25 George Street, North Strathfield

Noise and Vibration Impact Assessment

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Document Control

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1 Introduction

White Noise Acoustics has been engaged to undertake the Noise Impact Assessment of the proposed residential development located at 25 George Street, North Strathfield.

The proposed project includes the following:

1. 2 levels of basement with parking
2. A 5 story residential development.

This assessment includes the acoustic investigation into the potential for noise impacts from the operation of the completed project to surrounding receivers as well as potential noise and vibration impacts from existing noise sources within the vicinity of the site which predominantly includes traffic noise from George Street and noise and vibration from the train line to the east of the site.

1.1 Development Description

The proposed 25 George Street, North Strathfield development is located to the east George Street with a train line located to the east. The surrounding receivers to the site include existing residential receivers to the north and south of the site.

The site location is detailed in Figure 1 below.

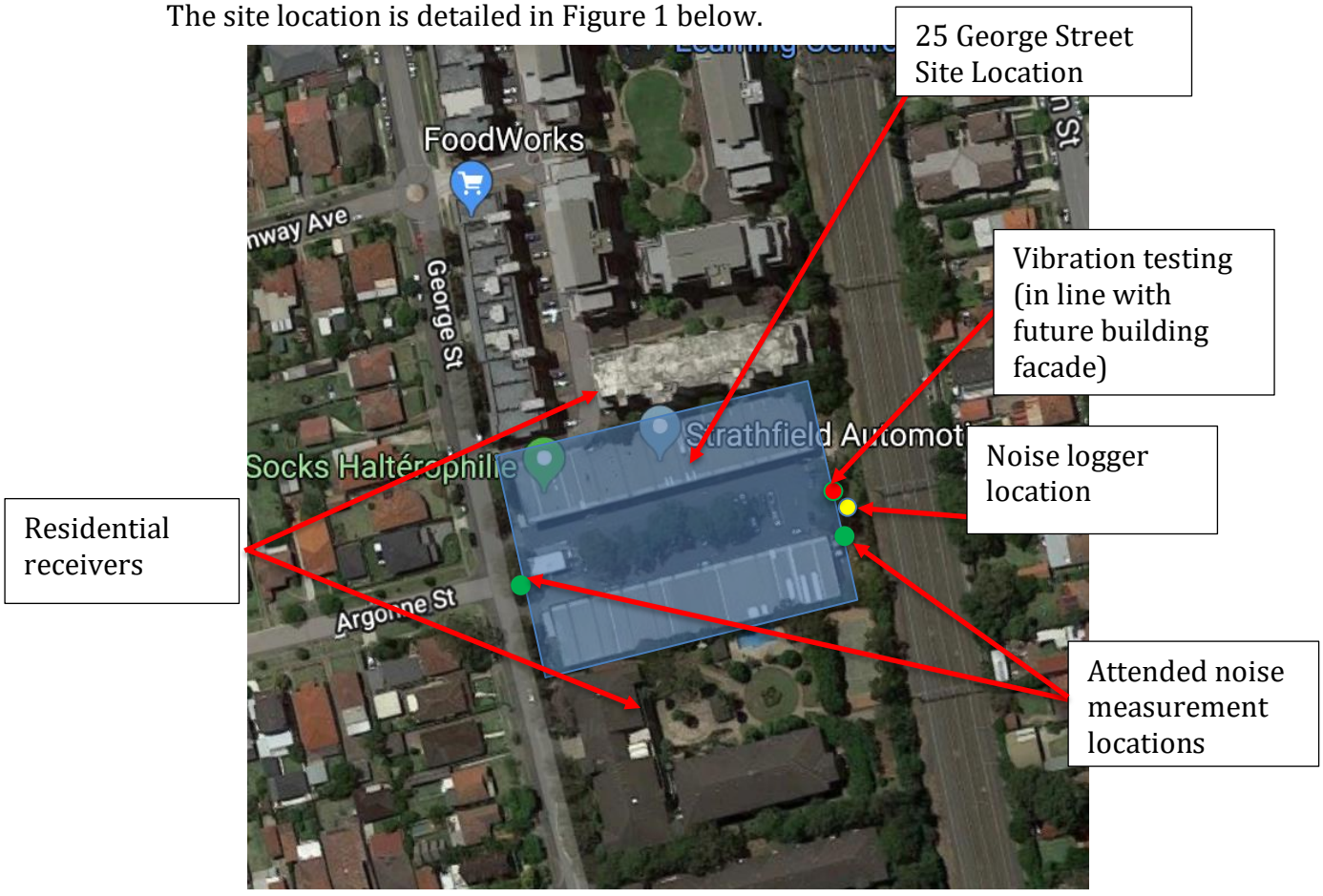


Figure 1 – 25 George Street, North Strathfield development site location

2 Proposed Development

The proposed project is located at 25 George Street, North Strathfield. The site is located within the City of Canada Bay Council area.

The proposed development will include the following:

1. 2 levels of basement with parking
2. A story residential development.

The proposed development is detailed in FUSE architectural drawings, which include a typical floor which is included below.

