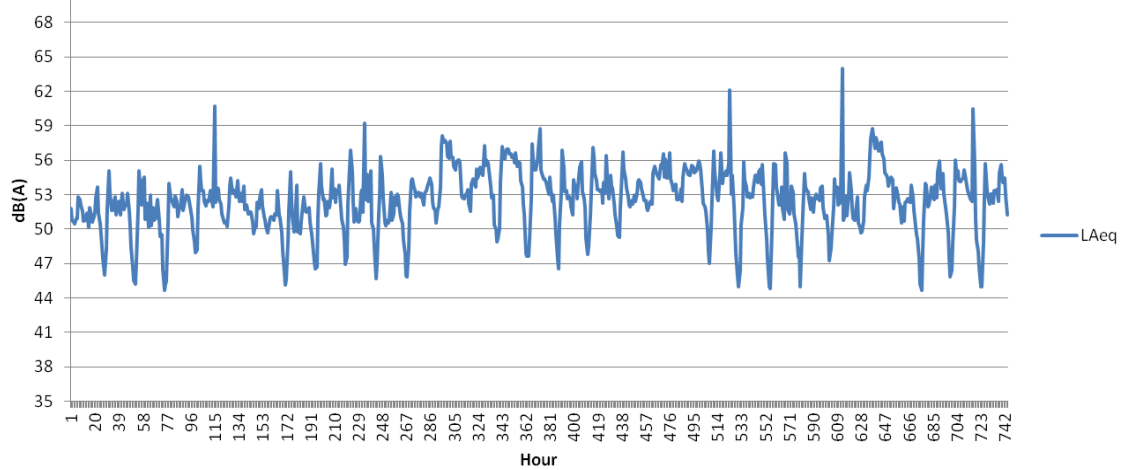




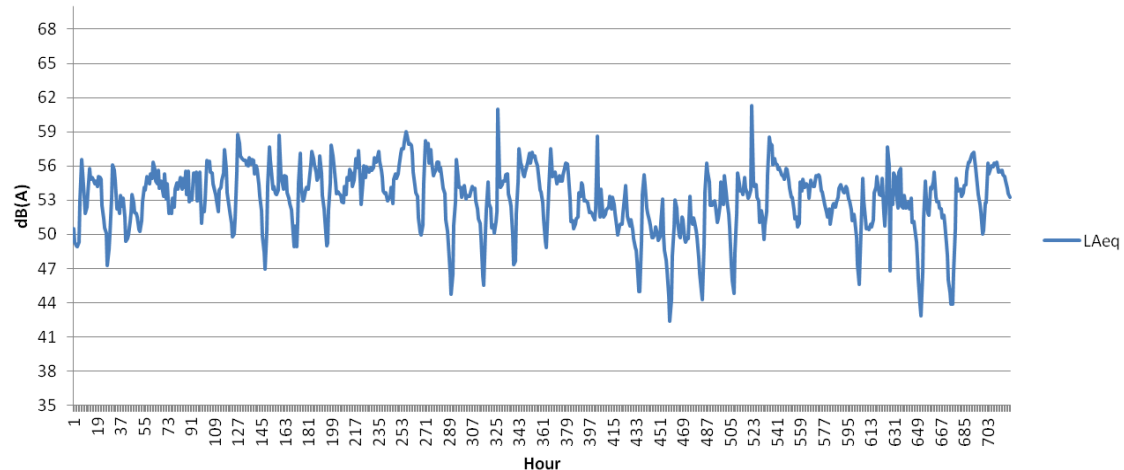
Navan Rd. April '17' Hourly Values

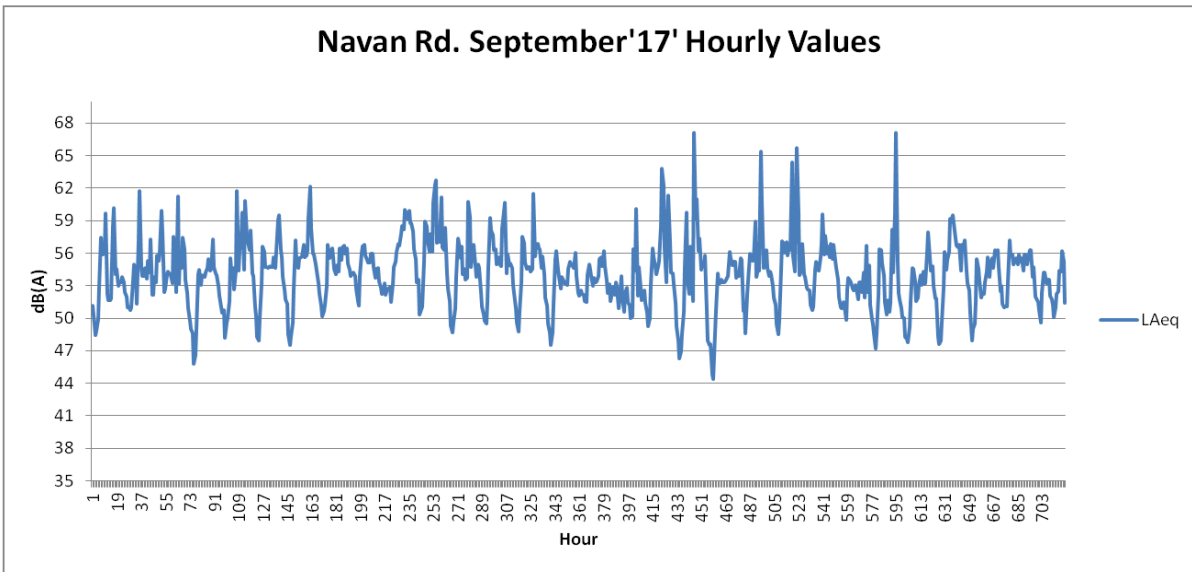
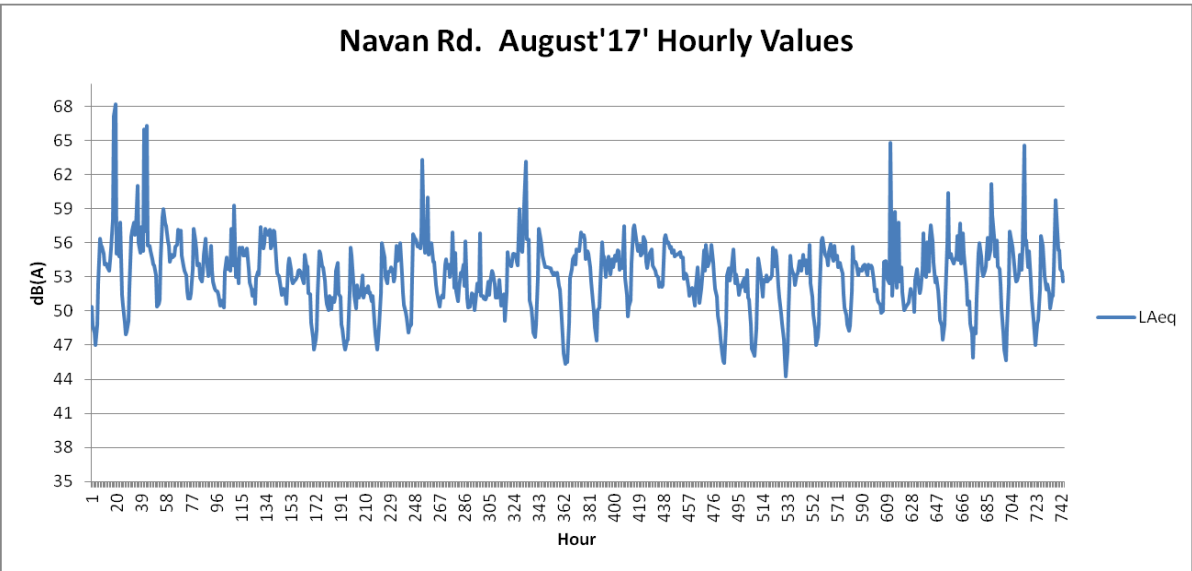
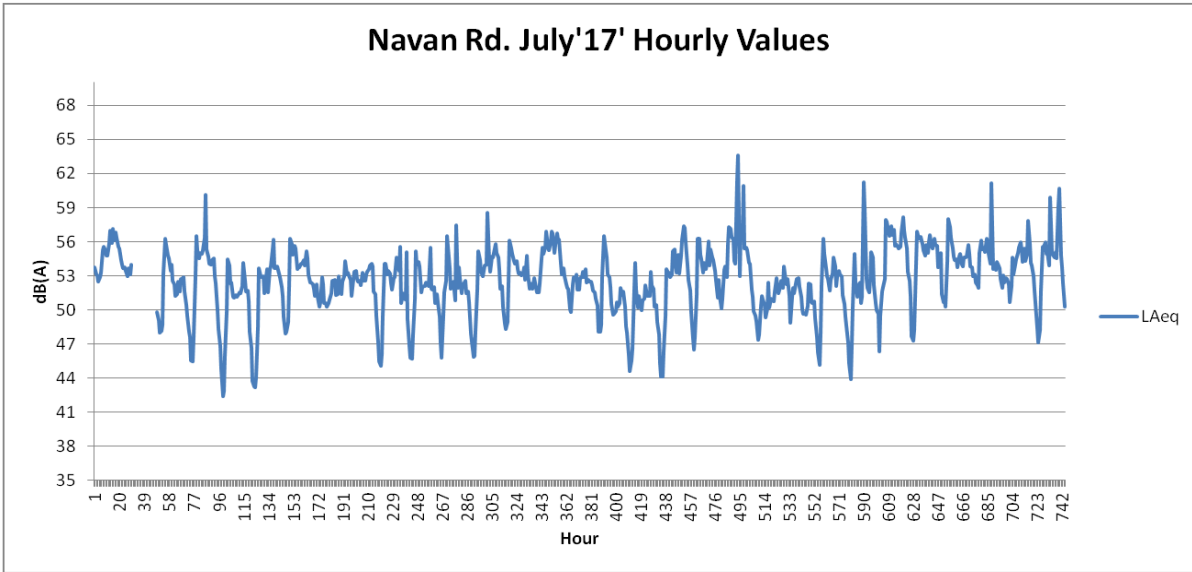


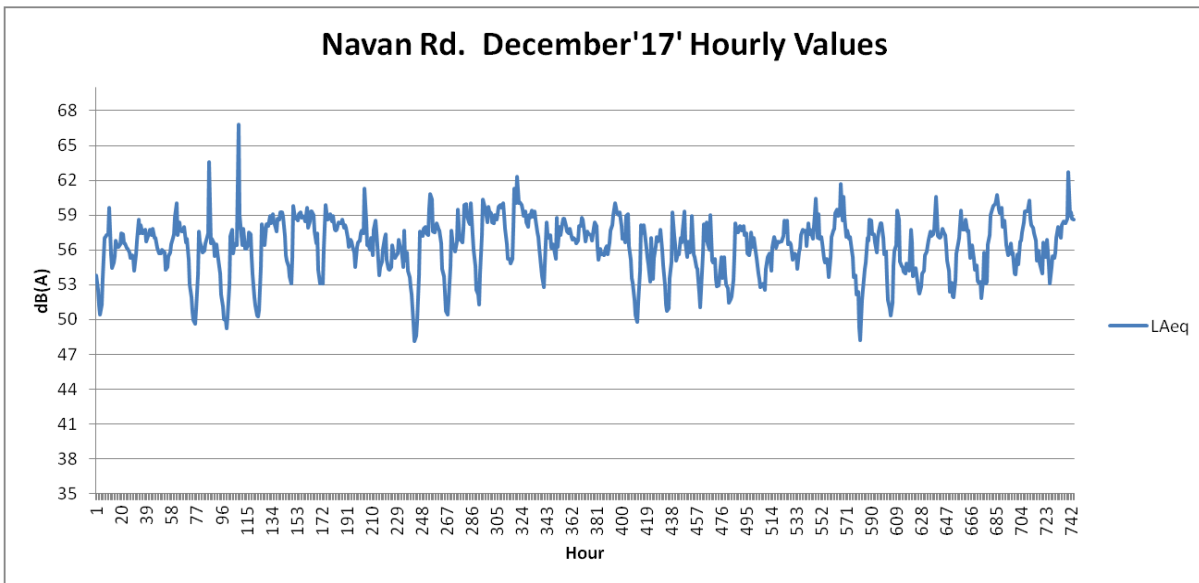
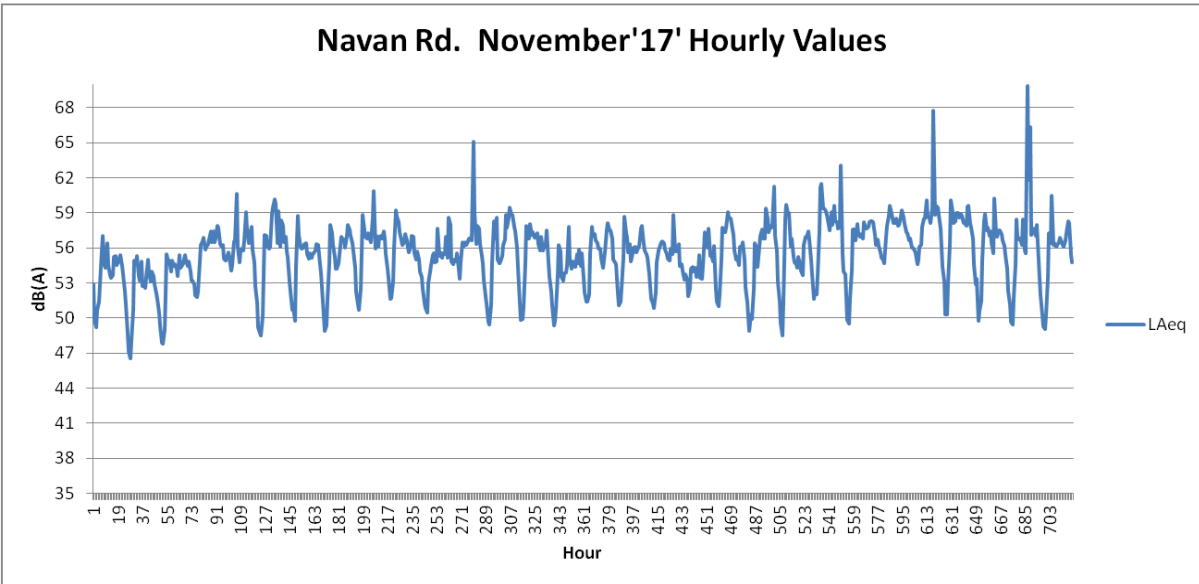
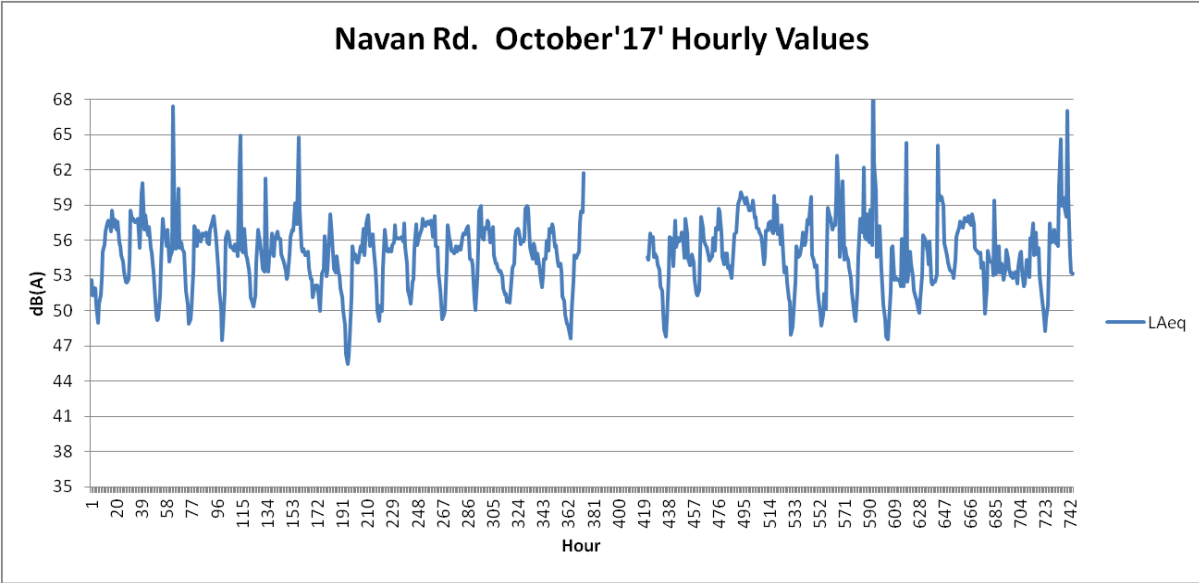
Navan Rd. May '17' Hourly Values



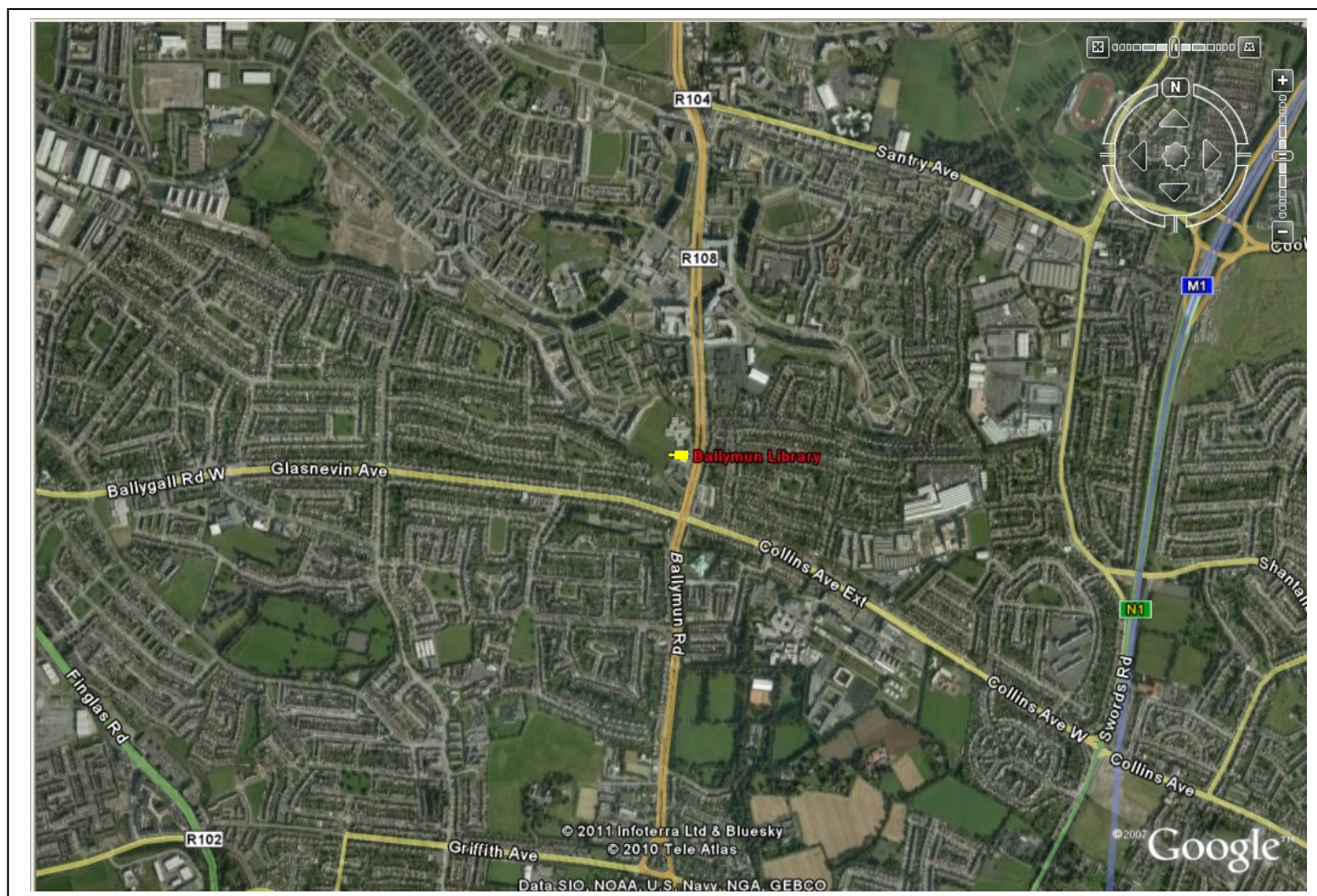
Navan Rd. June '17' Hourly Values

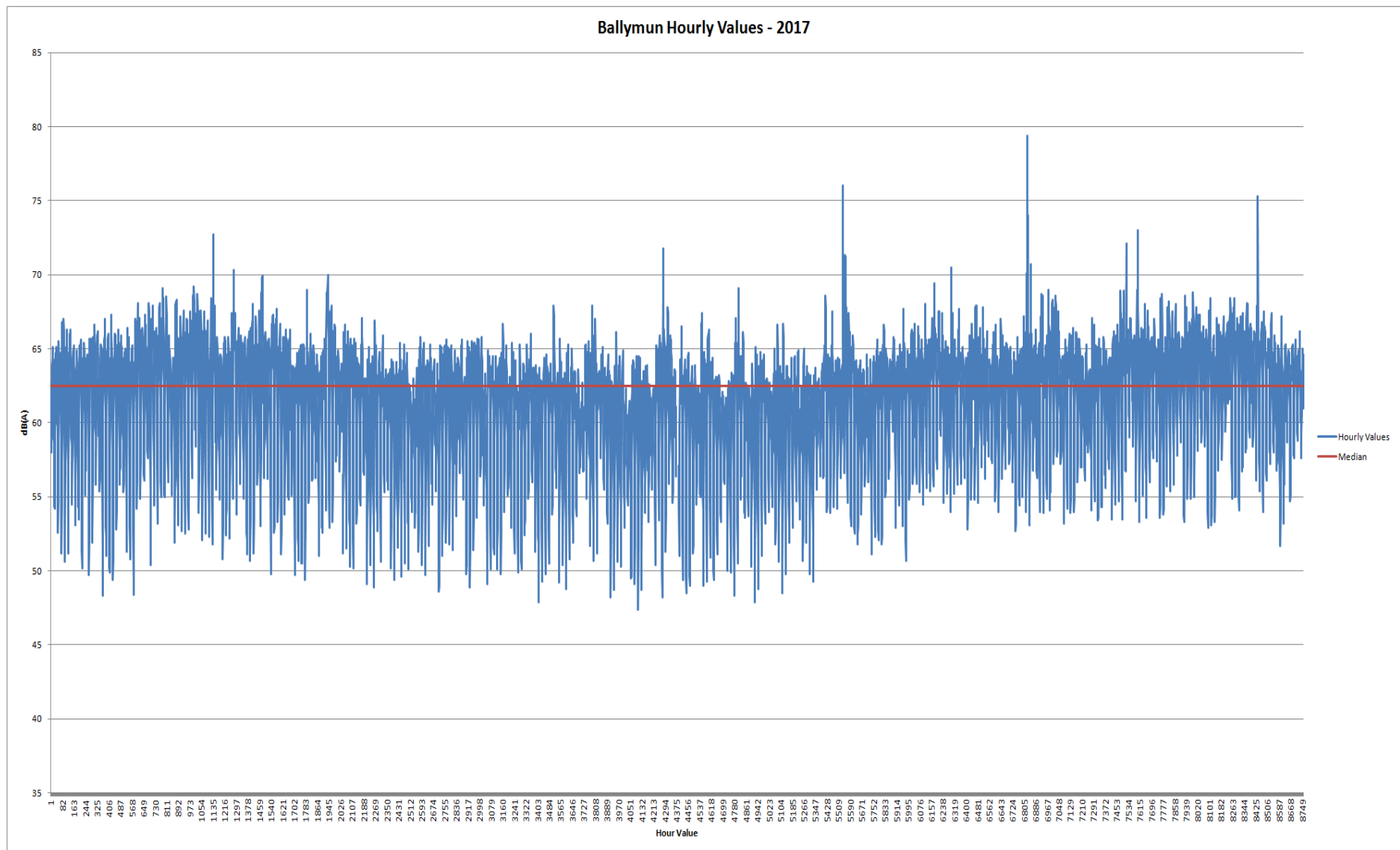


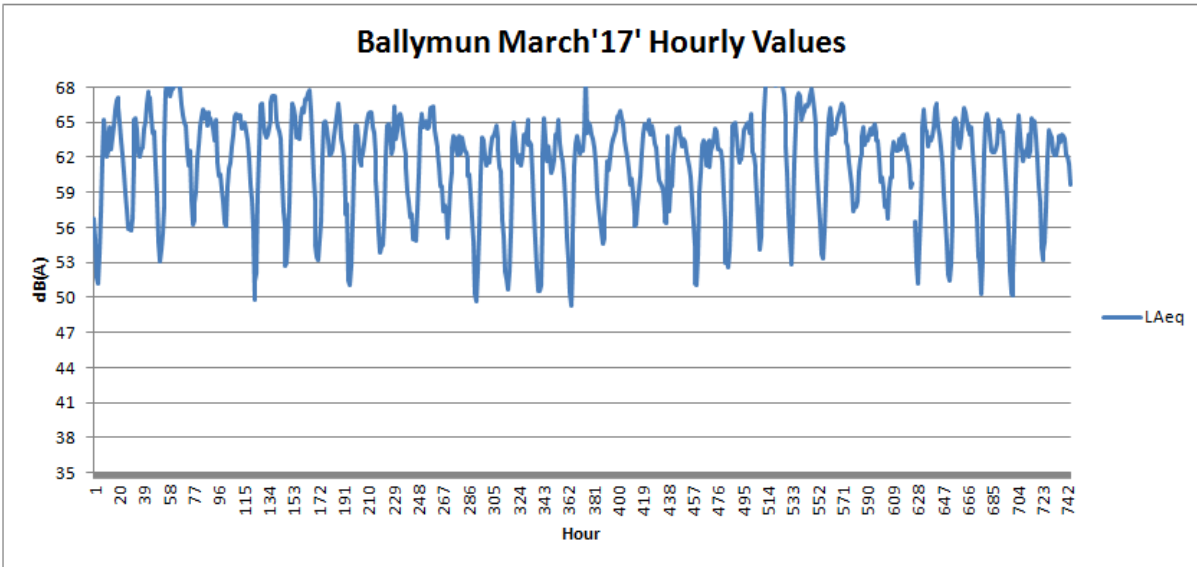
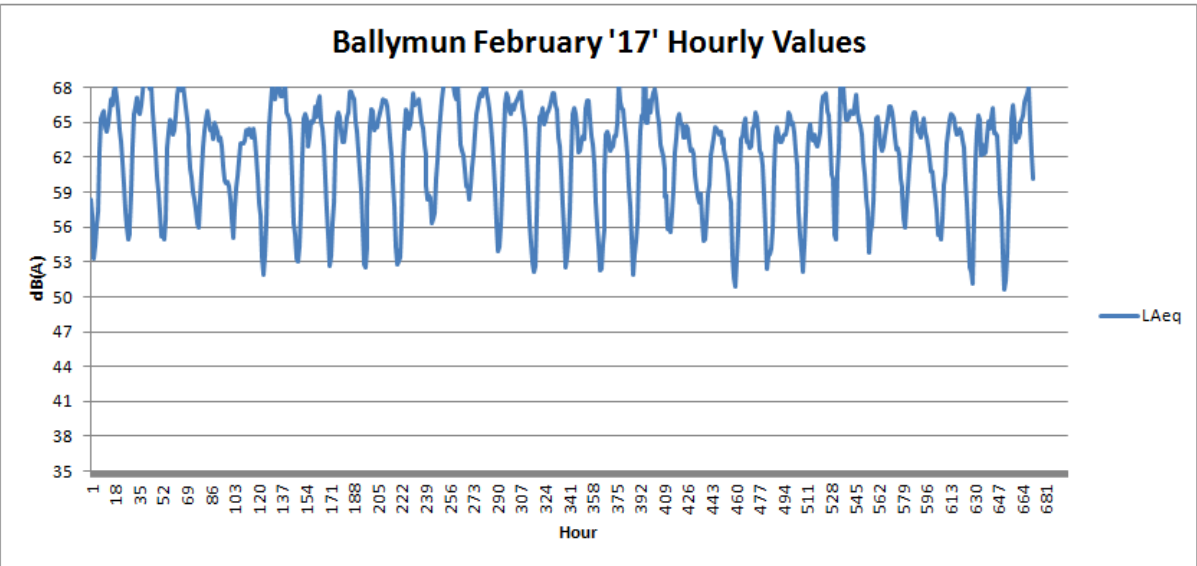
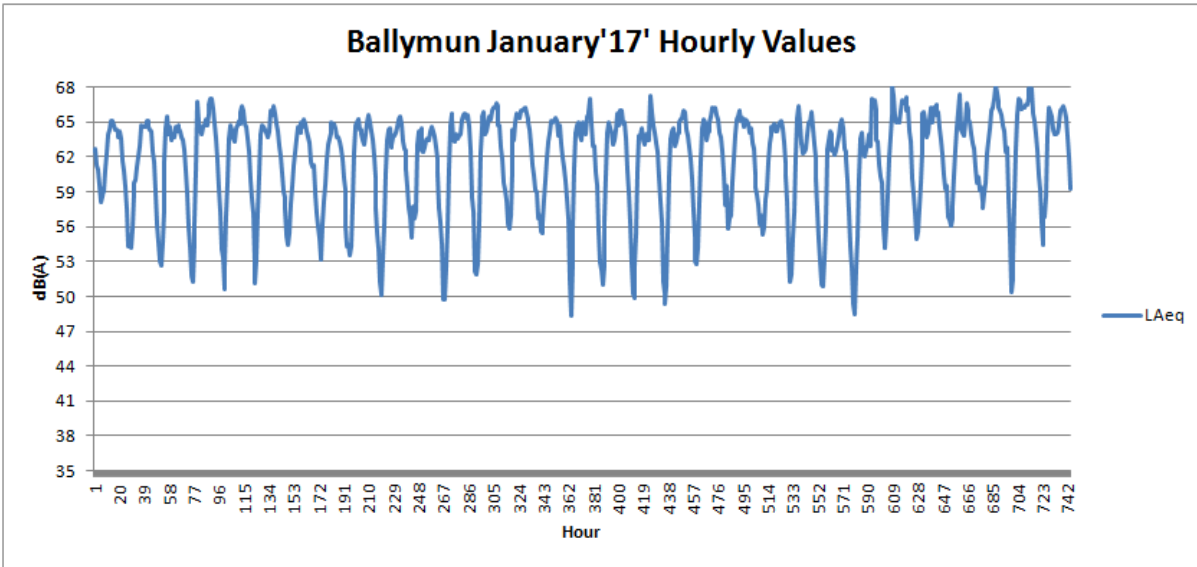


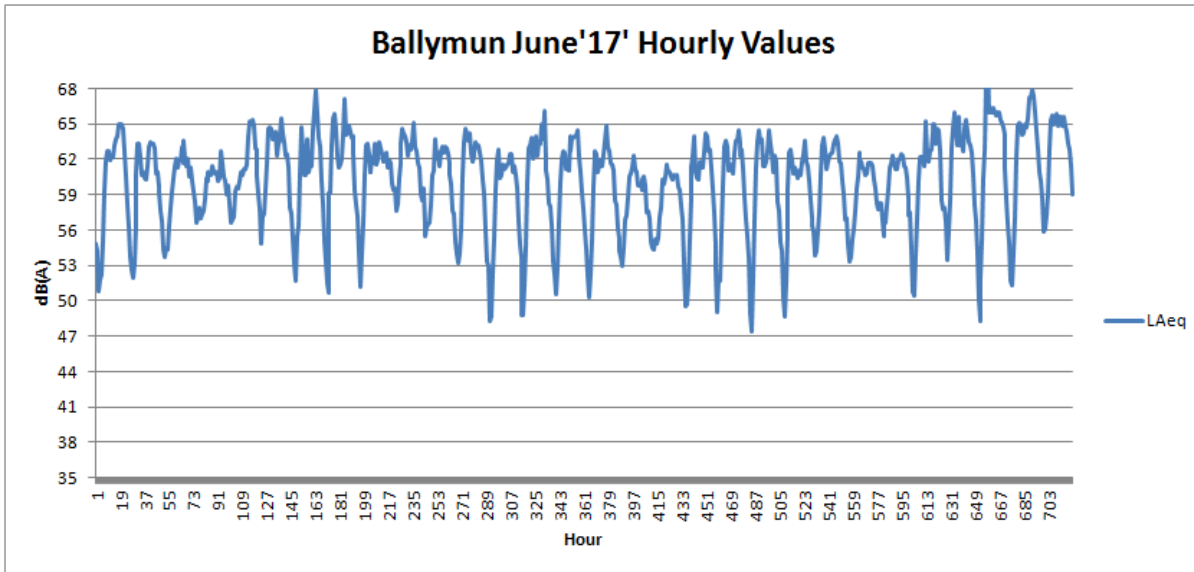
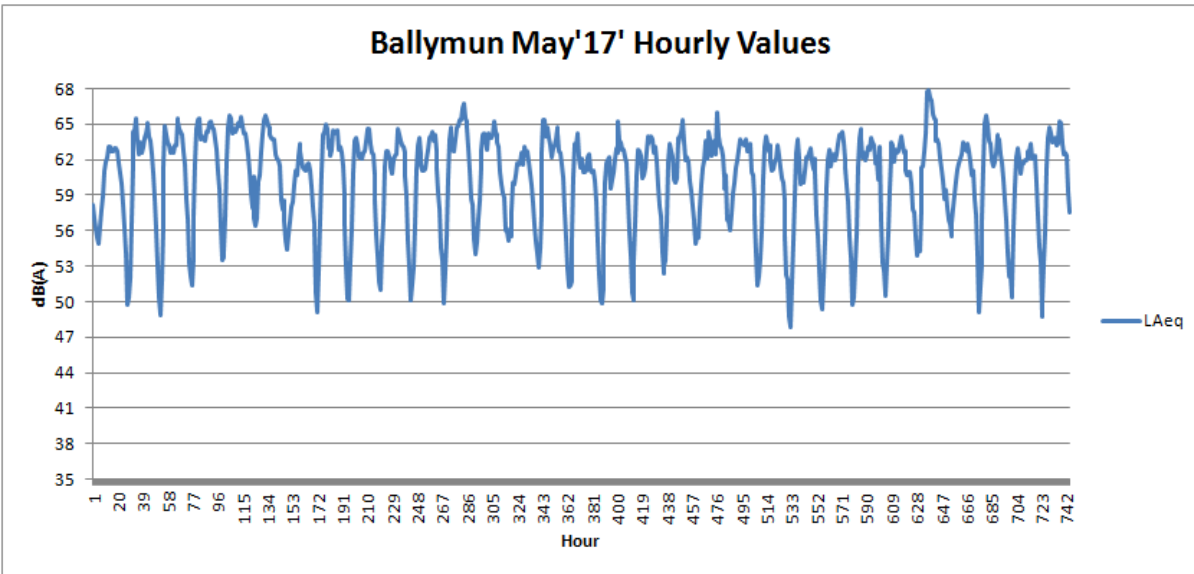
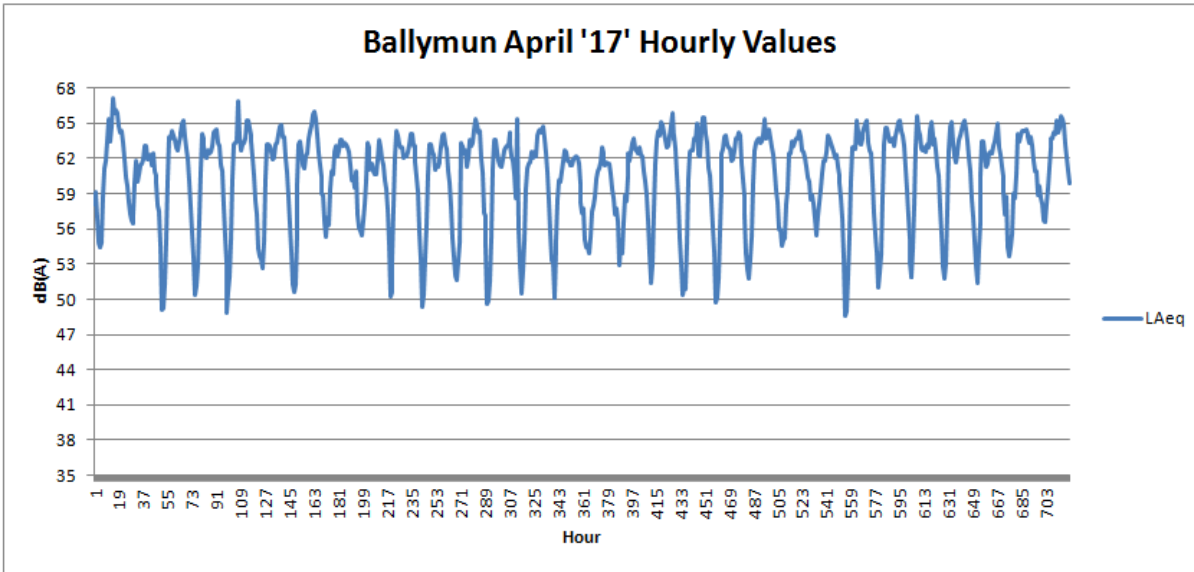


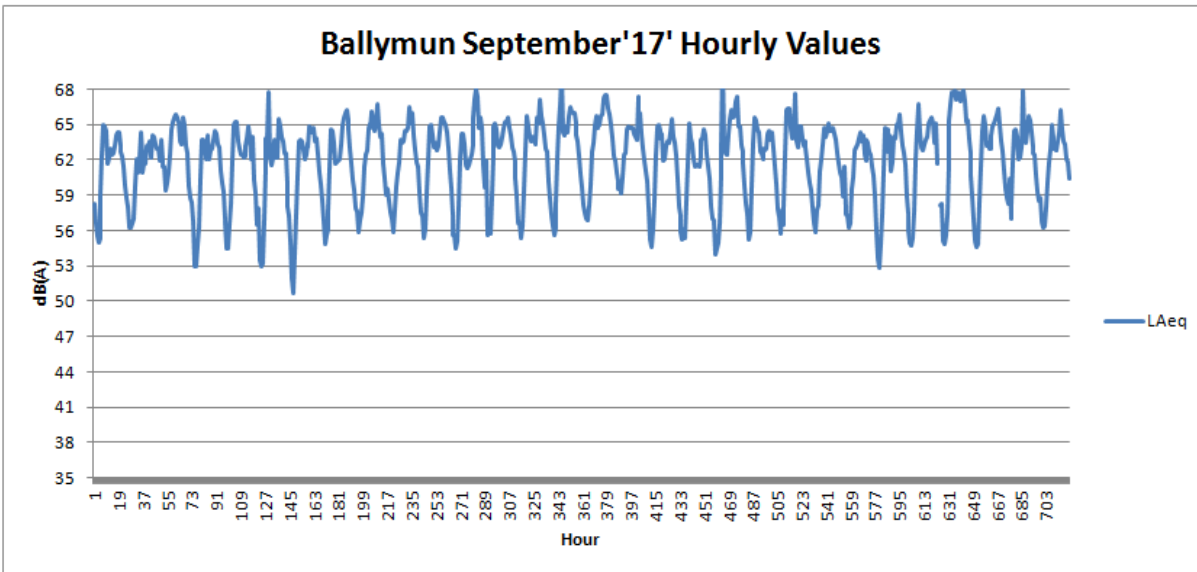
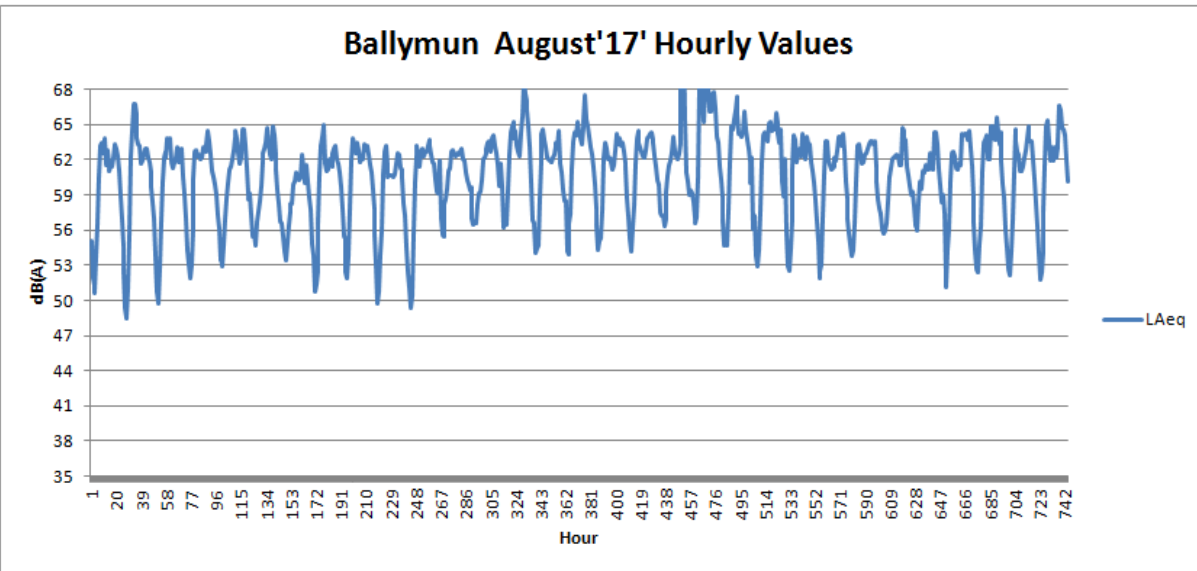
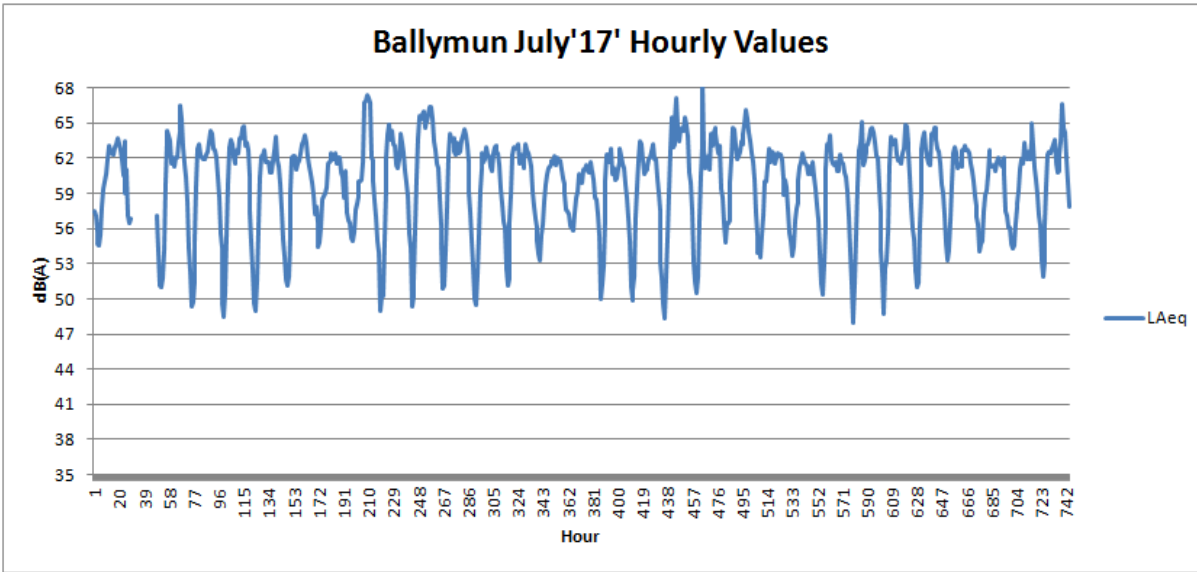
BALLYMUN LIBRARY
BALLYMUN ROAD
DUBLIN 11

