

MANAGING DIRECTORS

MATTHEW PALAVIDIS
VICTOR FATTORETTO

DIRECTORS

MATTHEW SHIELDS
BEN WHITE



United Cinemas, Gregory Hills

Environmental Noise Impact Assessment

SYDNEY

A: 9 Sarah St Mascot NSW 2020
T: (02) 8339 8000
F: (02) 8338 8399

SYDNEY MELBOURNE BRISBANE CANBERRA
LONDON DUBAI SINGAPORE GREECE

www.acousticlogic.com.au

ABN: 11 068 954 343

The information in this document is the property of Acoustic Logic Consultancy Pty Ltd ABN 11 068 954 343 and shall be returned on demand. It is issued on the condition that, except with our written permission, it must not be reproduced, copied or communicated to any other party nor be used for any purpose other than that stated in particular enquiry, order or contract with which it is issued.

DOCUMENT CONTROL REGISTER

| | |
|---------------------------|---------------------------------------|
| Project Number | 20171197.1 |
| Project Name | United Cinemas, Gregory Hills |
| Document Title | Environmental Noise Impact Assessment |
| Document Reference | 20171197.1/1412A/R3/GW |
| Issue Type | Email |
| Attention To | Landon Yan |

| Revision | Date | Document Reference | Prepared By | Checked By | Approved By |
|-----------------|-------------|---------------------------|--------------------|-------------------|--------------------|
| 0 | 11/10/2017 | 20171197.1/1110A/R0/GW | GW | | GW |
| 1 | 24/11/2017 | 20171197.1/2411A/R1/GW | GW | | GW |
| 2 | 11/12/2017 | 20171197.1/1112A/R2/GW | GW | | GW |
| 3 | 14/12/2017 | 20171197.1/1412A/R3/GW | GW | | GW |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

TABLE OF CONTENTS

| | | |
|------------|----------------------------------------------|-----------|
| 1 | INTRODUCTION | 4 |
| 2 | SITE DESCRIPTION | 5 |
| 3 | NOISE DESCRIPTORS | 6 |
| 4 | NOISE EMISSION ASSESSMENT | 7 |
| 4.1 | BACKGROUND NOISE MONITORING | 7 |
| 4.1.1 | Measurement Position | 7 |
| 4.1.2 | Time of Measurement | 8 |
| 4.1.3 | Measurement Equipment | 8 |
| 4.2 | ASSESSMENT CRITERIA | 10 |
| 4.2.1 | Environmental Noise Policy by Camden Council | 10 |
| 4.2.2 | NSW EPA Industrial Noise Policy | 10 |
| 4.2.2.1 | Intrusiveness Criterion | 10 |
| 4.2.2.2 | Amenity Criterion | 10 |
| 4.2.2.3 | Sleep Arousal | 11 |
| 4.2.3 | Summarised Criteria | 11 |
| 4.3 | ASSESSMENT OF NOISE EMISSION | 13 |
| 4.3.1 | Loading Dock Operation | 13 |
| 4.3.1.1 | Noise Sources | 13 |
| 4.3.2 | Noise From Car Park | 15 |
| 4.4 | PLANT NOISE | 15 |
| 5 | CONCLUSION | 16 |

1 INTRODUCTION

The report presents our DA acoustic assessment associated with the proposed United Cinemas at Gregory Hills.

In the report we have:

- Identified and conducted measurements of existing background noise levels.
- Identified appropriate noise emission assessment criteria.
- Identified potential noise sources caused by proposed development.
- Assessed the impacts on nearby sensitive receivers.
- Provided appropriate management and noise control measures.

The report is based on the following architectural drawings provided to this office.

Table 1 – Architectural Drawings used for Assessment

| Sheet No | Issue | Date |
|----------|-------|----------|
| DA00 | D | 21/11/17 |
| DA10 | E | 23/11/17 |
| DA11 | D | 21/11/17 |
| DA12 | D | 21/11/17 |
| DA13 | D | 21/11/17 |
| DA14 | D | 21/11/17 |
| DA15 | D | 21/11/17 |
| DA20 | E | 23/11/17 |
| DA21 | D | 21/11/17 |
| DA22 | D | 21/11/17 |
| DA25 | D | 21/11/17 |

2 SITE DESCRIPTION

The project site is located at the corner of Lasso Rd and Steer Rd with 112 open car park spaces at rear of site. The site is surrounded by existing commercial/industrial development. The nearest residential receivers are below:

- Receiver 1- Houses located immediately across Camden Valley Way which is approximate 300m distance from the nearest facade of project site.
- Receiver 2- Houses located immediately across Discovery Circuit which is approximate 400m distance from project site.

The proposed operation hours of project site are 9am to 12am every day and 12 times a year for midnight screenings 3am close. Figure below shows the site map and measurement location.