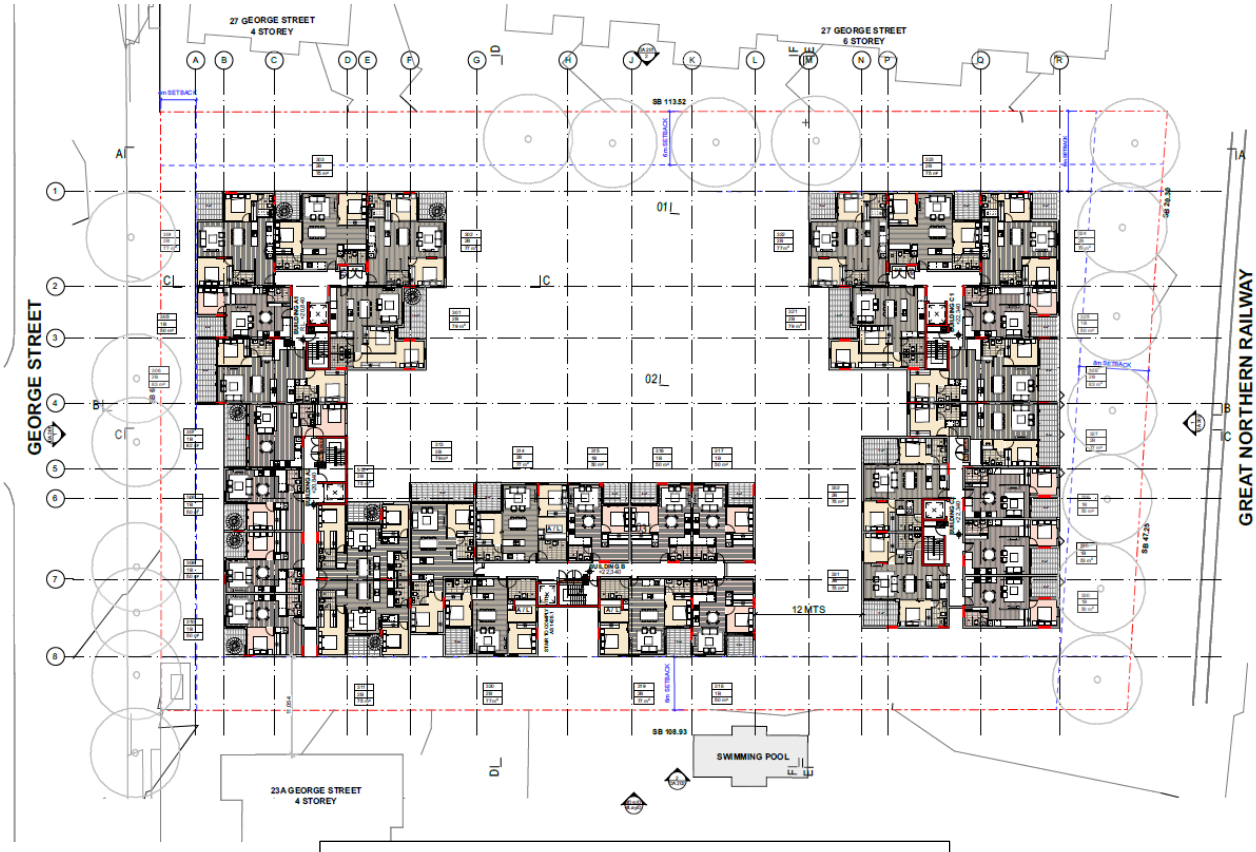


Figure 2 – Typical Floor Architectural Plan

3 Existing Acoustic Environment

The 25 George Street, North Strathfield site will be located with typically residential area of which is classified as a Suburban residential area. The exiting noise levels at the site are predominantly as a result from the following:

1. Existing noise levels from George Street to the west of the site
2. Noise and vibration from train pass byes on the railway line located to the east of the site.

The site is located on George Street which is not defined as a busy road carrying over 40,000 Annual Average Daily Traffic (AADT) number, nor carries over 20,000 AADT as defined in Map 15 of the RTA's *Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads*.

See the Figure below which includes the site location included on Map 16 as detailed above.