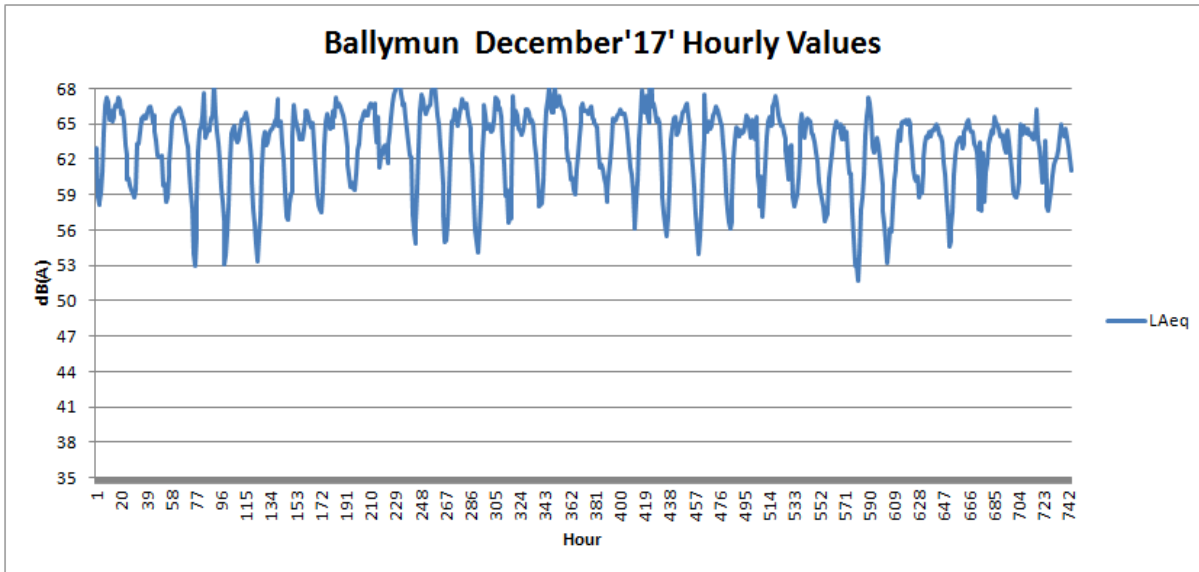
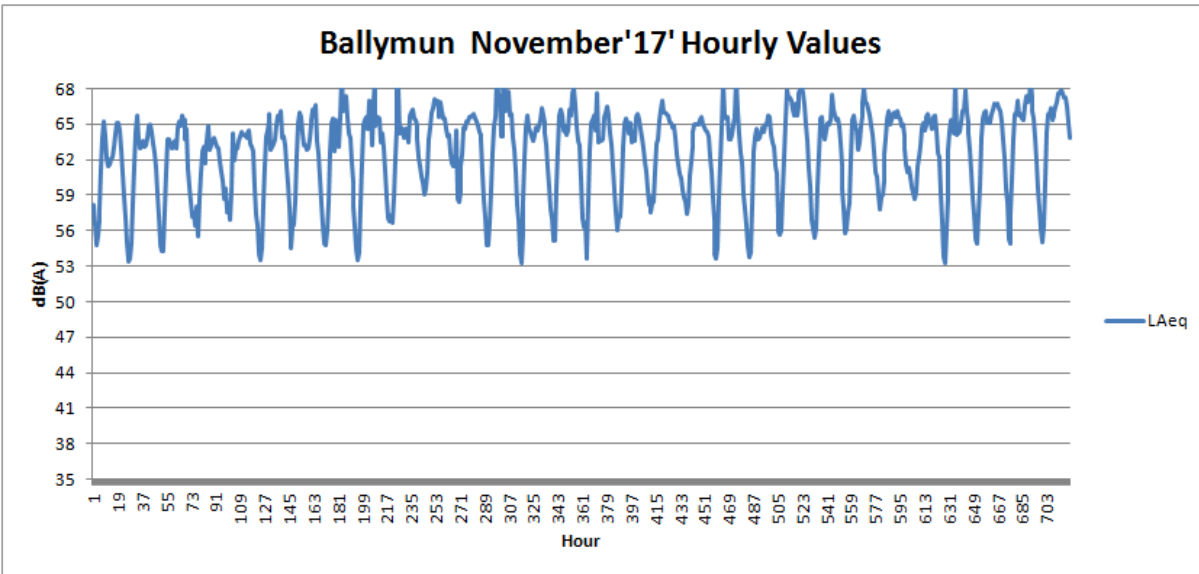
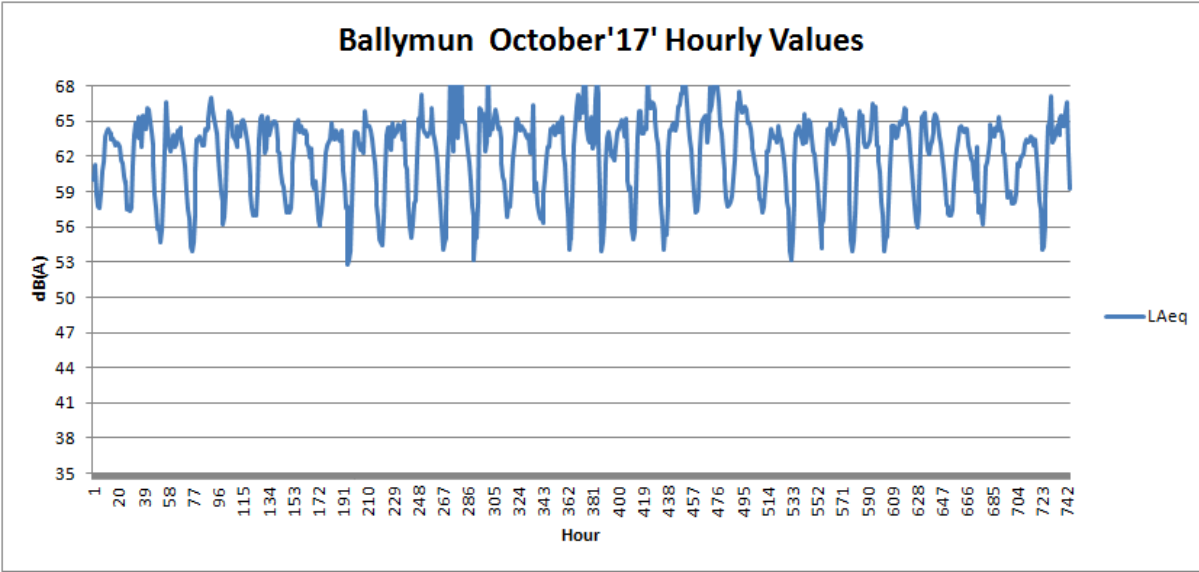








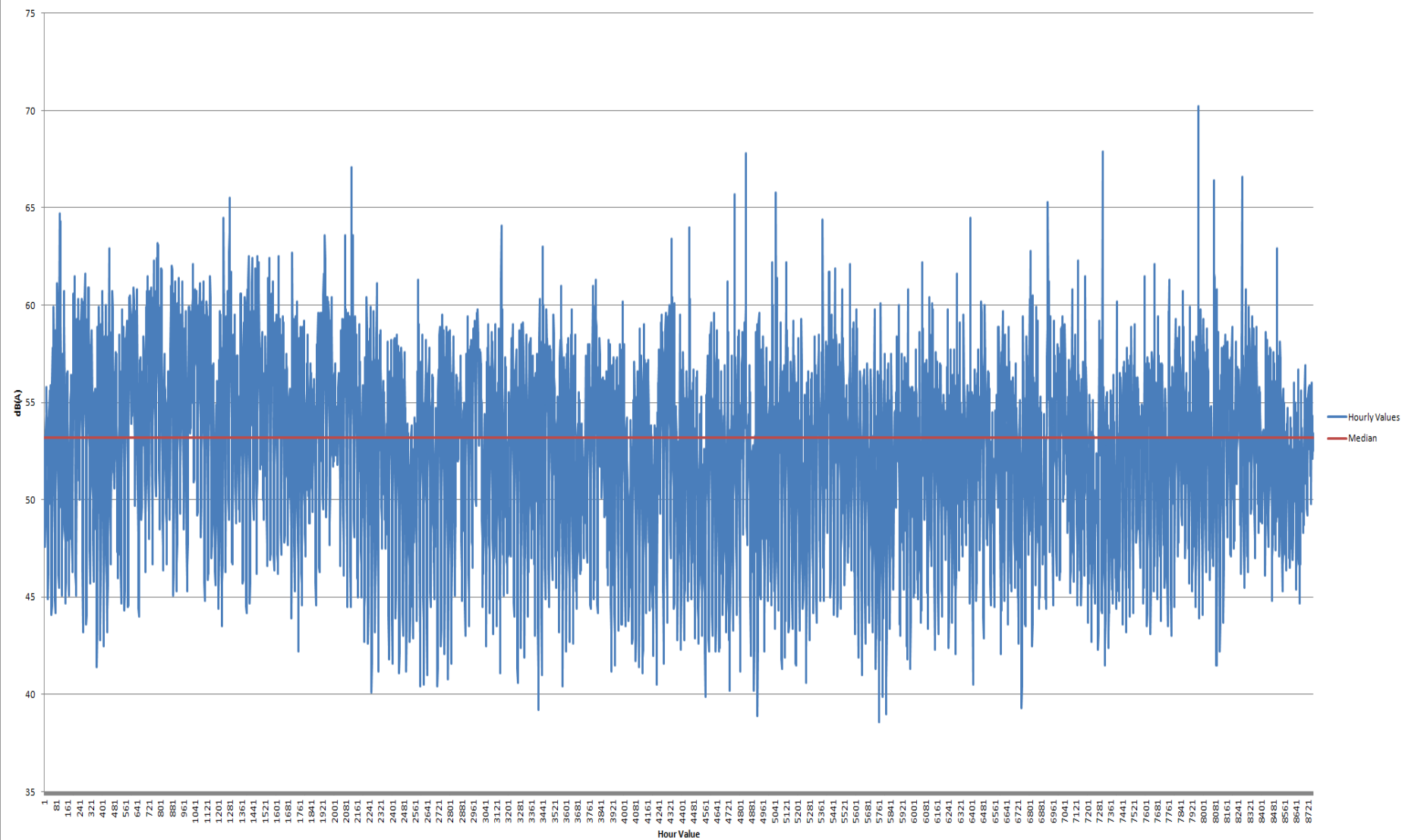


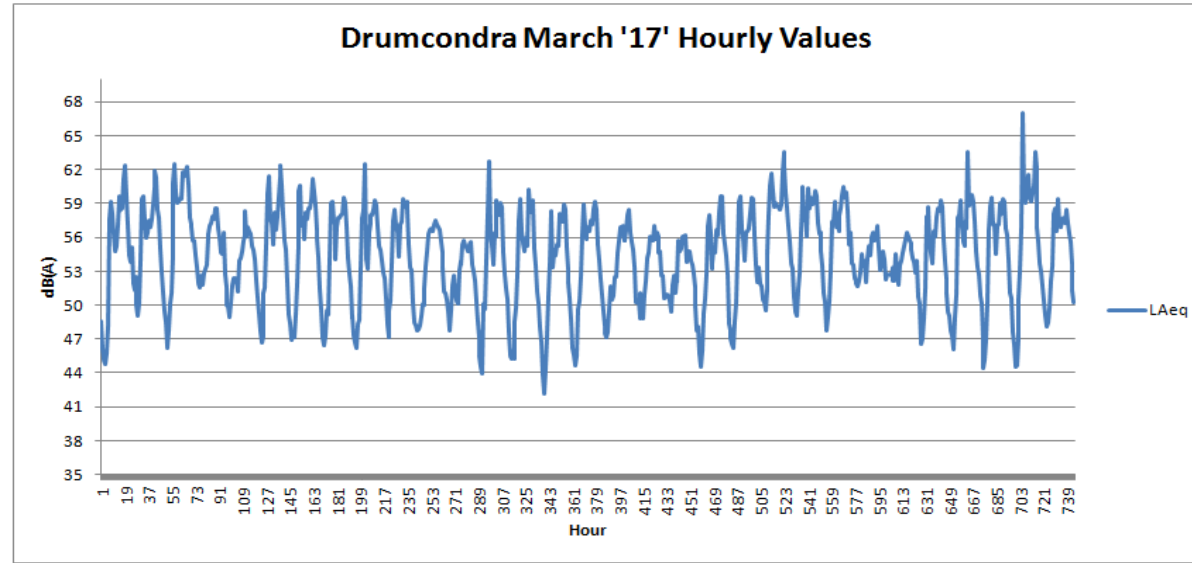
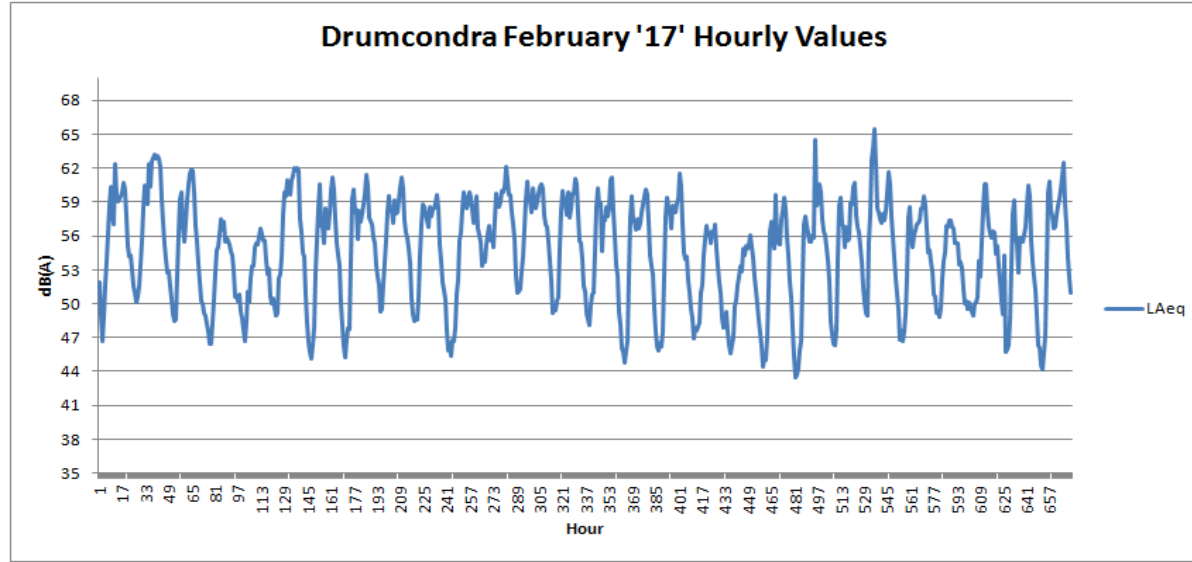
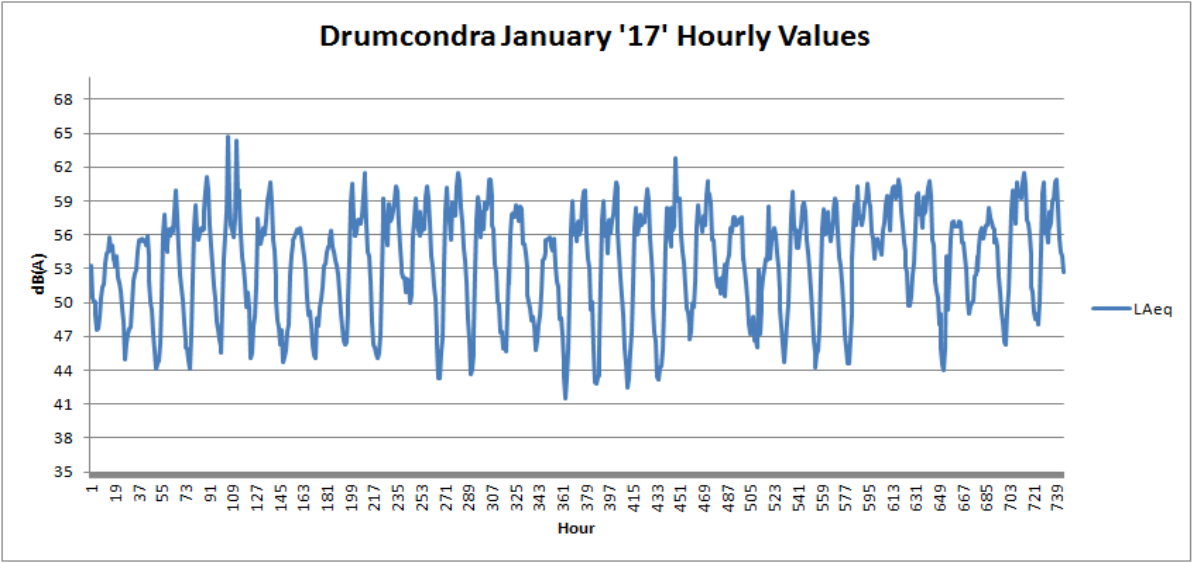


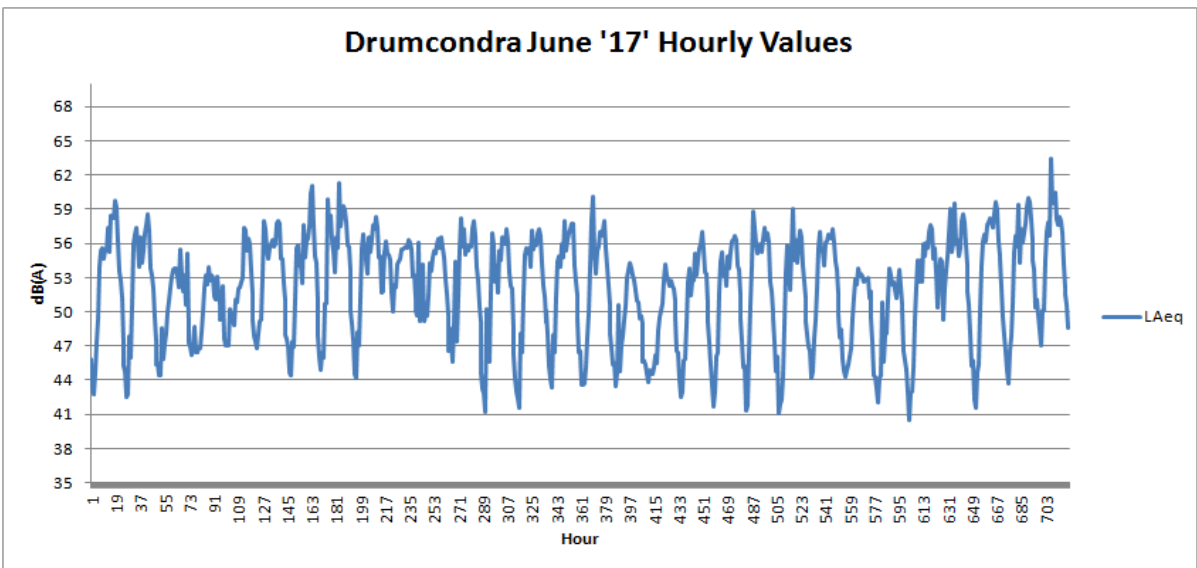
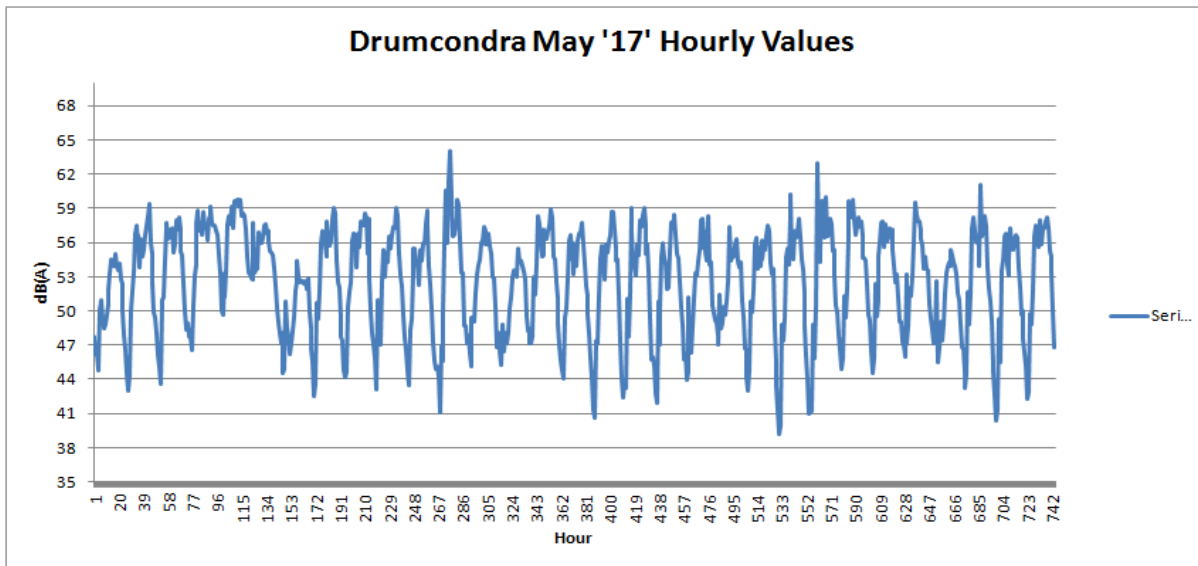
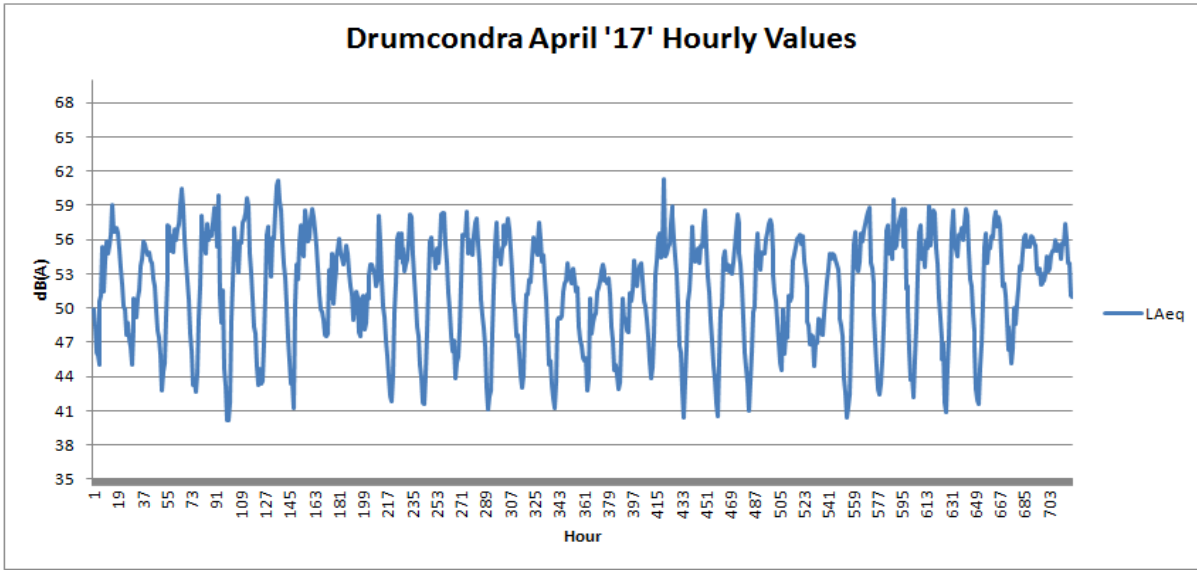
DRUMCONDRA LIBRARY
MILLMOUNT AVENUE
DUBLIN 9

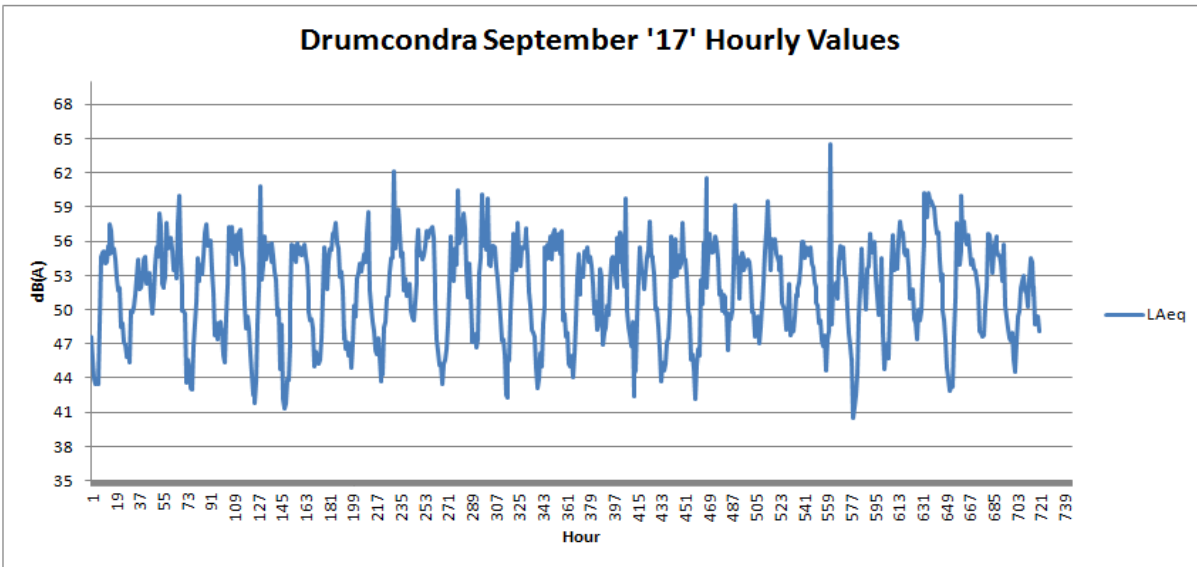
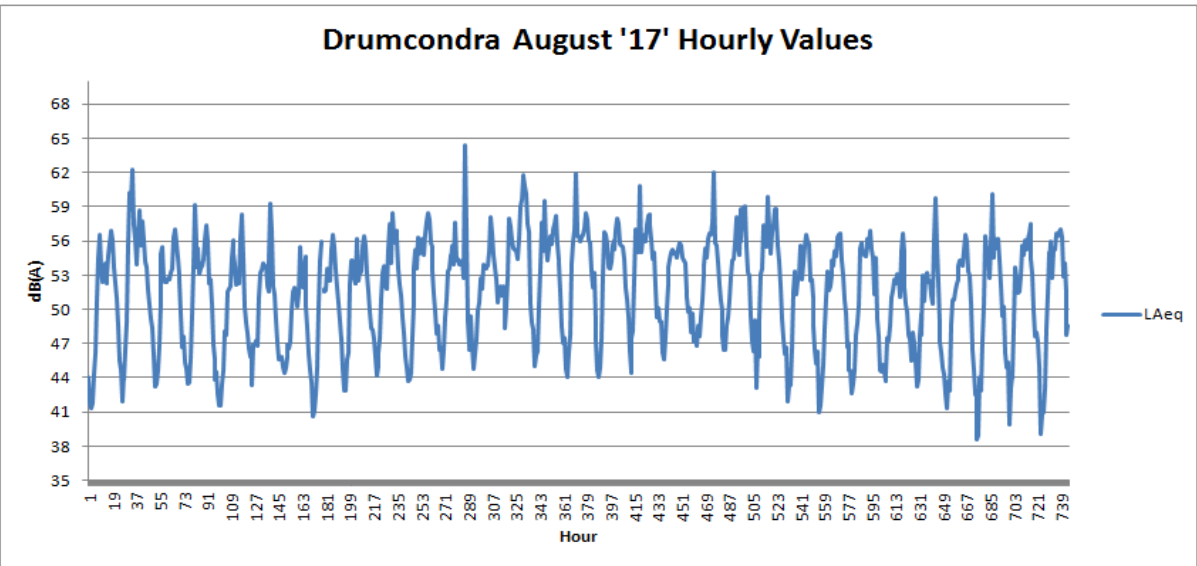
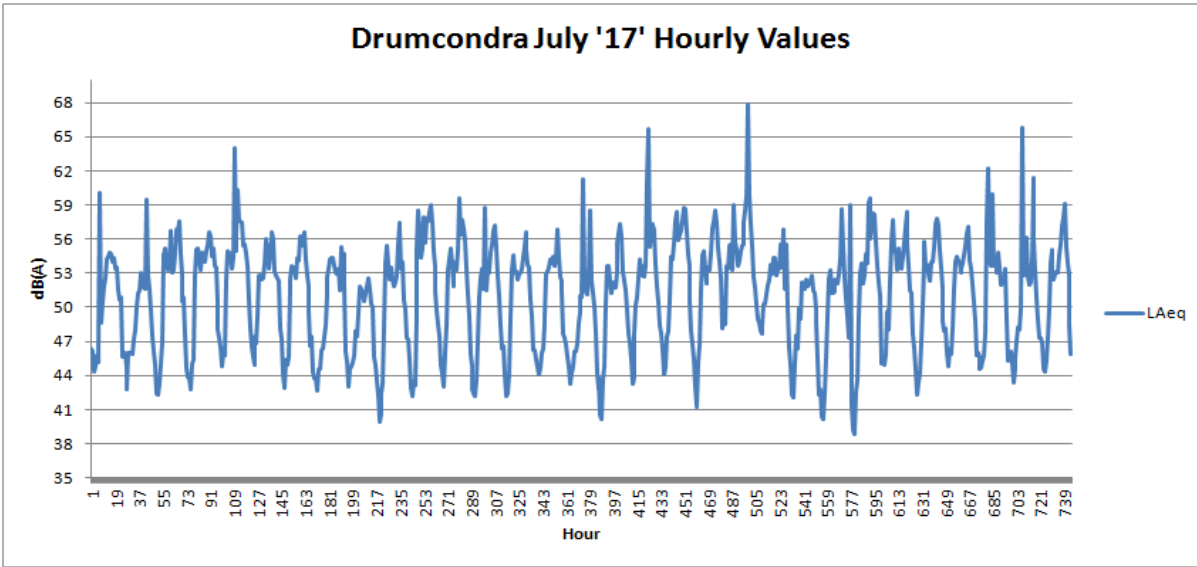


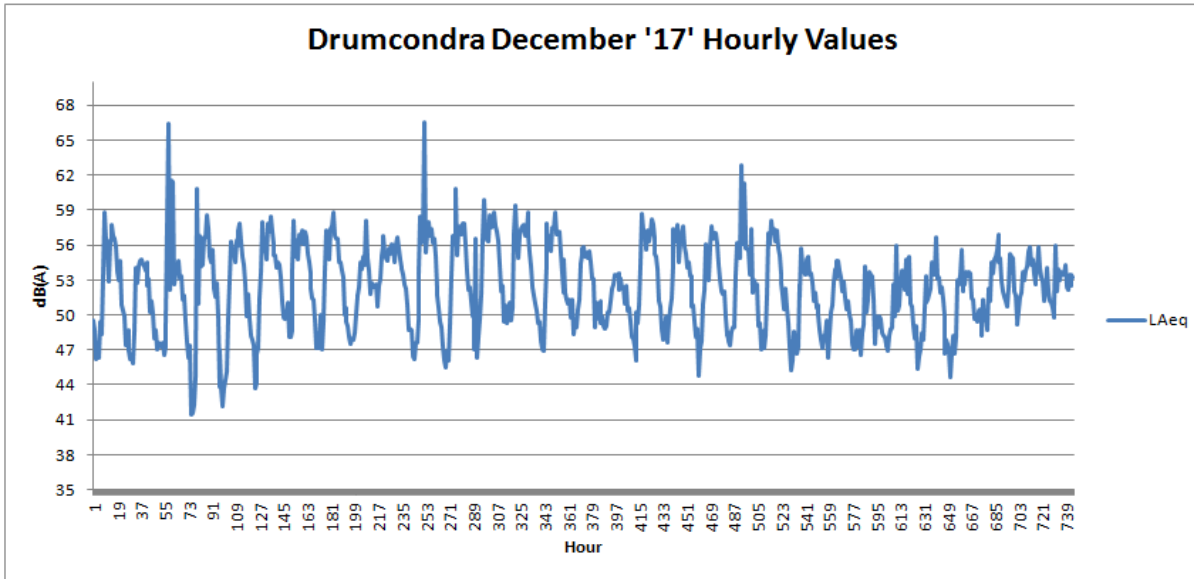
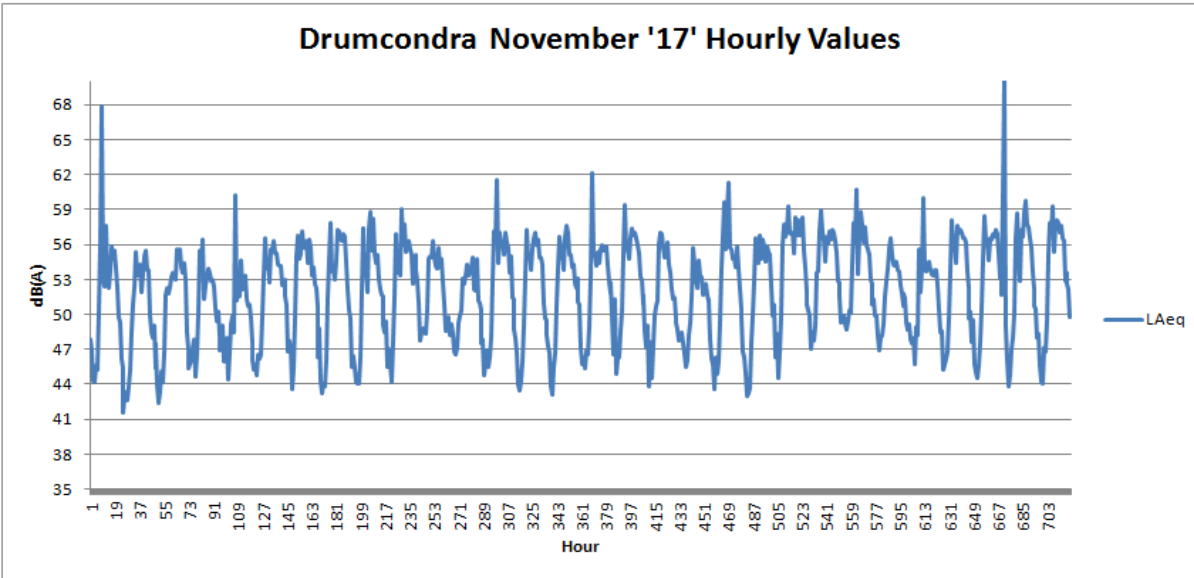
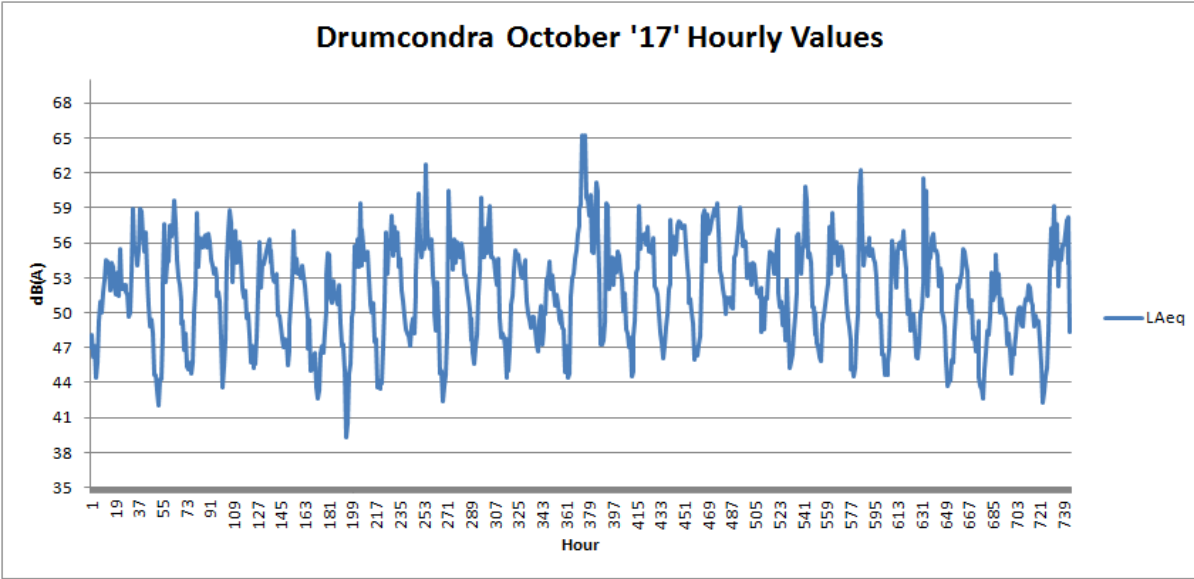
Drumcondra Hourly Values - 2017







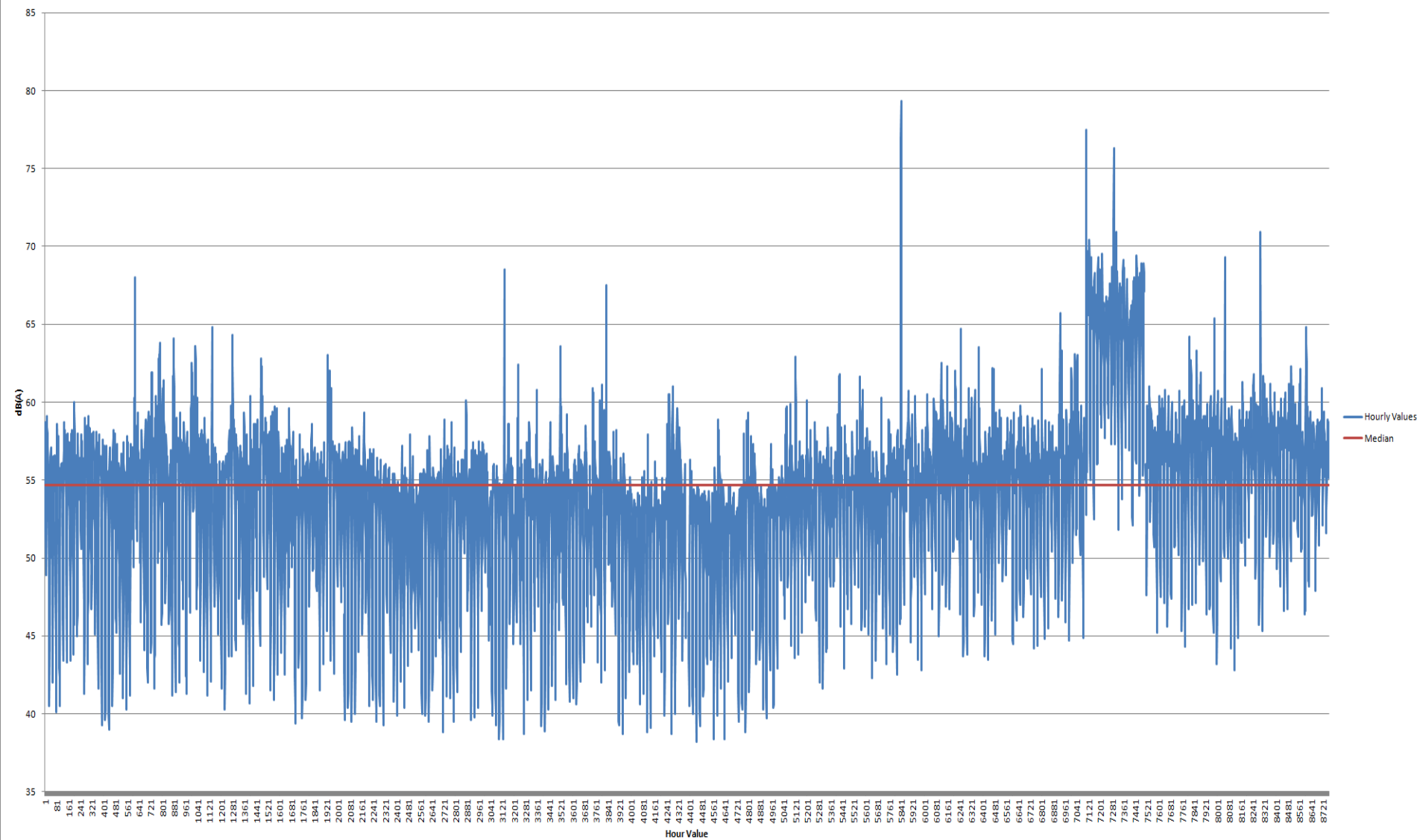


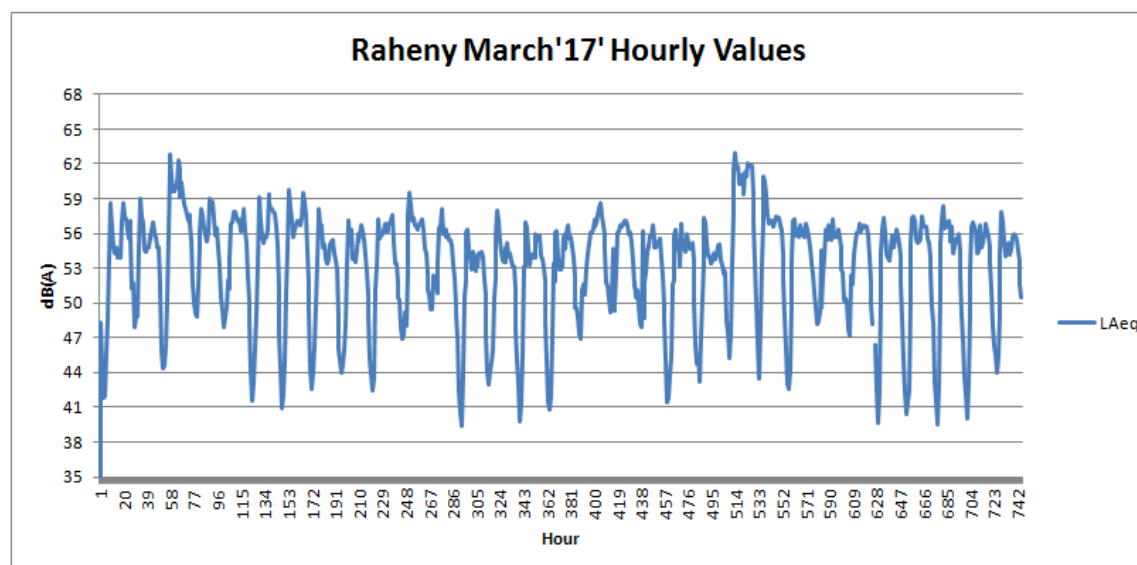
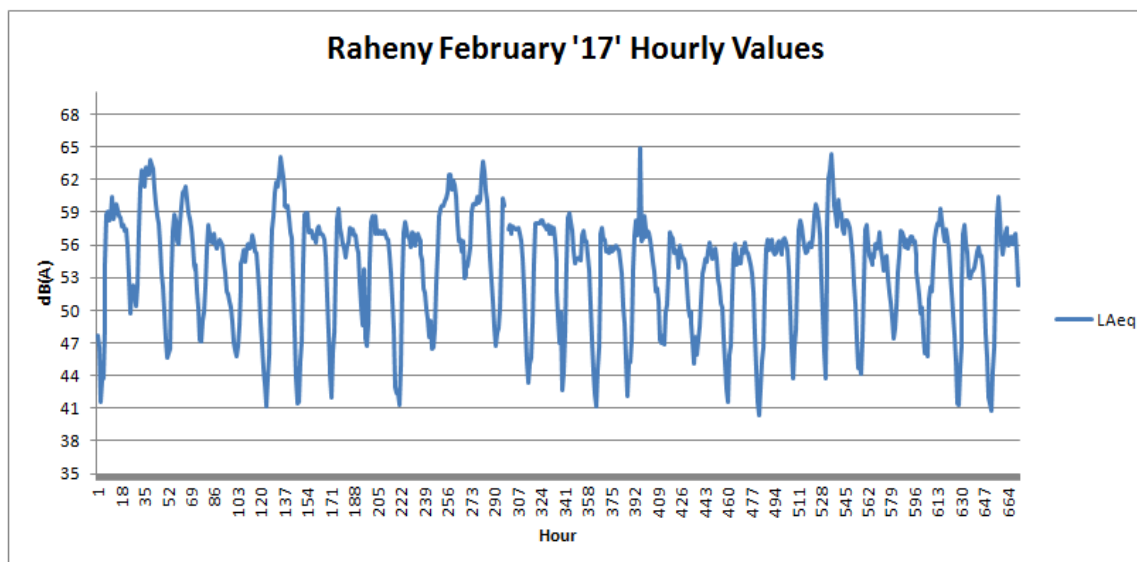
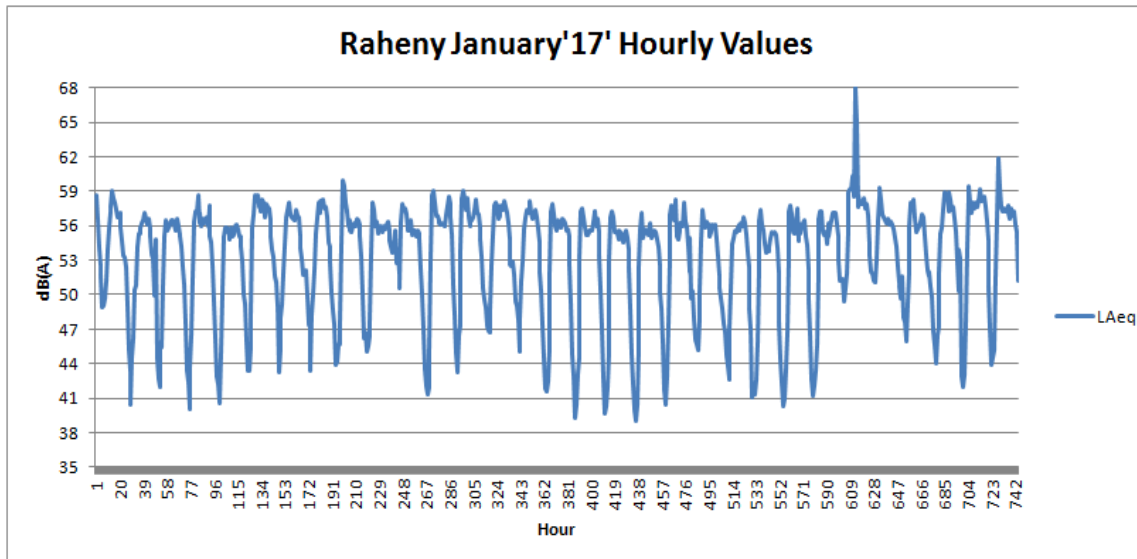