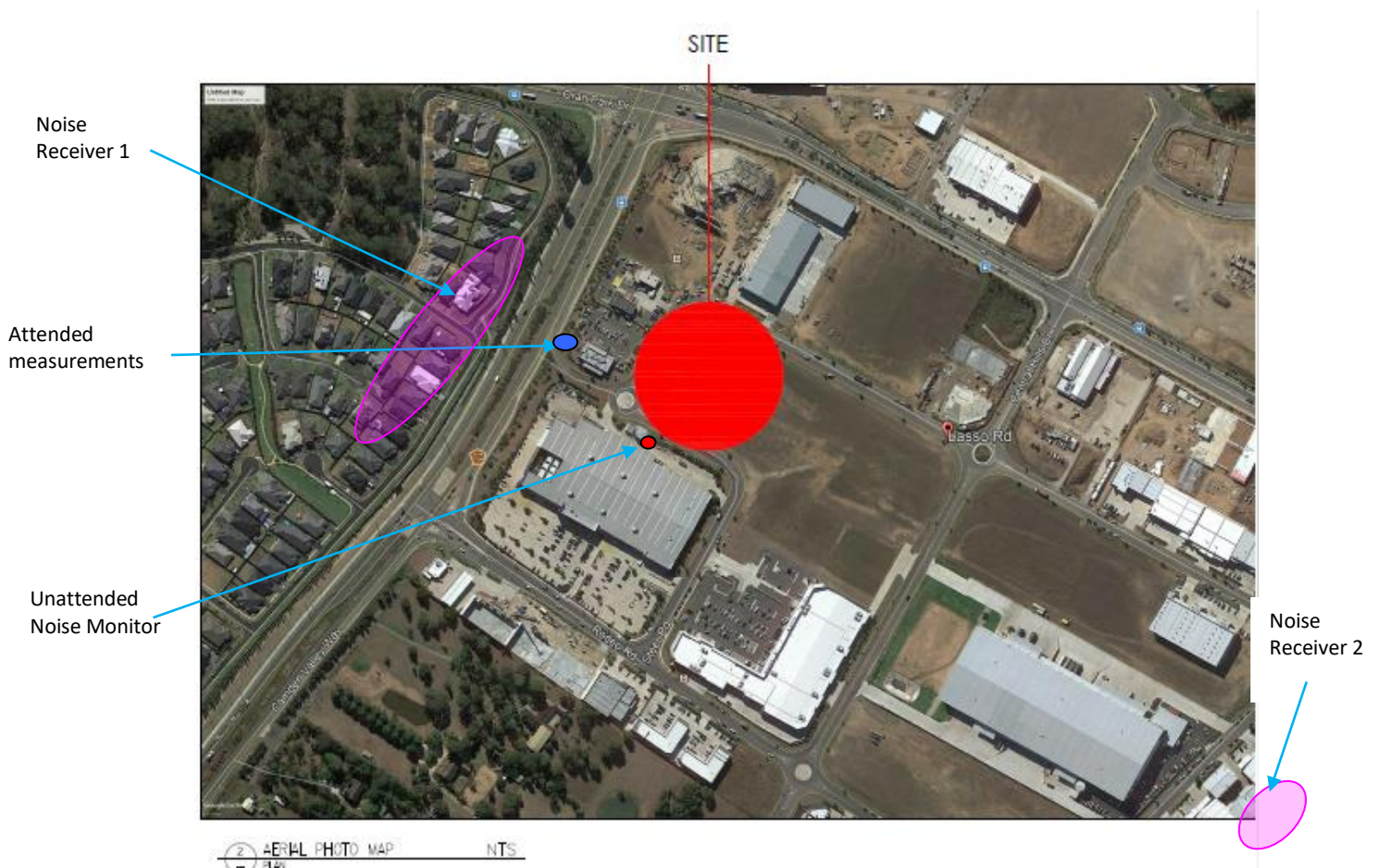


Figure 1 Site Map

3 NOISE DESCRIPTORS

Environmental noise constantly varies in level, due to fluctuations in local noise sources including road traffic. Accordingly, a 15 minute measurement interval is normally utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In the case of environmental noise three principle measurement parameters are used, namely L_{10} , L_{90} and L_{eq} .

The L_{10} and L_{90} measurement parameters are statistical levels that represent the average maximum and average minimum noise levels respectively, over the measurement intervals.

The L_{10} parameter is commonly used to measure noise produced by a particular intrusive noise source since it represents the average of the loudest noise levels produced by the source.

Conversely, the L_{90} level (which is commonly referred to as the background noise level) represents the noise level heard in the quieter periods during a measurement interval. The L_{90} parameter is used to set the allowable noise level for new, potentially intrusive noise sources since the disturbance caused by the new source depends on how audible it is above the pre-existing noise environment, particularly during quiet periods, as represented by the L_{90} level.

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the measurement period. L_{eq} is important in the assessment of traffic noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of industrial noise.

4 NOISE EMISSION ASSESSMENT

The main noise emitted from the project site will be those from the mechanical plant servicing the site and operational noise from the proposed carpark. Detailed mechanical equipment selection and layouts are not available at this stage, detailed acoustic assessment will be conducted at construction certificate stage. The external noise emission criteria are set up in this section of the report to ensure that the acoustic amenity of nearby residents is not adversely affected.

4.1 BACKGROUND NOISE MONITORING

Noise emission objectives from the premises will be determined with reference to existing ambient noise levels. Existing ambient noise levels have been determined based on long term noise monitoring conducted on site.

4.1.1 Measurement Position

The noise monitor was installed immediately across Steel Road with microphone not facing traffic, approximately 1.5m above the ground. Photo of noise logger is below.



4.1.2 Time of Measurement

Monitoring has been conducted between 22nd September 2017 and 3rd October 2017.

4.1.3 Measurement Equipment

Equipment used consisted of an Acoustic Research Laboratories Pty Ltd noise logger. The logger was set to A-weighted fast response and was programmed to store 15-minute statistical noise levels throughout the monitoring period. The monitor was calibrated at the start and end of the monitoring period using a Rion NC-73 calibrator. No significant drift was noted. Noise logger data is provided in Appendix 1. Measurements indicate that there has been a slight increase in the rating background noise levels at this site since the previous assessment.

The measurement results are presented in Table 3 below.

Table 2 – Measured Rating Background Noise Levels

| Location | Period | Rating Background Noise Level dB(A)_{L₉₀} |
|-----------------|----------------------|---------------------------------------------------------------------|
| Steer Road | Day (7am – 6pm) | 46 |
| | Evening (6pm – 10pm) | 45 |
| | Night (10pm – 3am) | 39 |

4.2 ASSESSMENT CRITERIA

The following noise emission criteria have been adopted for this assessment:

- Environmental Noise Policy by Camden Council dated 10 June 2008
- EPA Industrial Noise Policy

4.2.1 Environmental Noise Policy by Camden Council

Operational noise from the development will need to be assessed in accordance with the DECC's NSW Industrial Noise Policy. All developments must be designed to "Acceptable Recommended" LAeq Noise Levels in Table 2.1 of that document. The Recommended Maximum LAeq Noise Levels in Table 2.1 are not to apply to any development. (Refer to Table 4.3.1 of this Policy, page 16).

4.2.2 NSW EPA Industrial Noise Policy

The EPA Industrial Noise Policy, has two criteria which need to be satisfied namely Intrusiveness and Amenity.

The EPA Industrial Noise Policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. Under the policy the nearest residence would be assessed against the rural criteria.

Noise levels are to be assessed at the property boundary or nearby dwelling, or at the balcony or façade of an apartment.

4.2.2.1 Intrusiveness Criterion

The guideline is intended to limit the audibility of noise emissions at residential receivers and requires that noise emissions measured using the L_{eq} descriptor not exceed the background noise level by more than 5dB(A). Where applicable, the intrusive noise level should be penalised (increased) to account for any annoying characteristics such as tonality.

Background noise levels adopted are presented in Section 4.1. Noise emissions from the site should comply with the noise levels presented below when measured at nearby property boundary.

4.2.2.2 Amenity Criterion

The guideline is intended to limit the absolute noise level from all noise sources to a level that is consistent with the general environment.

The EPA's Industrial noise policy sets out acceptable noise levels for various localities. Table 2.1 on page 16 of the policy indicates 4 categories to distinguish different residential areas. They are rural, suburban, urban and urban/industrial interface. This site is categorised by the residential receivers as rural.

For the purposes of this condition:

- Day is defined as the period from 7am to 6pm Monday to Saturday and 8am to 6pm Sundays and Public Holidays;

- Evening is defined as the period from 6pm to 10pm.
- Night is defined as the period from 10pm to 7am Monday to Saturday and 10pm to 8am Sundays and Public Holidays

Table 3 – EPA Amenity Noise Levels

| Type of Receiver | Time of day | Recommended Noise Level dB(A) _{Leq(period)} | |
|---------------------|-------------|---------------------------------------------------------|---------|
| | | Recommended | Maximum |
| Residential - Rural | Day | 50 | 55 |
| | Evening | 45 | 50 |
| | Night | 40 | 45 |
| Commercial premises | When in use | 65 | 70 |
| Industrial premises | When in use | 70 | 75 |

4.2.2.3 Sleep Arousal

To minimise the potential for sleep arousal the L_1 (1 minute) noise level of any specific noise source does not exceed the background noise level (L_{90}) by more than 15 dB(A) outside a resident's bedroom window between the hours of 10pm and 7am.

The L_1 noise level is the level exceeded for 1 per cent of the time and approximates the typical maximum noise level from a particular source. Where the typical repeatable existing L_1 levels exceed the above requirement then the existing L_1 levels form the basis for, sleep disturbance criteria.