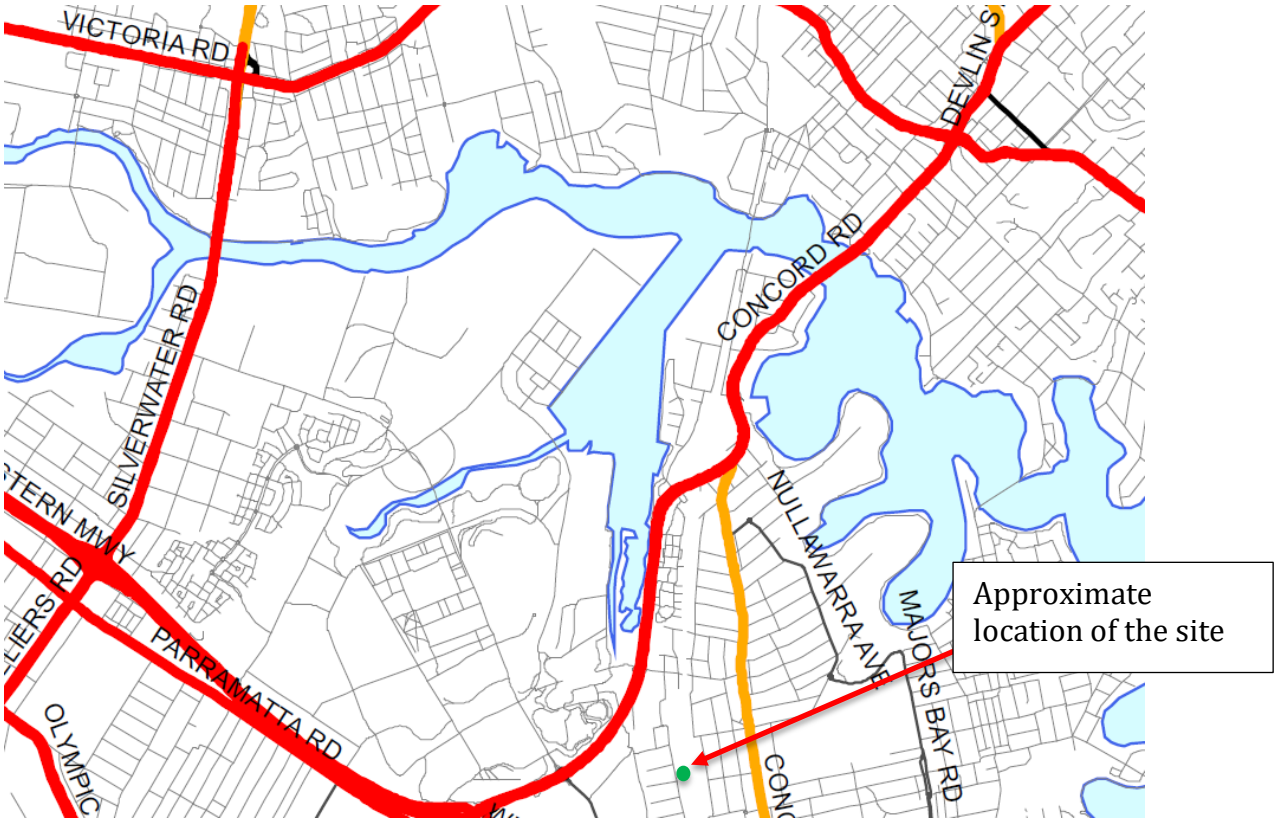


Figure 2 – Site Location of Map 15 of the RTA's *Traffic Volume Maps for Noise Assessment for Buildings on Land Adjacent to Busy Roads*

3.1 Noise Survey Results

The attended noise survey of the site was undertaken to characterise the acoustic environment within the vicinity of the site.

As part of this assessment an acoustic survey of the existing acoustic environment at the site was undertaken. The survey included attended noise level measurements at the site, during various times of the day on the 21st October, 2019 as well as long term unattended noise logging which was undertaken between the 21st and 29th of October, 2019.

Noise logging was undertaken using a ARL EL-215 type noise monitor with serial number 396932 and calibration with calibration number C19465. The noise logger was located to the front of the site as detailed in Figure 1 above. The logger was positioned such that it was in a free field location and façade corrects were not required to be applied within the existing vegetate area to the south of the site. The location of the logger is detailed in the figure below.

Figure 3 – Noise Logger Located within the Vegetated area to the east of the site

It is noted that the recorded noise levels at the site and included in Appendix B includes noise levels where the Leq is constantly higher than the L_{10}. This can occur where there is a constant noise level at the site (such as natural levels from vegetation, crickets or the like) for less than 10% of the site. In this case the logger was located within a vegetated area and noise from wind passing through the vegetation has generated noise levels for up to 90% of the time.

Attended noise testing was conducted using a Bruel and Kjaer 2236C type meter. The meter was calibrated before and after testing and no significant drift was recorded.