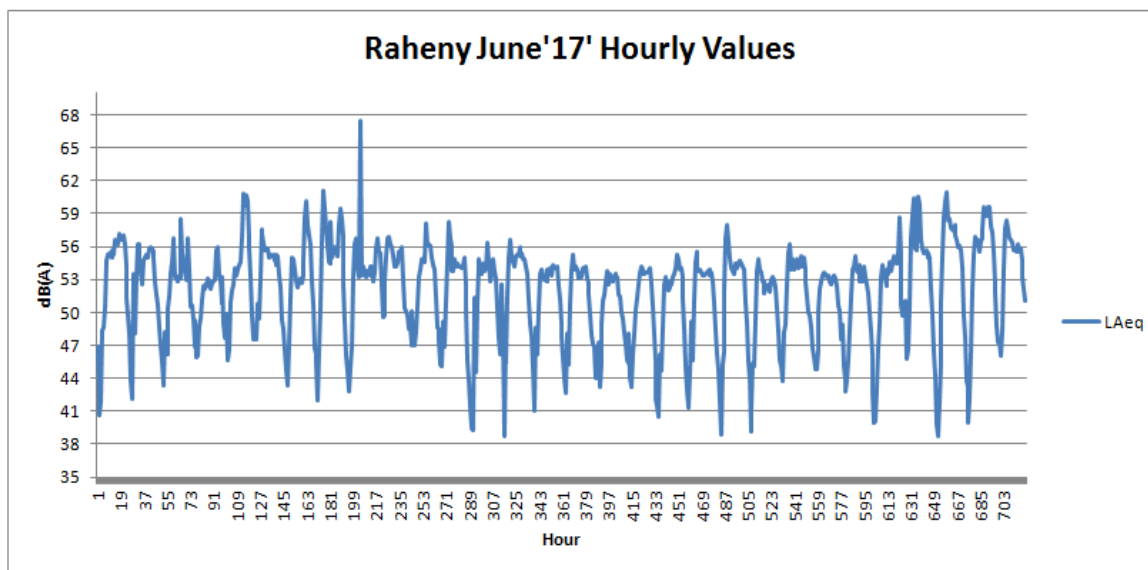
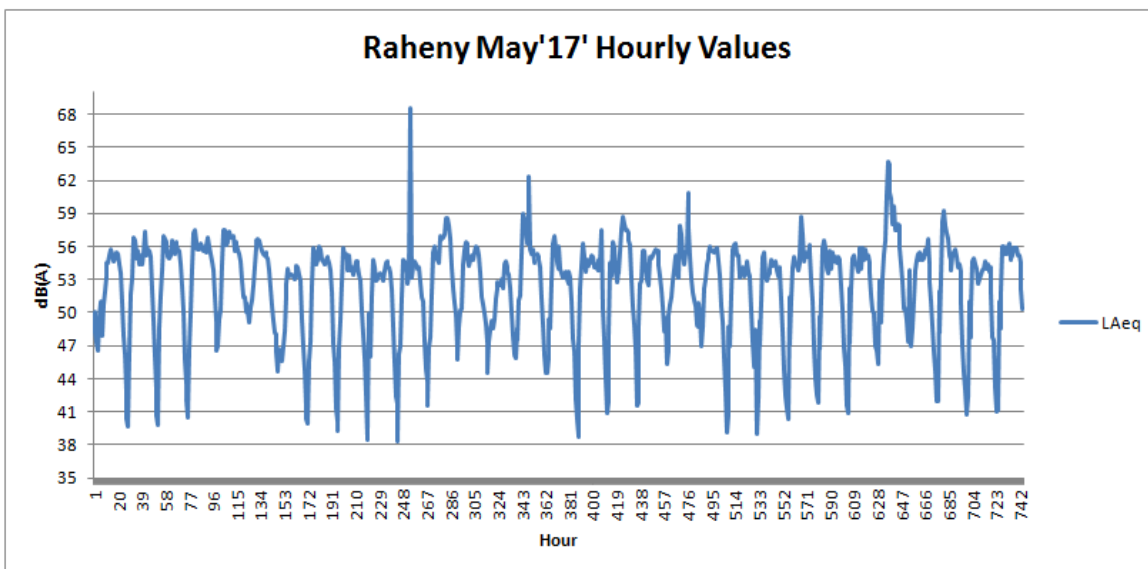
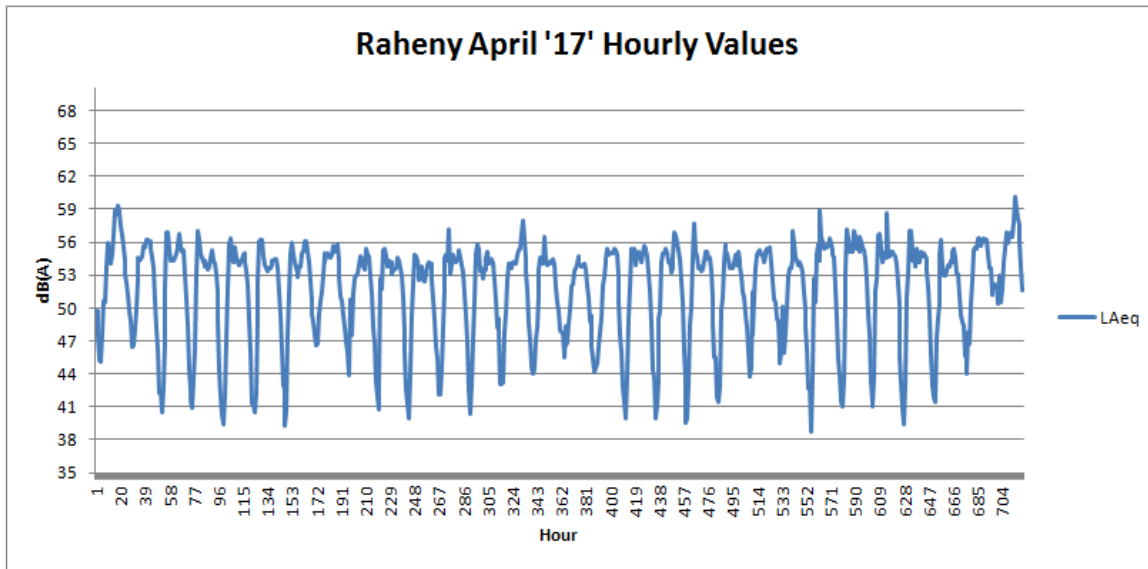
RAHENY LIBRARY
HOWTH ROAD
DUBLIN 5

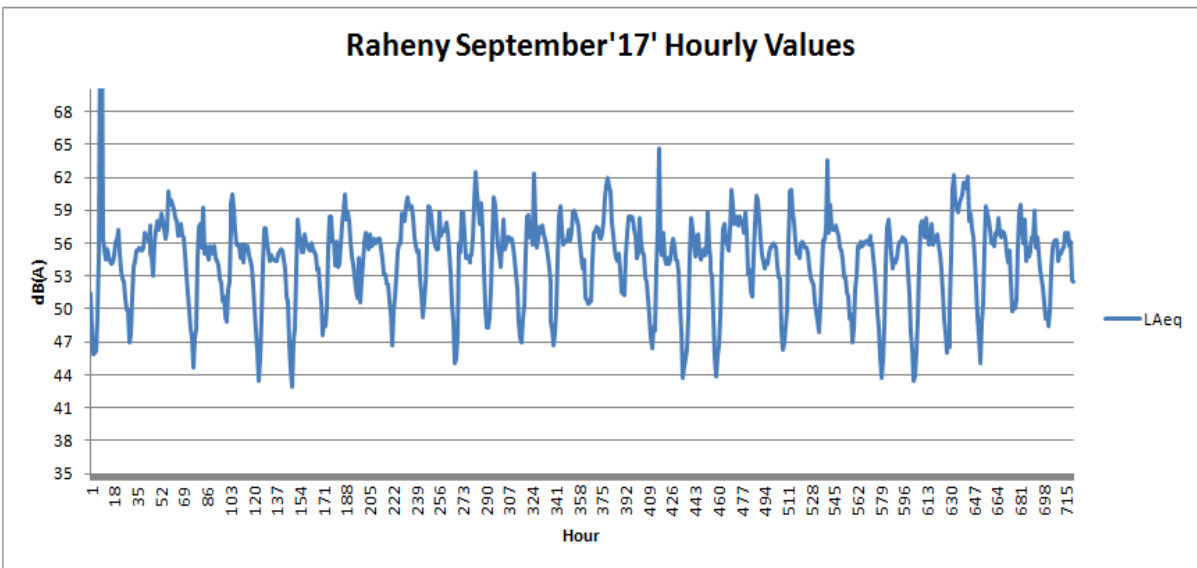
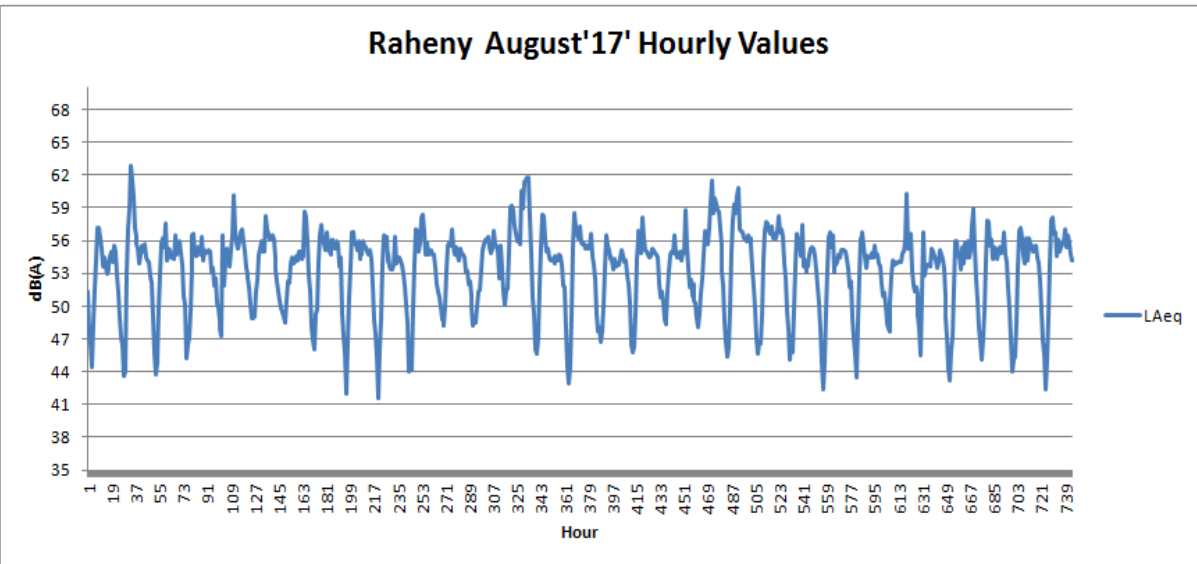
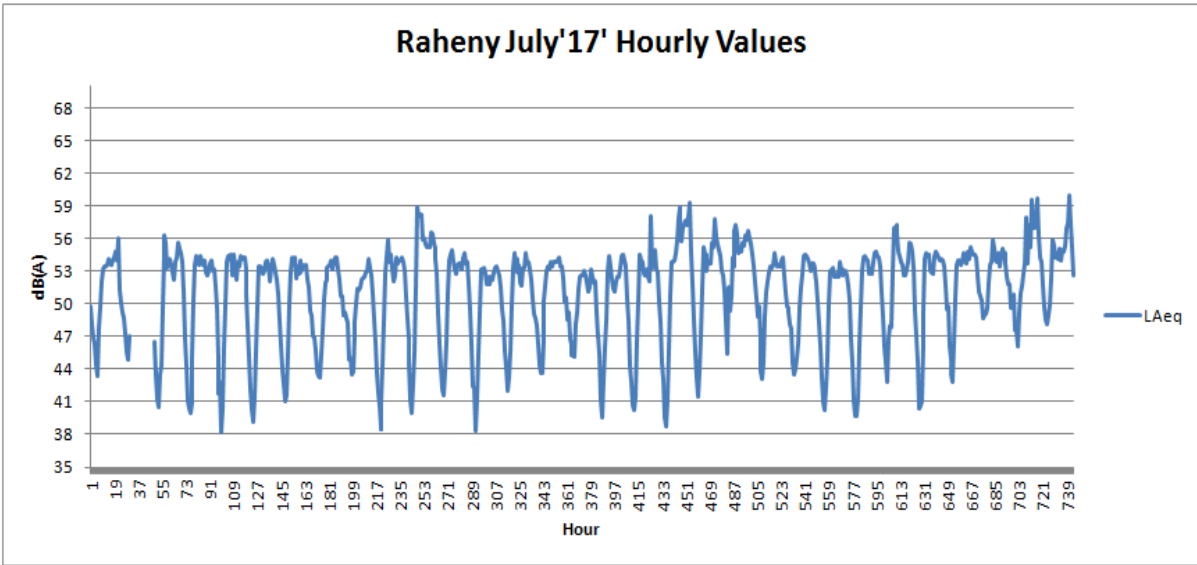


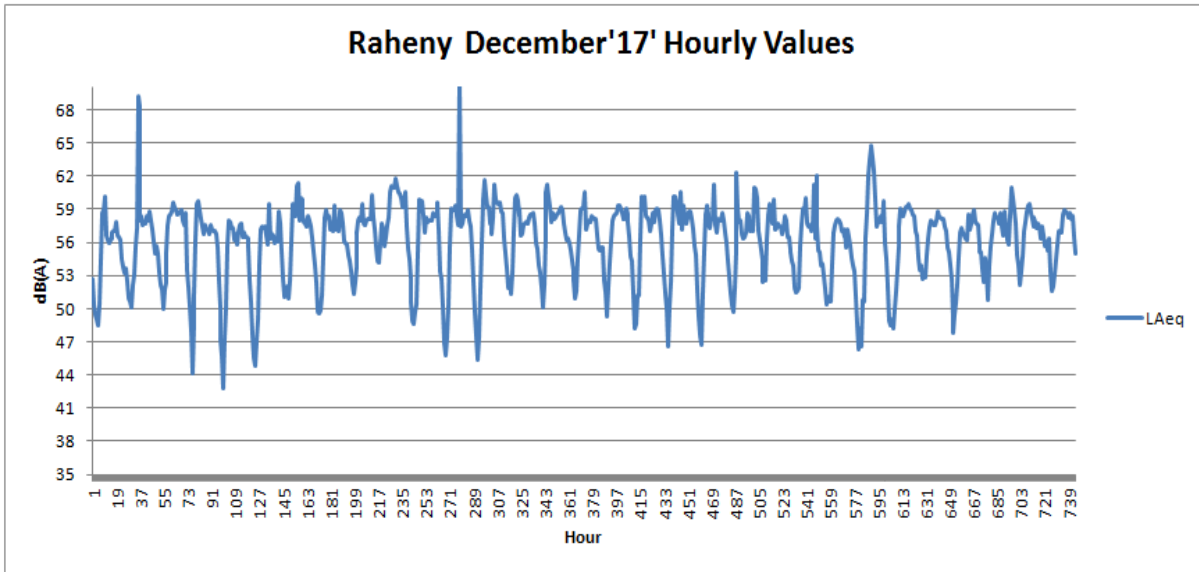
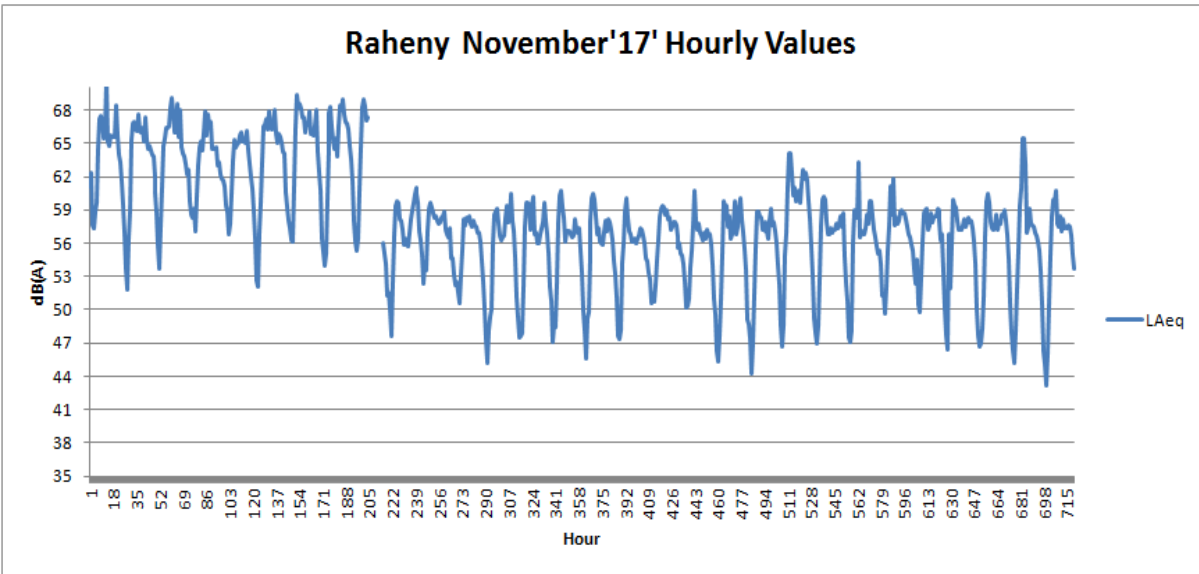
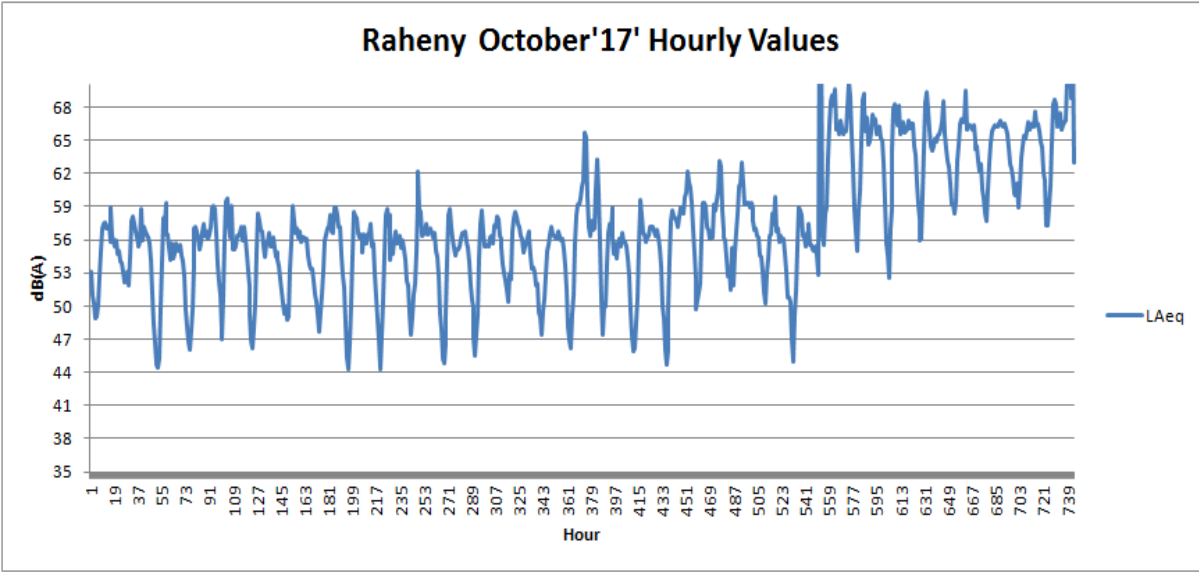
Raheny Hourly Values - 2017



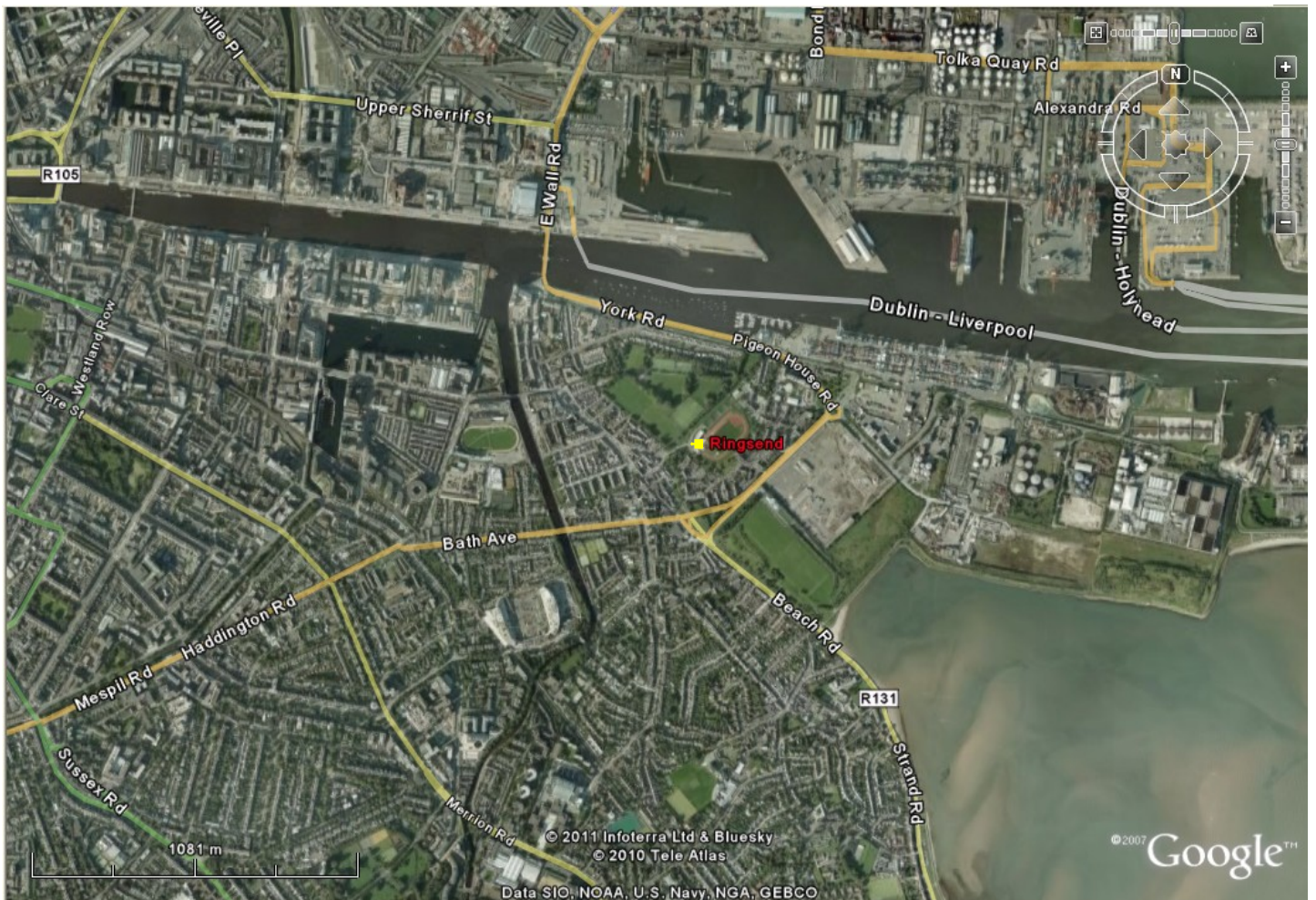


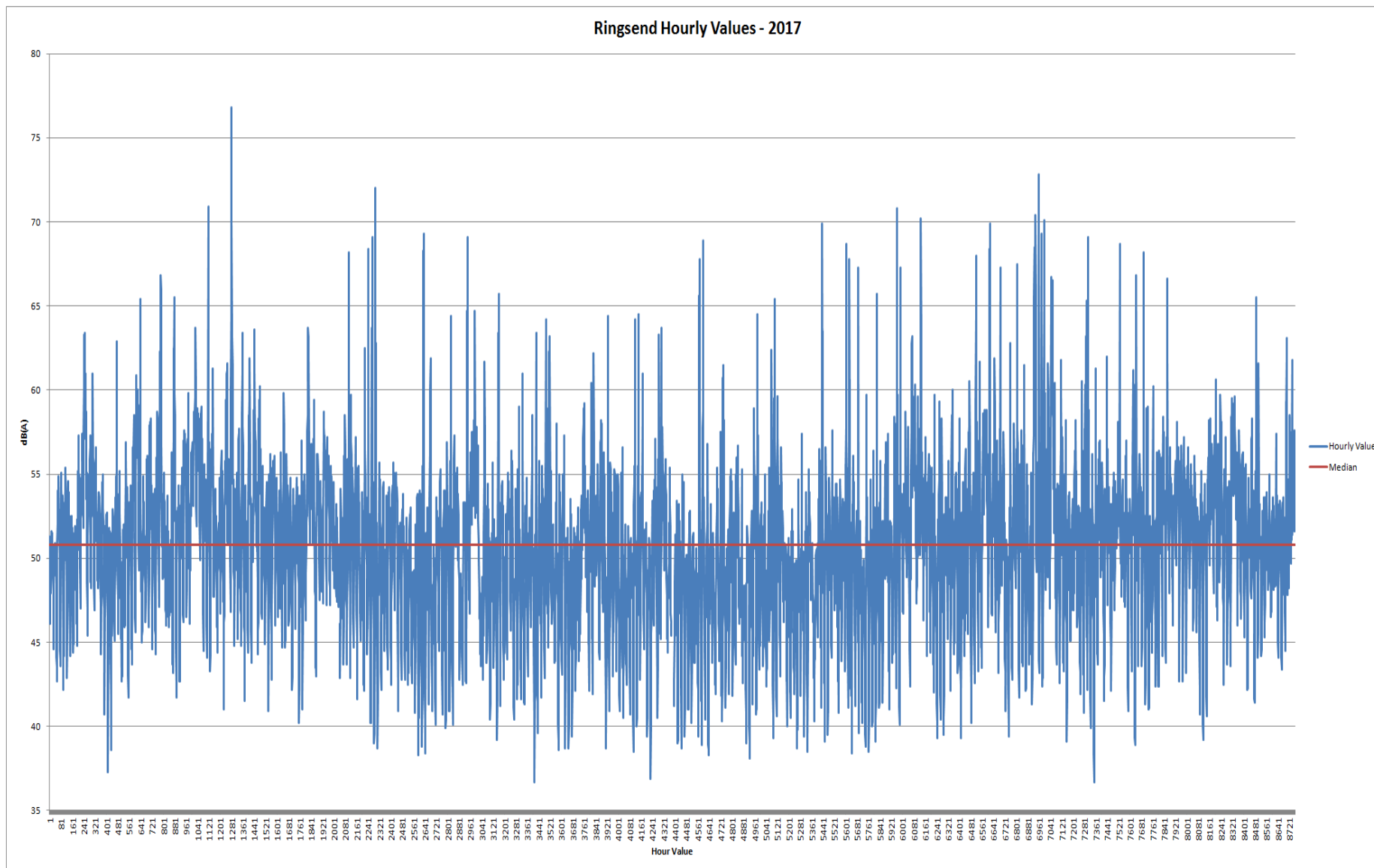


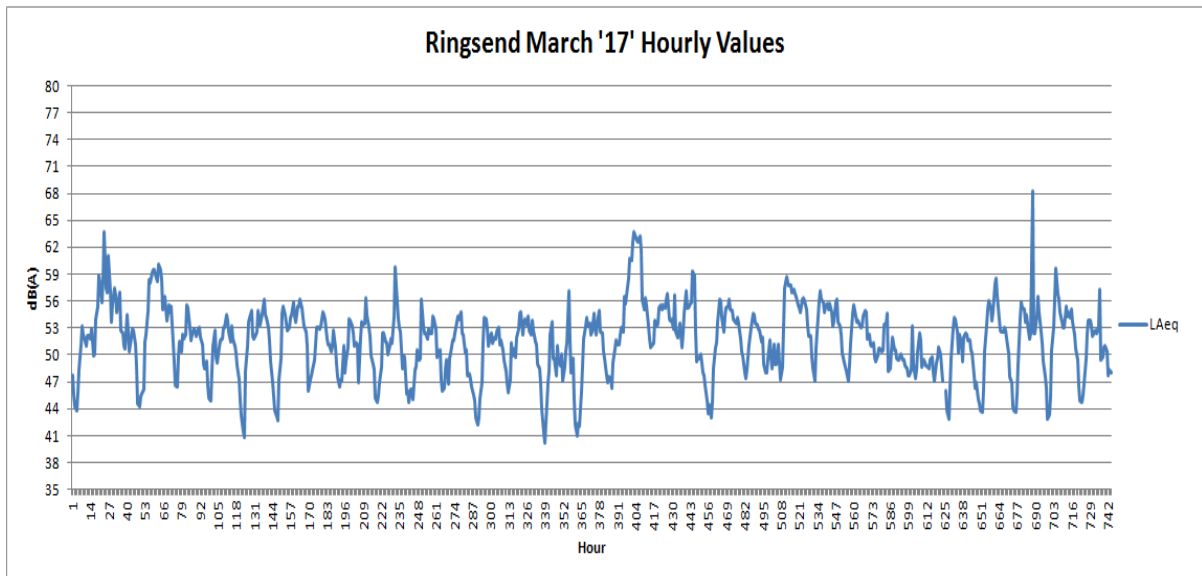
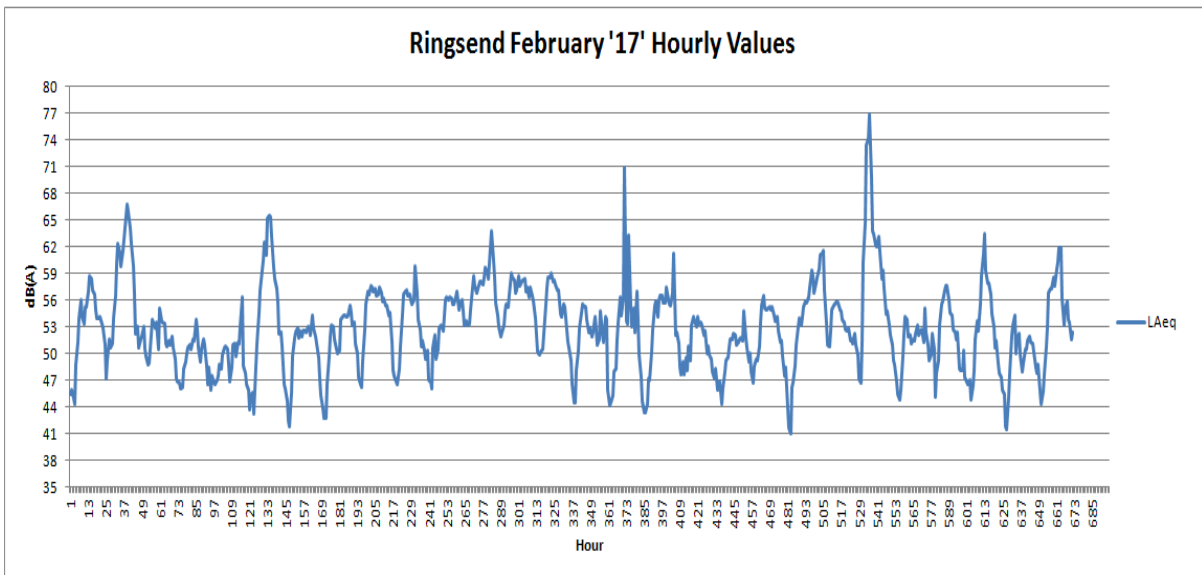
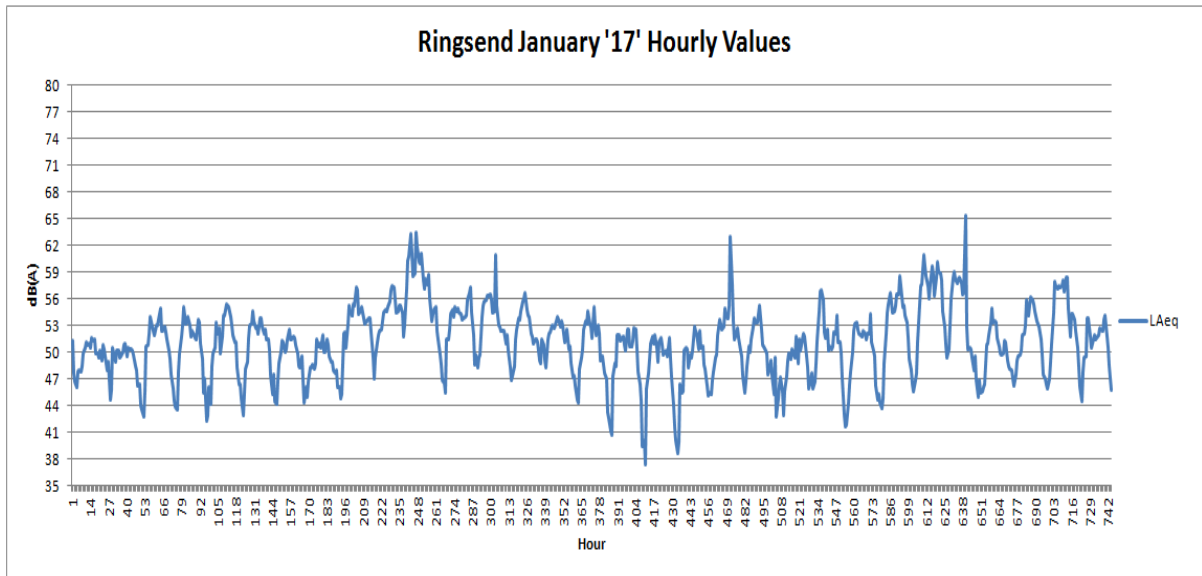


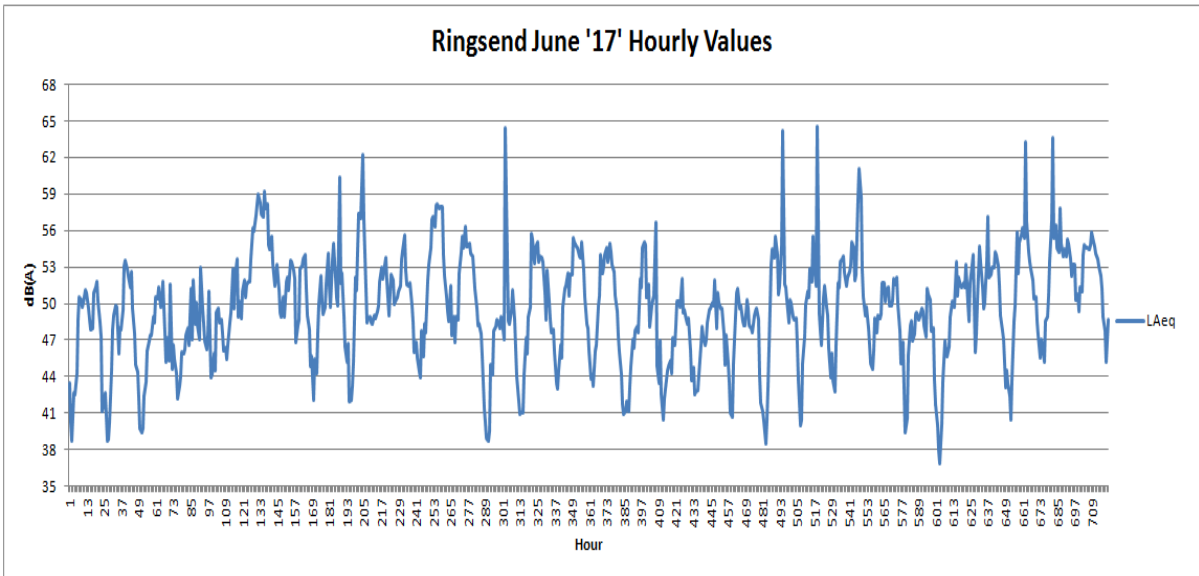
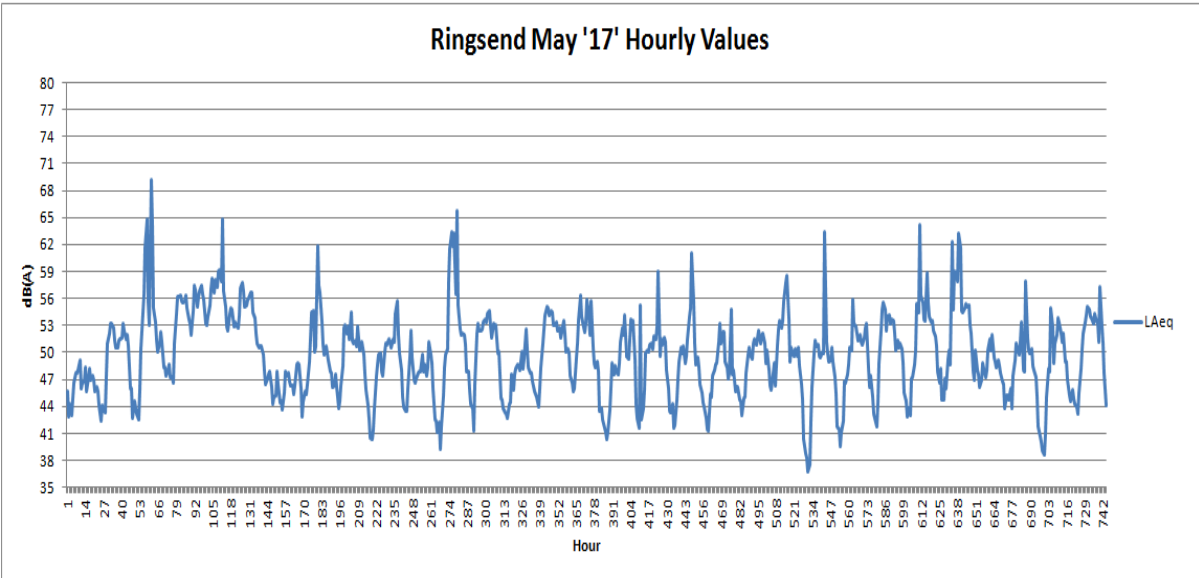
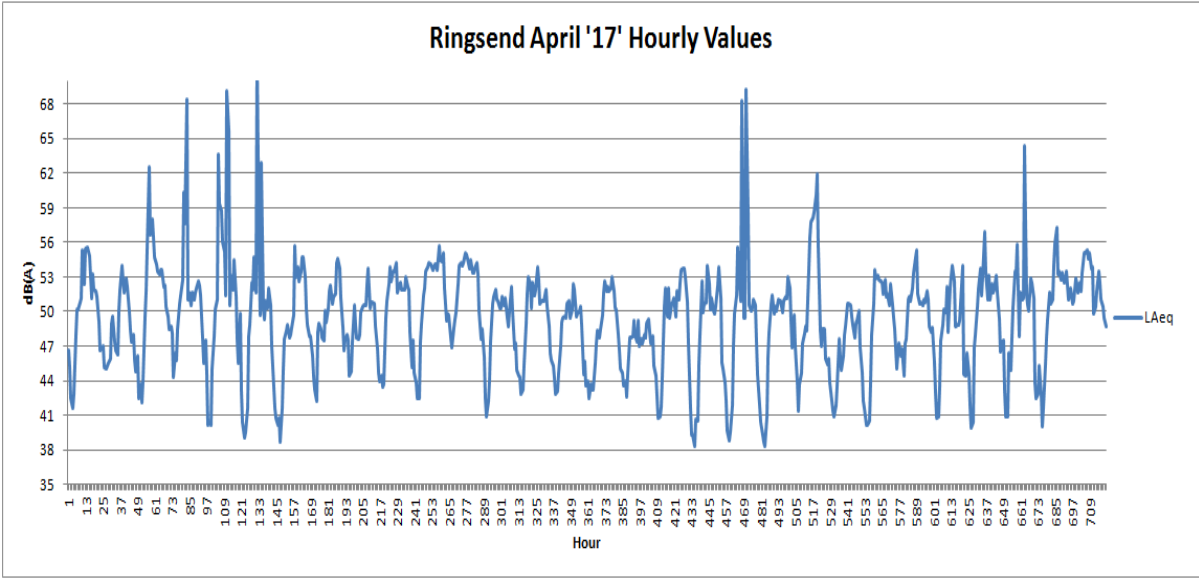


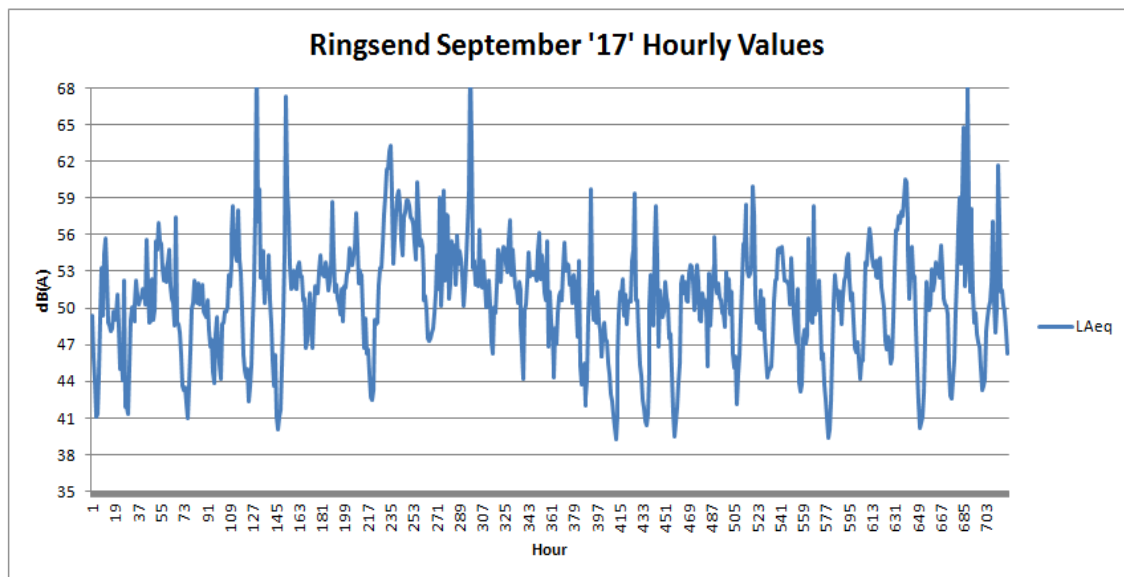
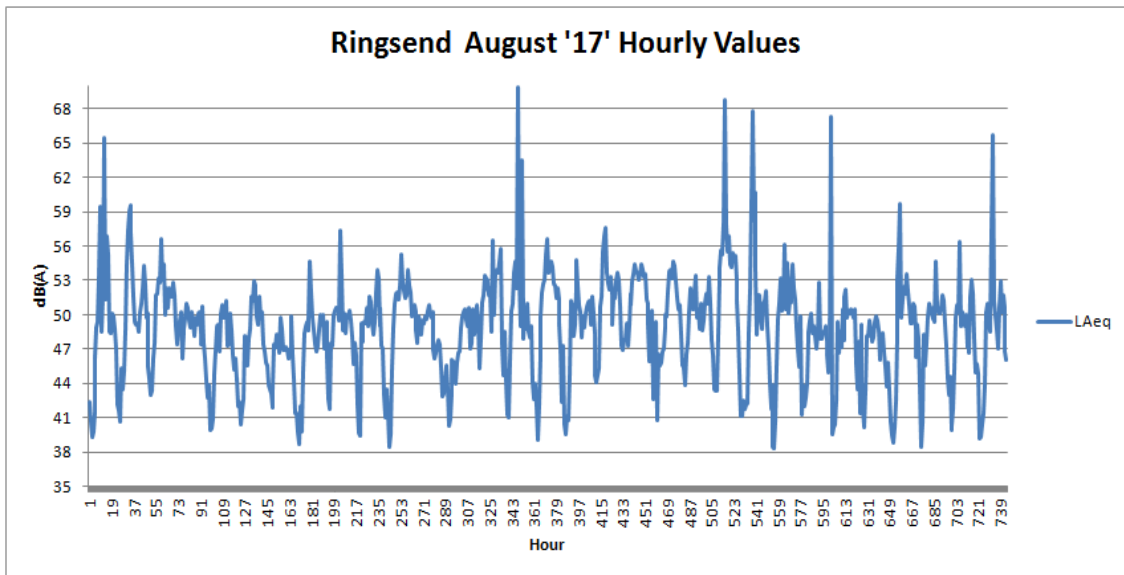
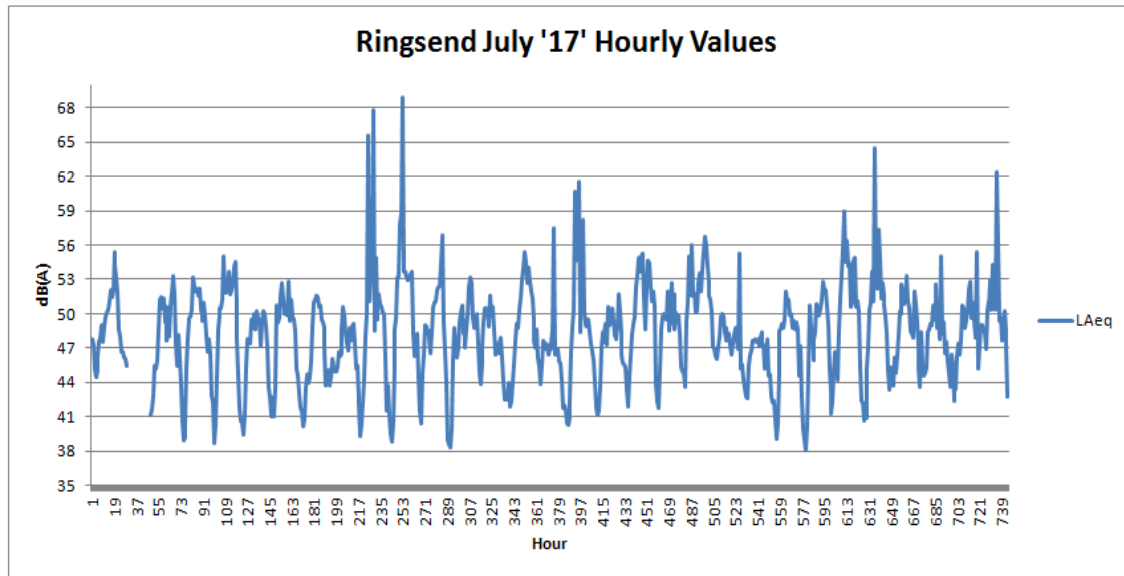
IRISHTOWN SPORTS CENTRE
RINGSEND
DUBLIN 4