4.2.3 Summarised Criteria

The outdoor seating area of the hotel (licensed premises) will be assessed against OLGR guidelines, the rest of the operation noise of the site will be assessed against the EPA Industrial Noise Policy.

Table 4 – EPA INP Noise Emission Criteria (Residential)

| Time Period | Assessment Background Noise Level dB(A) _{L90} | Amenity Criteria dB(A) _{Leq} | Intrusiveness Criteria Background + 5 dB(A) _{Leq(15min)} | EPA Criteria for Sleep Disturbance dB (A) _{L1(1minute)} |
|-------------|-----------------------------------------------------------|------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------|
| Day | 46 | 50 | 51 | N/A |
| Evening | 45 | 45 | 50 | N/A |
| Night | 39 | 40 | 44 | 54 |

Table 5 – EPA INP Noise Emission Criteria (Non-Residential)

| Receiver | Time of Day | Amenity Criteria dB(A) L_{eq} |
|-----------------|--------------------|----------------------------------------------|
| Commercial | When in use | 65 |
| Industrial | When in use | 70 |

4.3 ASSESSMENT OF NOISE EMISSION

Noise emissions from the site are assessed against the corresponding acoustic guidelines presented in Section 5.2.

Noise from music /speech within the cinemas shall not be audible at any residential receivers with walls and roof/ceiling structure minimum R_w 50 ratings. The major potential noise emission sources are below:

- Operation of loading dock;
- Carpark noise;
- Plant service project building.

4.3.1 Loading Dock Operation

4.3.1.1 Noise Sources

The potential significant noise source will be the operation of truck on site. The noise level is listed in [Table 6](#) below.

Table 6 – Source Noise Data

| Equipment/Activity | Noise Level |
|-----------------------|-------------------------------------------|
| Truck Idle | 99 |
| Trucks Manoeuvring | 103 |
| Truck reversing alarm | 108 including 5 dB(A) tonality correction |
| Truck Start | 75 dB(A) SEL @ 7m |
| Truck Air Brake | 89 dB(A) SEL @ 7m |

* includes 5 dB(A) tonality penalty for reversing alarms

Noise emission from the project site has been predicted based on the source noise data above and the proposed loading dock layout. Noise predictions for operational noise emission levels for the worst case scenarios for the L_{eq} noise level and L_1 noise level. The L_{eq} noise level was calculated by taking into account cumulative effect of all noise sources. Additionally, the following assumptions have been made:

- 2 truck movements per hour during peak operation.

The predicted noise level is presented in [Table 7](#) below.

Table 7 – Predicted Noise Level from Loading Dock

| Noise Receiver | Predicted Noise Level | Criteria dB(A) L_{eq} | Compliance |
|---------------------------------|-----------------------|-------------------------|------------|
| Commercial facility to the west | 60 | 65 dB(A) L_{eq} | Yes |
| Residential Camden Valley Way | < 40 | 50 dB(A) L_{eq} | Yes |

| | | | |
|-----------------------------------------|------|--------------------------|-----|
| Residential across Discovery Circuit | < 40 | 50 dB(A) L _{eq} | Yes |
|-----------------------------------------|------|--------------------------|-----|

4.3.2 Noise From Car Park

Predictions will be made based on the following data/assumptions:

- Sound power level of a car travelling at 10km/hr being 84dB(A) L_{eq} , based on measurements conducted by this office;
- Worst case scenario of 120 cars entering into the car park over one hour time.
- Door slamming noise 89 dB(A) L_{max} @ 1m distance measured by this office

Noise emissions from cars manoeuvring within the car park at the nearest receivers will be assessed below.

The predicted noise levels in the internal areas have been calculated.

Table 8 – Predicted Noise Levels from Car Park Noise

| Receiver Location | Predicted Noise Level – dB(A) $L_{eq(15min)}$ | Noise Emission Criteria dB(A) L_{eq} | Complies |
|------------------------------------------------|----------------------------------------------------|---------------------------------------------------|----------|
| Receiver 1: Houses across Camden Valley Way | < 35 dB(A) $L_{eq(15min)}$ < 40 dB(A) L_{max} | Night -40dB(A) L_{eq} 54 dB(A) $L_{1, 1min}$ | Yes |
| Receiver 2: Houses across Discovery Circuit | < 32 dB(A) $L_{eq(15min)}$ < 37 dB(A) L_{max} | Night -40dB(A) L_{eq} 54 dB(A) $L_{1, 1min}$ | Yes |

4.4 PLANT NOISE

Detailed plant selection has not been undertaken at this stage, as plant selections have not been determined. Detailed acoustic review should be undertaken at CC stage to determine acoustic treatments to control noise emissions to satisfactory levels. Satisfactory levels will be achievable through appropriate plant selection and location and, if necessary, standard acoustic treatments such as duct lining, acoustic silencers and enclosures.

Noise emissions from all mechanical services to the closest residential receiver should comply with the requirements of section 4.2.

5 CONCLUSION

This report presents our acoustic assessment for the proposed United Cinemas Gregory Hills. Noise emissions from the project site were found fully comply with the requirements of Environmental Noise Policy by Camden Council and NSW EPA Industrial Noise Policy.

Please contact us should you have any further queries.

We trust this information is satisfactory. Please contact us should you have any further queries.

Yours faithfully,

A handwritten signature in black ink, appearing to read 'George Wei', is centered on the page. The signature is fluid and cursive, with the first name 'George' and the last name 'Wei' clearly distinguishable.