The attended and unattended noise locations were selected to obtain suitable noise levels for the assessment of background noise levels ($L_{90\,(t)}$) as well as the impact from traffic movements ($Leq_{(t)}$). The results of the acoustic survey are detailed in the tables below which have been used as the basis of this assessment.

Table 1 – Results of the Attended Noise Survey at the Site

Measurement Location	**Time of Measurement**	**Recoded Noise level Leq**	**Background Noise Level $L_{A90,\,15min}$ dB(A)**	**Comments**
Railway Line Boundary	9.45am to 10am	62 $L_{eq,\,5min}$ dB(A)	46	Noise level at the site dominated by vehicle movements on George Street and train pass byes to the east
George Street Boundary	During typical environmental noise levels	58 $L_{eq,\,15min}$ dB(A)	48	

Table 2 – Results of the Noise Logging at the Site

Measurement Location	**Time of Measurement**	**Maximum Repeatable $L_{Aeq,\,15min}$ dB(A)**	**Representable Background noise Level (RBL) $L_{A90,\,15min}$ dB(A)**
Noise logger location, see figure 1 above	Day	63	45
	Evening	58	40
	Night	52	33

4 Internal Noise Level Criteria

Internal noise levels within the future residential occupancies have been based on the relevant noise levels as detailed within the Australian Standard AS2107:2000 *Acoustics - Recommended design sound levels and reverberation times for building interiors* and the Department of Planning *Development Near Rail Corridor and Busy Roads – Interim Guideline* (DNRCBR).

The required internal noise levels detailed within the standards are included in the sections below.

4.1 Australian Standard AS2107:2016

The Australian Standard AS2107:2016 *Acoustics - Recommended design sound levels and reverberation times for building interiors* recommended levels for various areas of a project. The recommended noise levels for residential dwellings near major roadways detailed within AS2107:2016 are detailed in the table below.