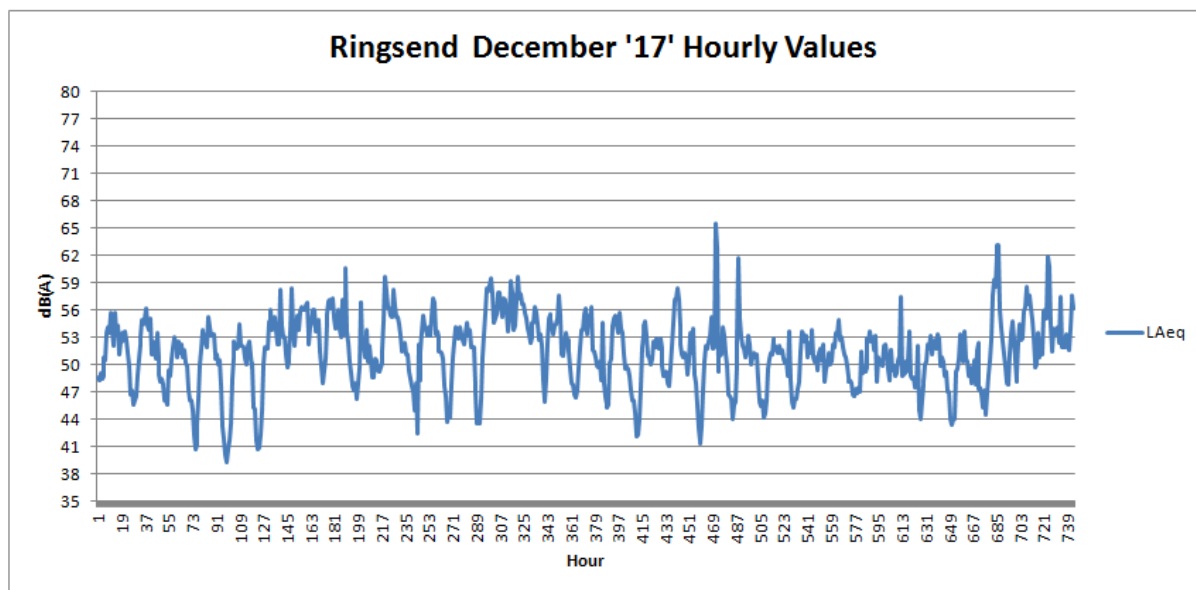
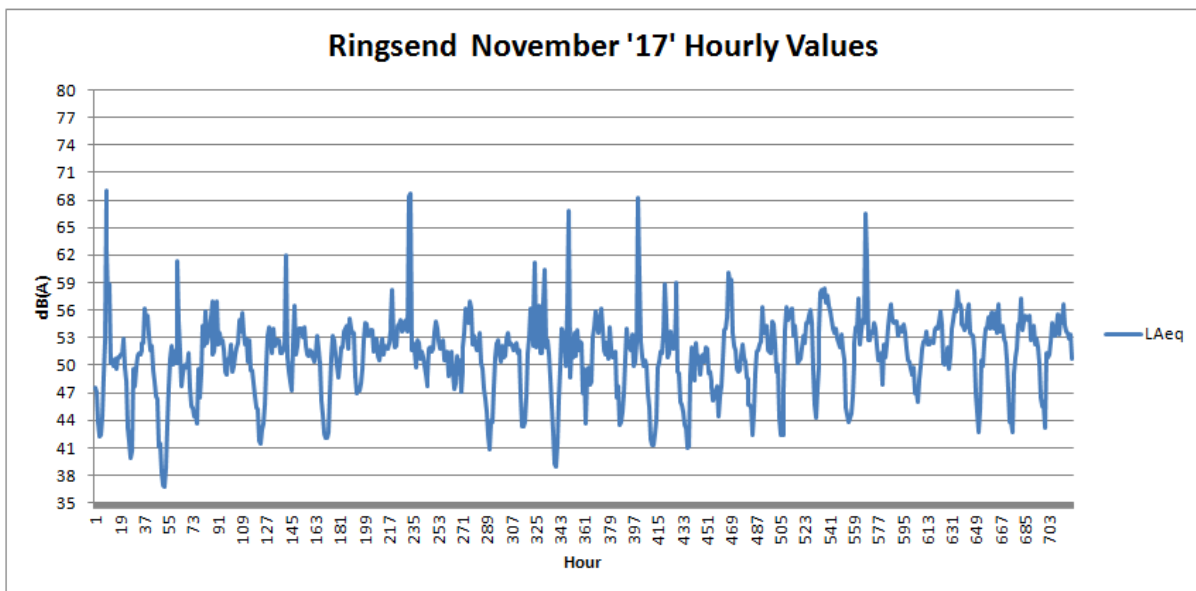
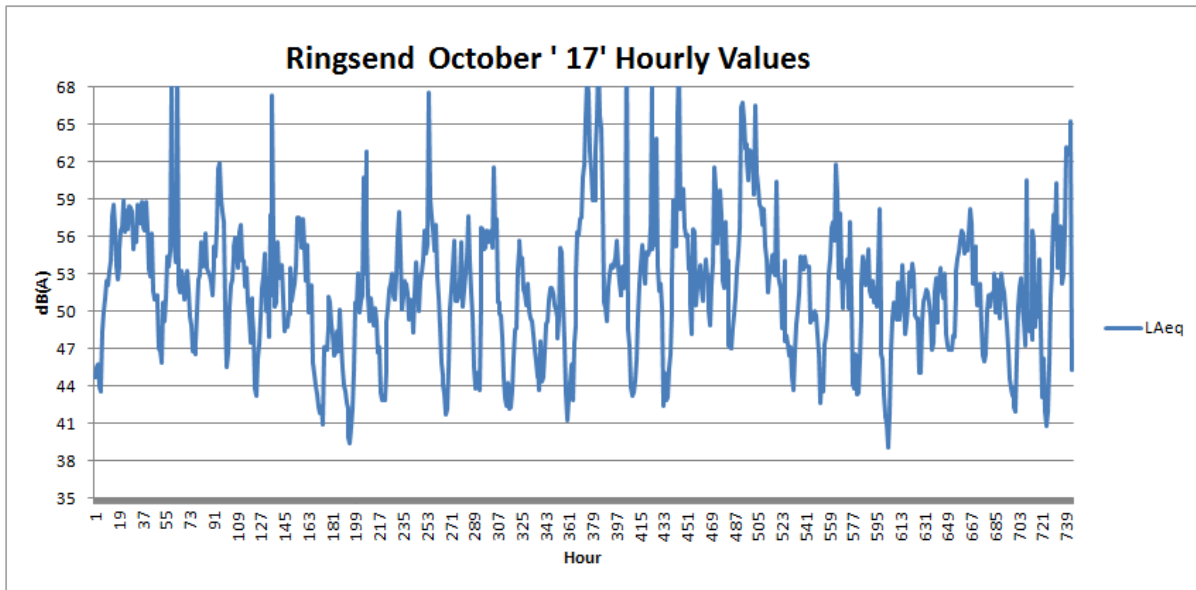






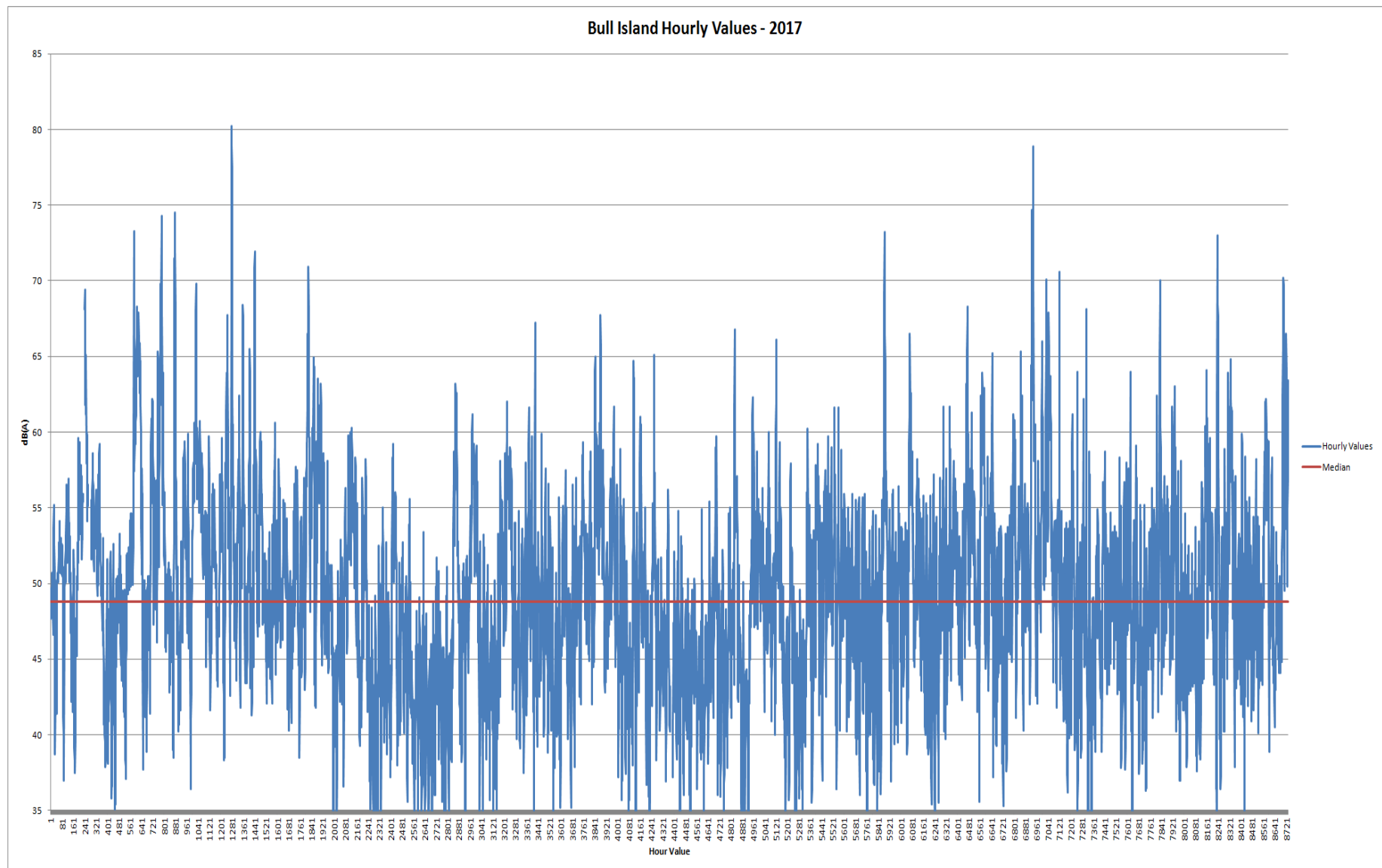


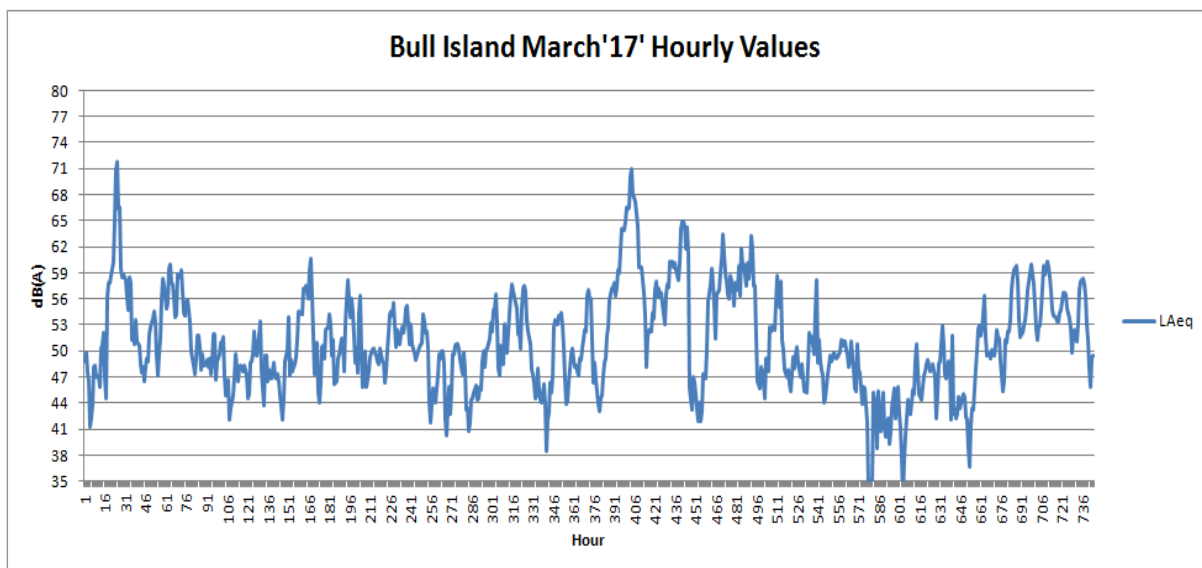
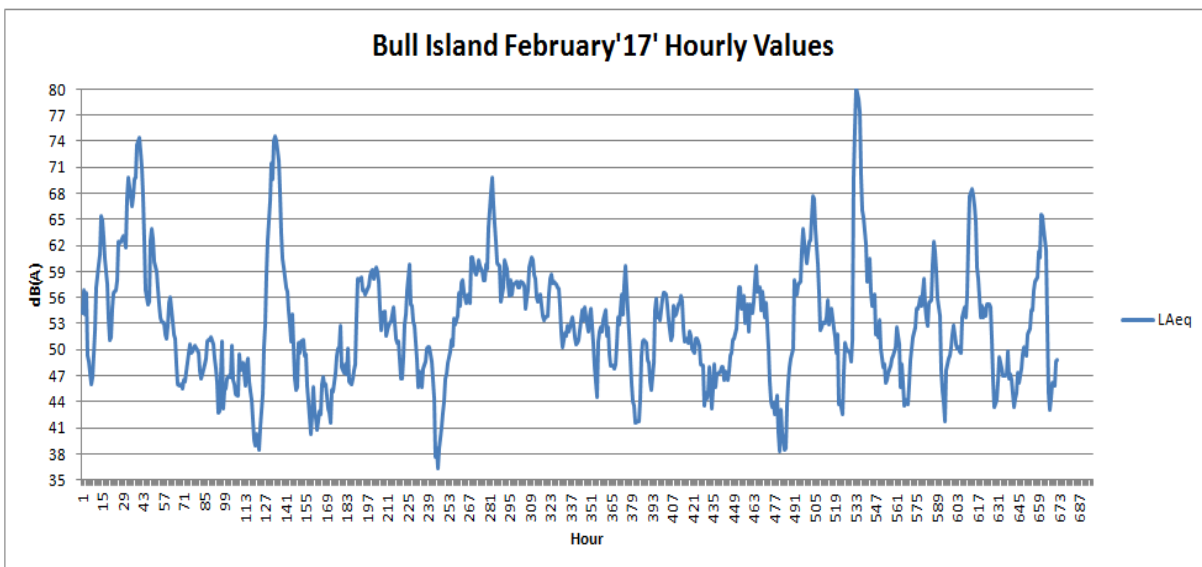
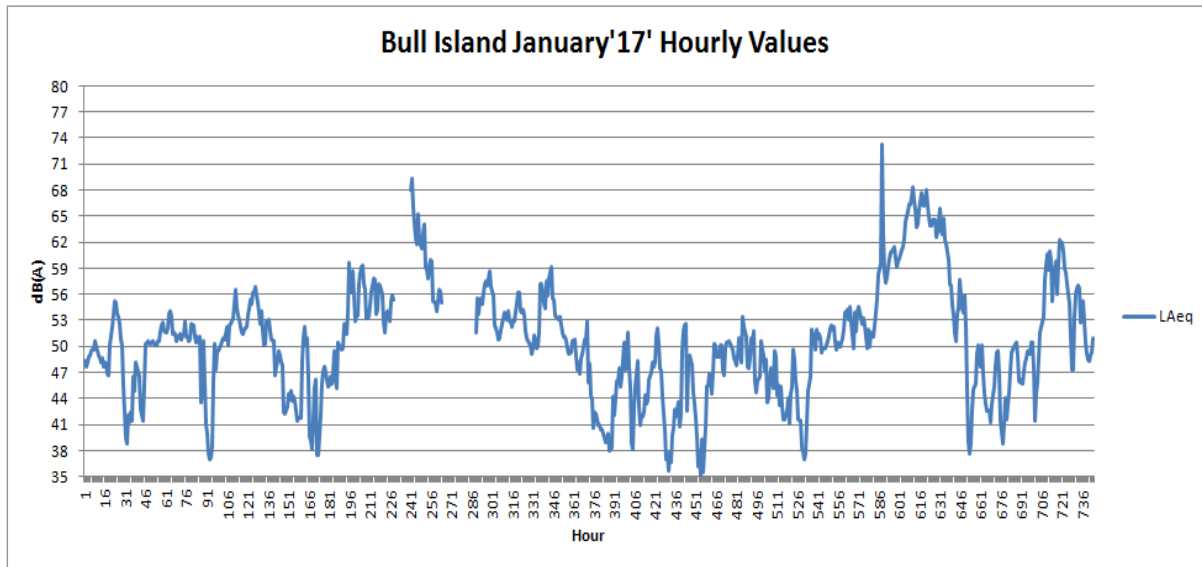


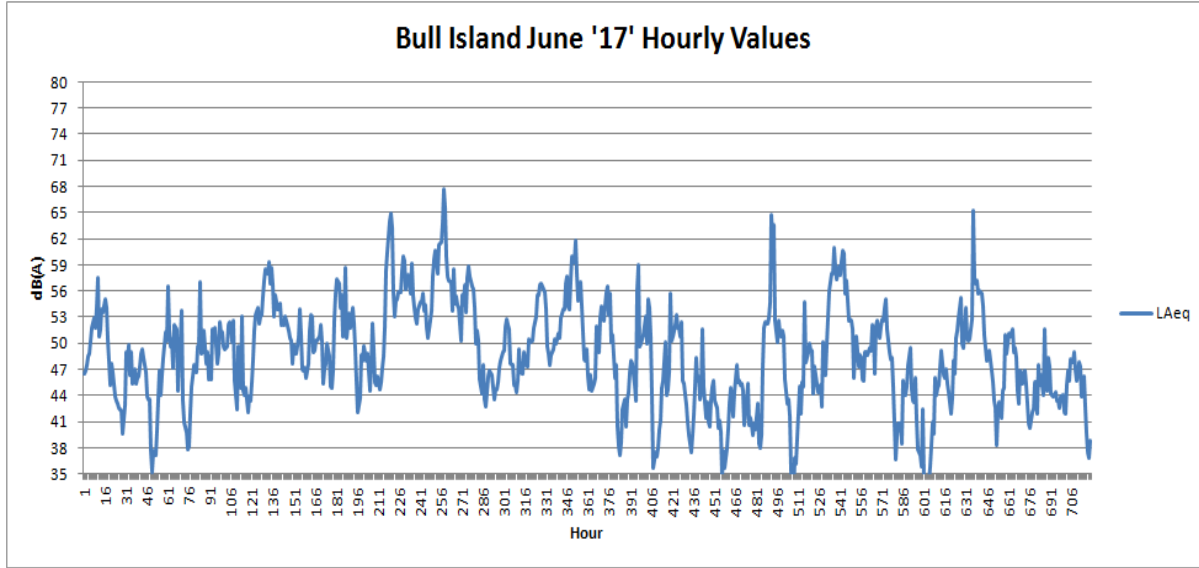
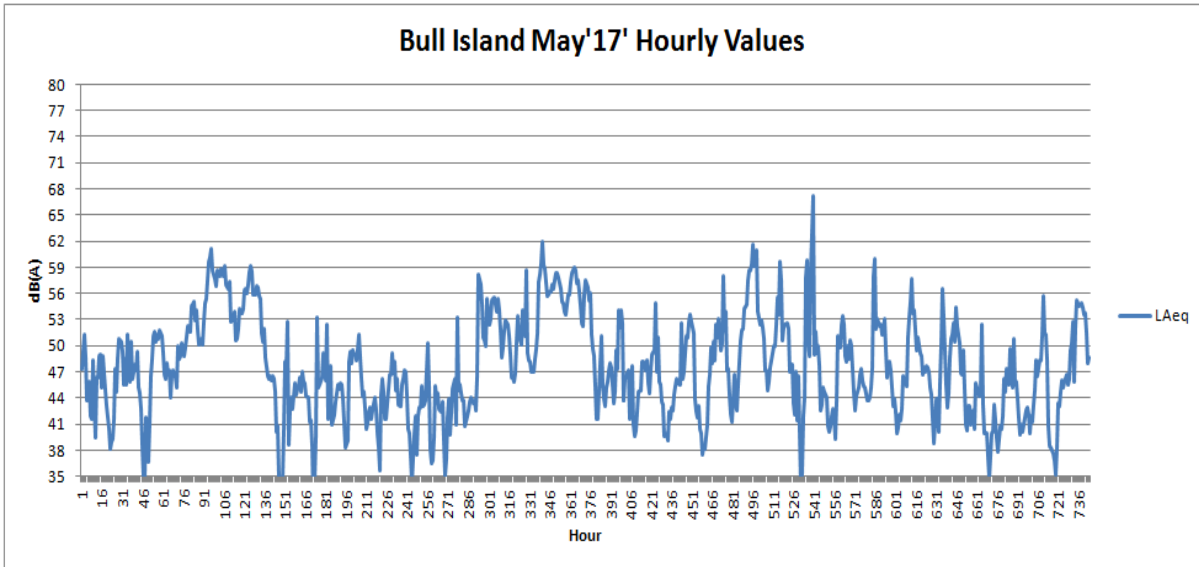
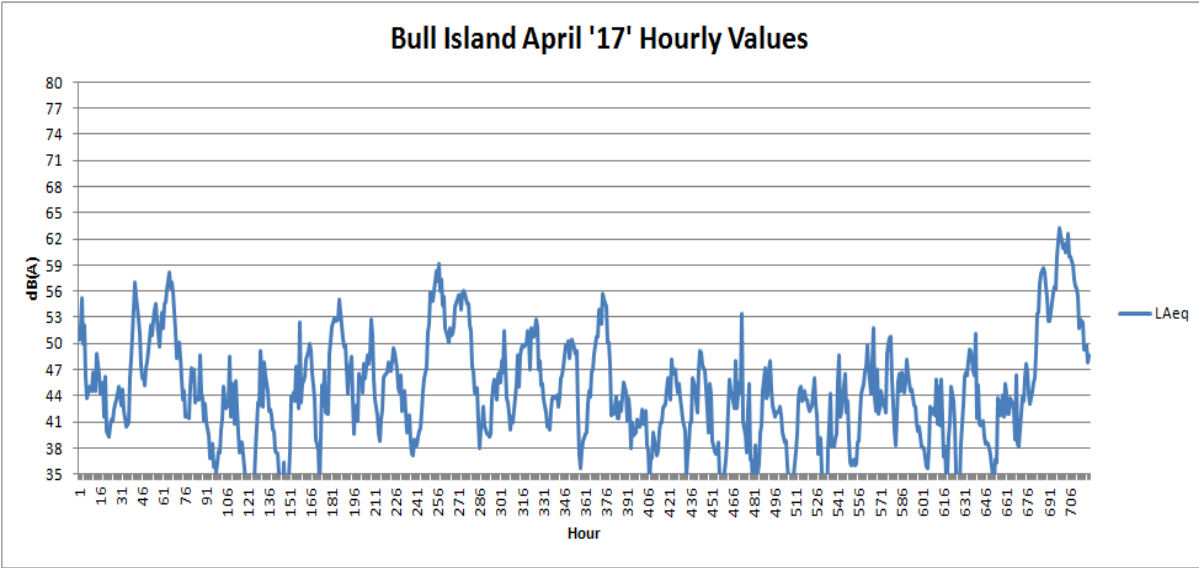


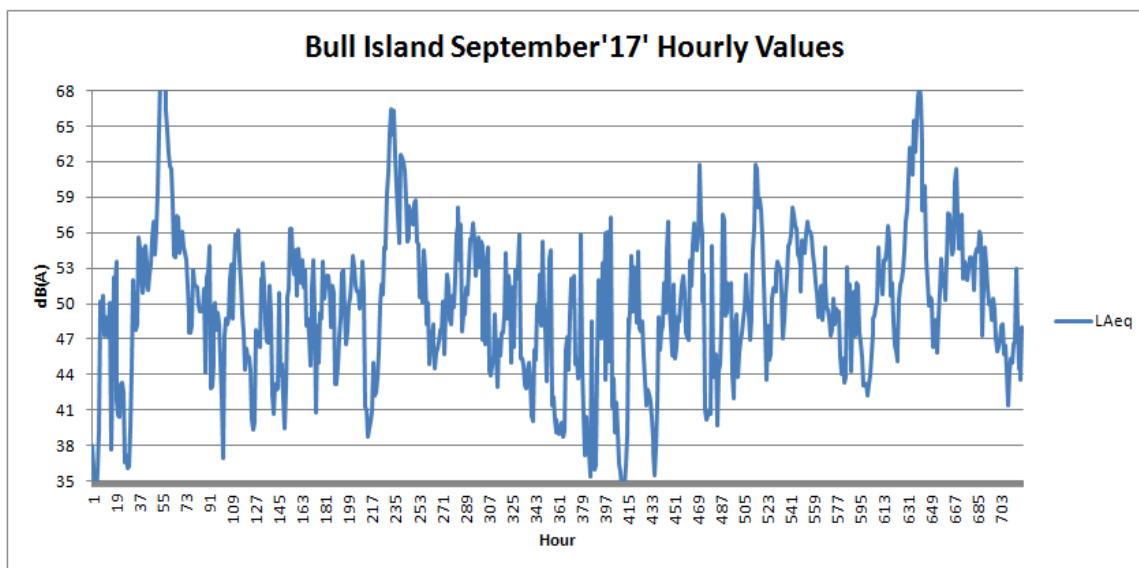
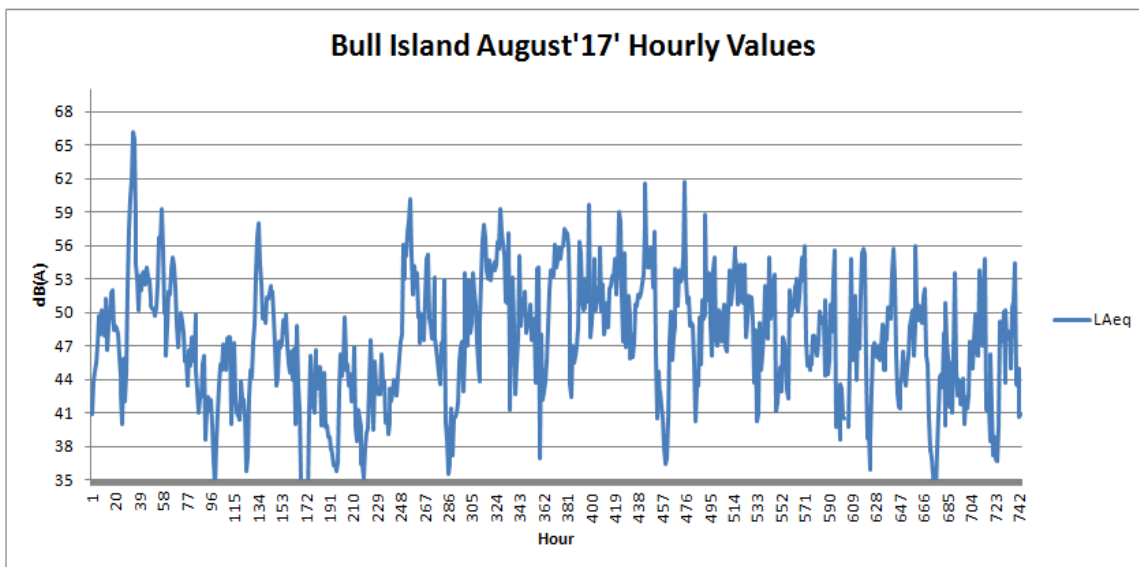
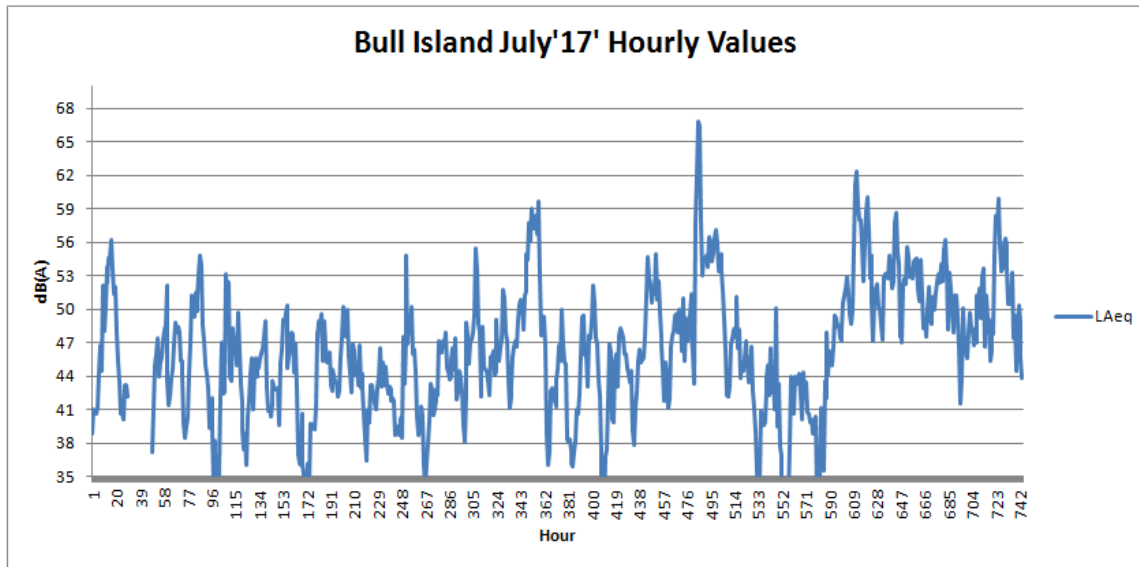
BULL ISLAND INTERPRETATIVE CENTRE
BULL ISLAND
DUBLIN 3

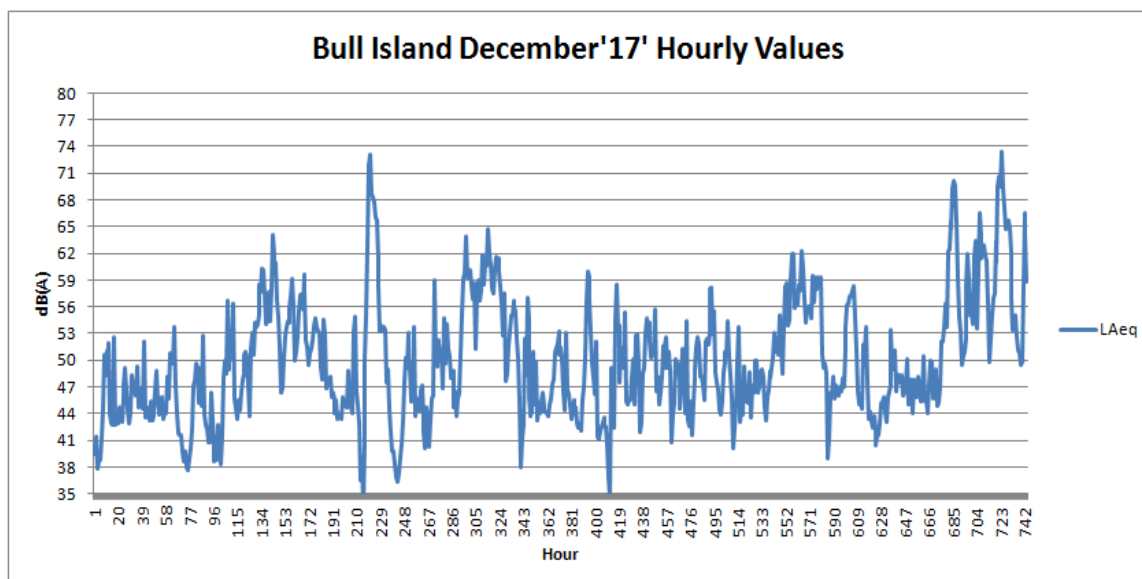
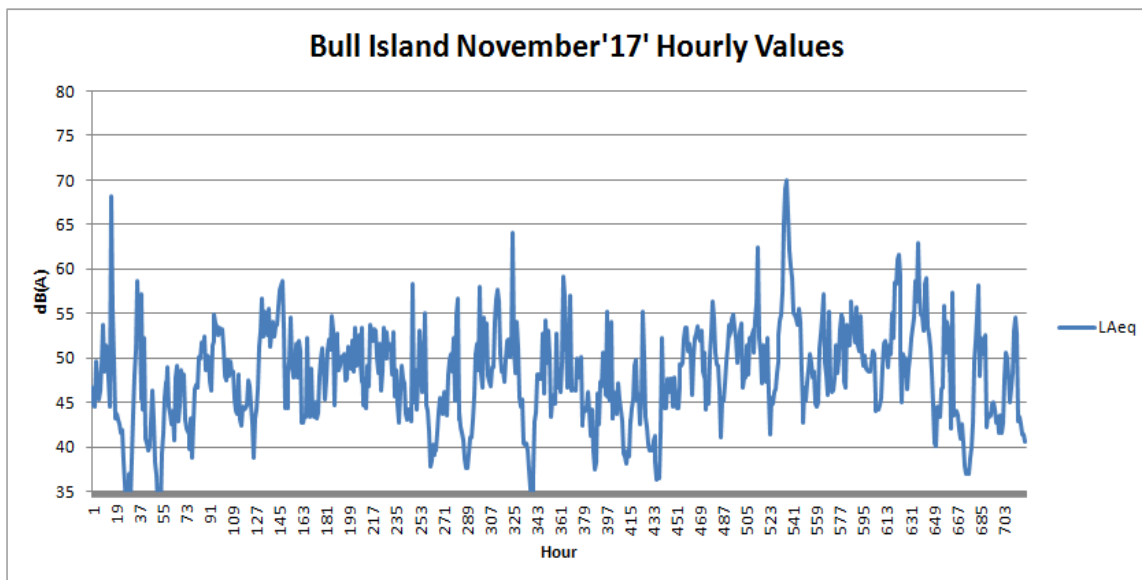
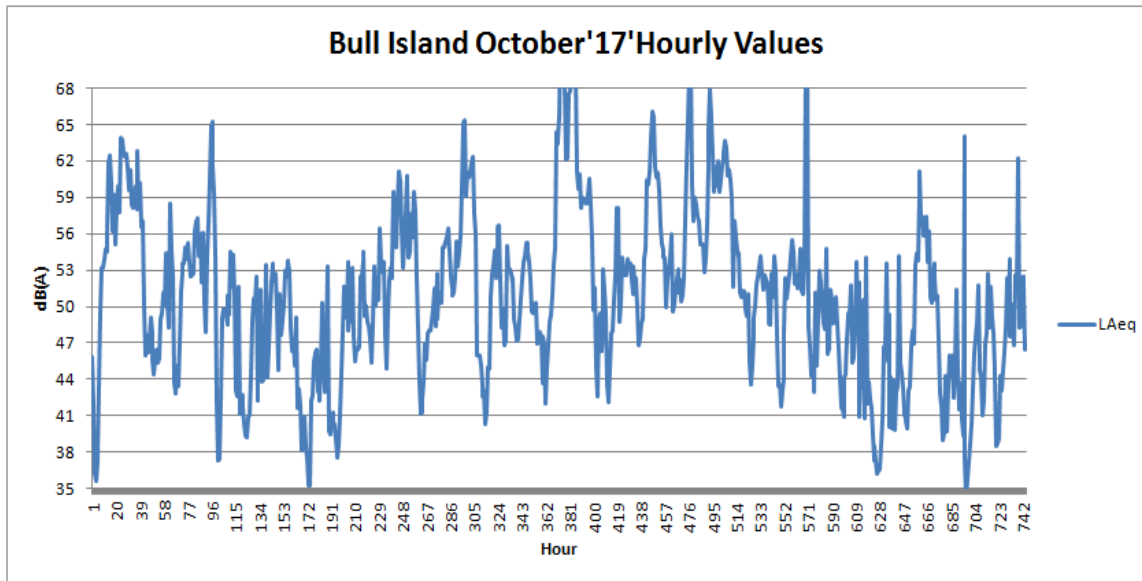






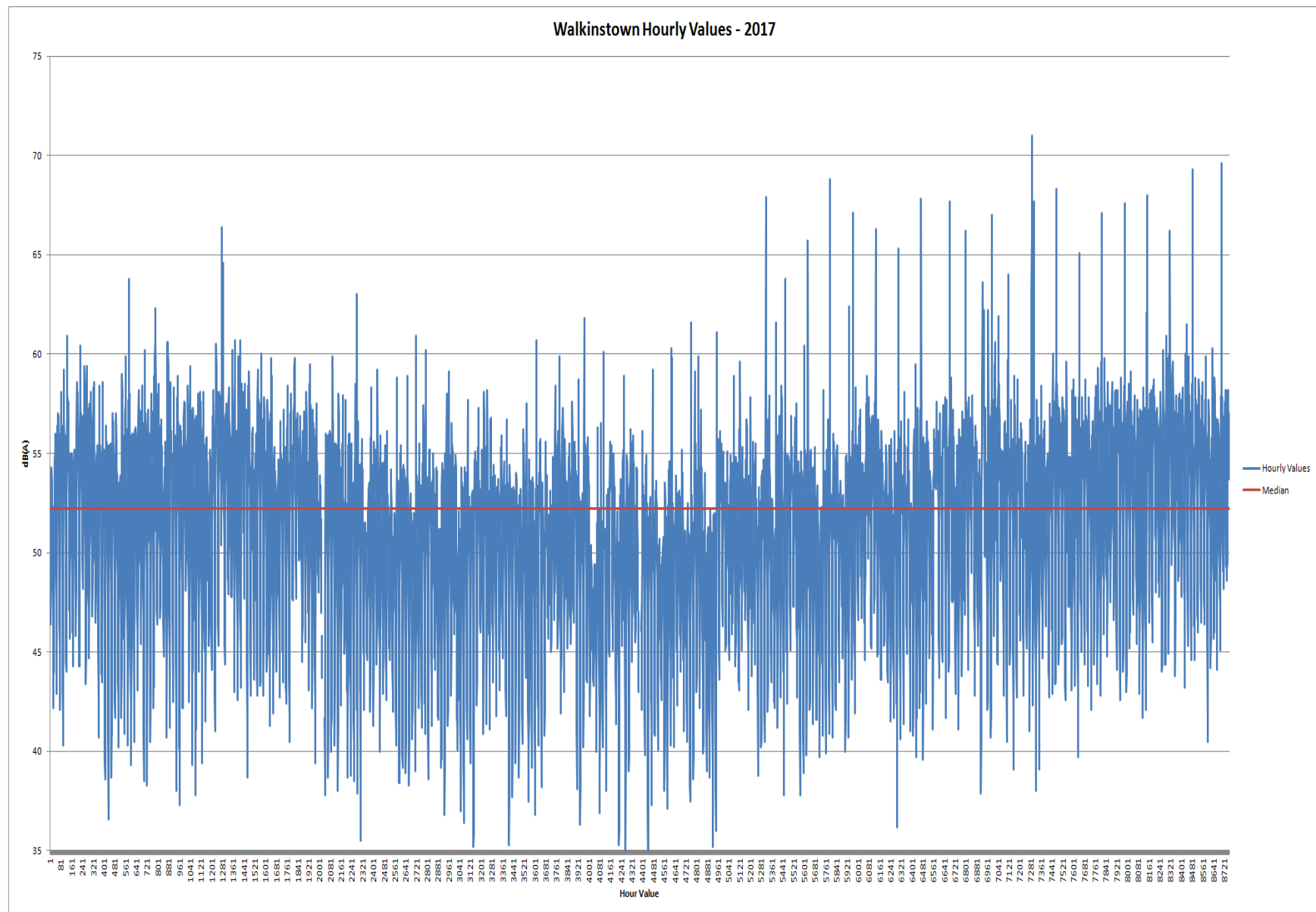


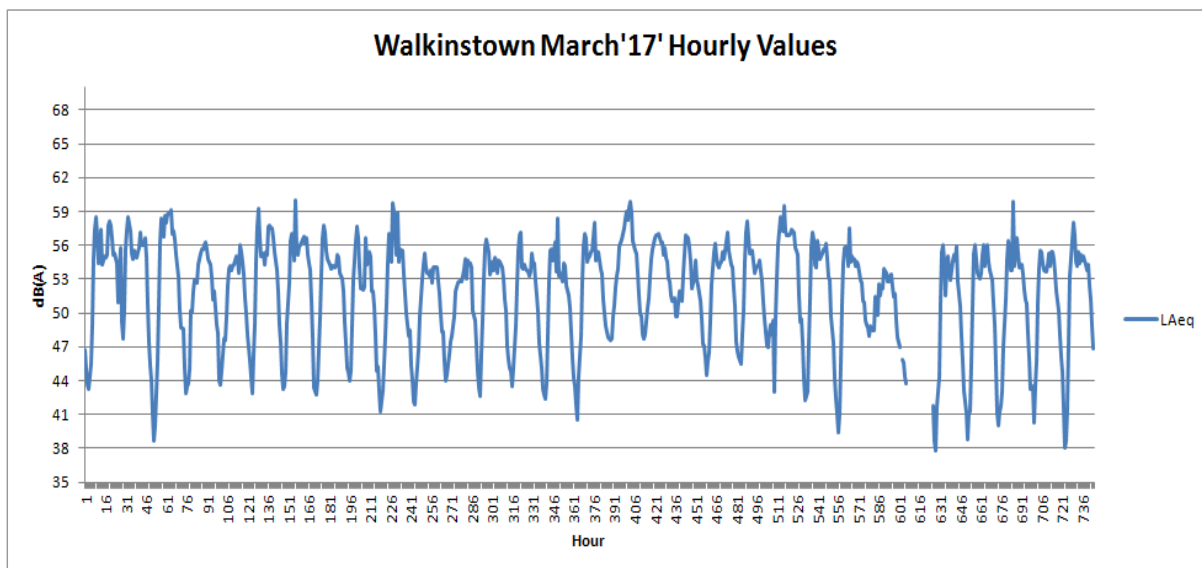
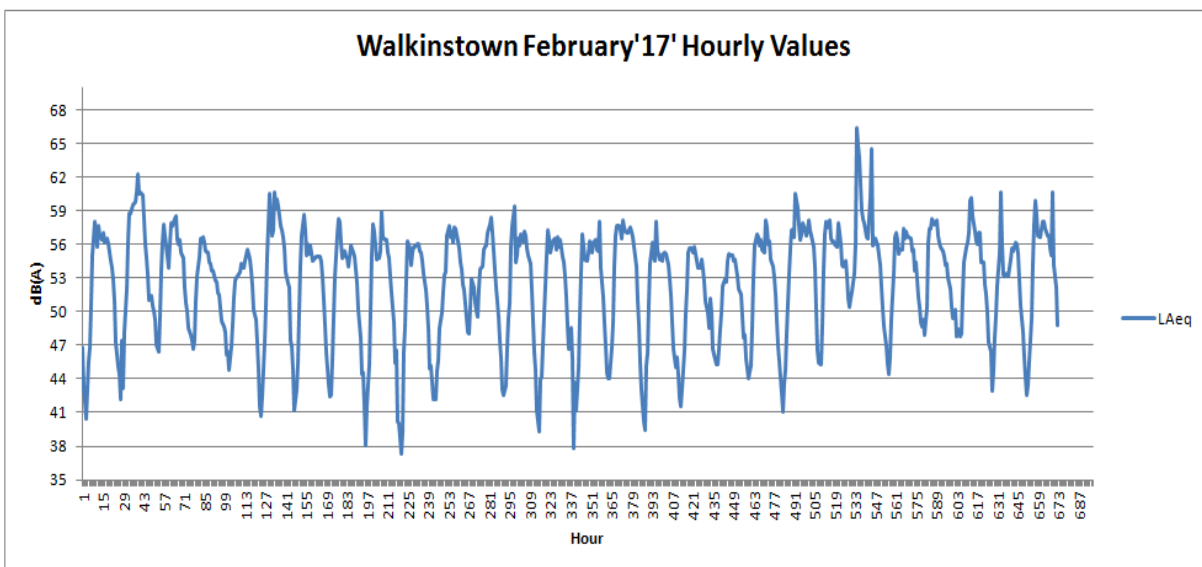
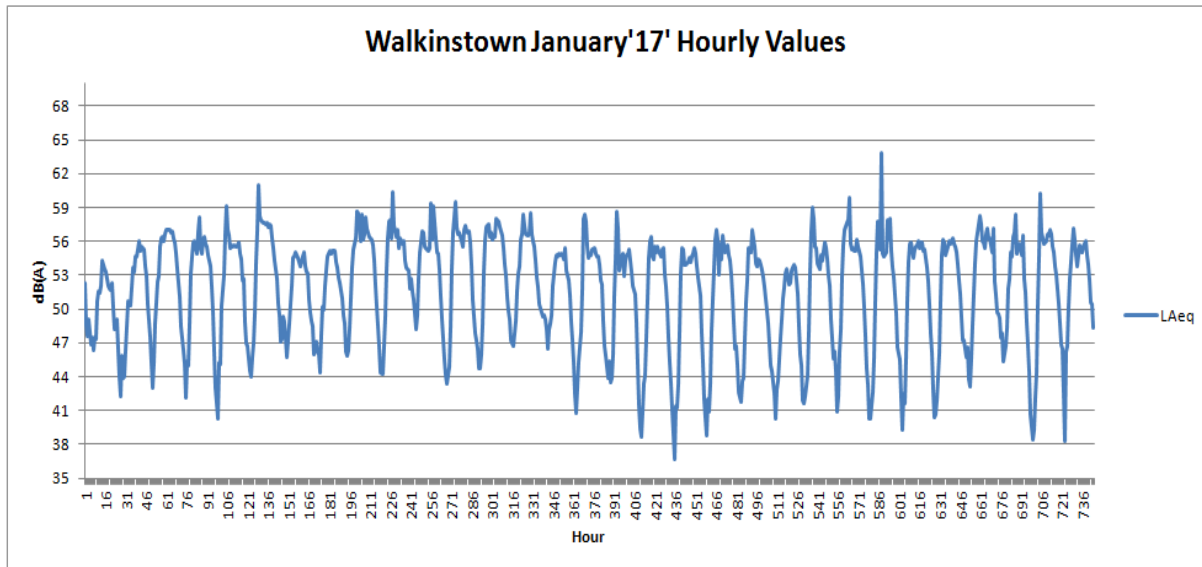