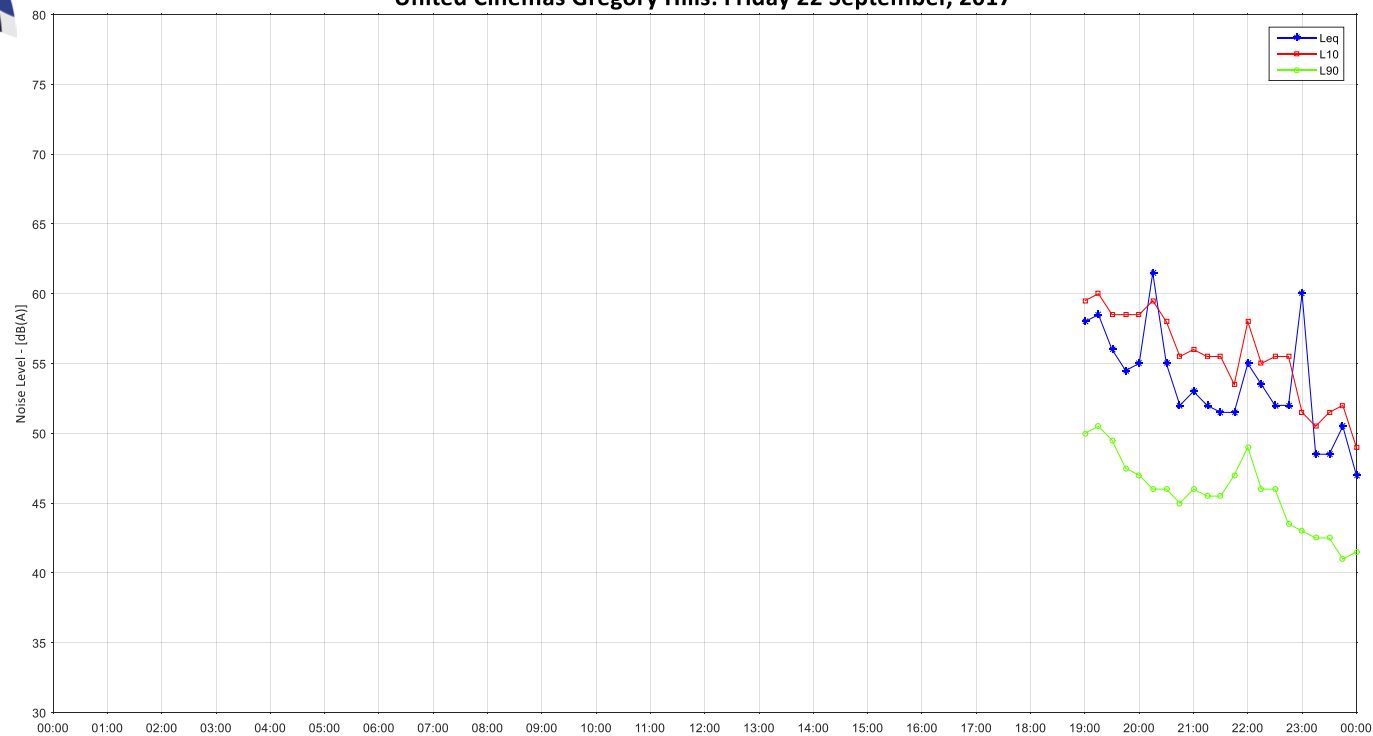
Acoustic Logic Consultancy Pty Ltd
George Wei

Associate Director

Appendix 1- Unattended Background Noise Data

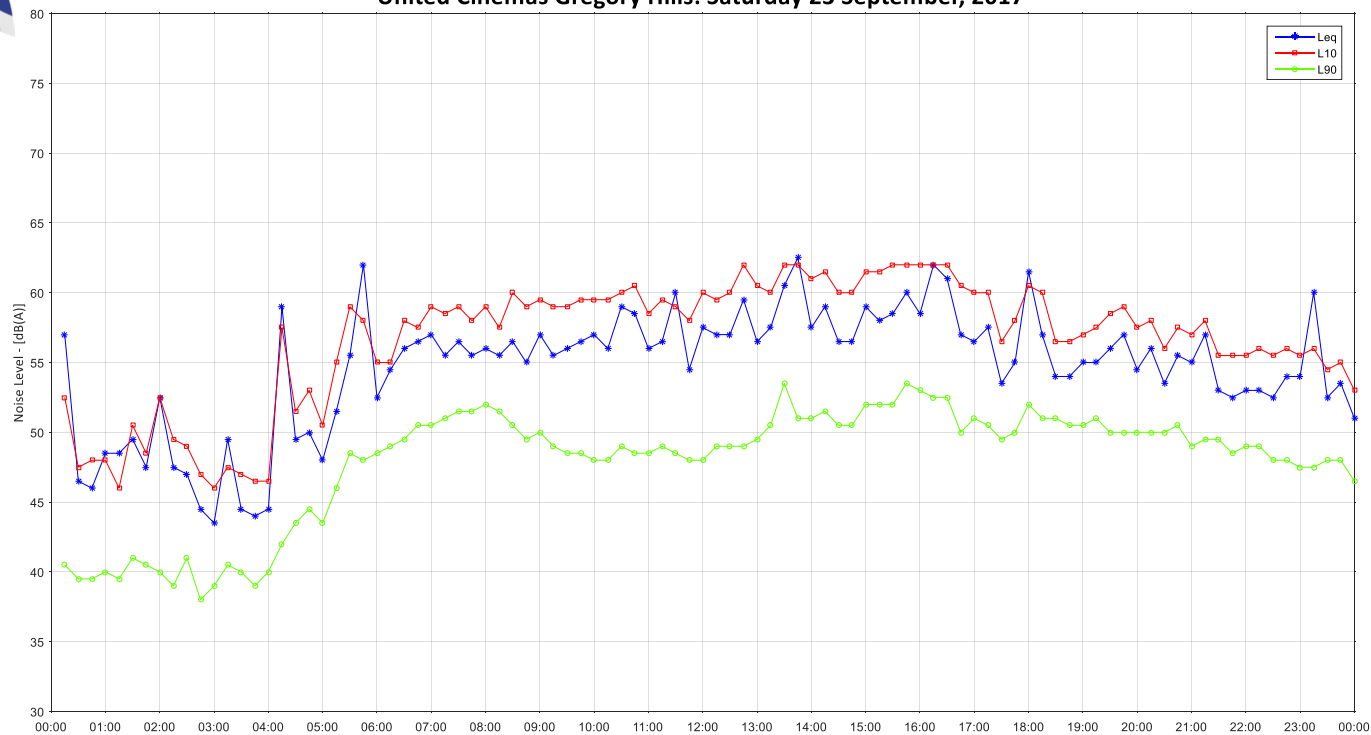


United Cinemas Gregory Hills: Friday 22 September, 2017



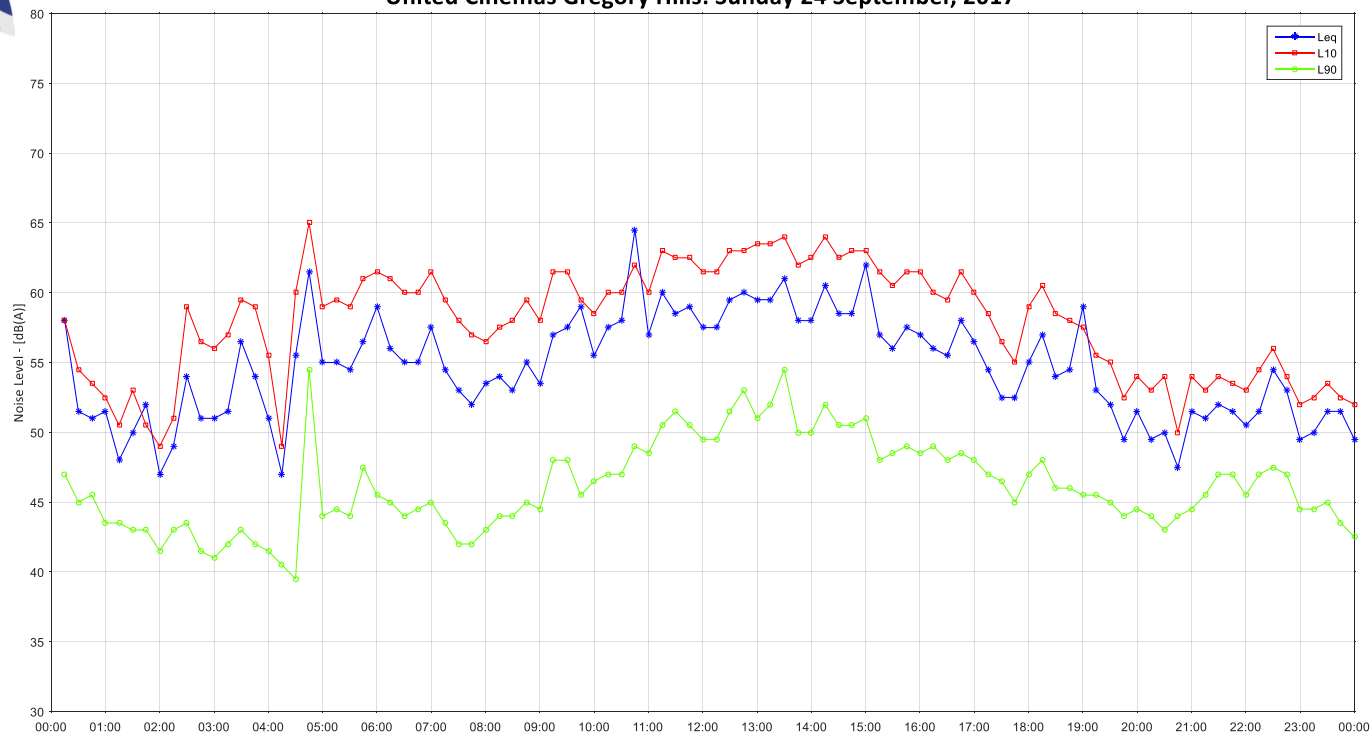


United Cinemas Gregory Hills: Saturday 23 September, 2017



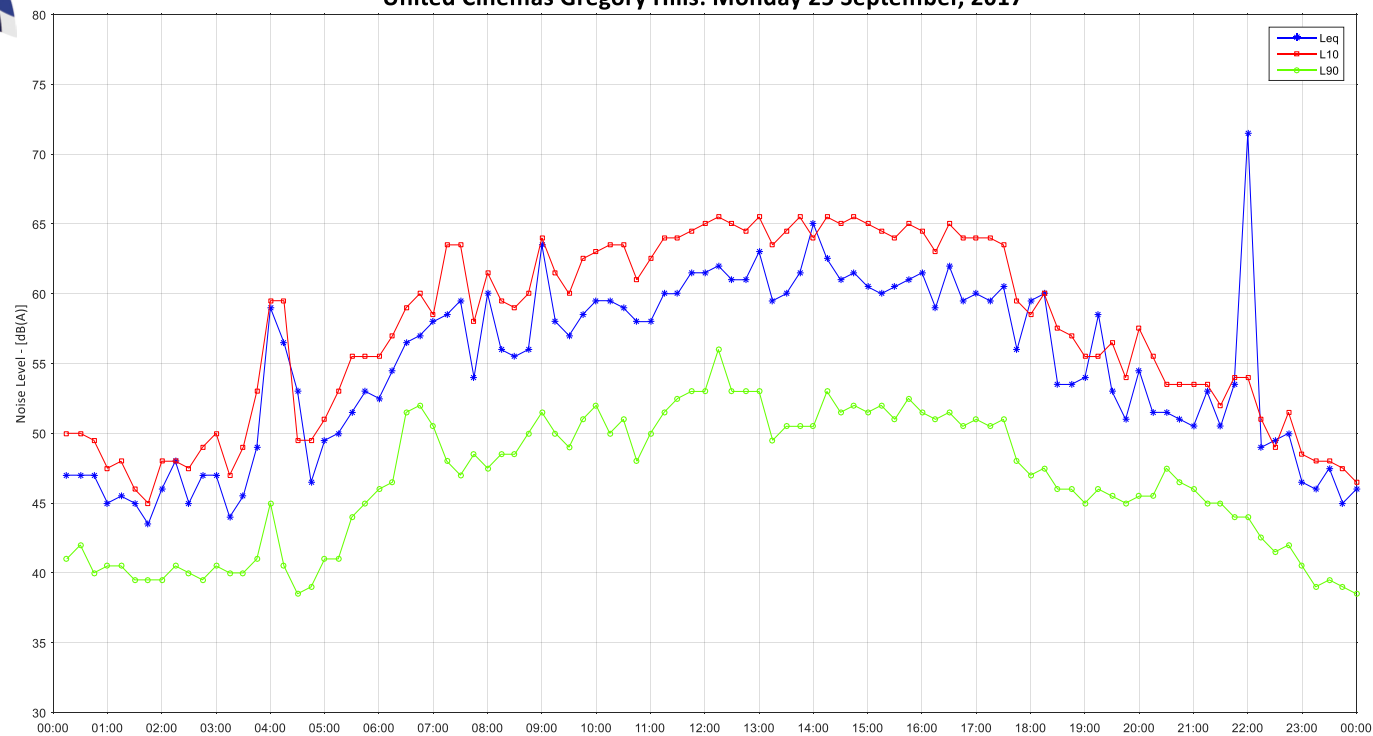