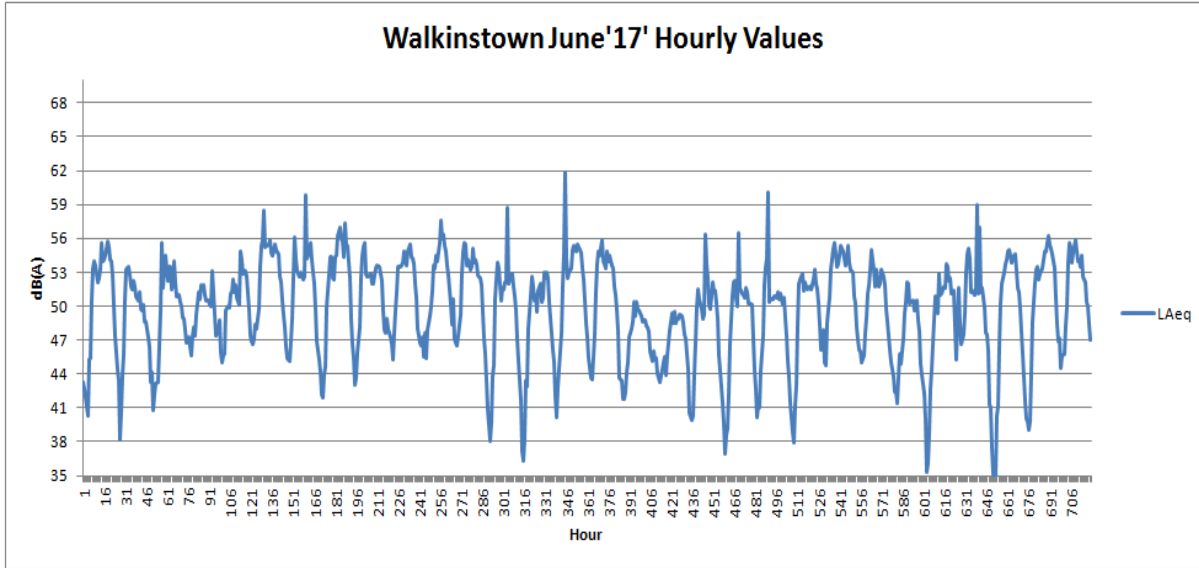
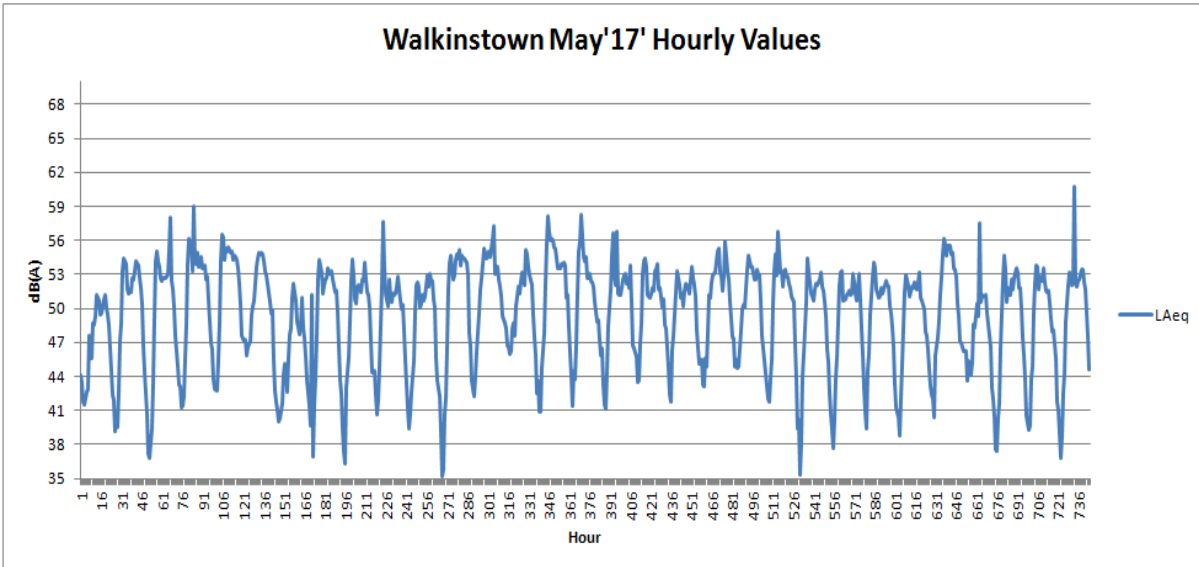
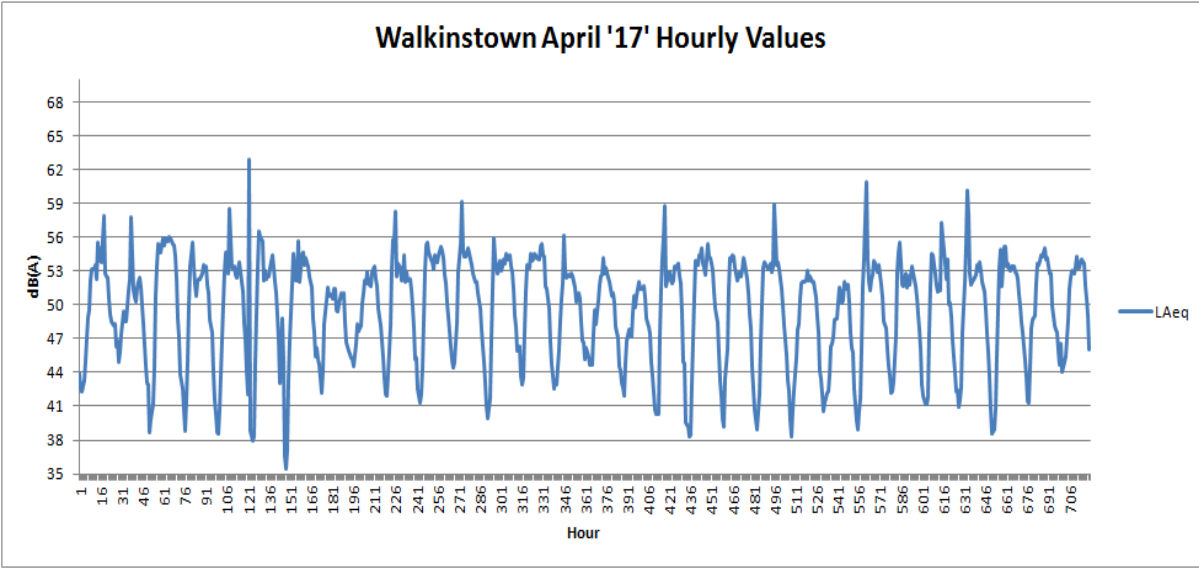


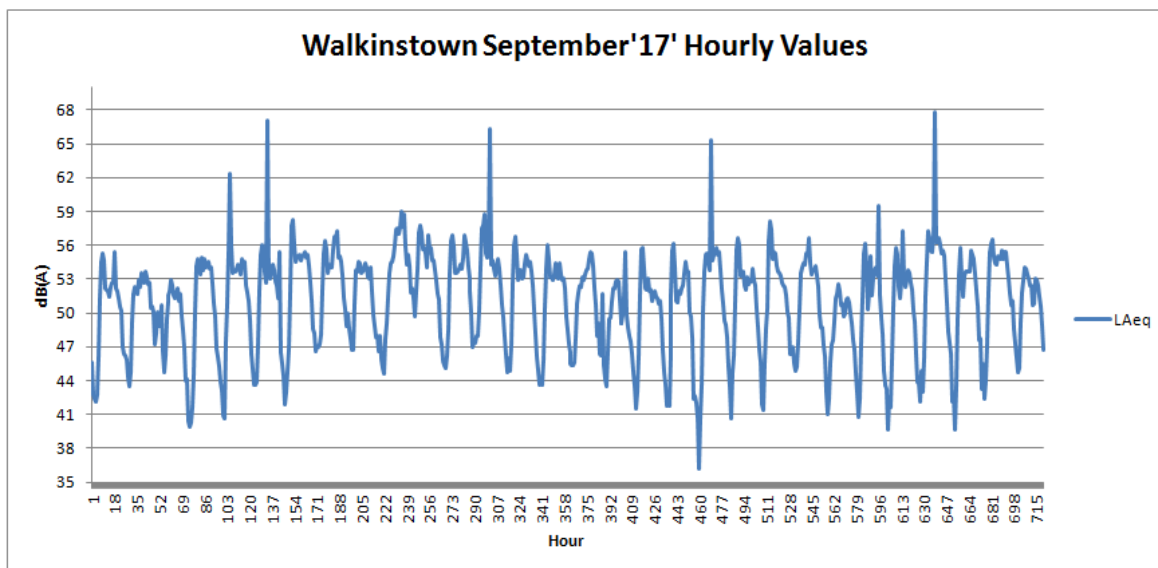
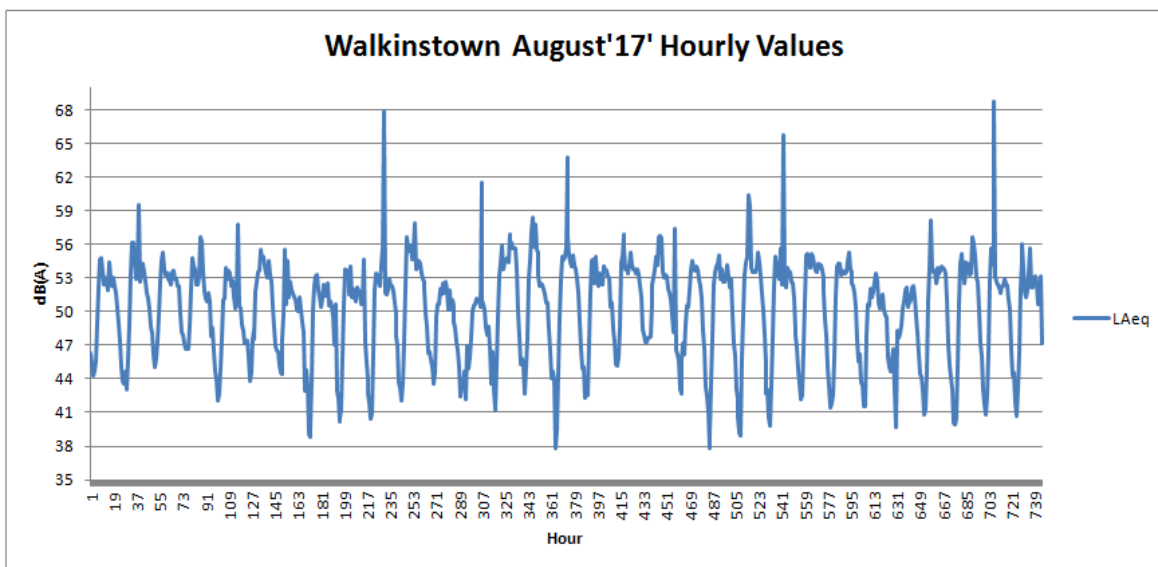
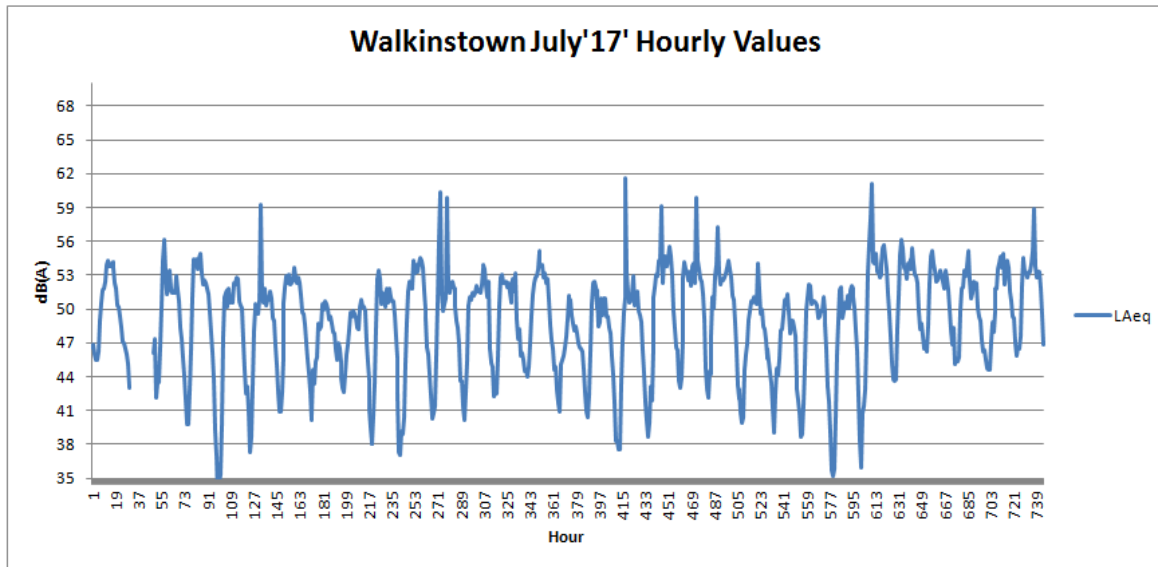
WALKINSTOWN LIBRARY
PERCY FRENCH ROAD
DUBLIN 12

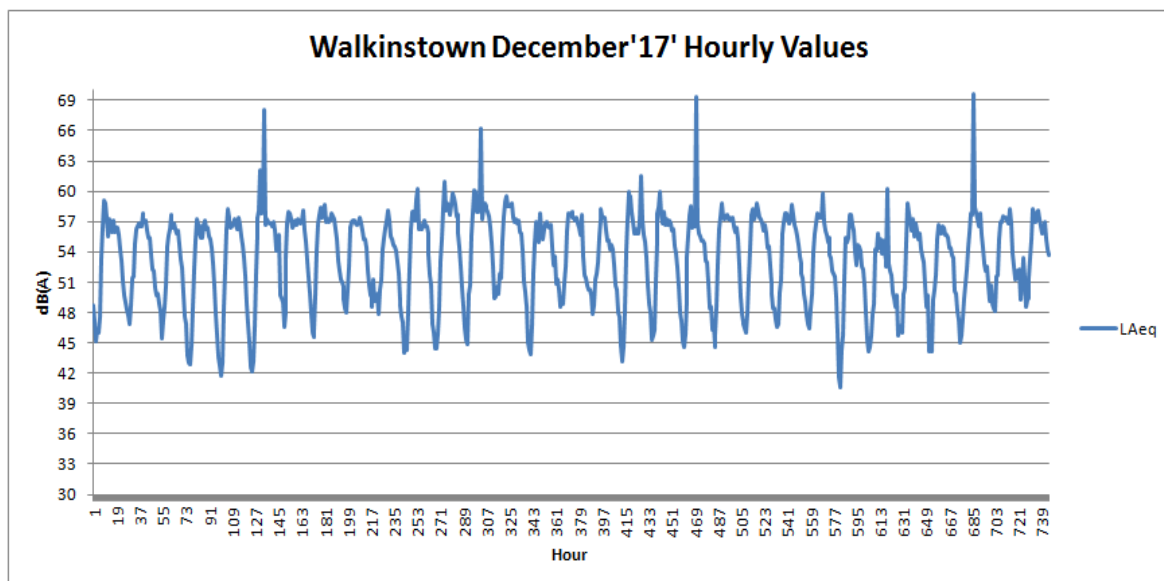
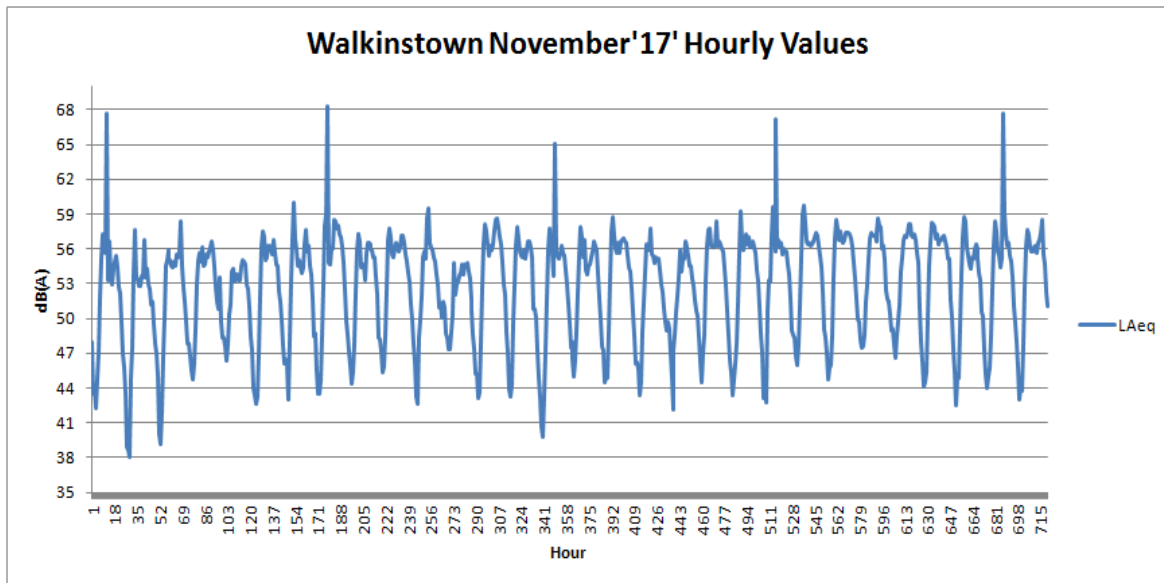
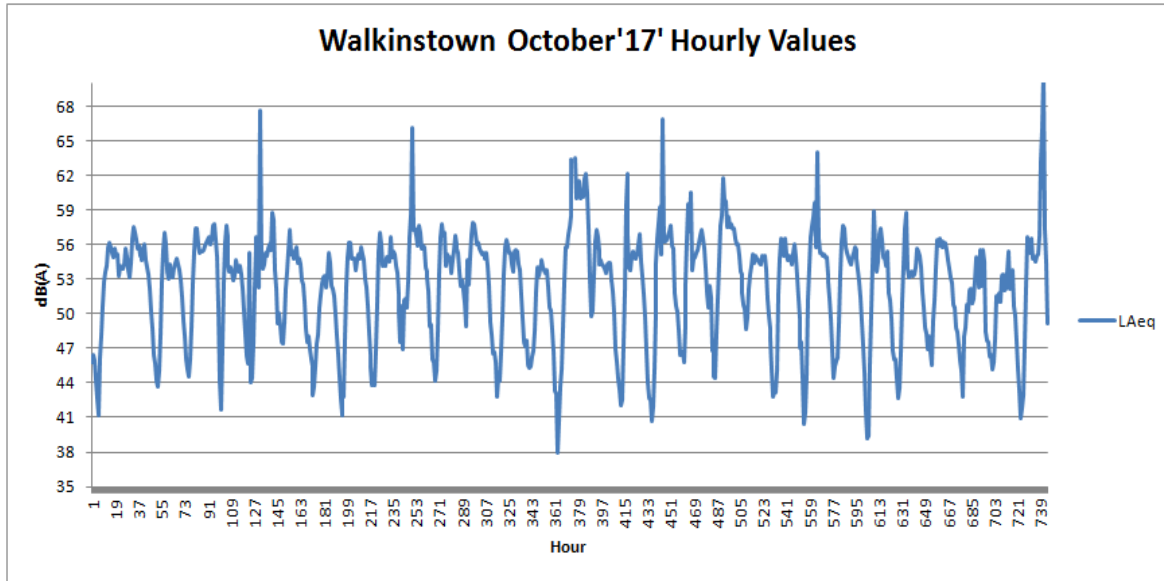






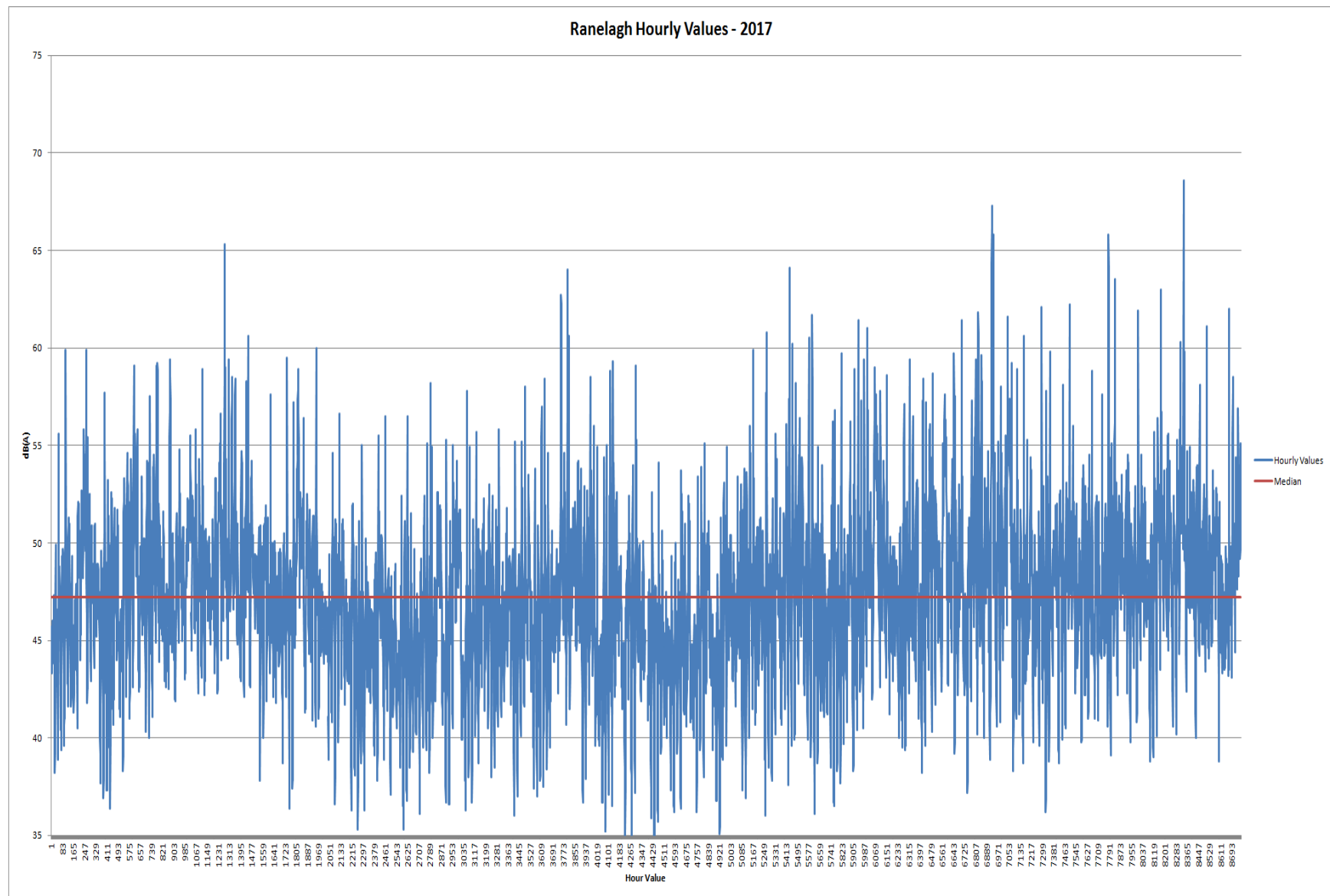


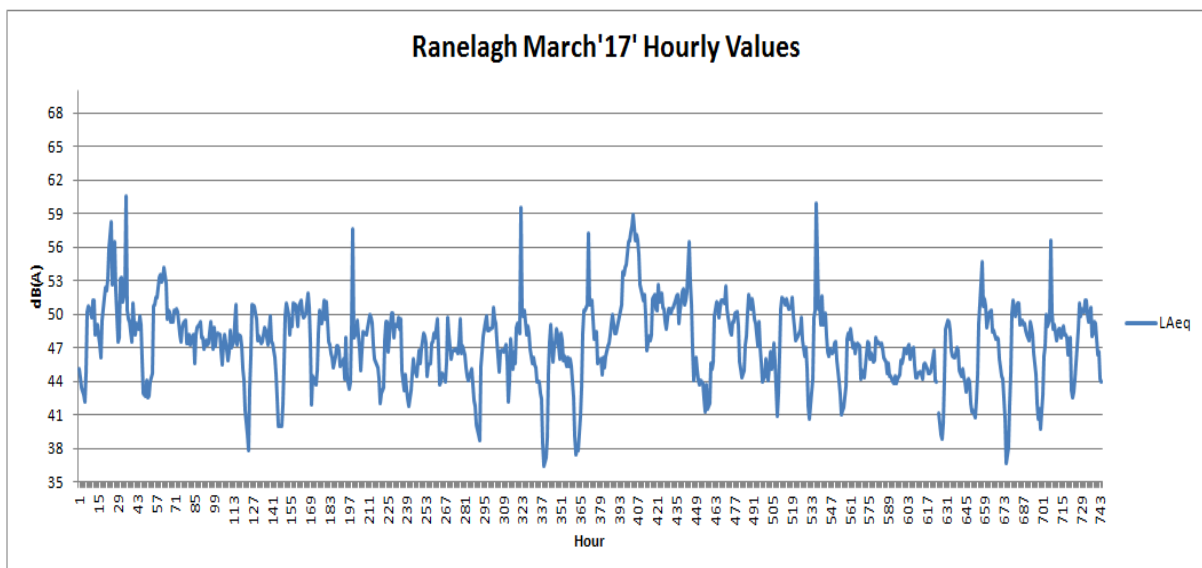
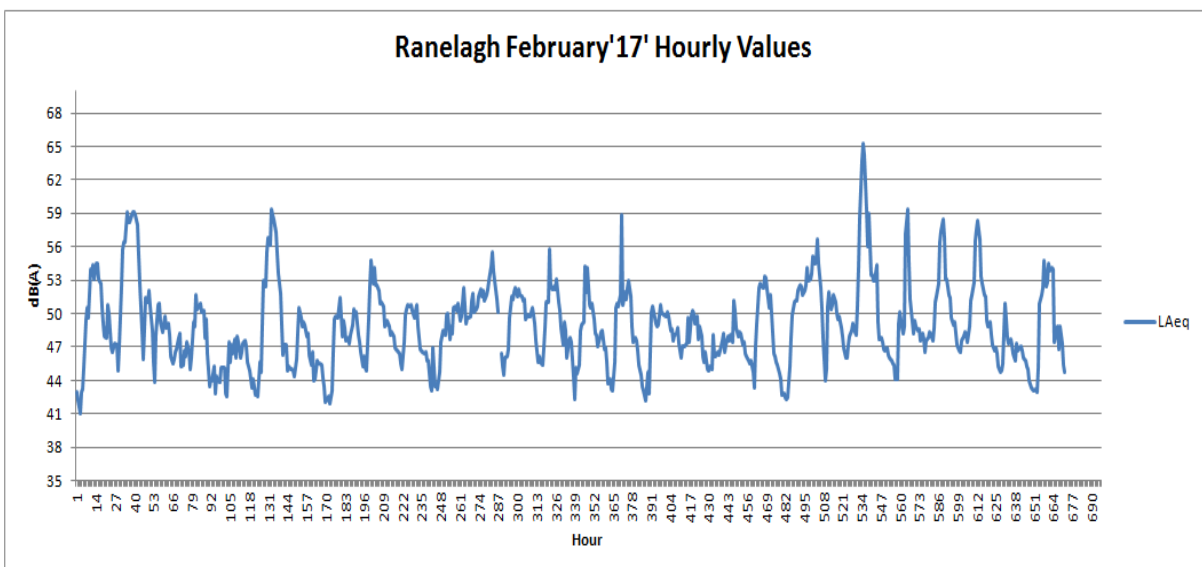
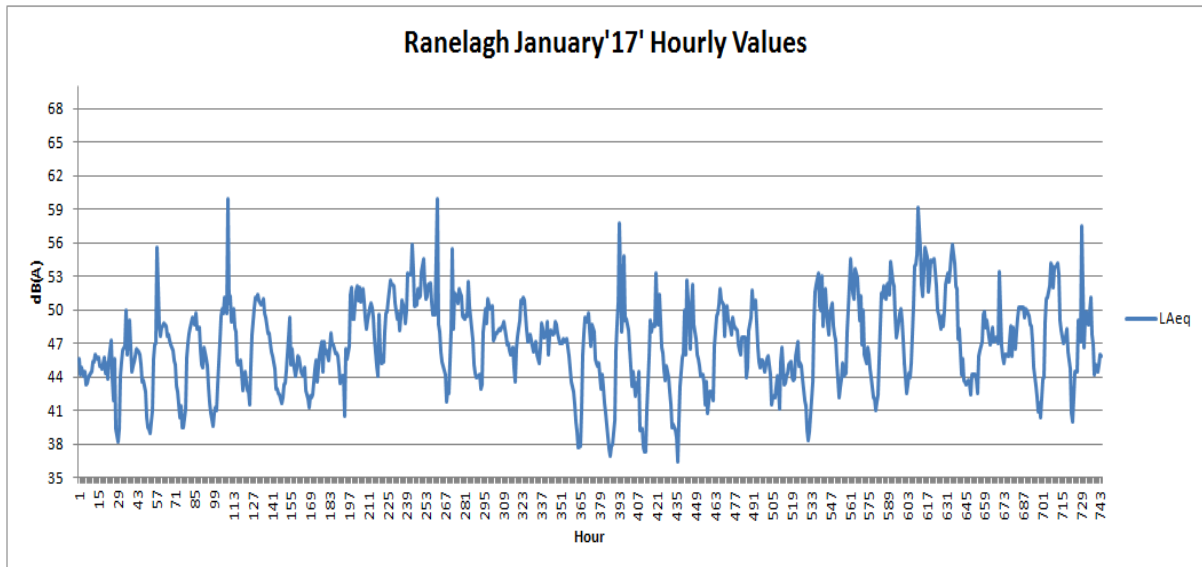


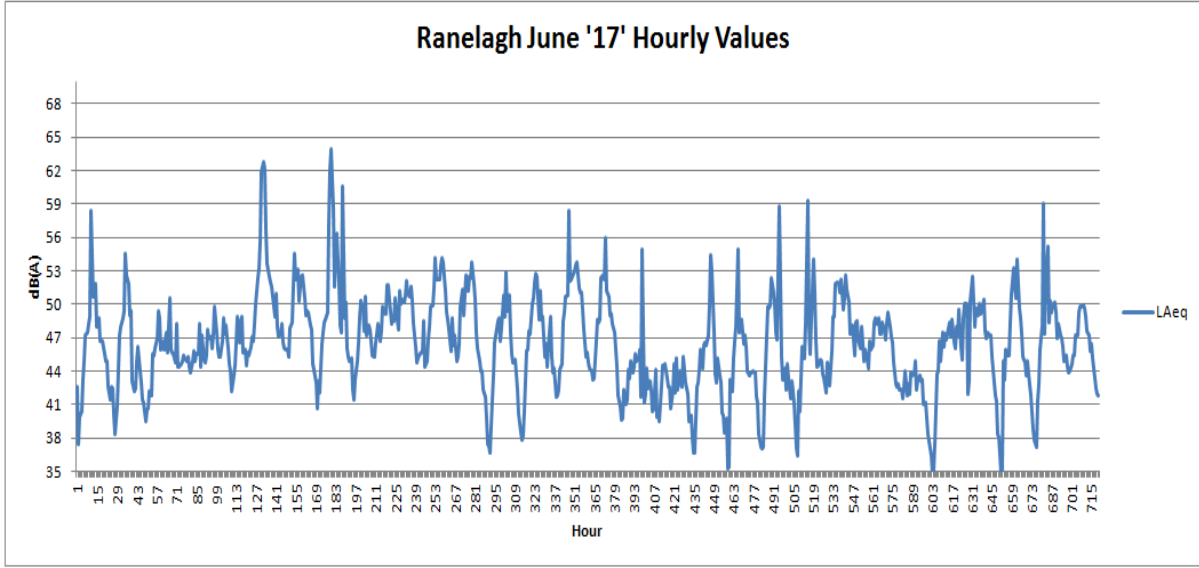
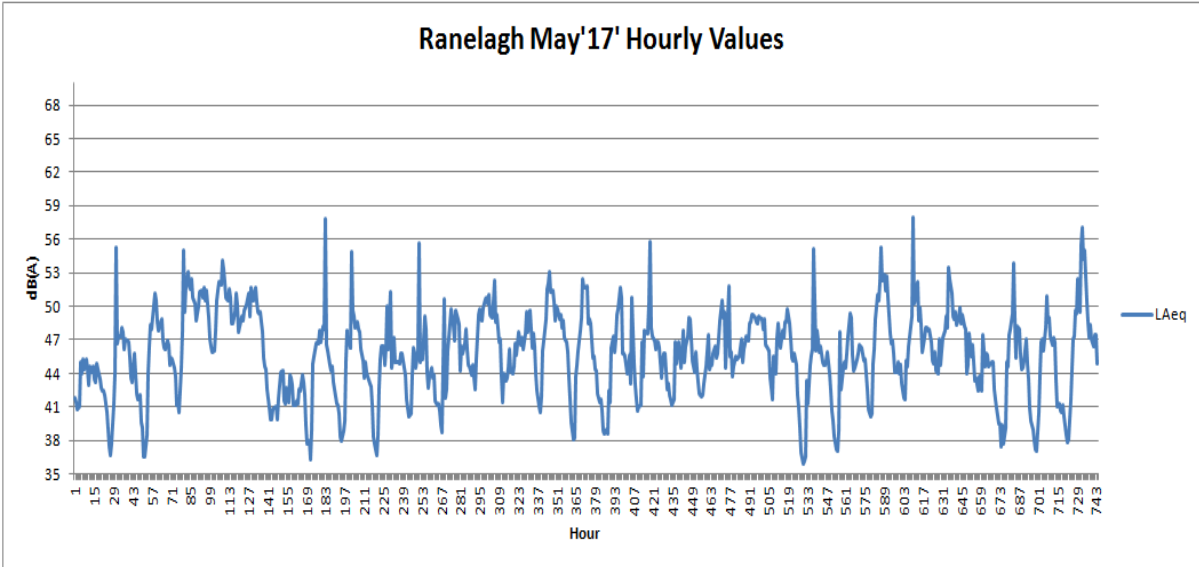
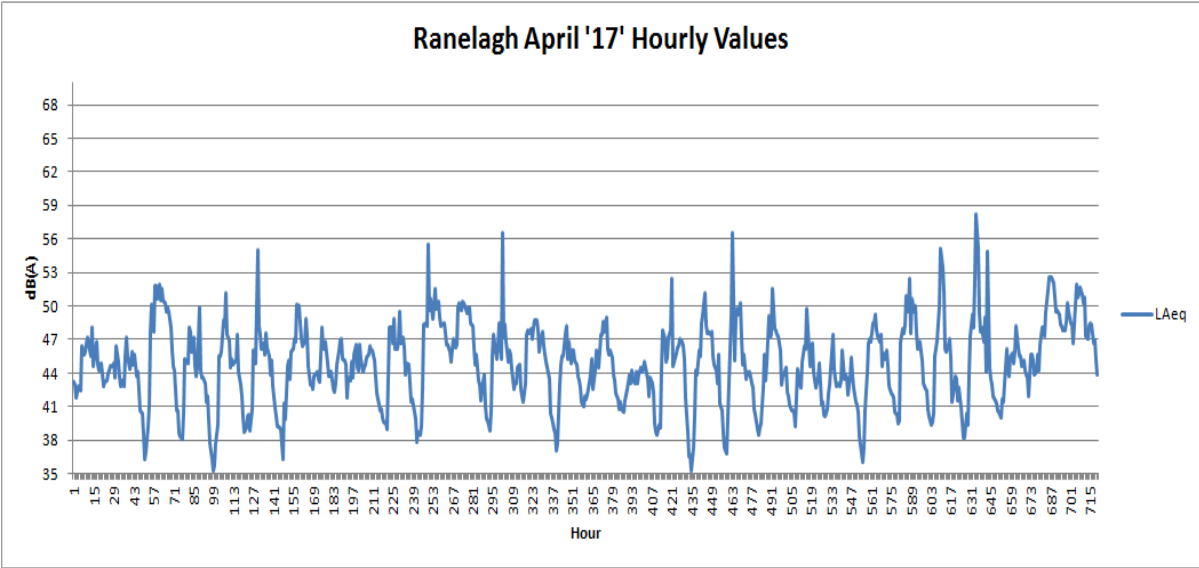


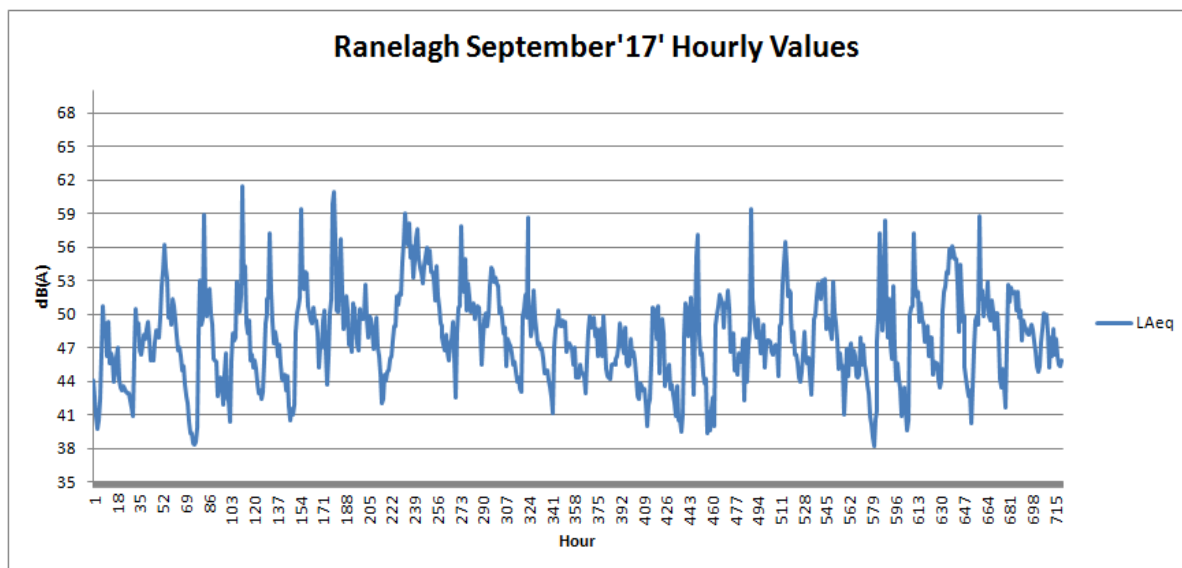
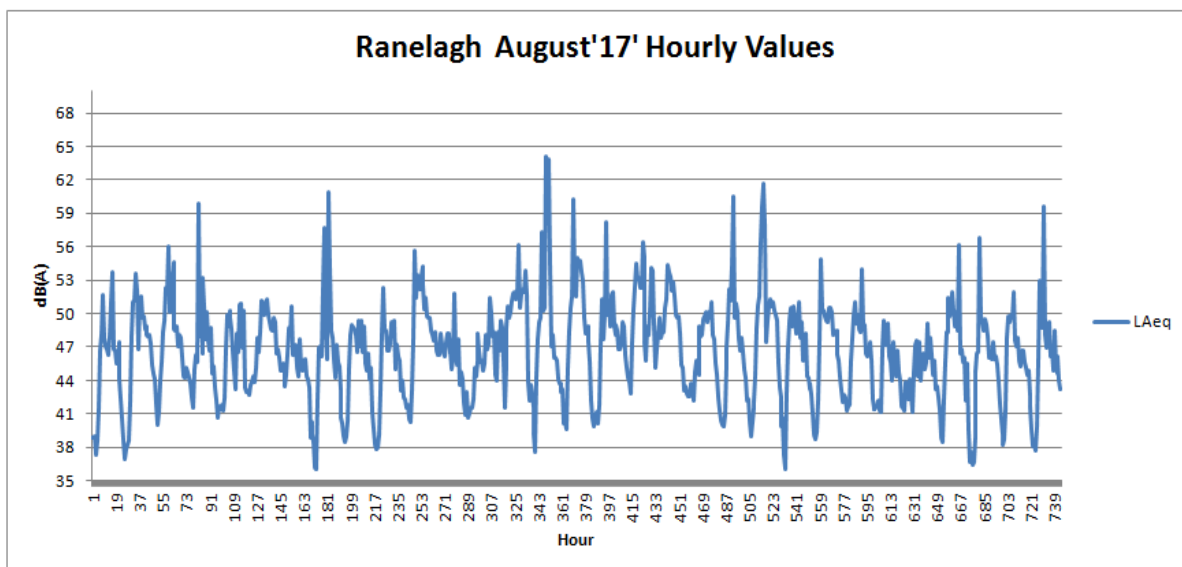
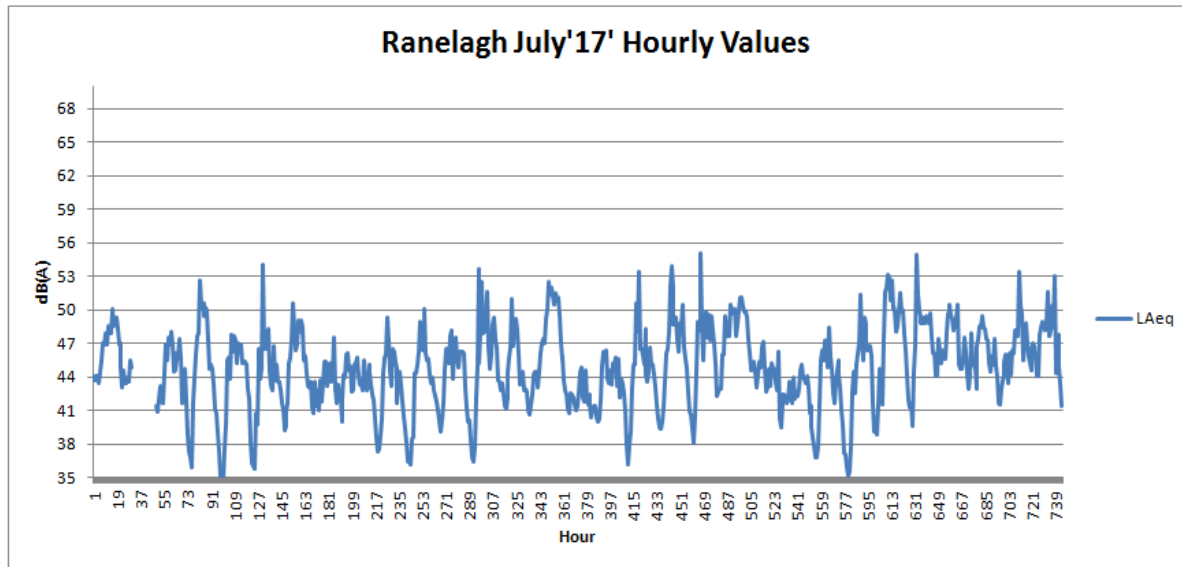
WOODSTOCK STOCK GARDENS
RANELAGH
DUBLIN 6

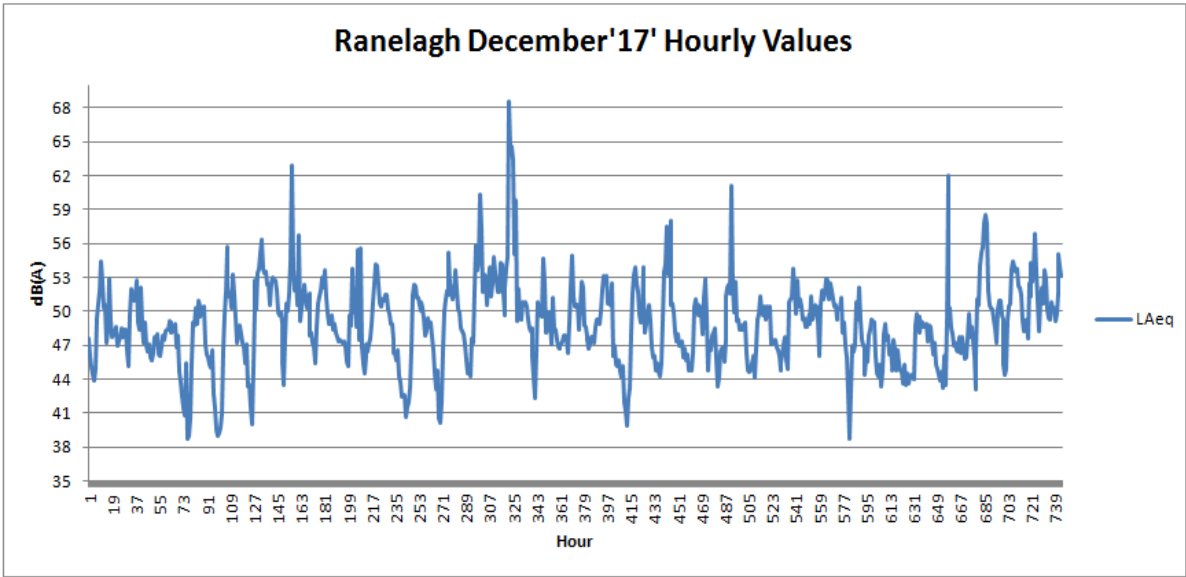
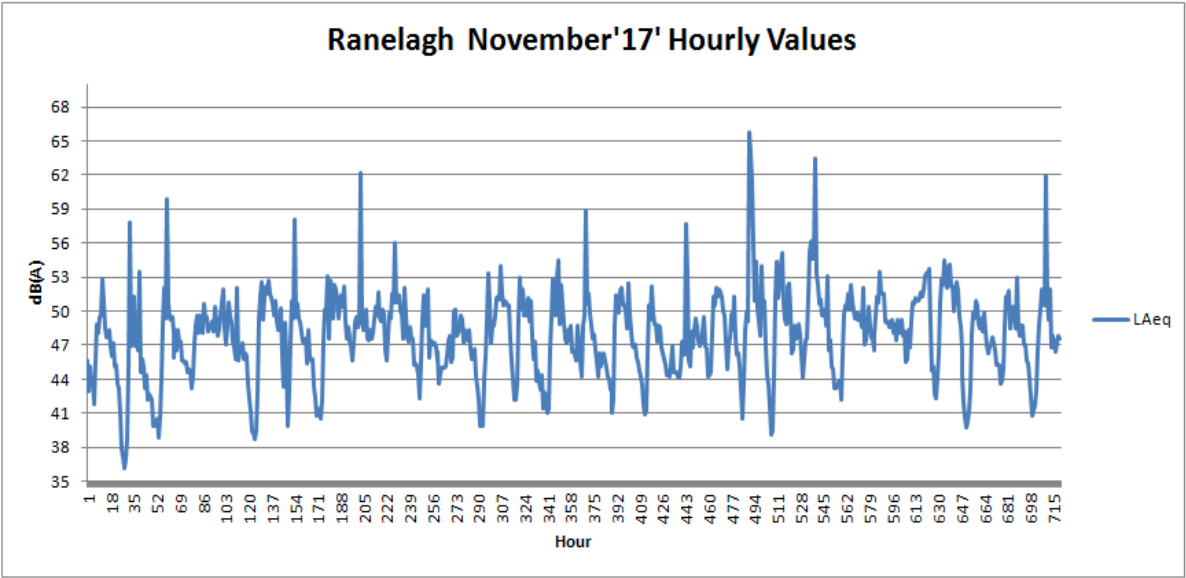
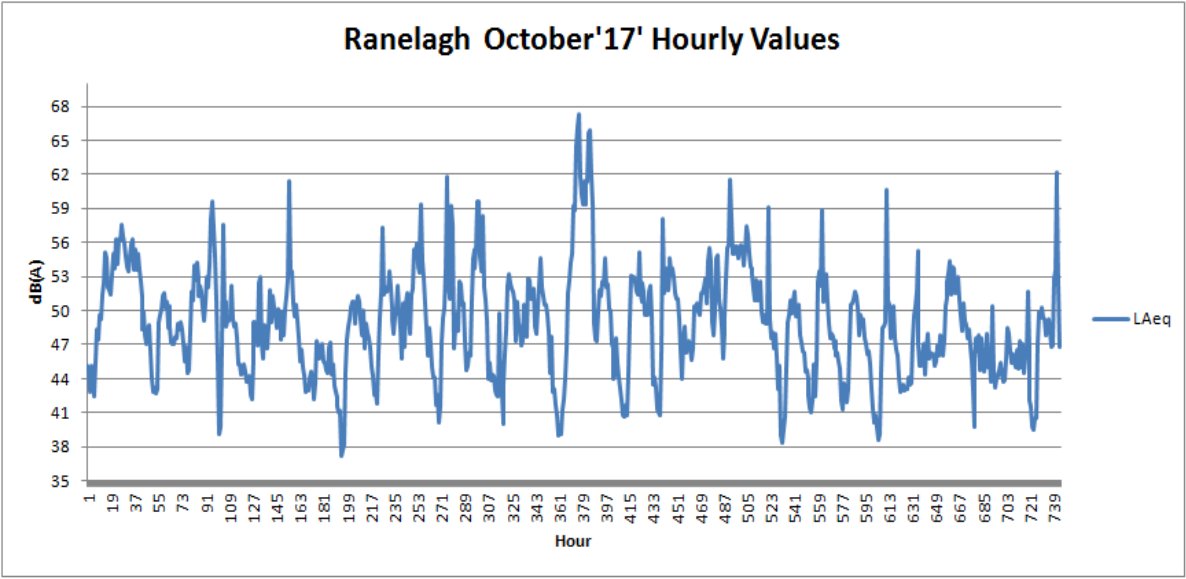




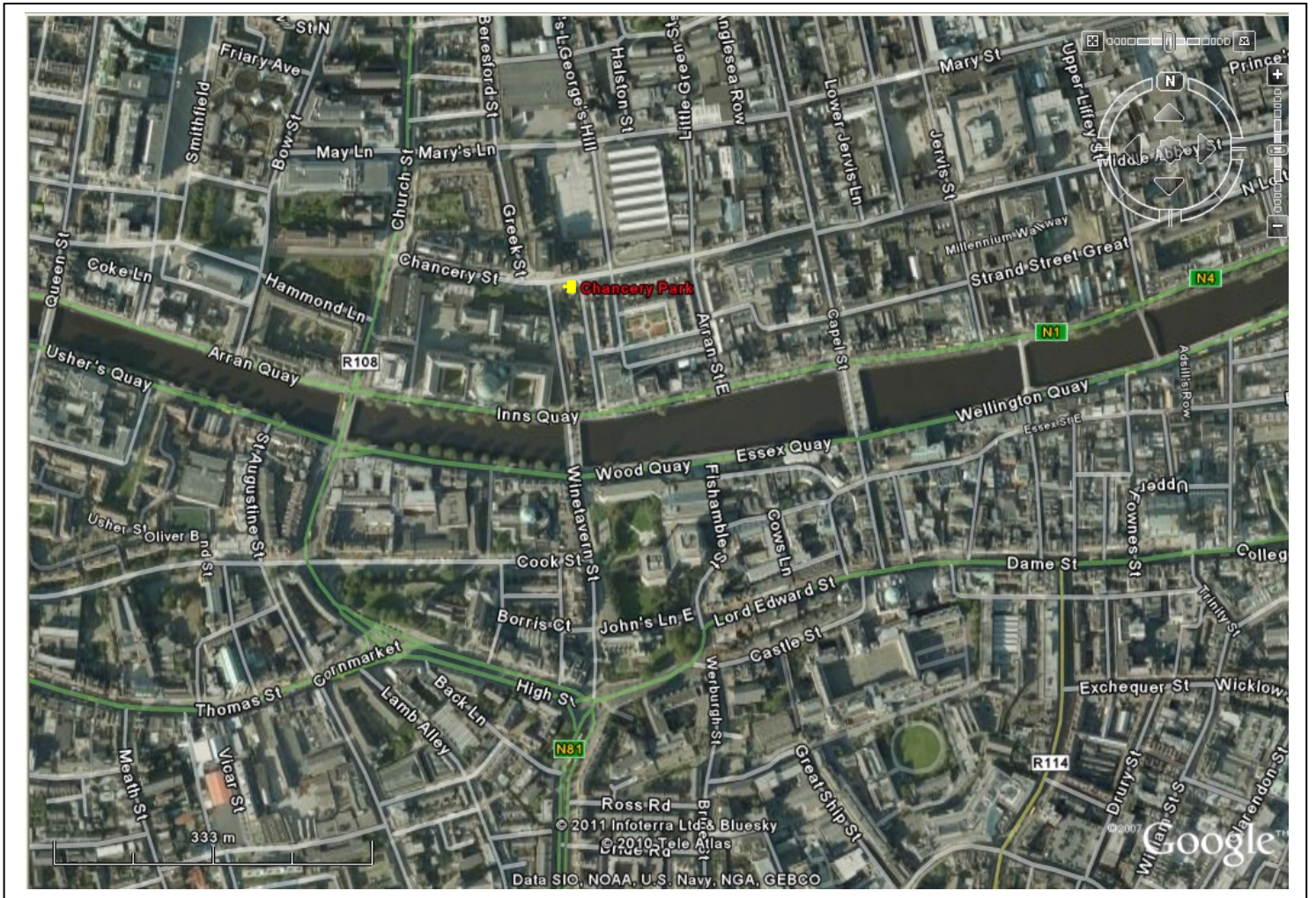


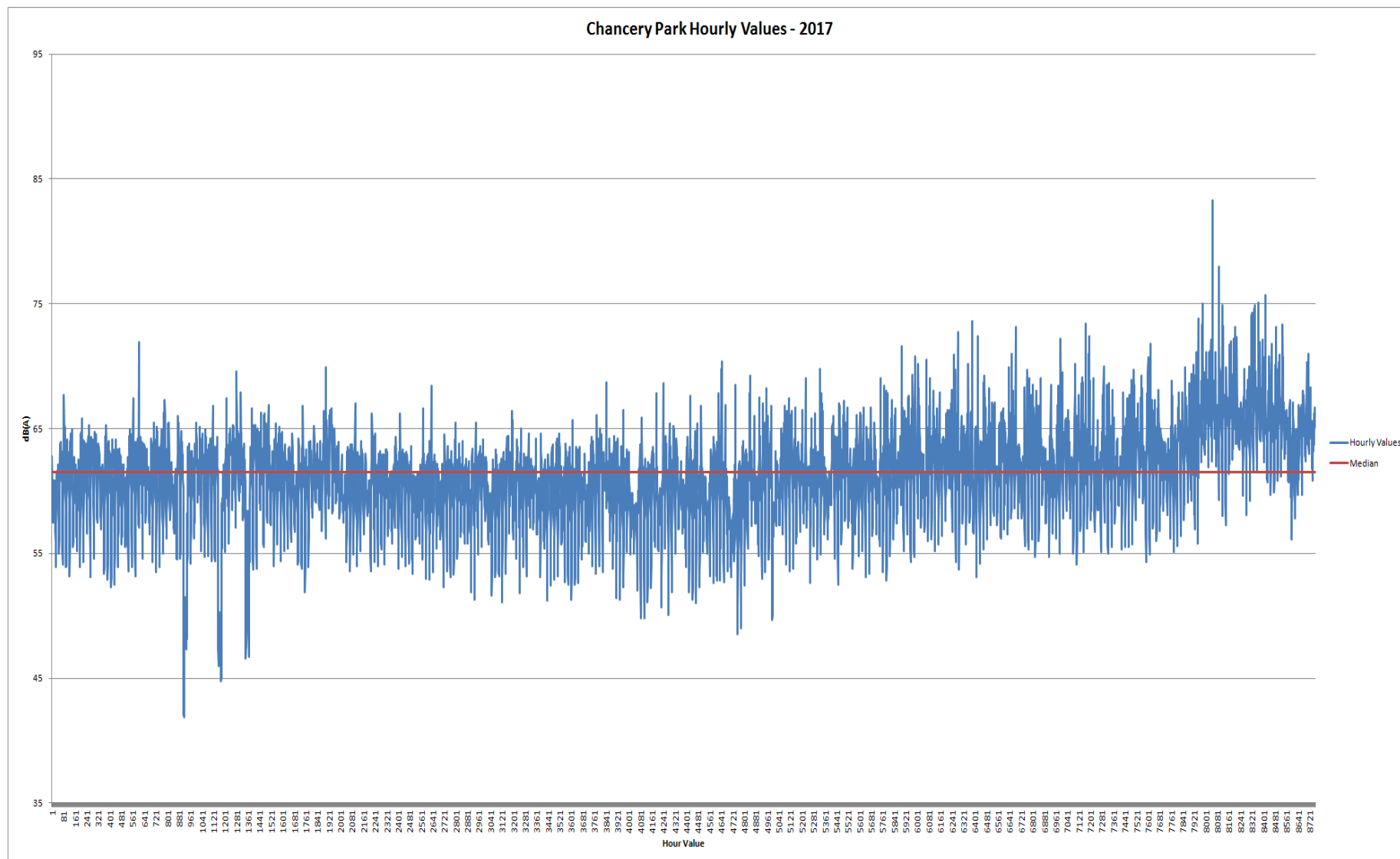


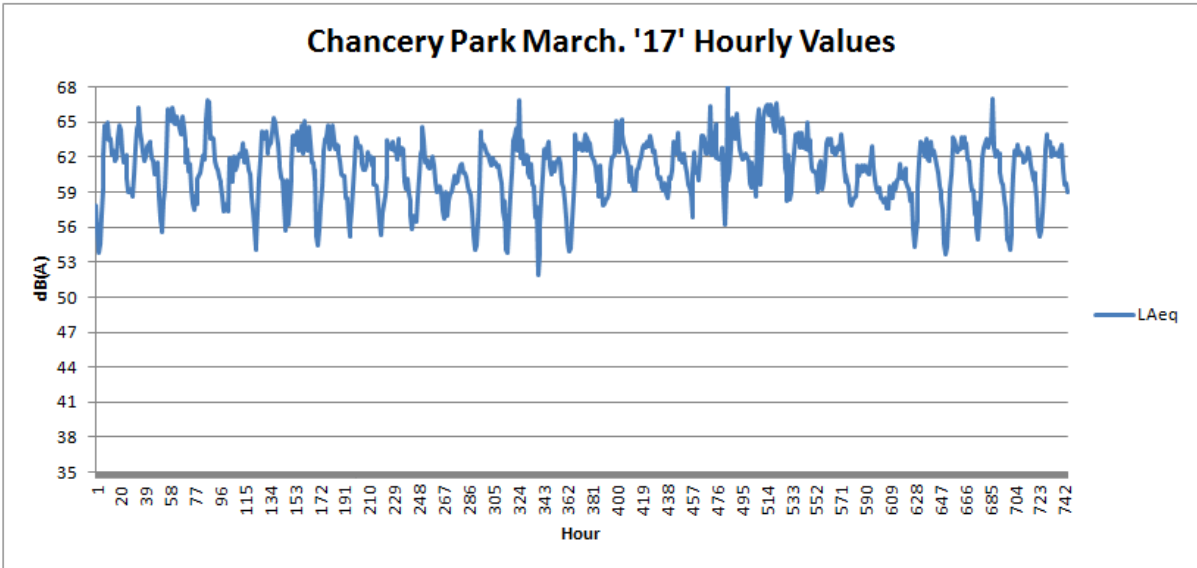
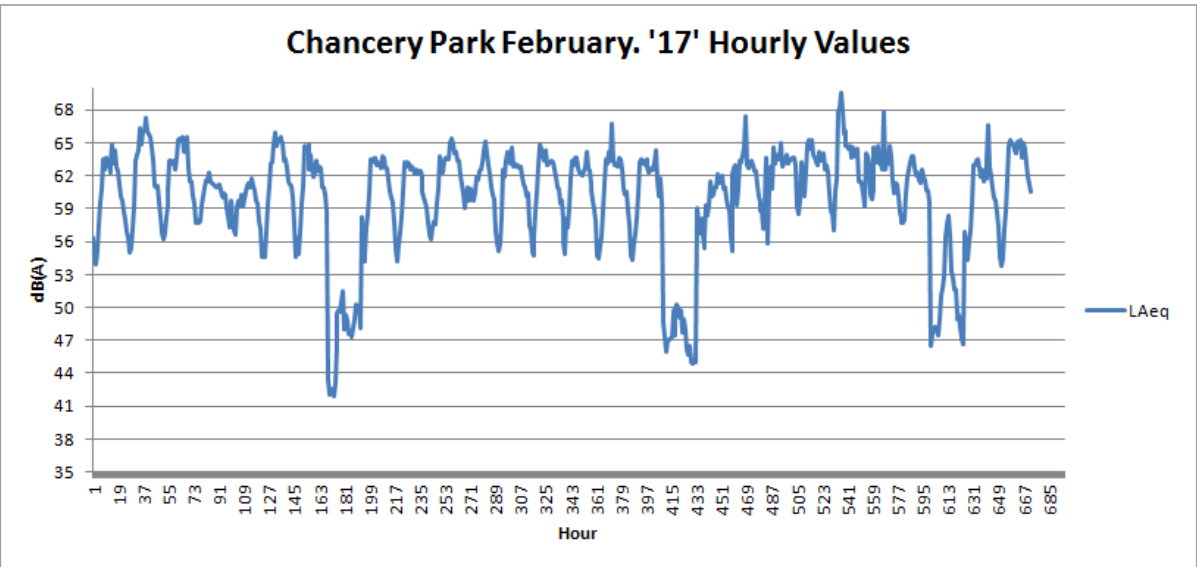
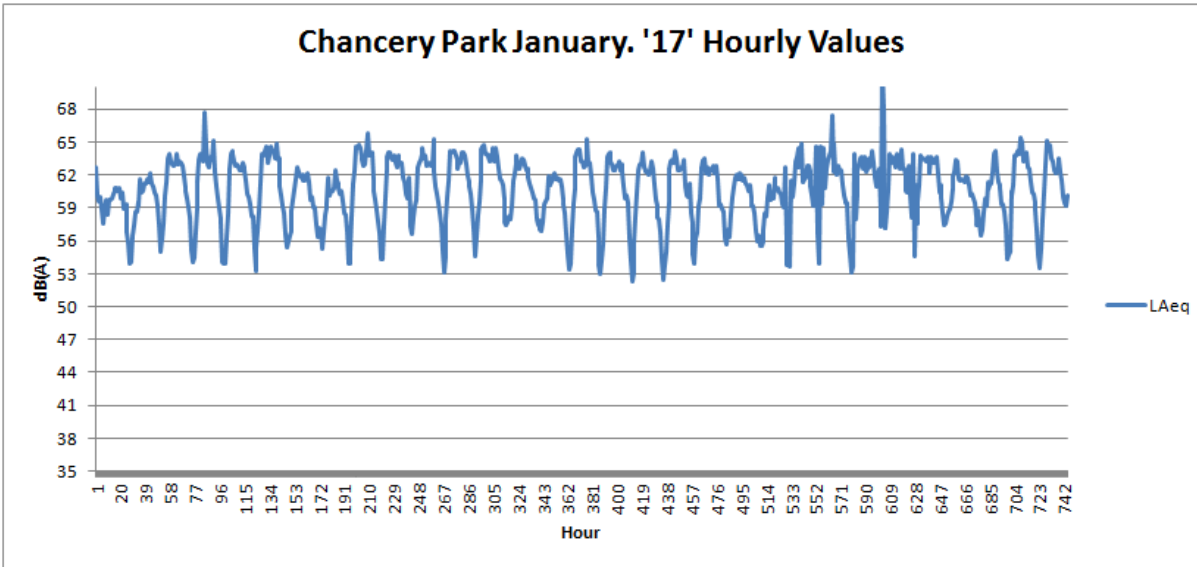


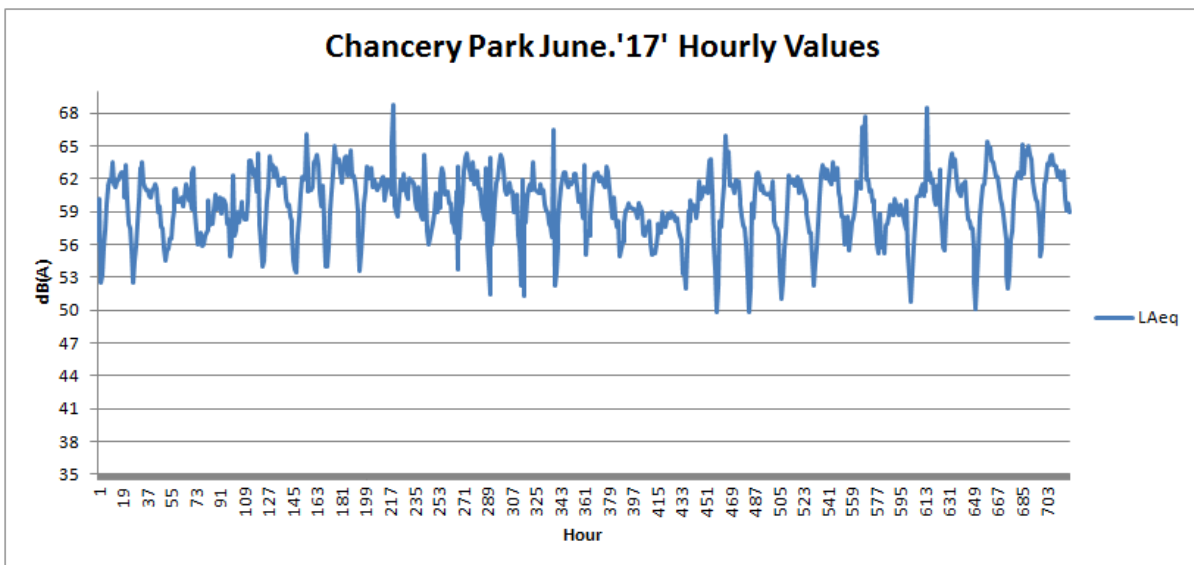
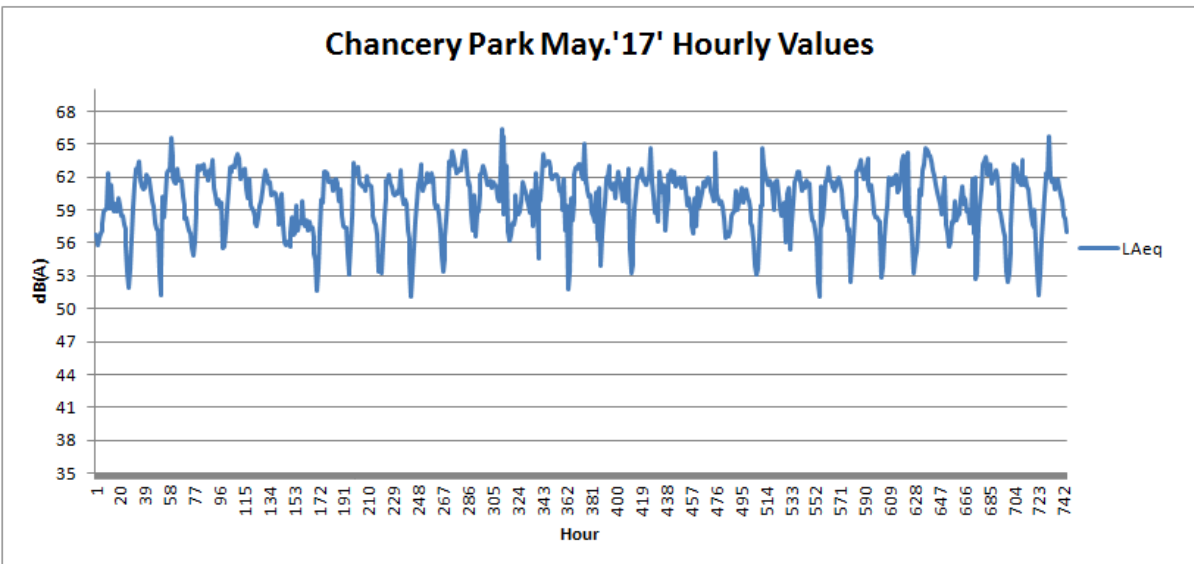
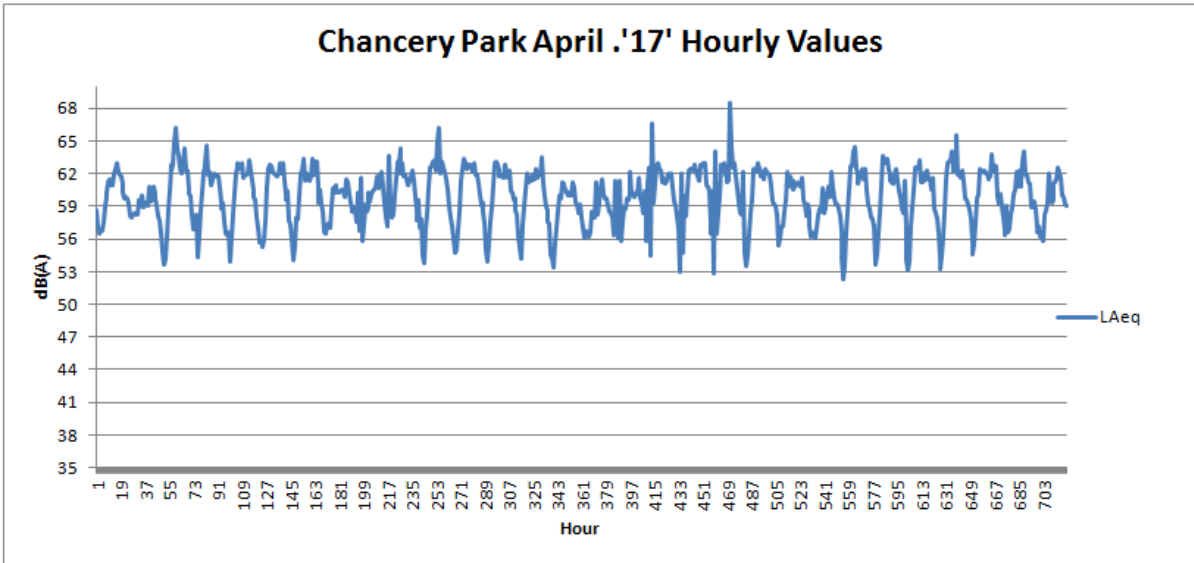


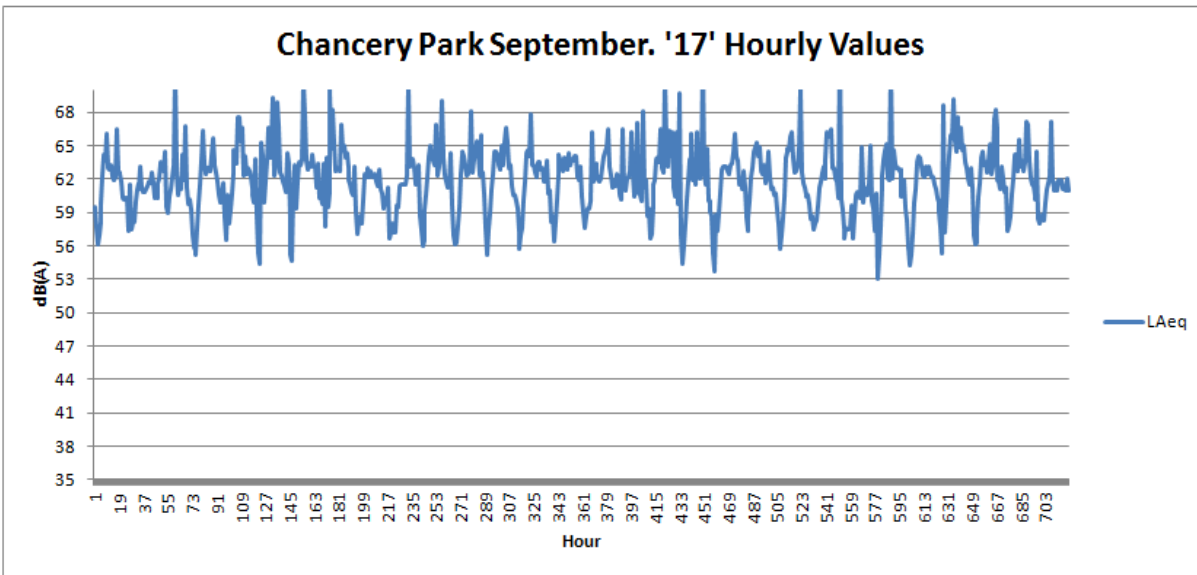
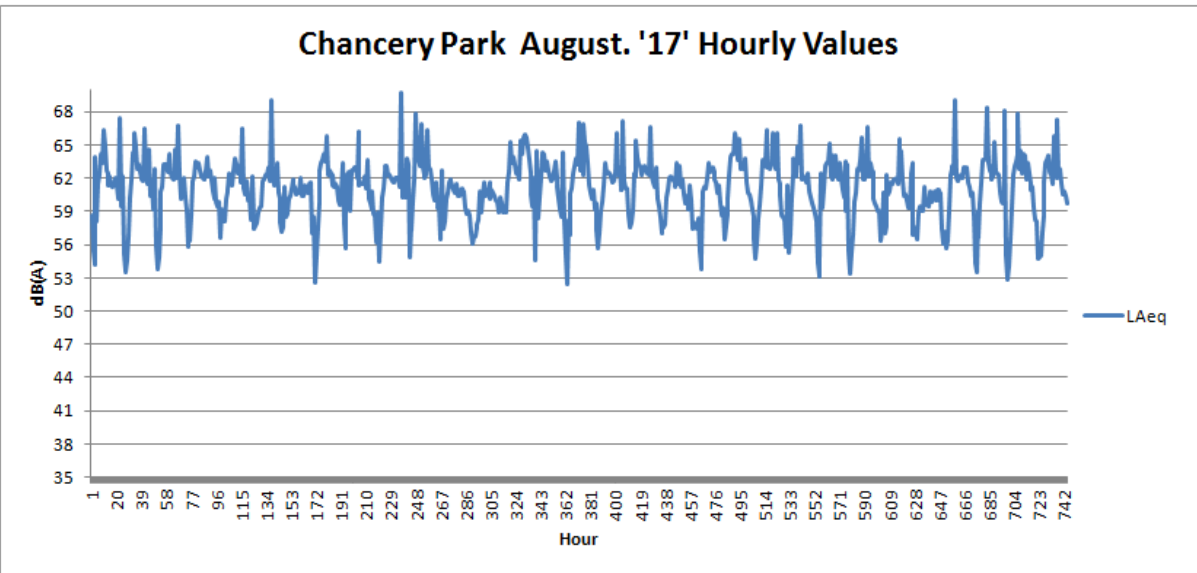
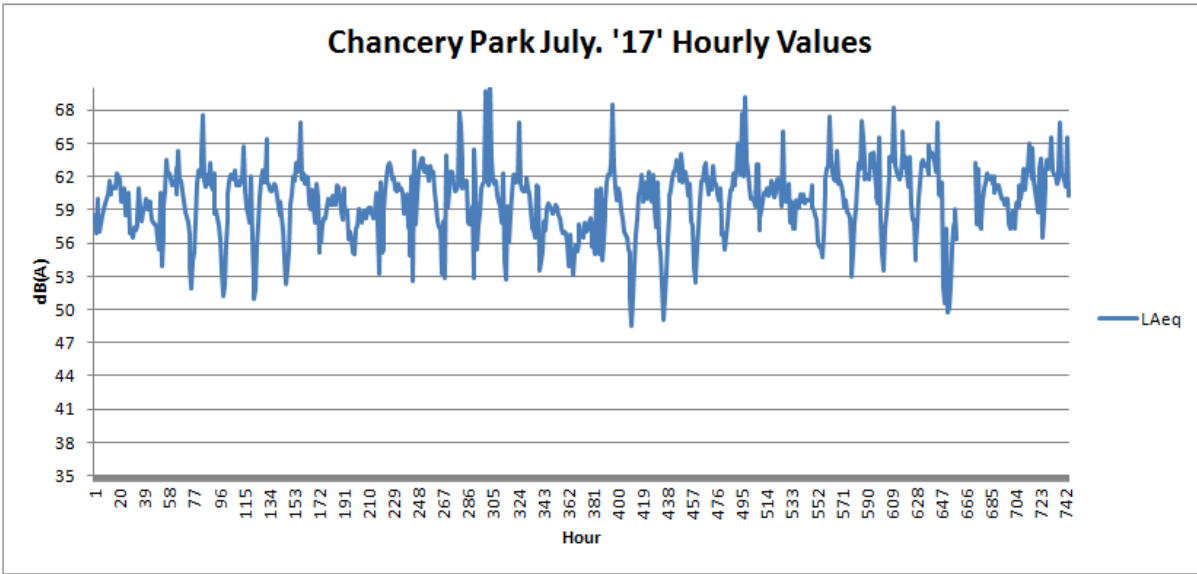
CHANCERY PARK
CHANCERY ST.
DUBLIN 1

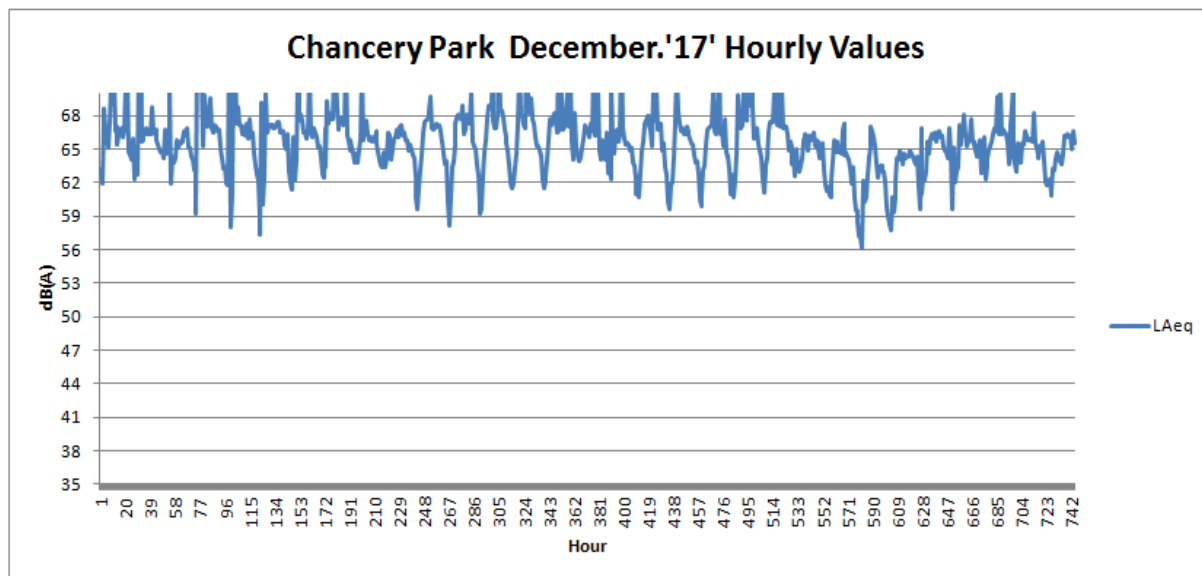
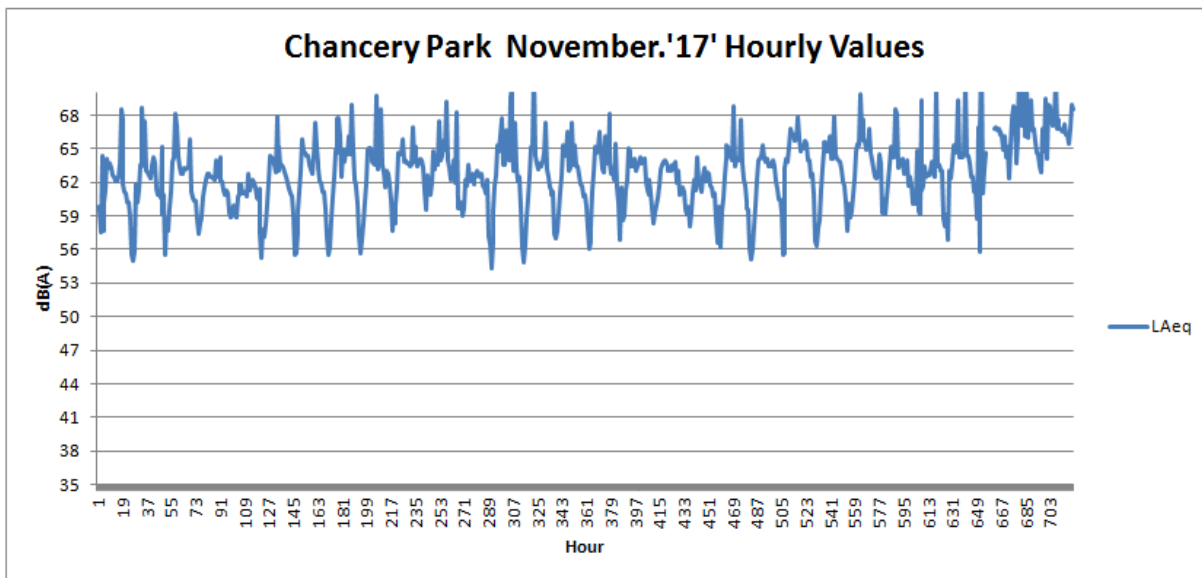
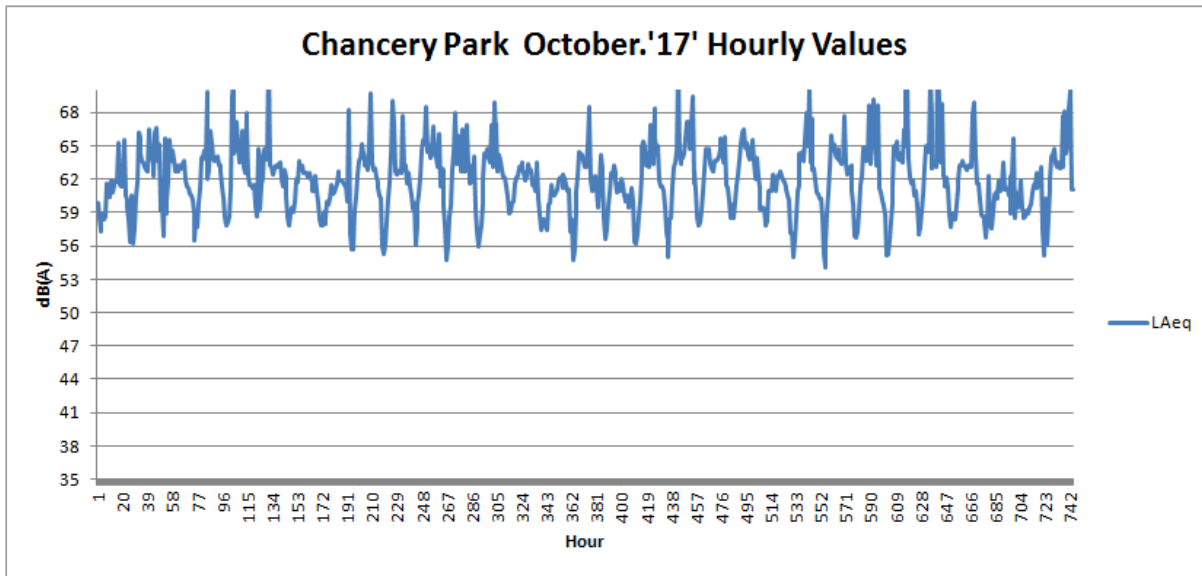