United Cinemas Gregory Hills: Sunday 24 September, 2017



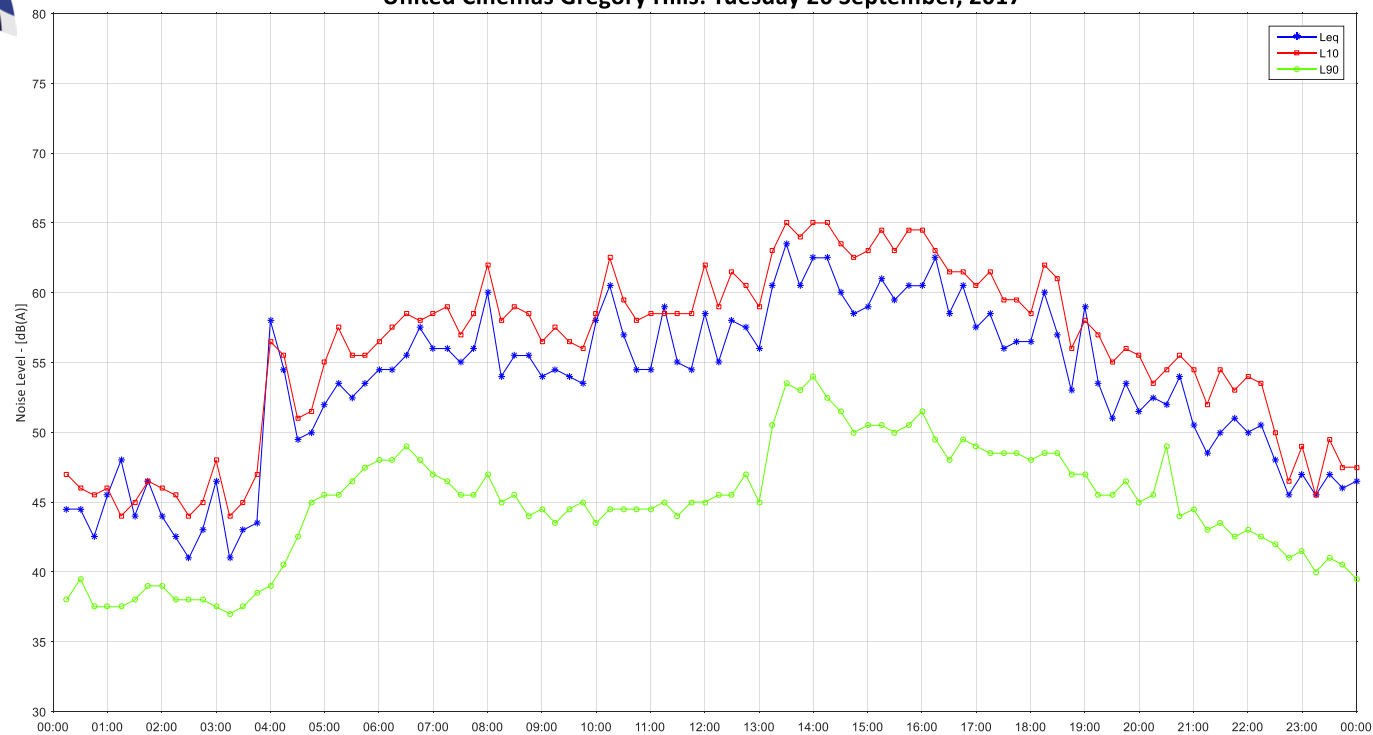


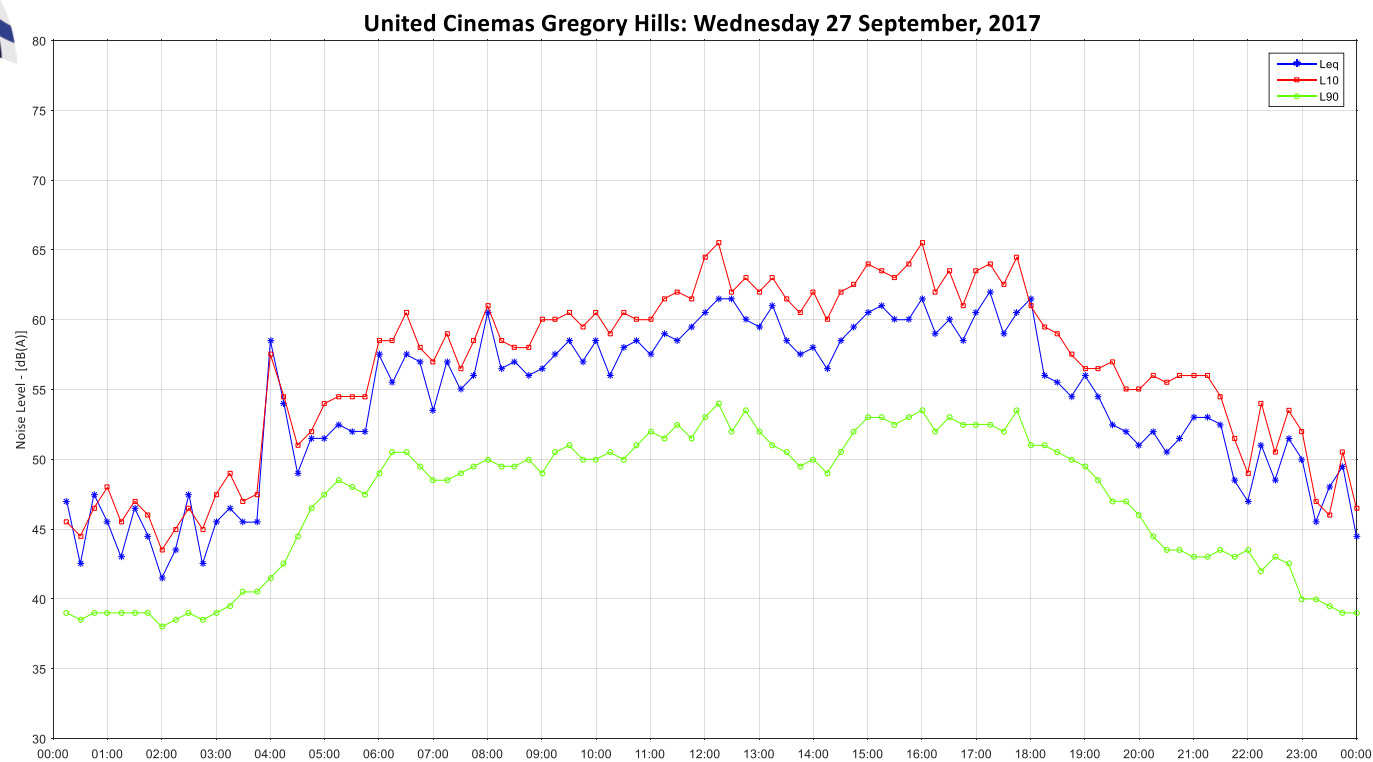
United Cinemas Gregory Hills: Monday 25 September, 2017





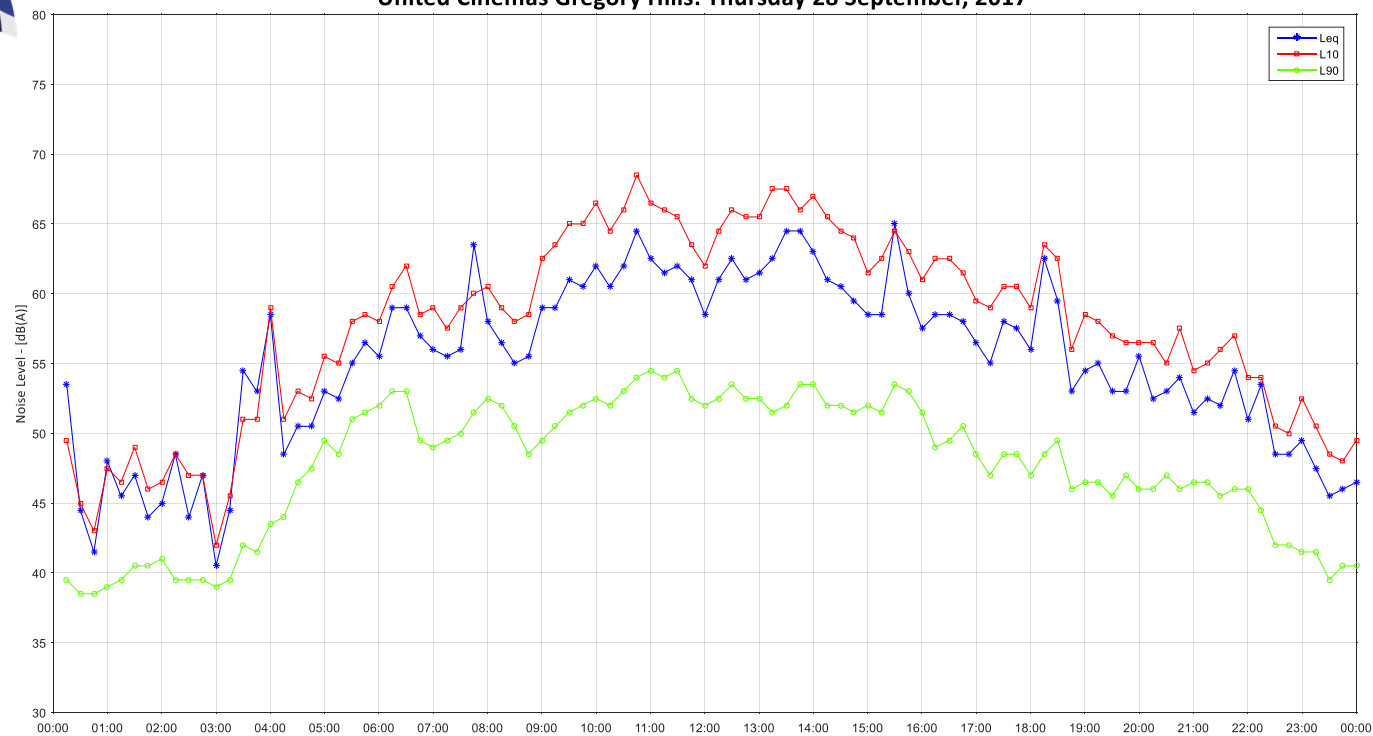
United Cinemas Gregory Hills: Tuesday 26 September, 2017