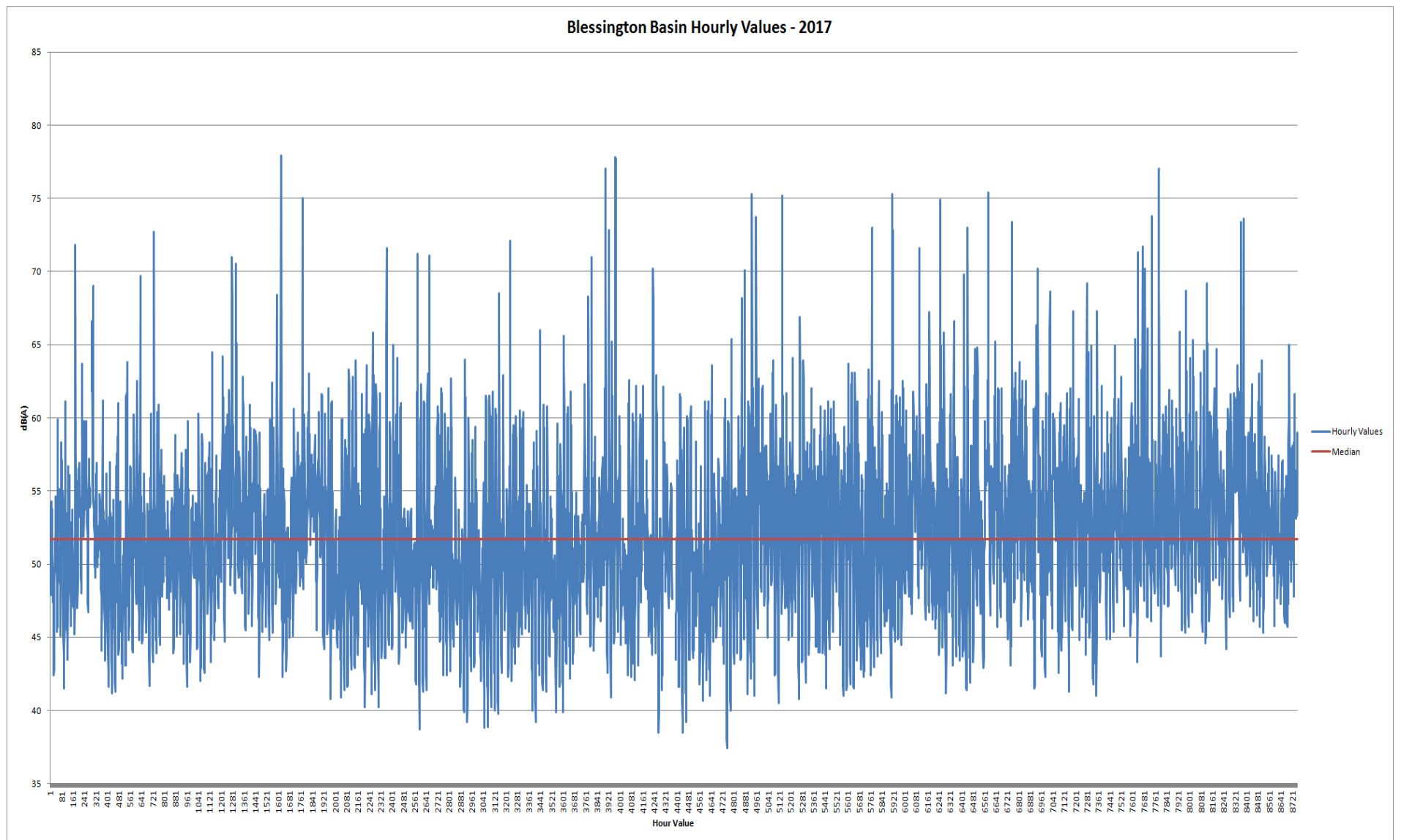


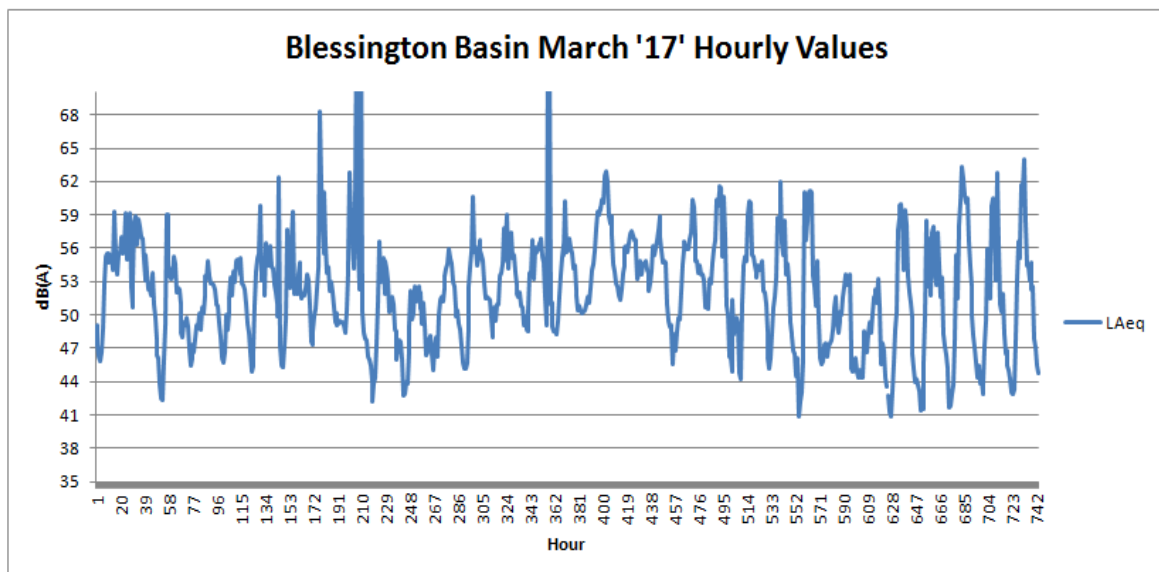
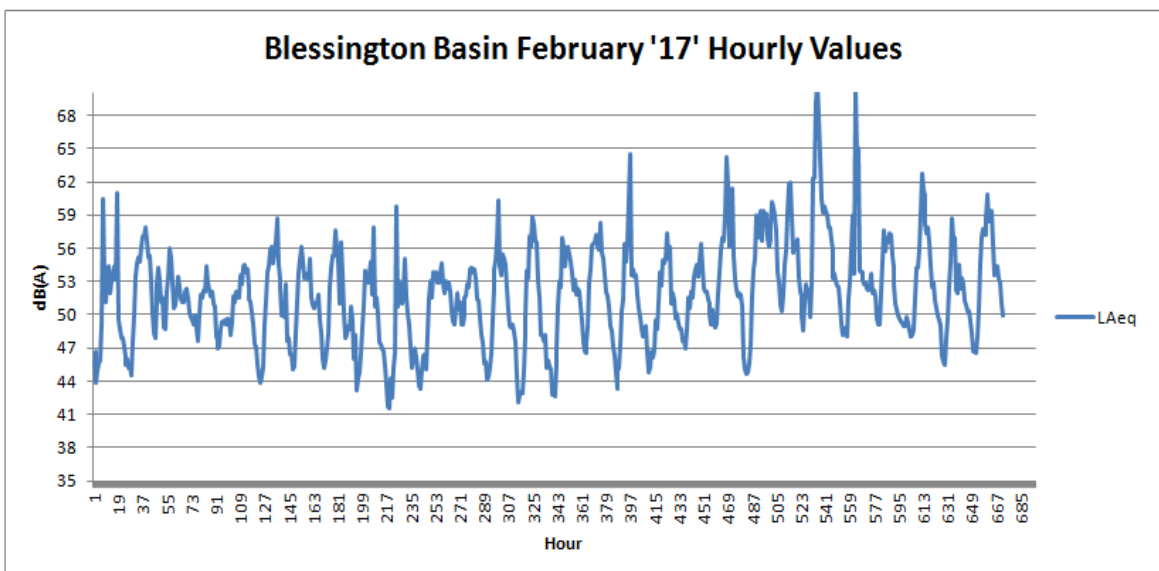
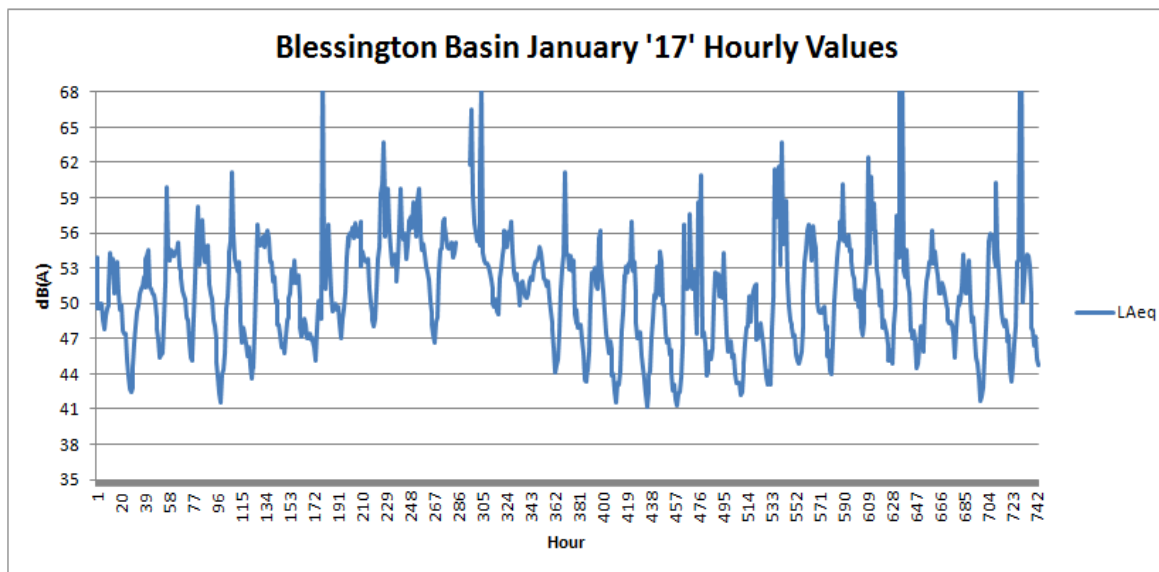


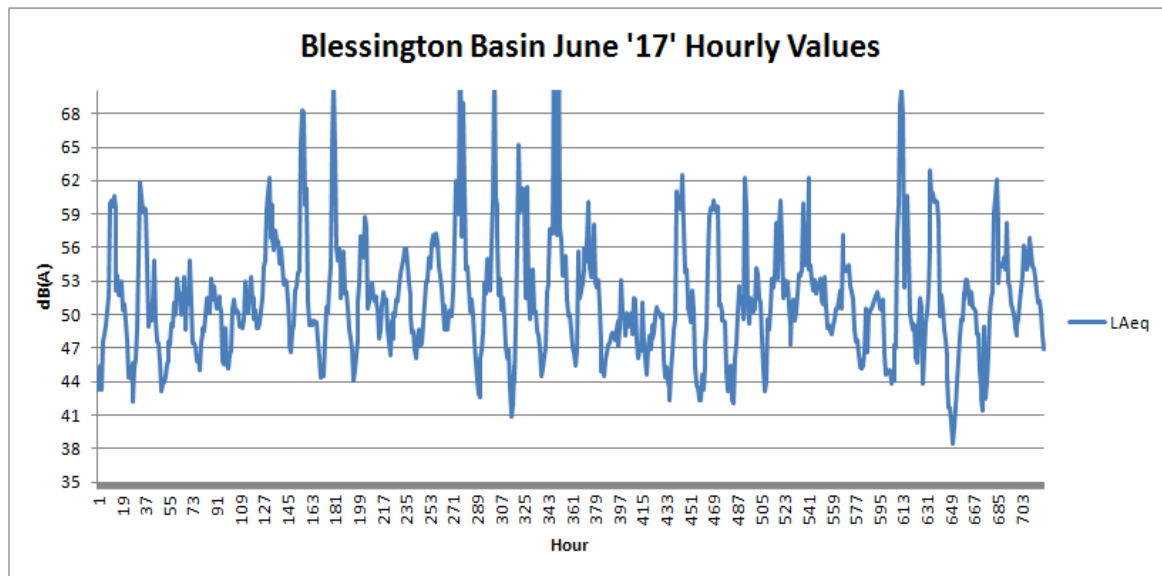
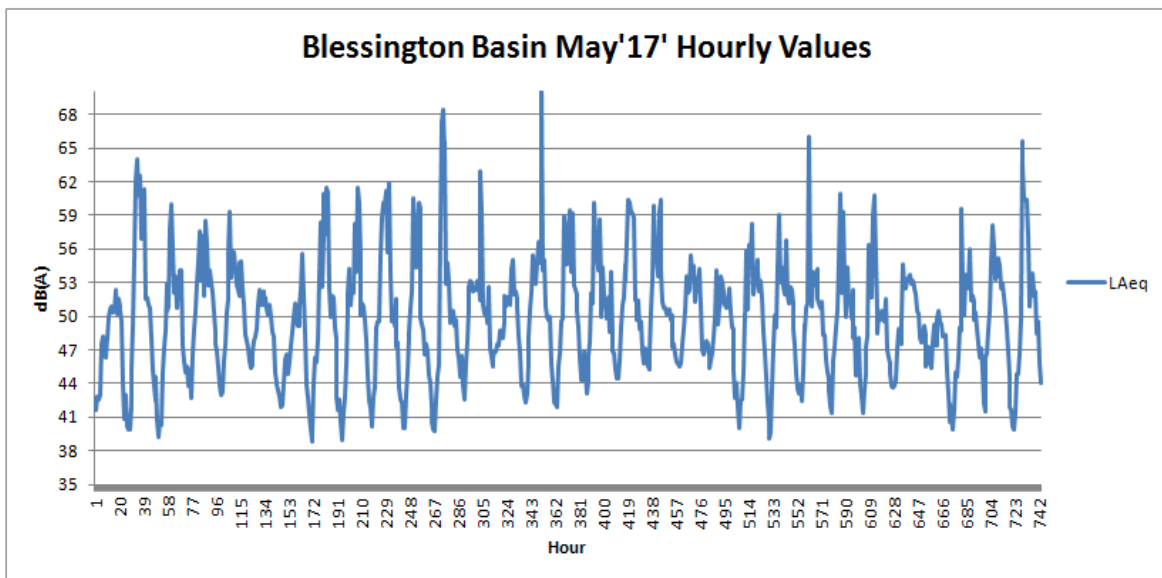
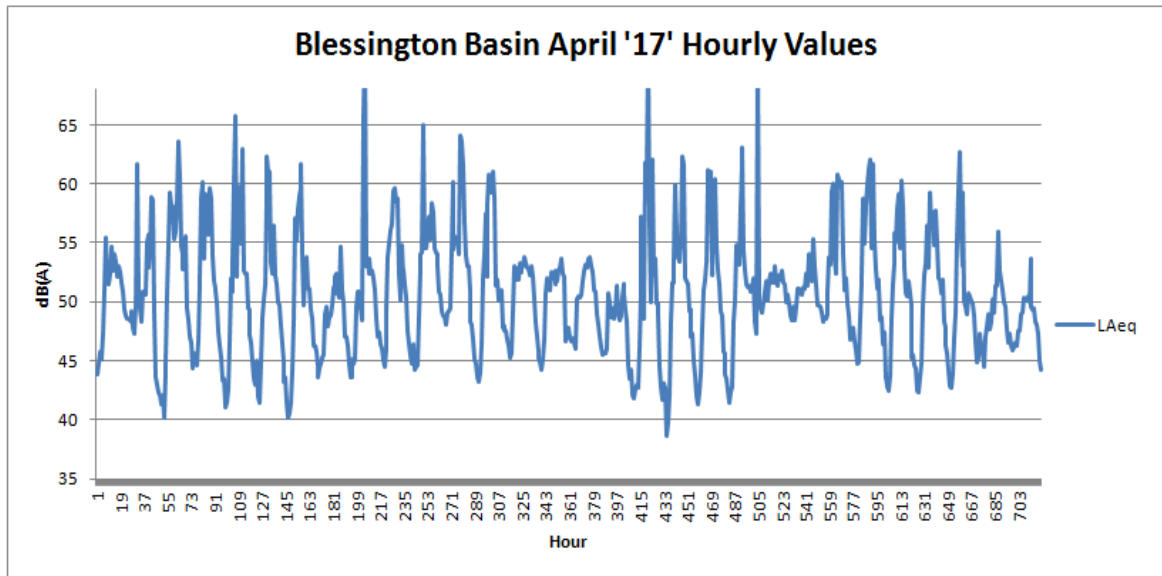


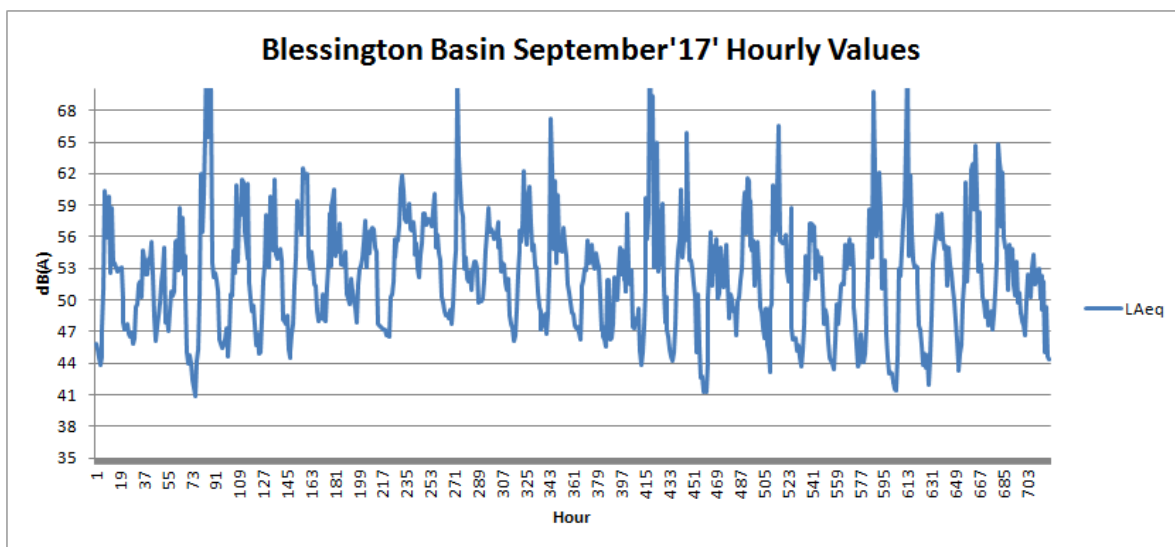
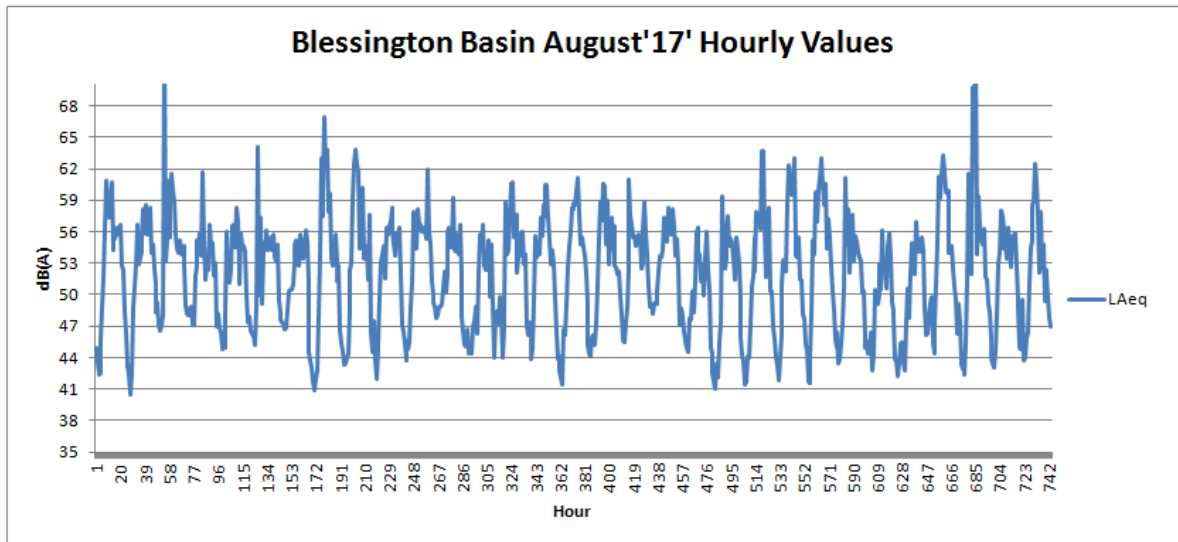
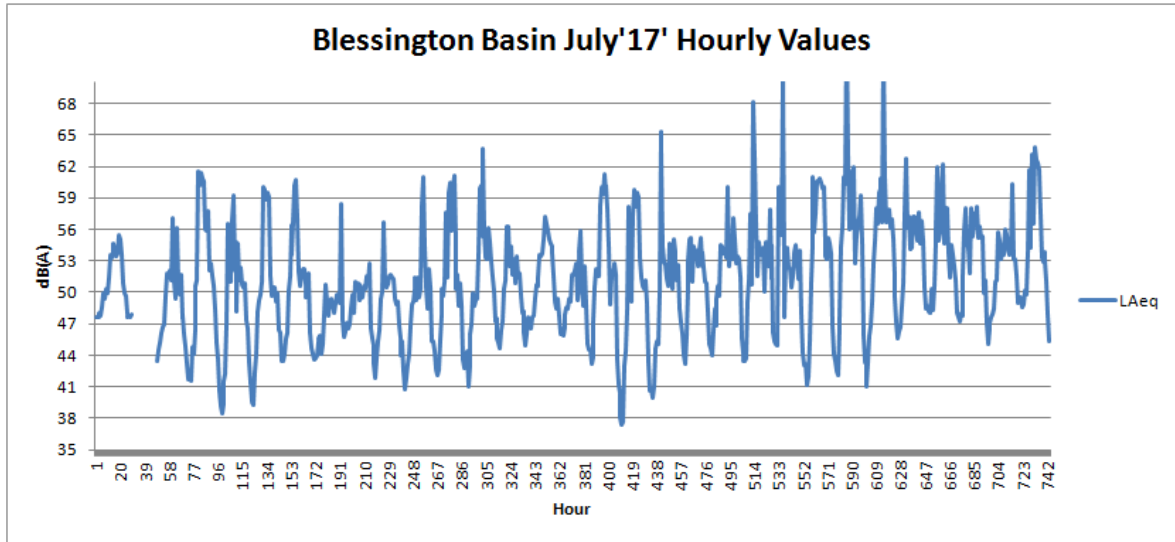
Blessington Basin
Blessington St.
DUBLIN 1

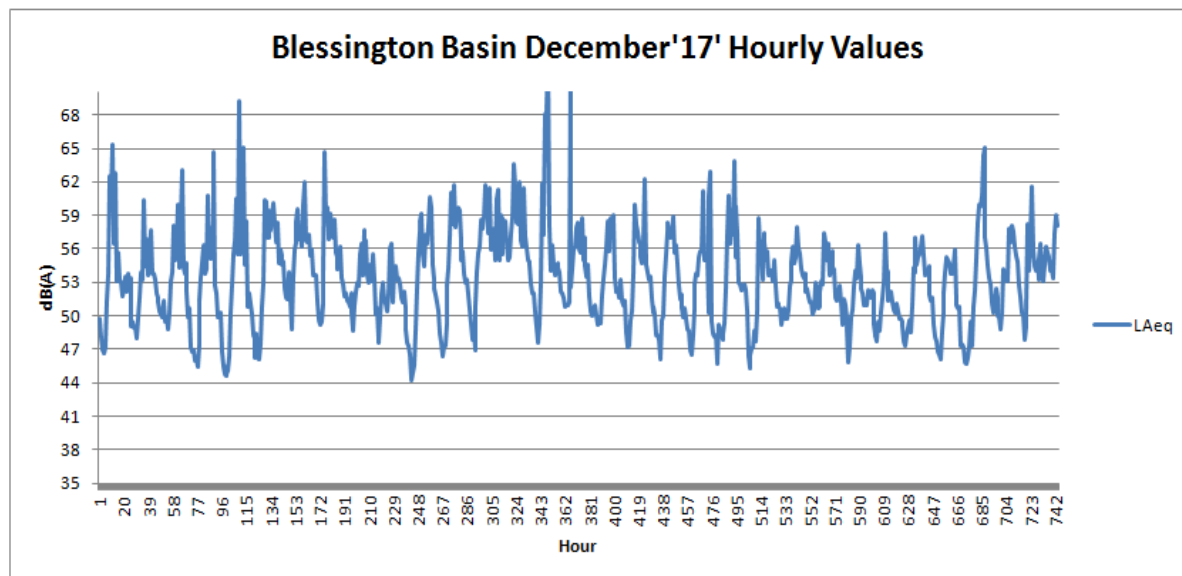
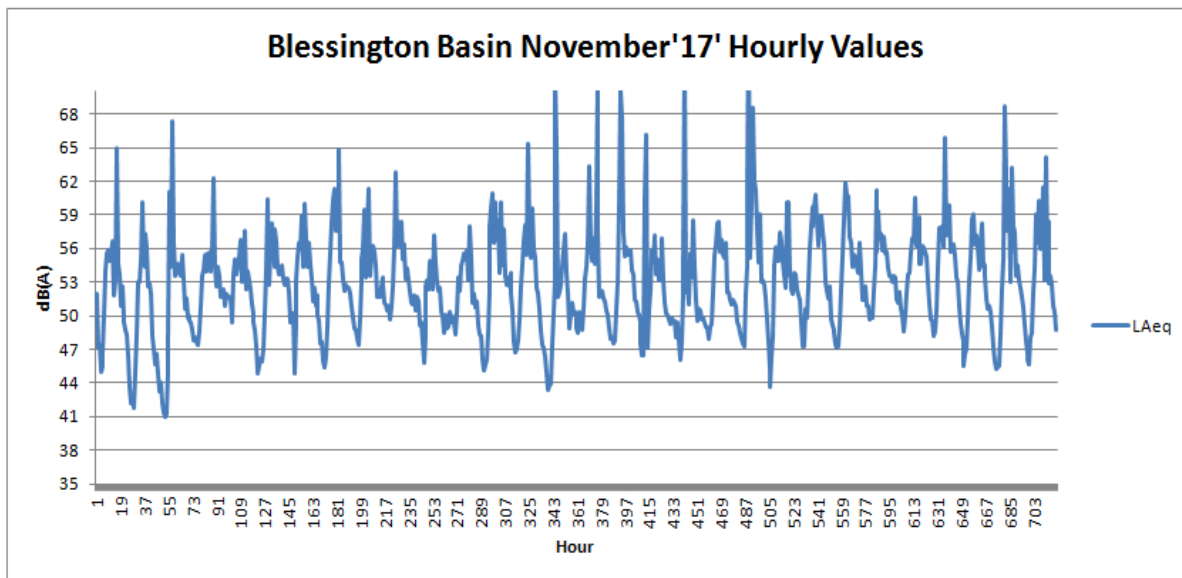
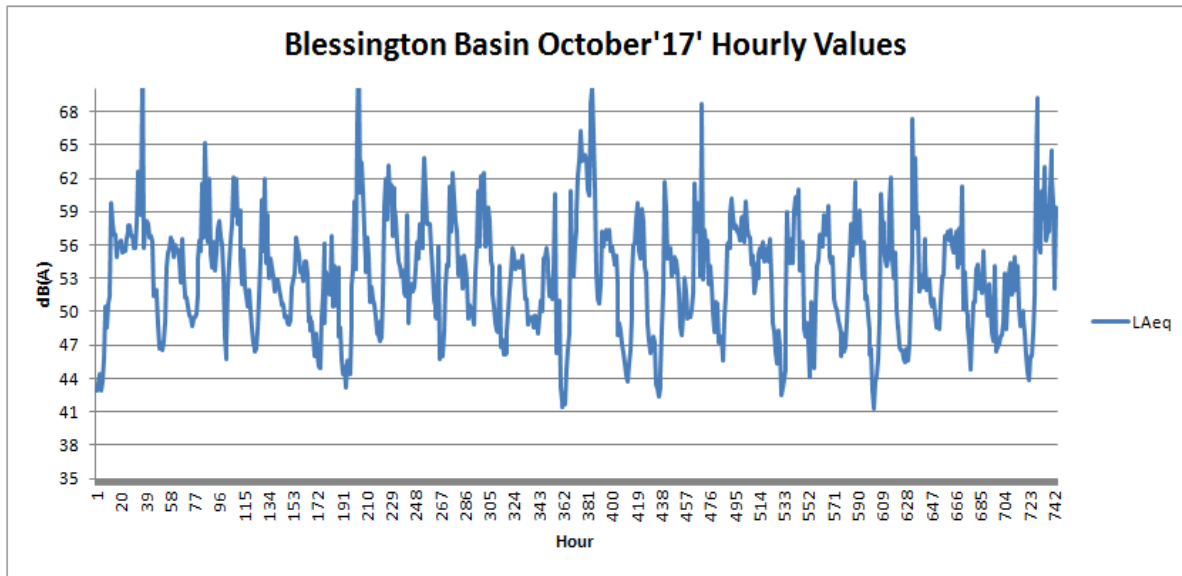




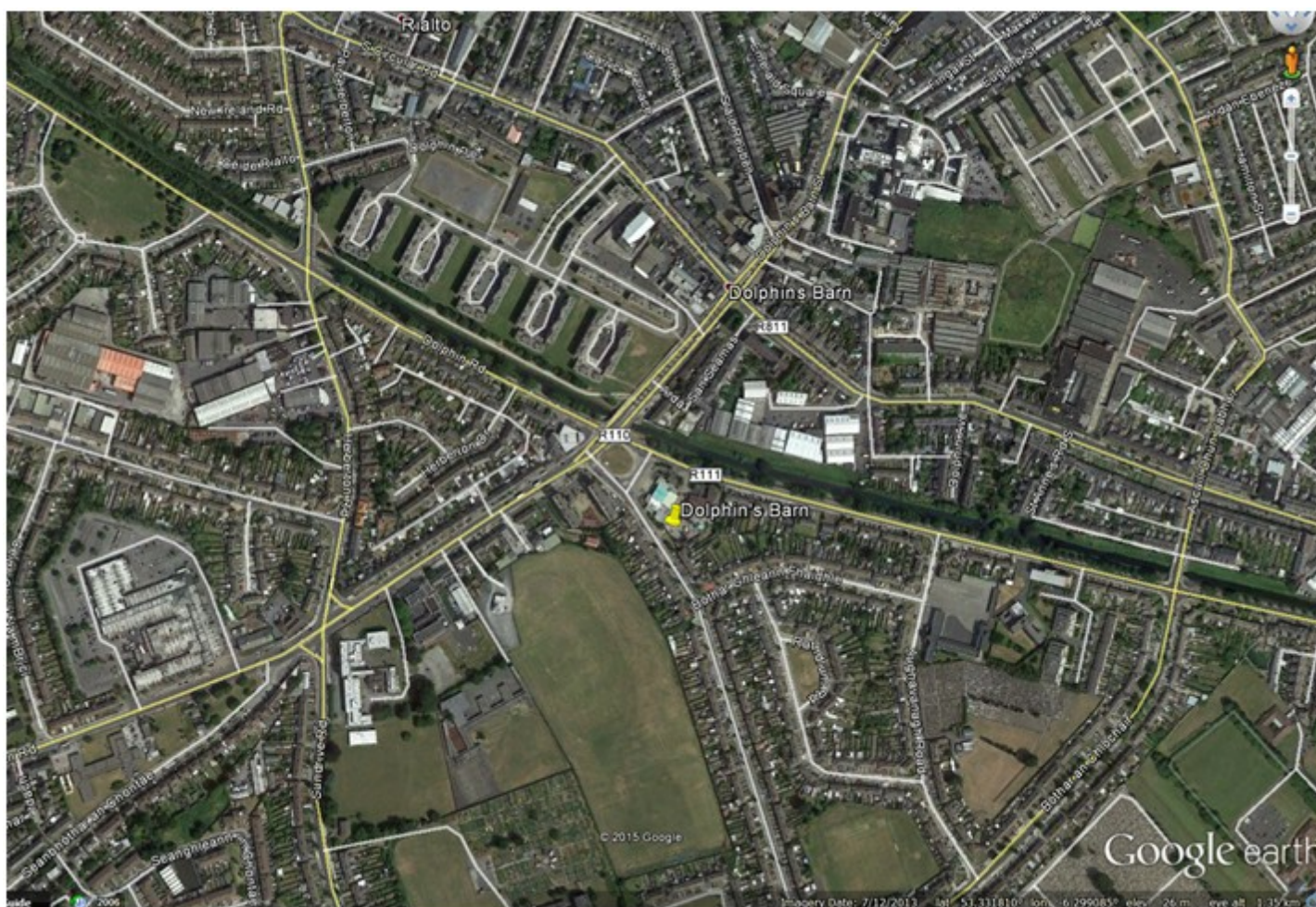


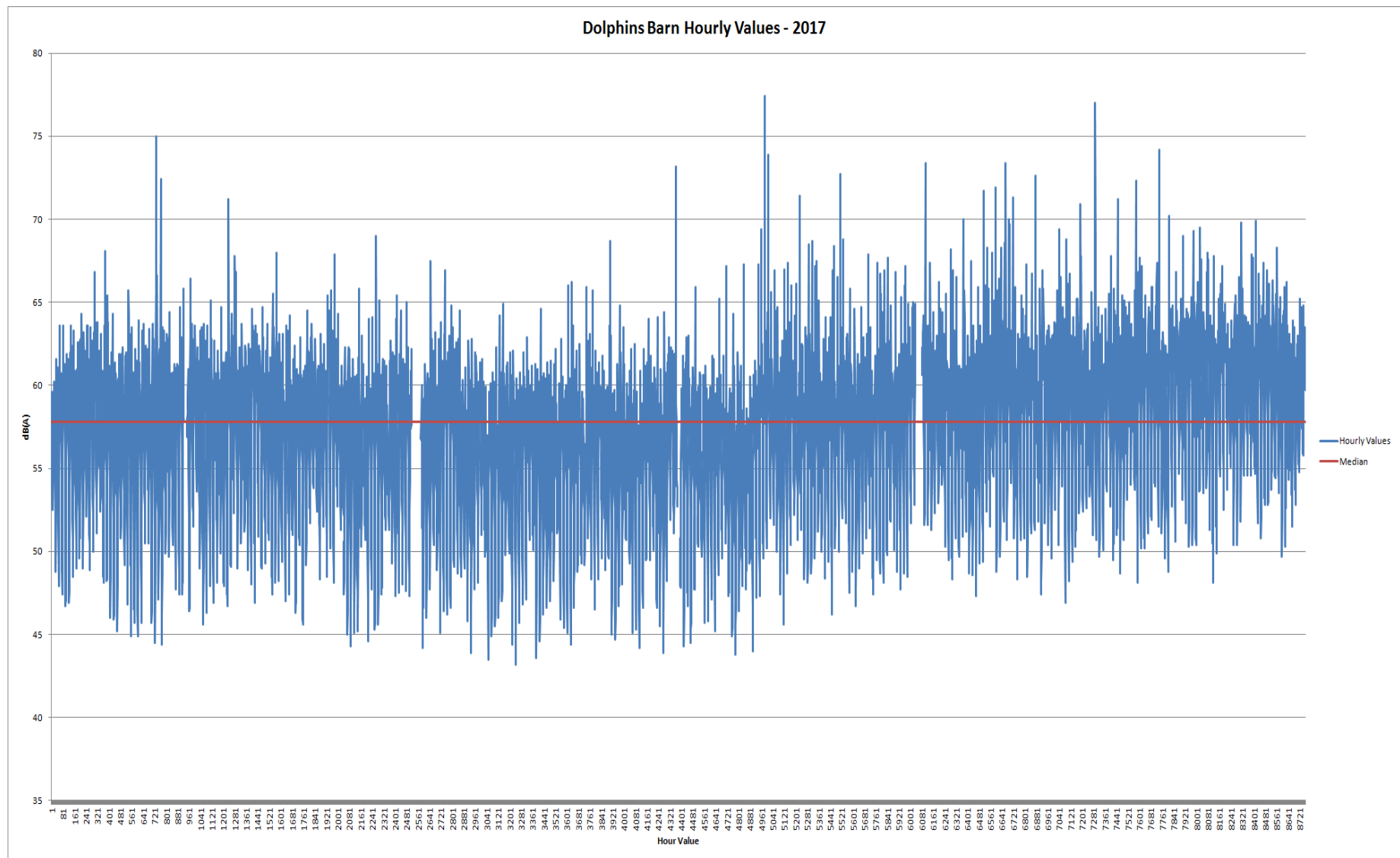


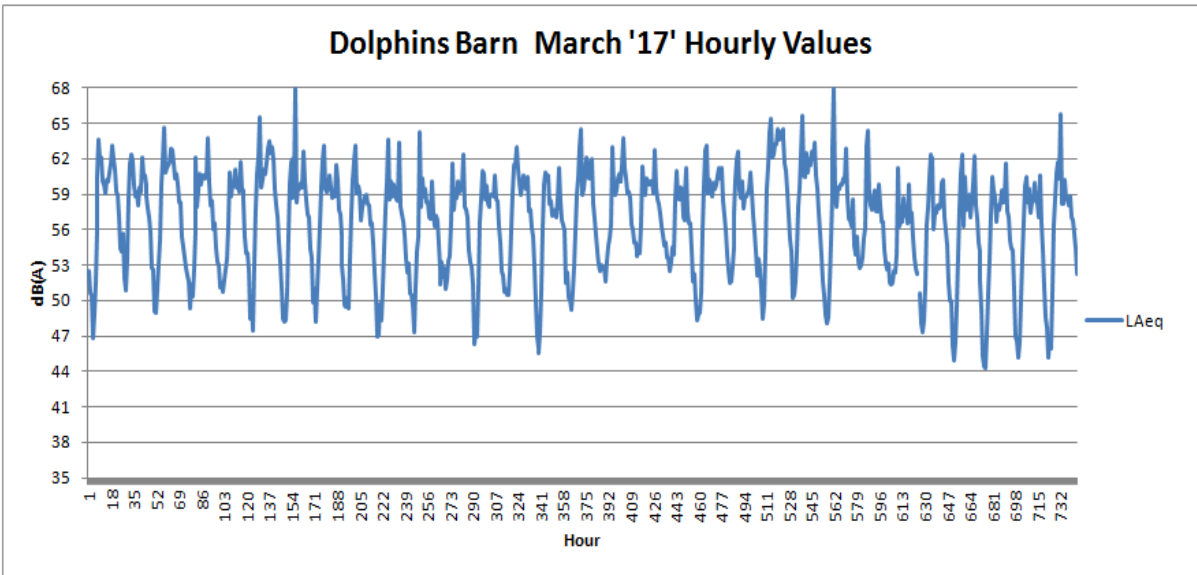
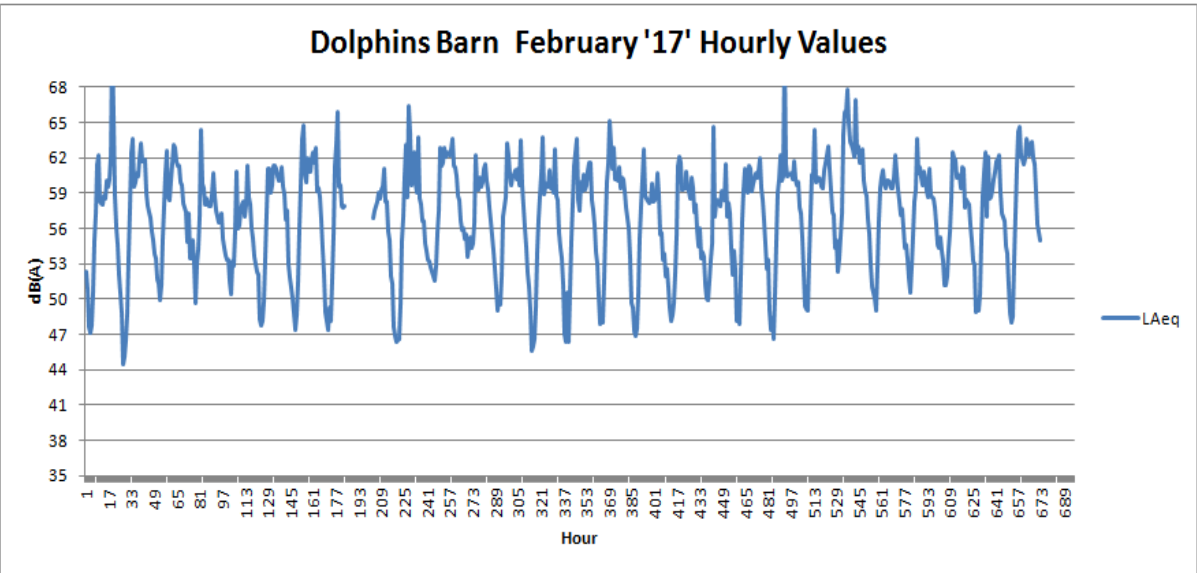
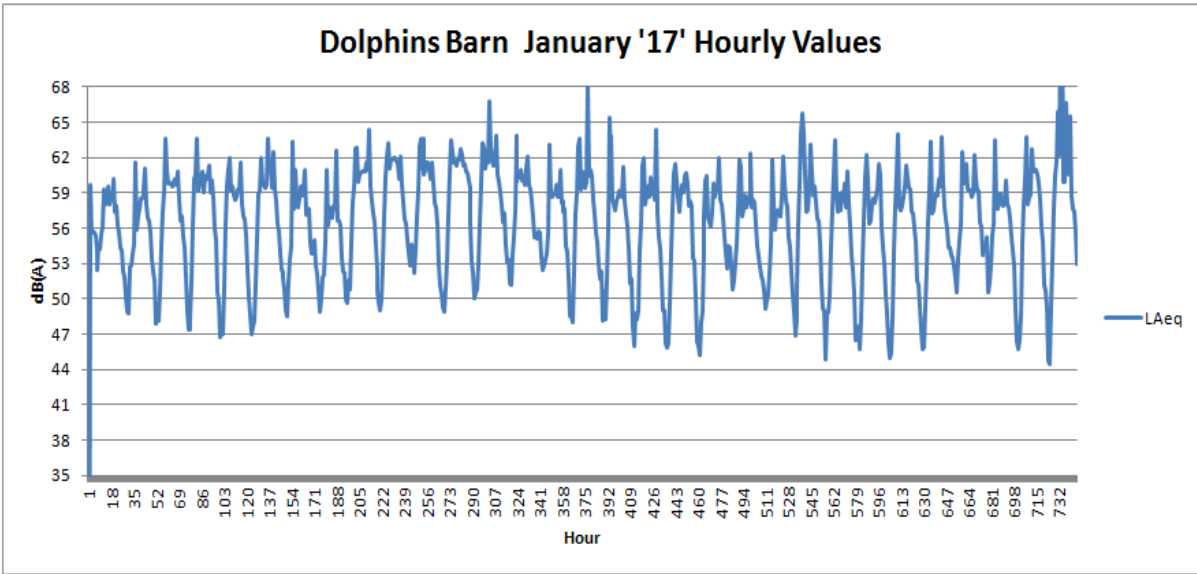


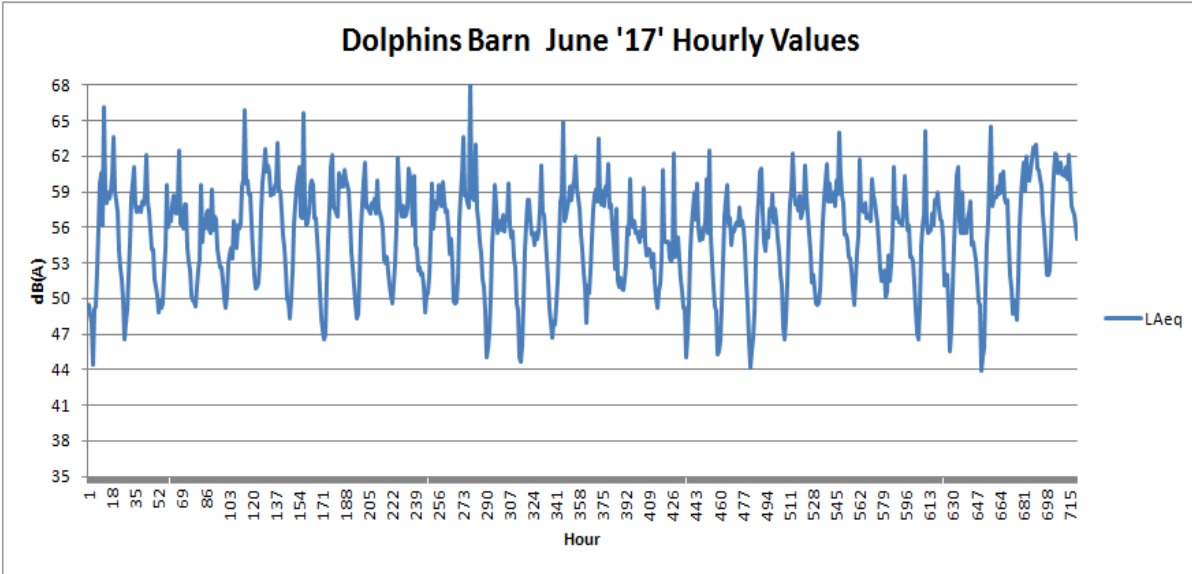
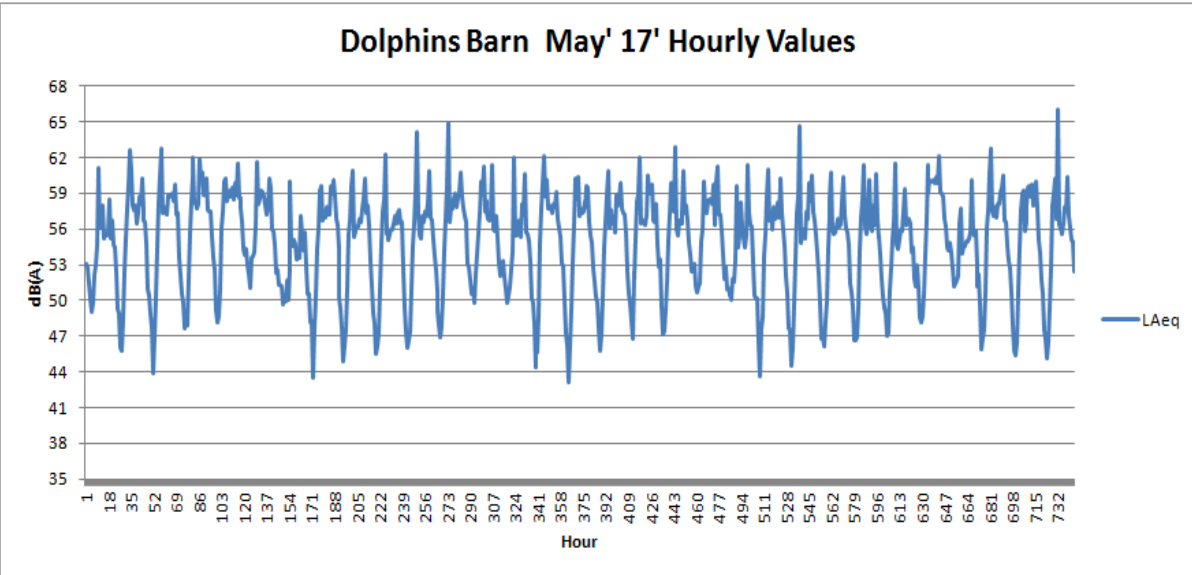
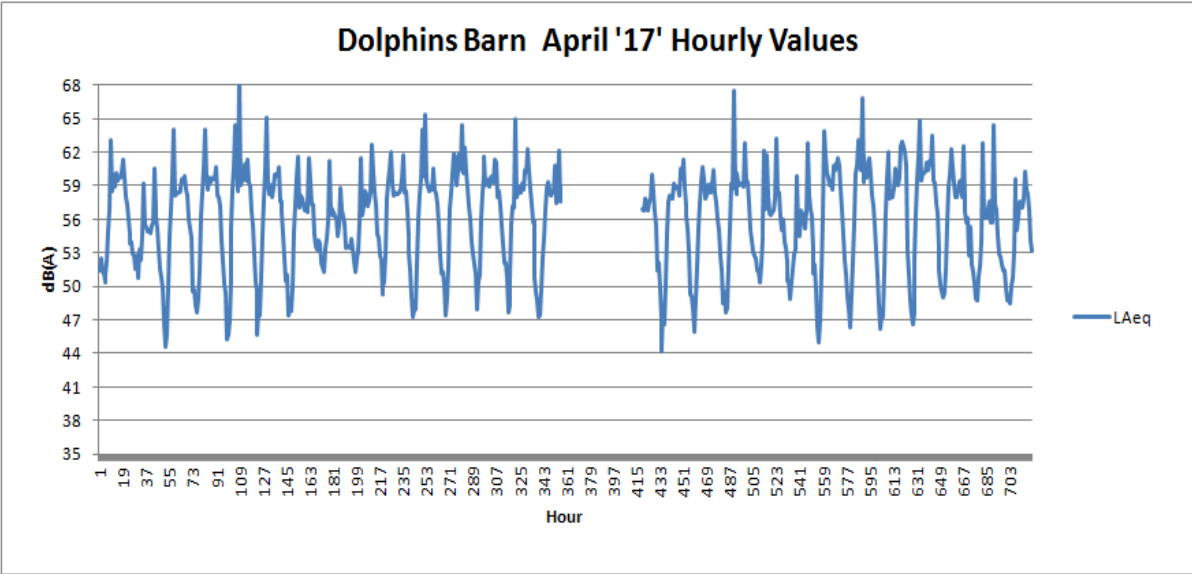


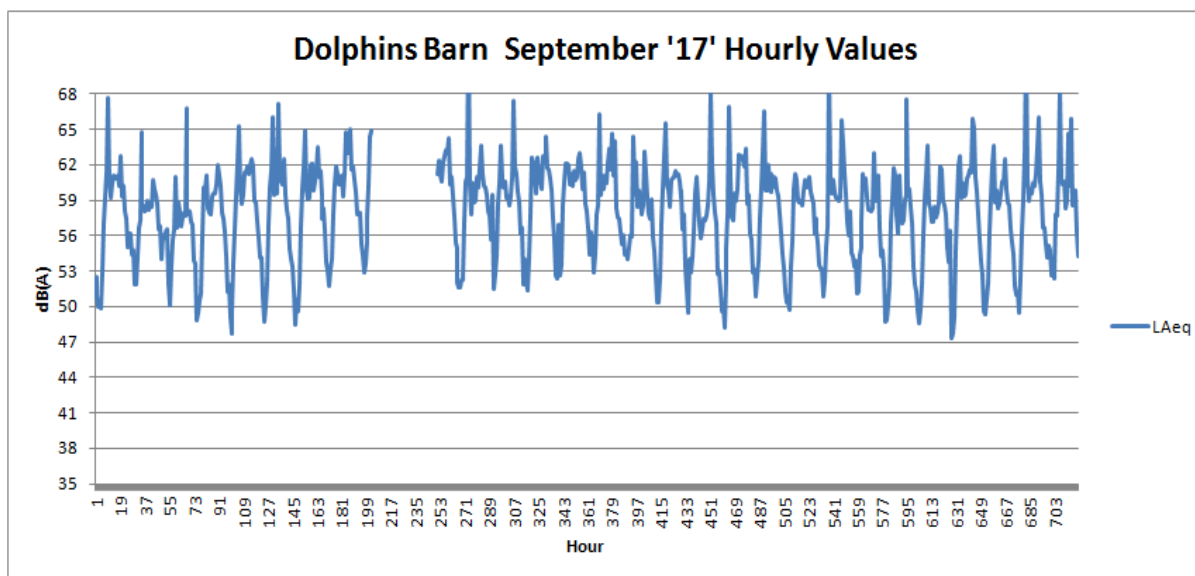
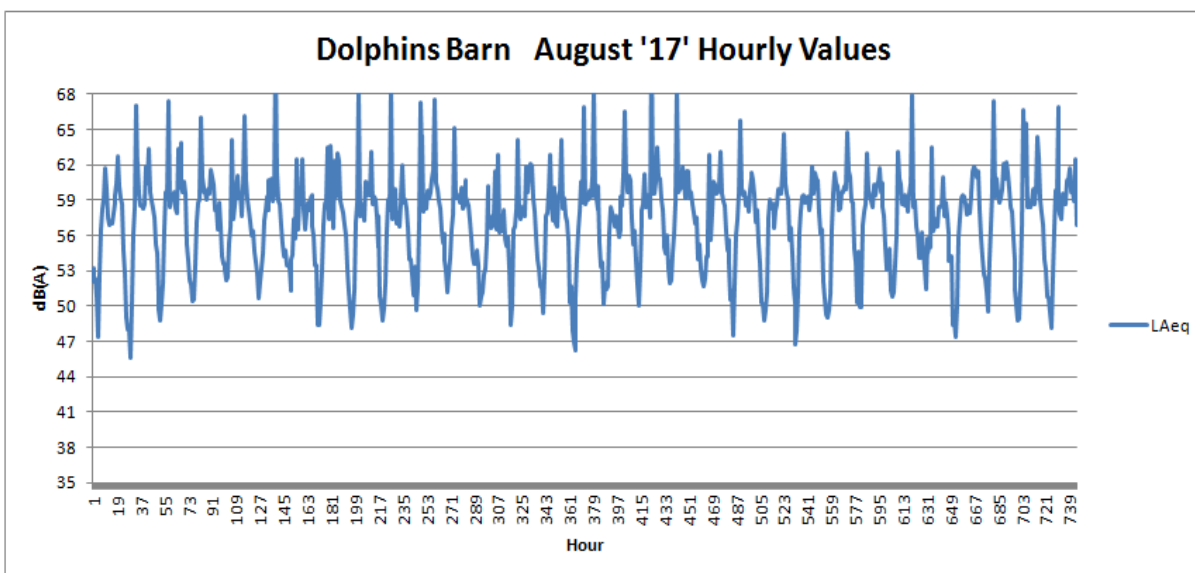
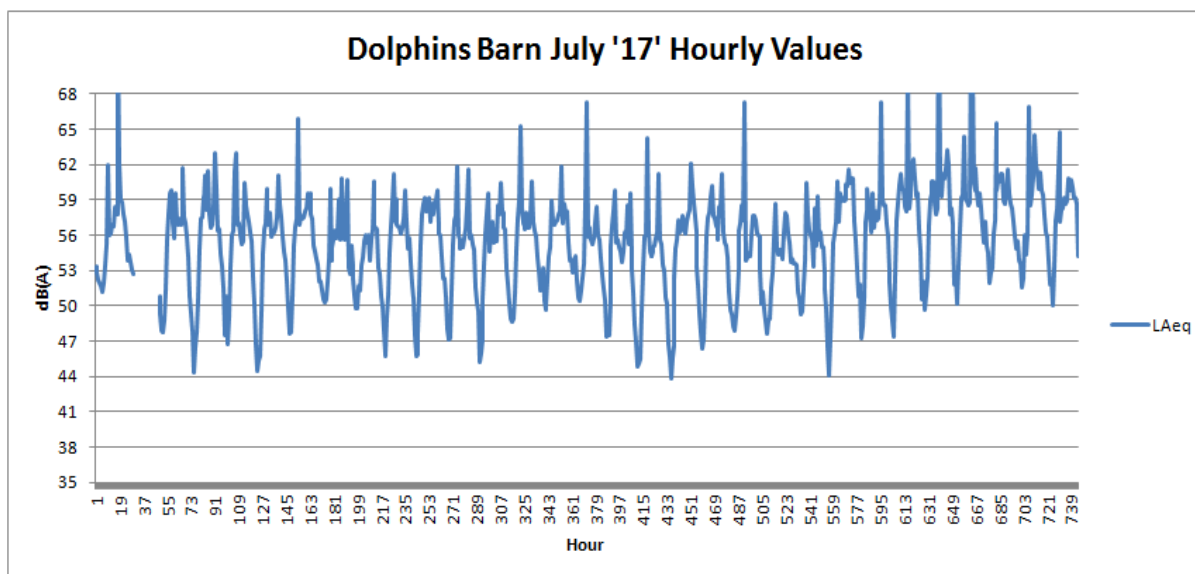
***Dolphin's Barn
Parnell Road.
DUBLIN 8***

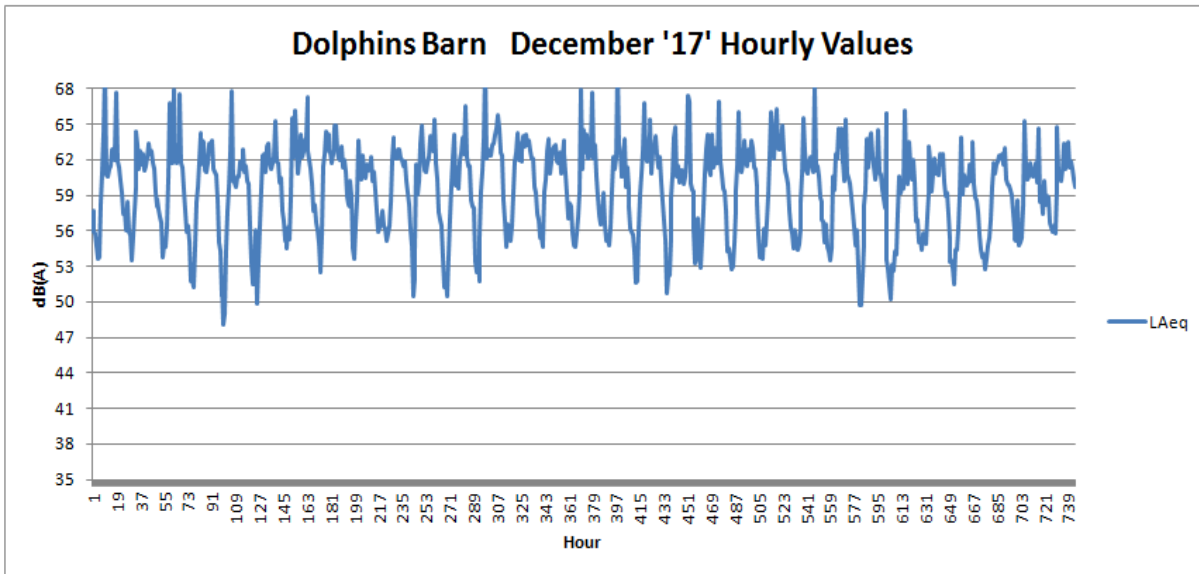
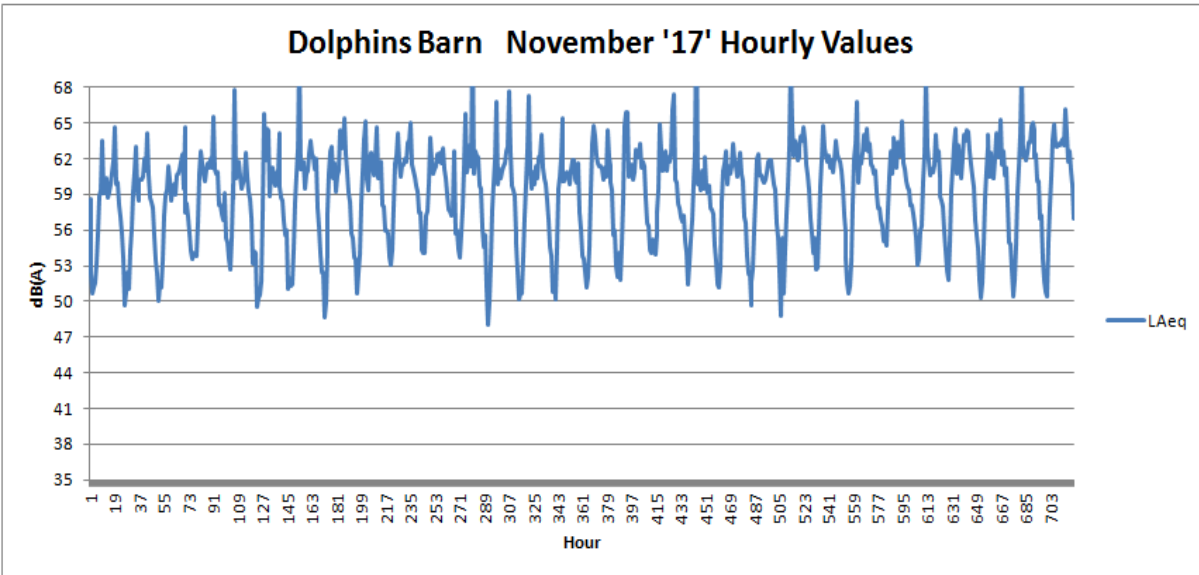
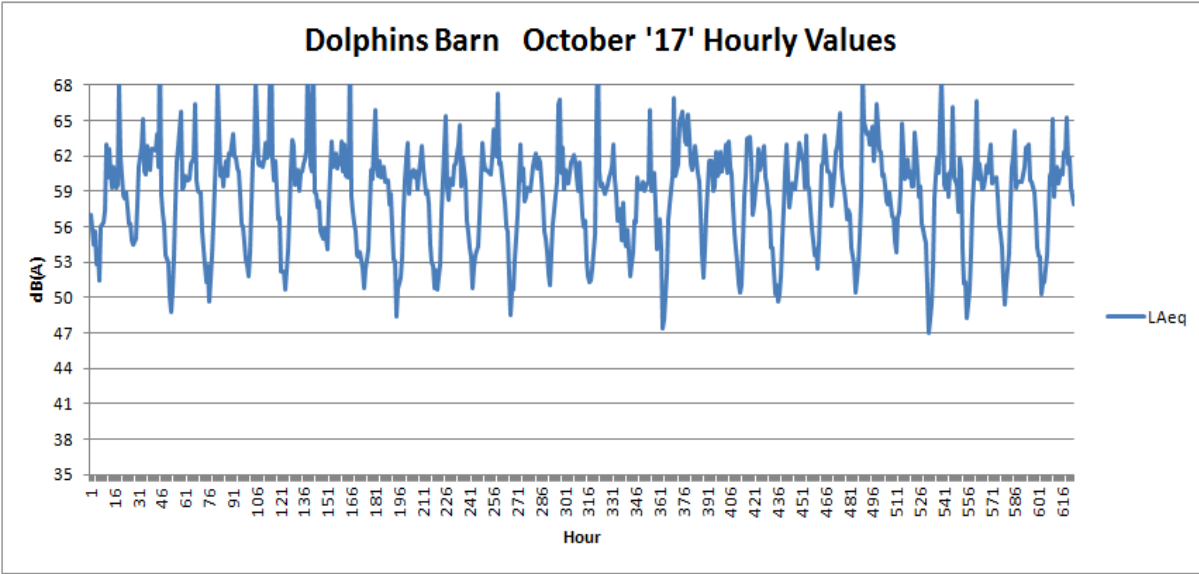




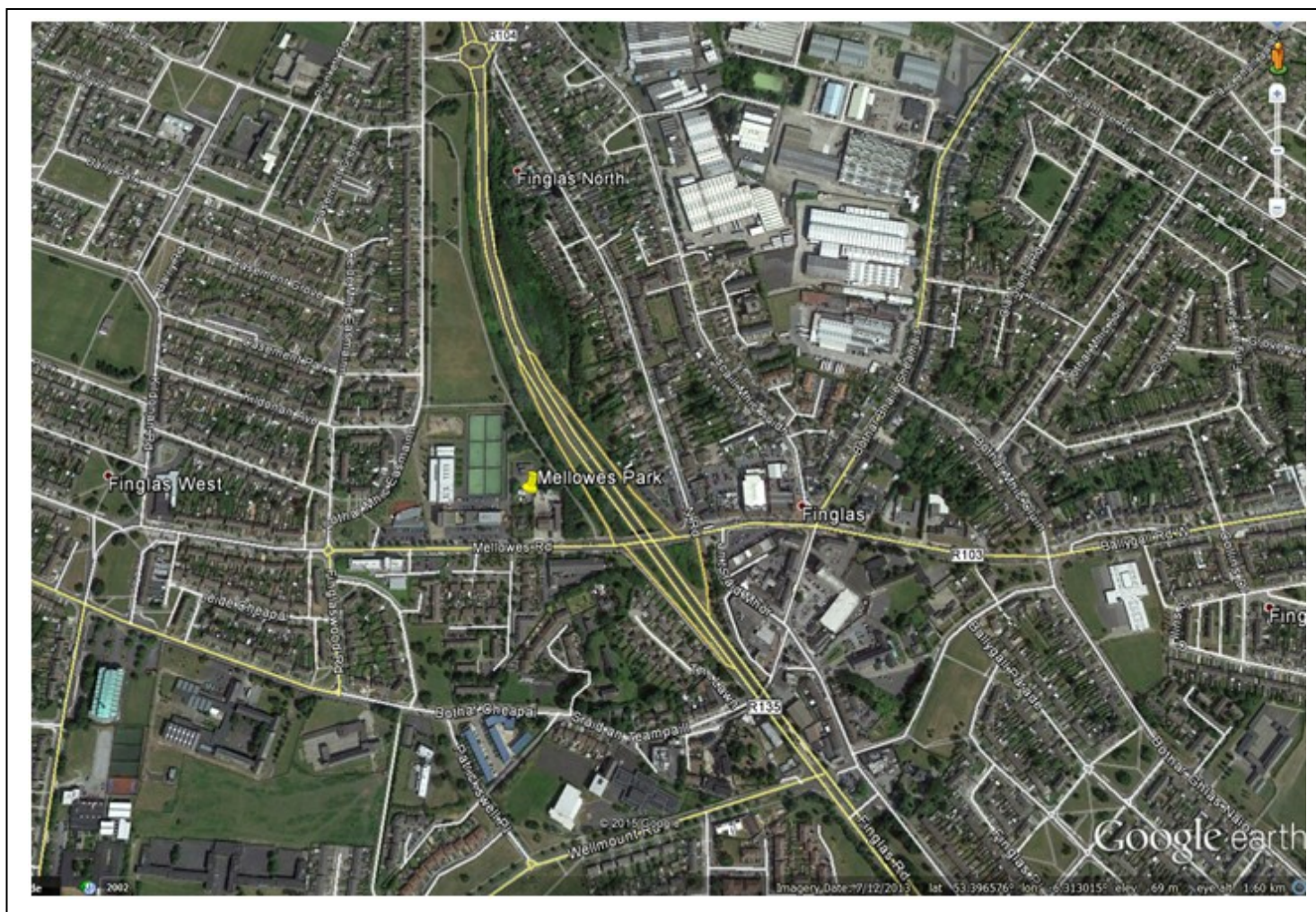


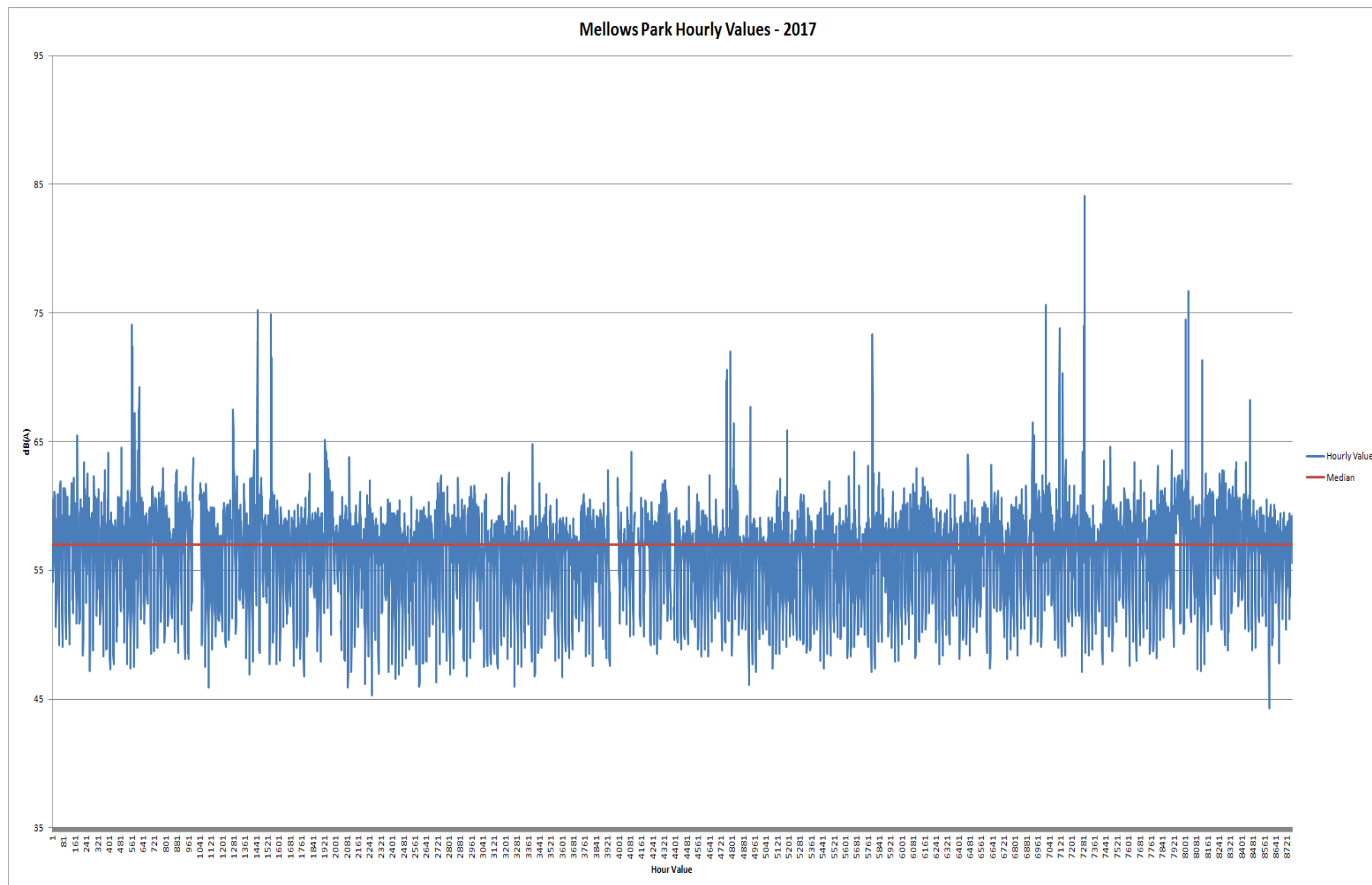


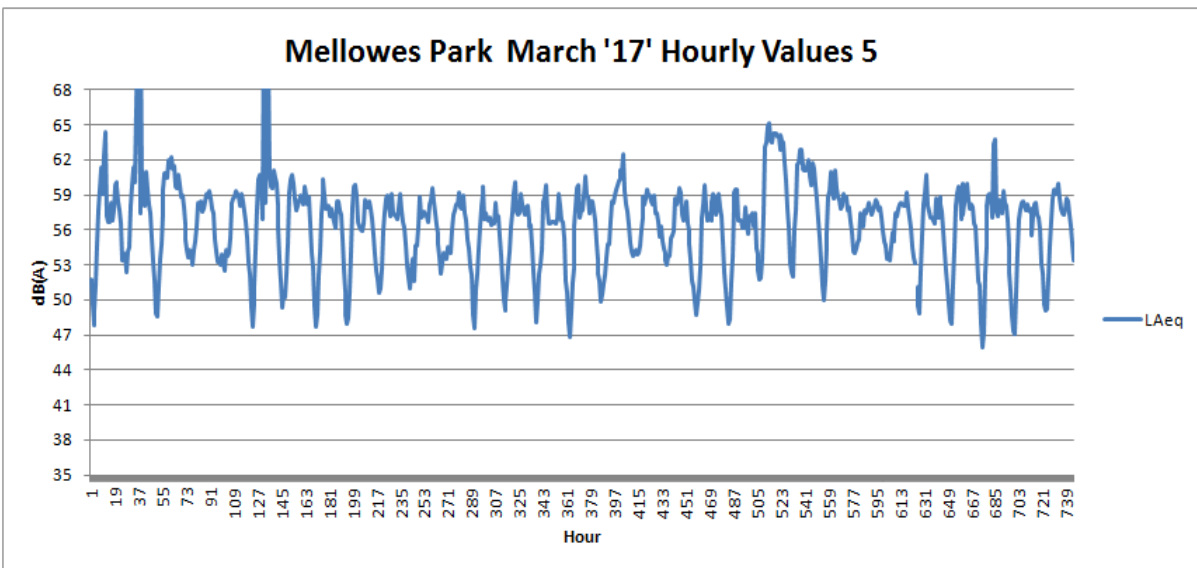
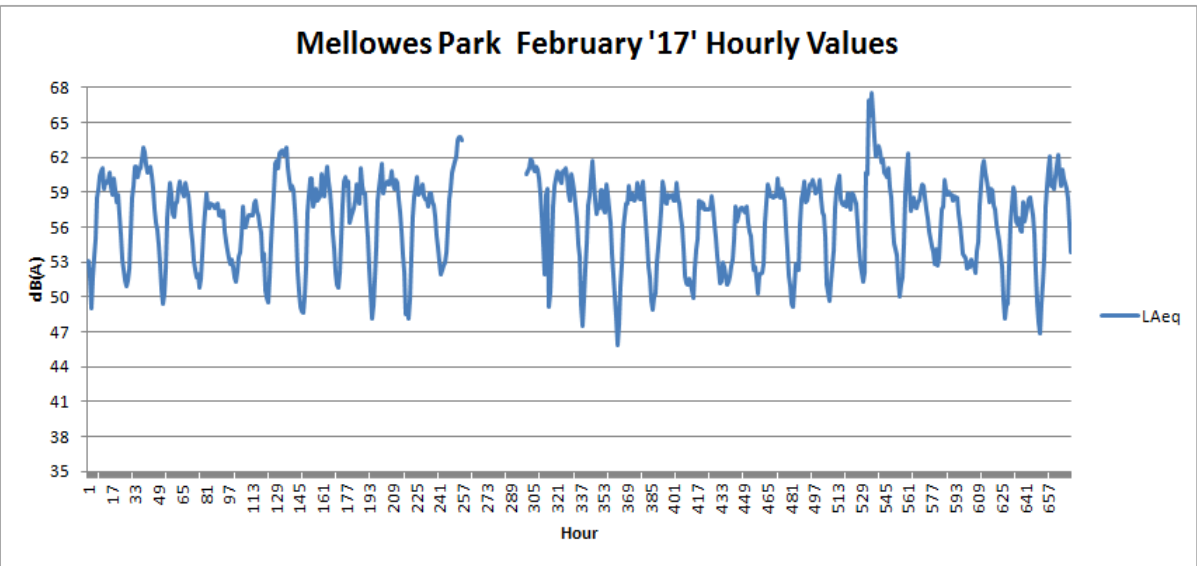
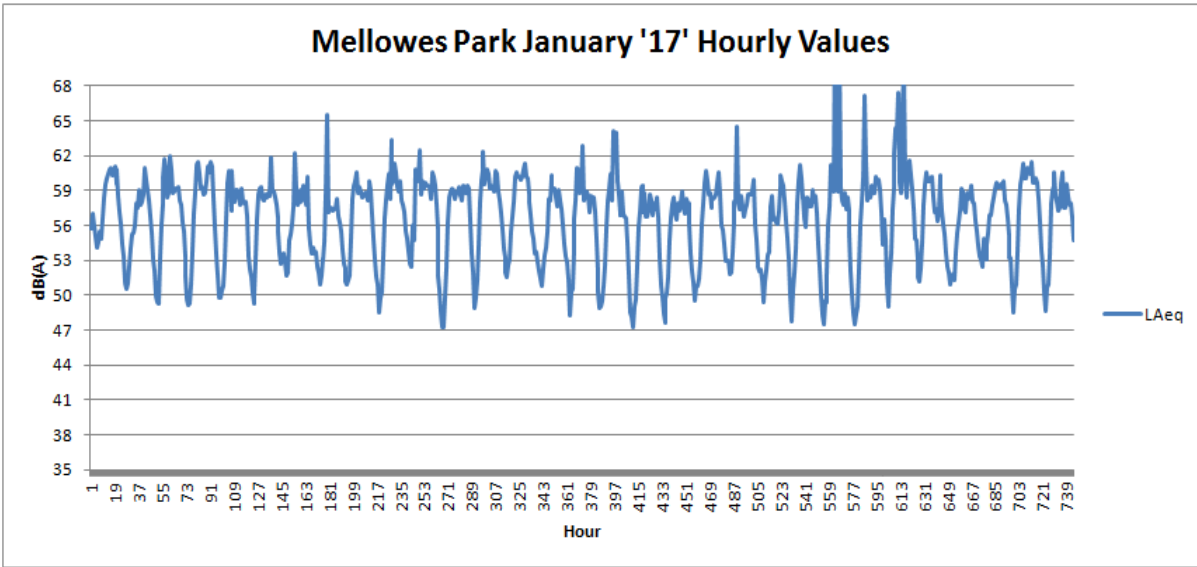


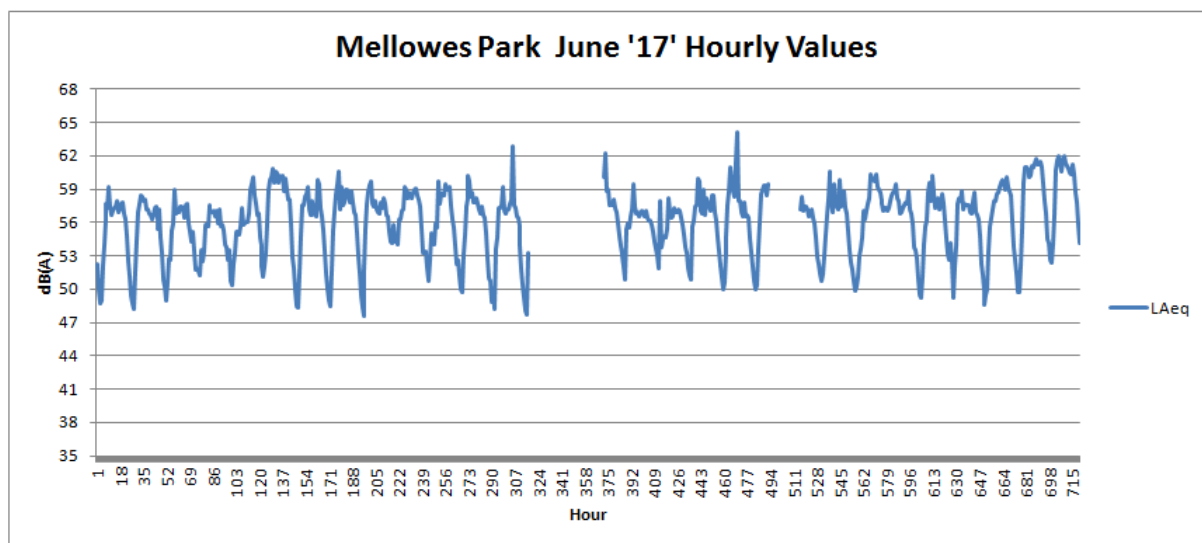
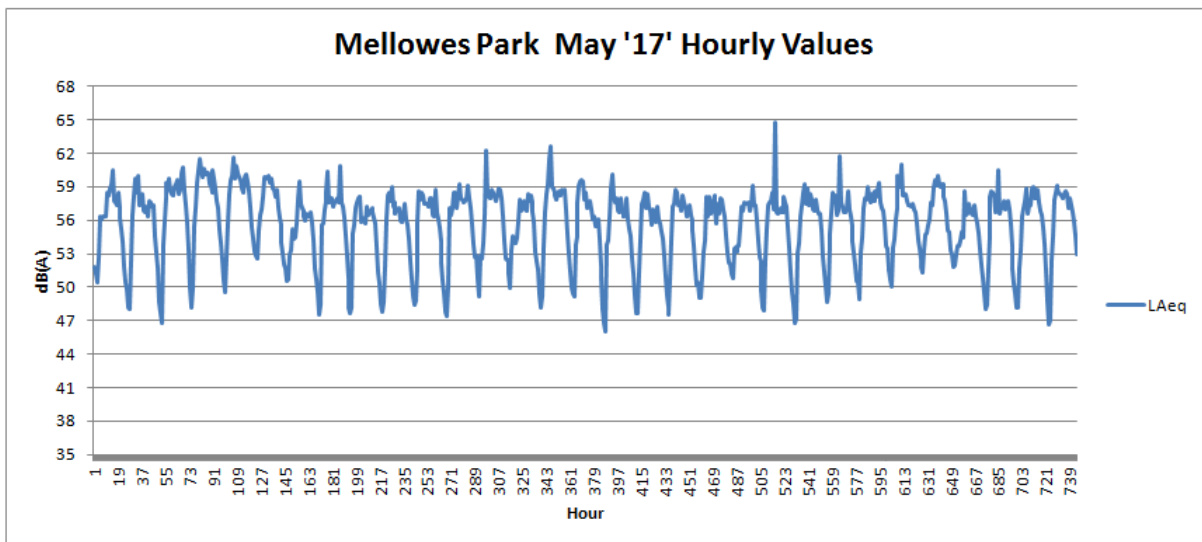
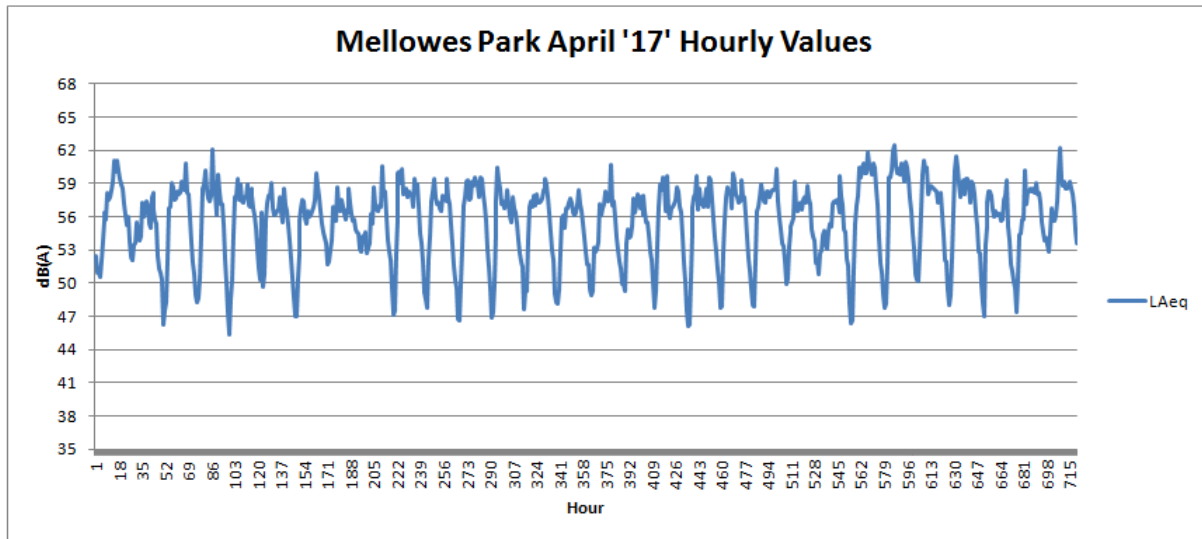


Mellowes Park
Finglas
DUBLIN 11

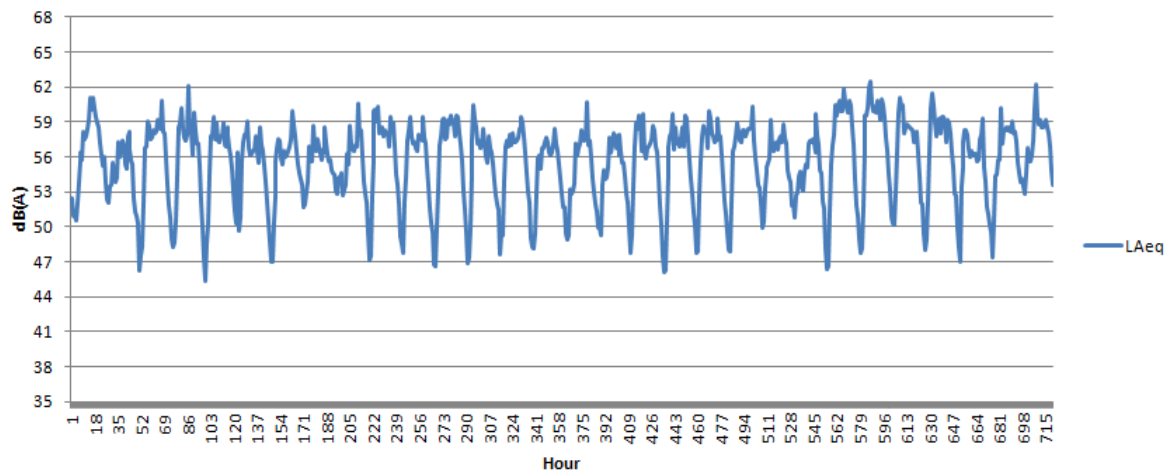




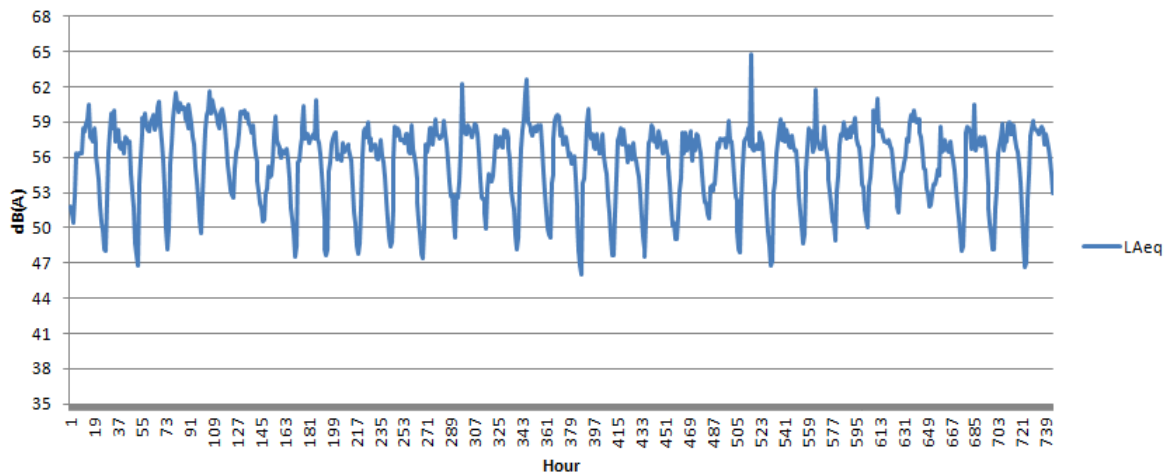




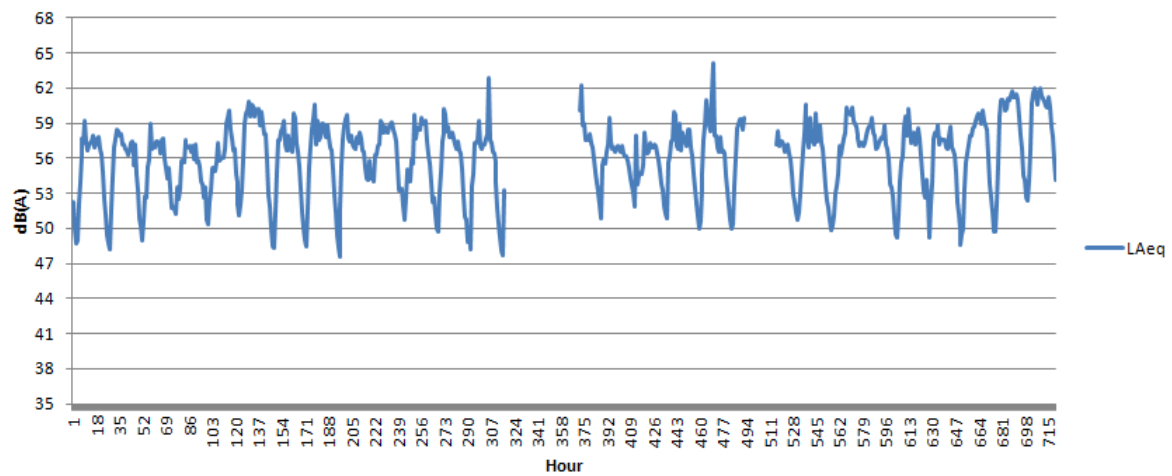
Mellowes Park April '17' Hourly Values

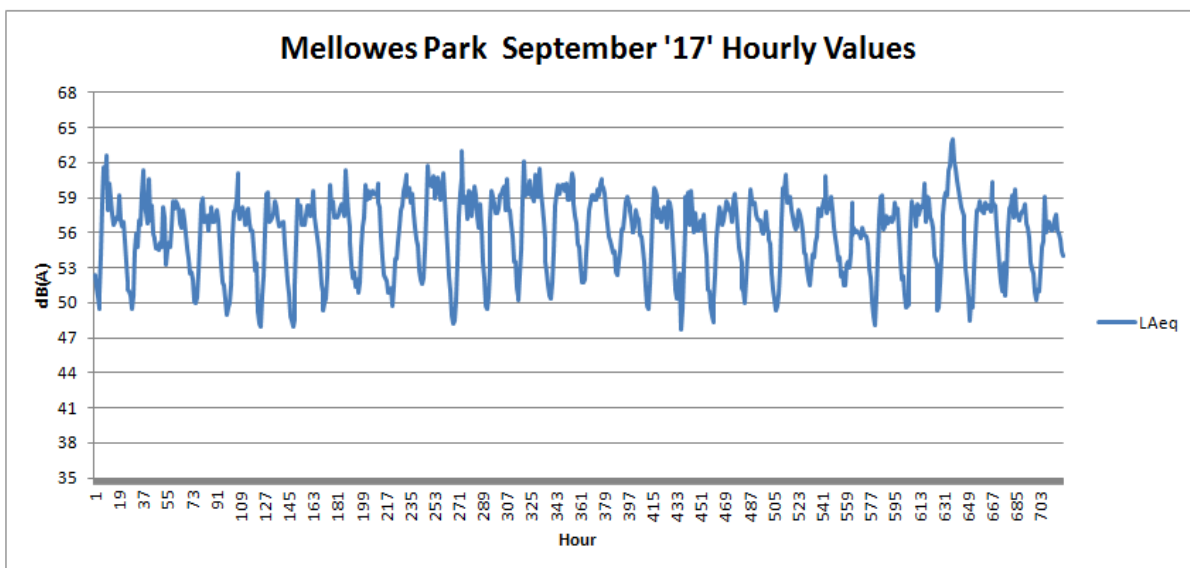
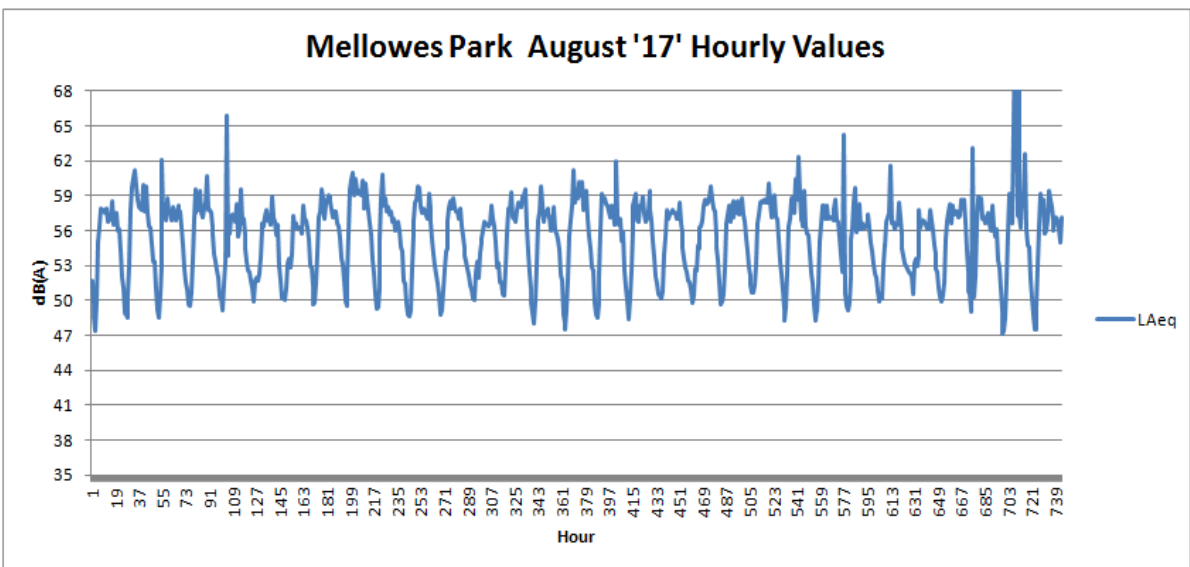
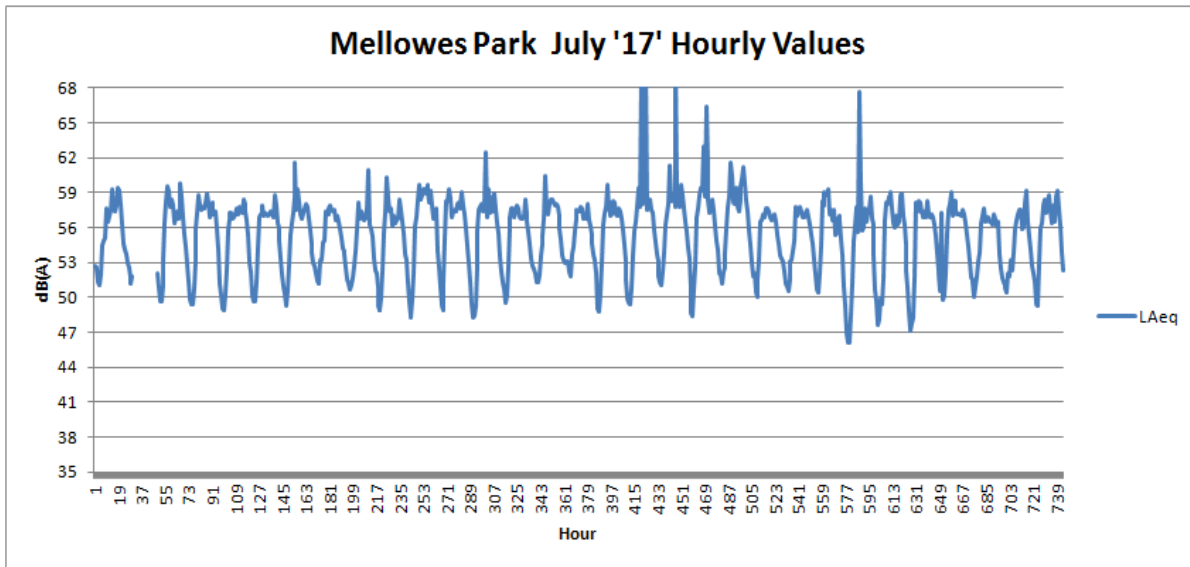


Mellowes Park May'17' Hourly Values



Mellowes Park June '17' Hourly Values





Notes



Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

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