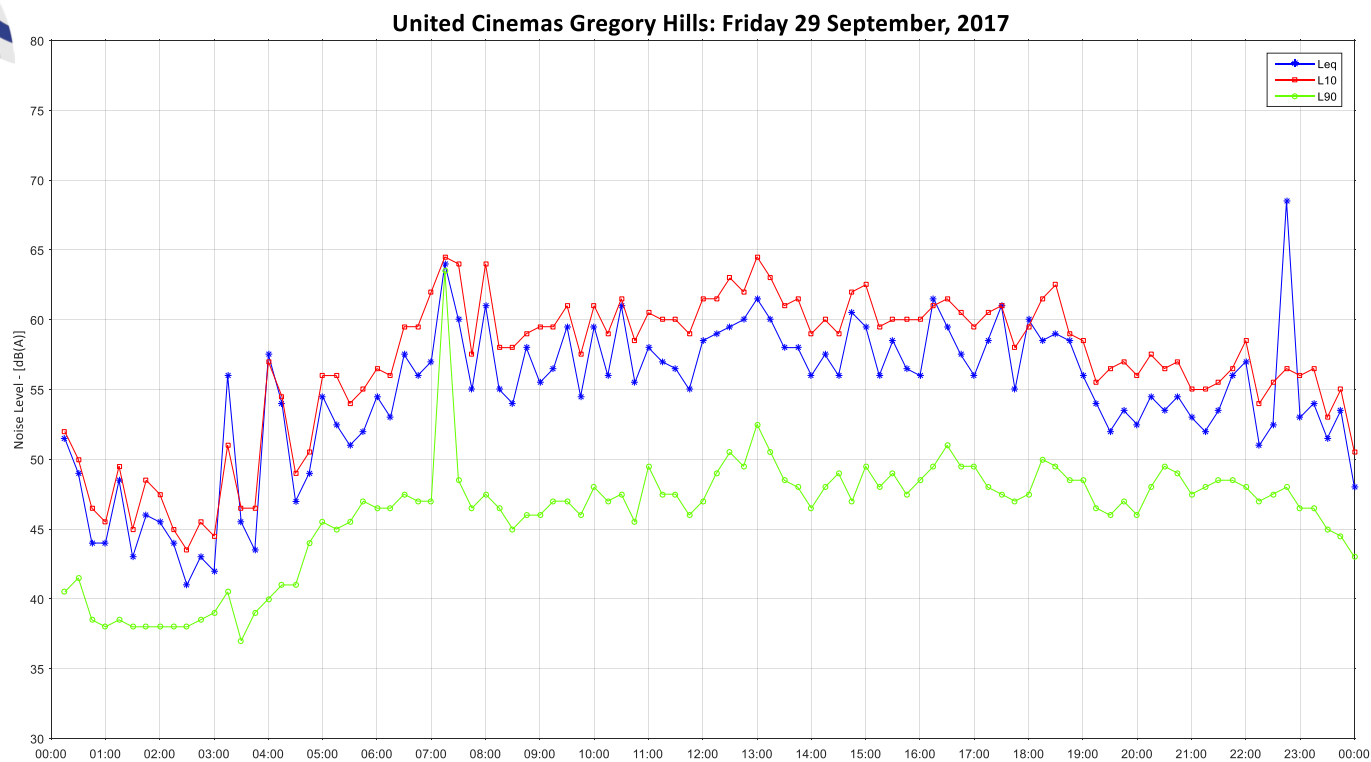






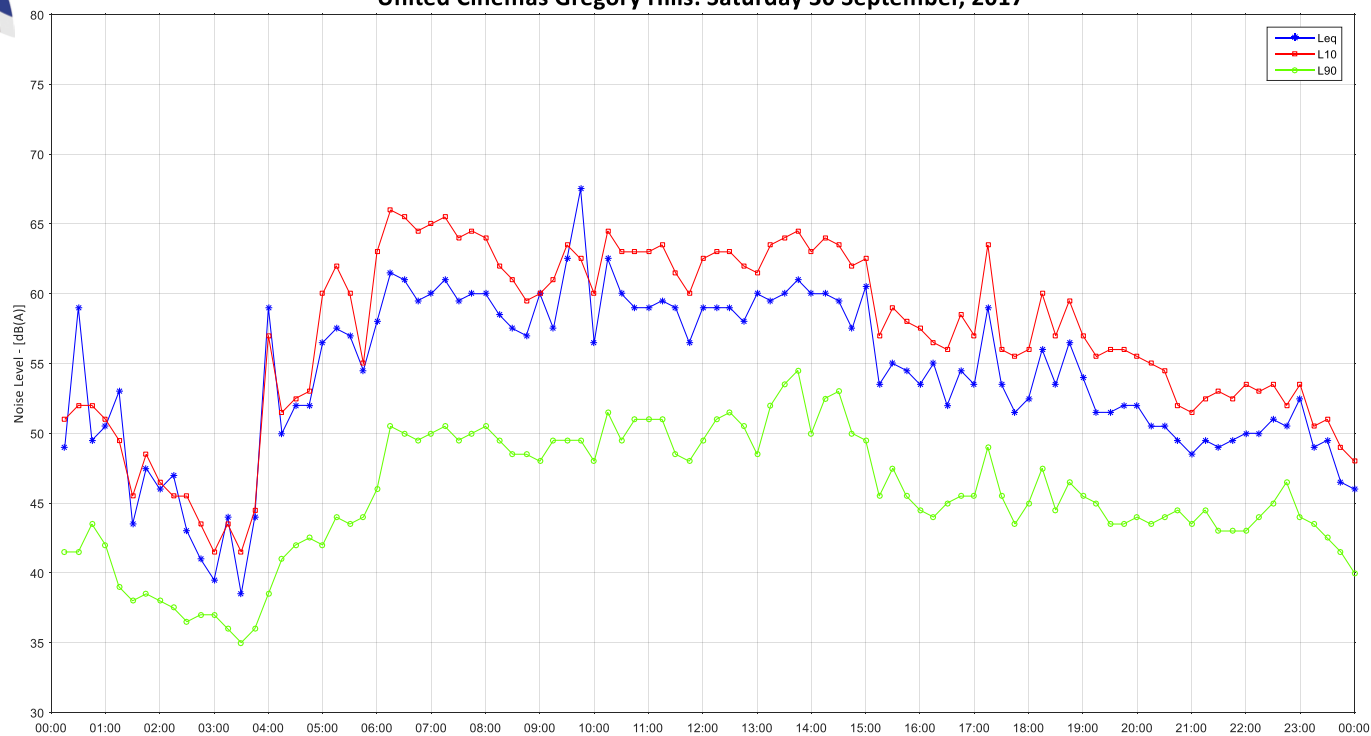
United Cinemas Gregory Hills: Thursday 28 September, 2017





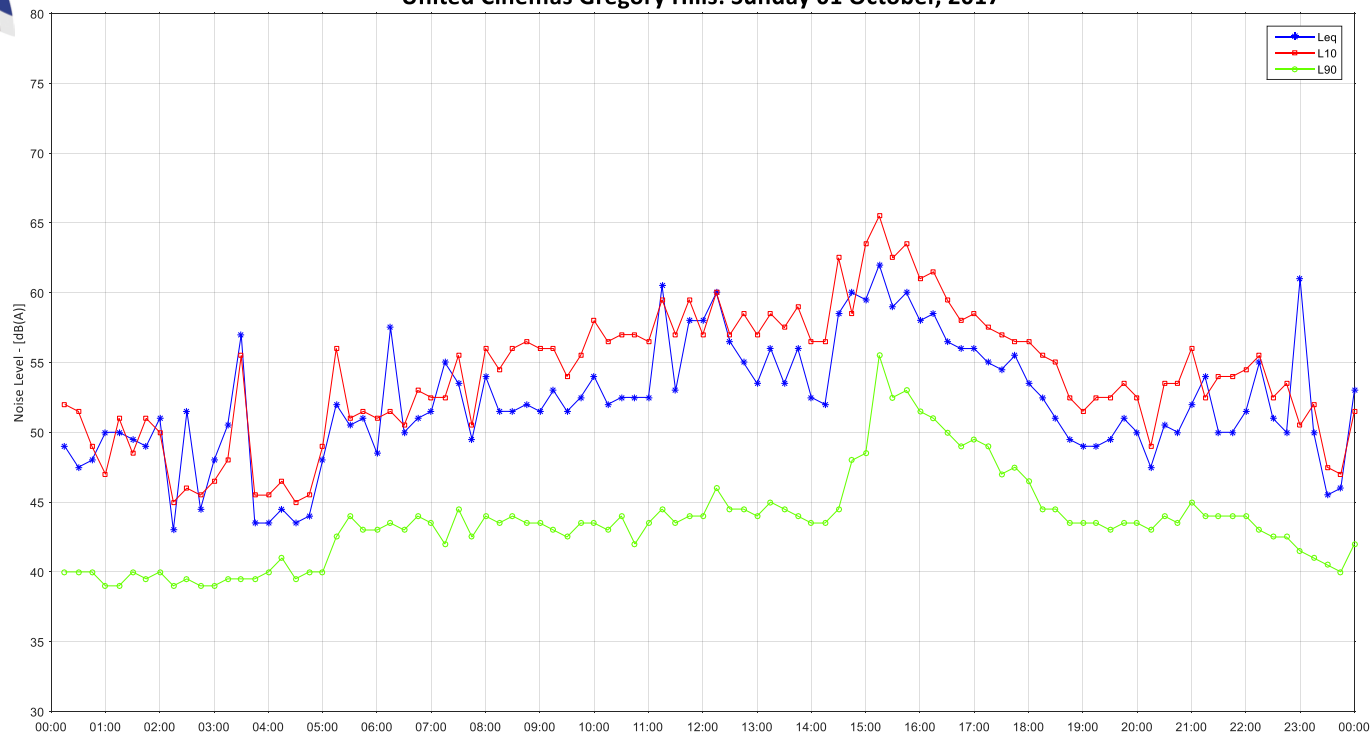


United Cinemas Gregory Hills: Saturday 30 September, 2017



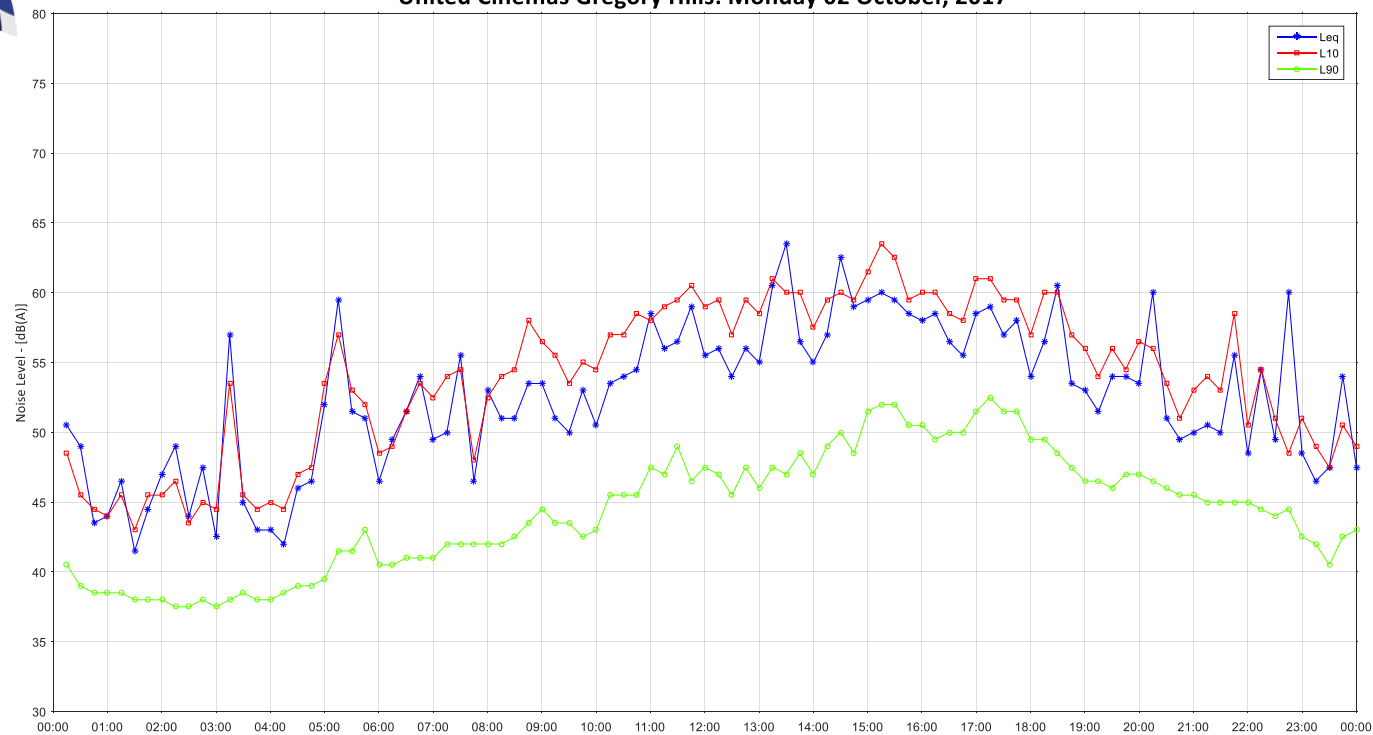


United Cinemas Gregory Hills: Sunday 01 October, 2017





United Cinemas Gregory Hills: Monday 02 October, 2017





United Cinemas Gregory Hills: Tuesday 03 October, 2017