Table 3 – Recommended Internal Noise Levels AS2107:2016

Type of Occupancy/Activity	Design sound level maximum ($L_{Aeq,t}$)
Common areas (e.g. foyer, lift lobby)	50
Residential - Living areas	45
Residential - Sleeping areas (night time)	40
Toilets	55
Small retail areas	50
Note: The relevant time period (t) for all areas detailed is 15 minutes.	

4.2 Department of Planning *Development Near Rail Corridor and Busy Roads – Interim Guideline*

The DNRCBR includes the following requirements for the relevant design of internal areas of residential developments near busy roads, including the following:

> ***For Clauses 87 (Rail) and 102 (Road):***
> *If the development is for the purpose of a building for residential use, the consent authority must be satisfied that appropriate measures will be taken to ensure that the following LA_{eq} levels are not exceeded:*
> - *in any bedroom in the building: 35dB(A) at any time 10pm–7am*
> - *anywhere else in the building (other than a garage, kitchen, bathroom or hallway): 40dB(A) at any time.*

4.3 Project Internal Noise Level Criteria

The required levels for various areas of the project are detailed in the following table. The recommended noise levels for residential dwellings near rail corridors detailed within AS2107:2016 and DNRCBR have been used as the basis of this assessment.

Table 4 - Design Recommended Internal Sound Levels EPA and AS2107:2016

Type of Occupancy/Activity	Design sound level maximum
Apartment common areas (e.g. foyer, lift lobby)	50 $L_{Aeq\ 15\ min}$
Residential - Living areas	40 $L_{Aeq\ 24\ hour}$
Residential - Sleeping areas (night time)	35 $L_{Aeq\ 9\ hour}$[1]
Toilets	55 $L_{Aeq\ 15\ min}$
Note 1: The relevant time period for bedrooms include the period of 10pm to 7am	

5 Rail Pass Bye Vibration

This section of the report details the suitable vibration criteria for possible impacts from the railway line located to the east of the project on future residential residence.

5.1 Vibration Impact Criteria

The potential for vibration impact from train pass byes on the railway line to the east of the site has been assessed for both tactile vibration impact as well as ground borne vibration resulting in structure borne noise.

The suitable criteria for the assessment of tactile vibration and structure borne noise are detailed in the following sections.

5.1.1 Tactile Vibration Impacts

The Department of Planning *Development Near Rail Corridor and Busy Roads – Interim Guideline (DNRCBR)* references to *"Assessing Vibration – A Technical Guideline".*

Vibration effects relating specifically to the human comfort aspects of the project are taken from the guideline titled *"Assessing Vibration – A Technical Guideline"*. (AVTG). The AVTG recommends that habitable rooms should comply with the criteria therein which is in line with the requirements of British Standard BS 6472:1992 "*Evaluation of Human Exposure to Vibration in Buildings (1Hz to 80Hz)*".

The British Standard details suitable criteria for the assessment of intermittent vibrations to prevent advise impacts on future residence.

Table 5 Intermittent vibration impacts criteria (m/s1.75) 1 Hz-80 Hz, Vibration Dose Values (VDV)

Location	Daytime		Night-time	
	Preferred Values	Maximum Values	Preferred Values	Maximum Values
Residences	**0.20**	0.40	**0.13**	0.26

For the purpose of this assessment the *Preferred Values* detailed in the standard have been used as the criteria used in this assessment.

5.1.2 Structure Borne Noise

The borne vibration is the potential for audible noise to be generated as the result of vibration transferred through the building structure and emanating from the building surfaces (such as walls, ceilings and the like) as audible noise within the future residential dwellings within the development.

Potential structure borne noise impacts as a result of the proposed light rail has been assessed in accordance with the criteria detailed within the DNRCBR which includes the following:

> *Generally, ground borne noise is associated more closely with rail operations than roads. Where buildings are constructed over or adjacent to land over tunnels, ground-borne noise may be present without the normal masking effect of airborne noise.*
>
> *In such cases, residential buildings should be designed so that the 95th percentile of train pass-bys complies with a ground-borne LAmax noise limit of 40dBA (daytime) or 35dBA (night-time) measured using the "slow" response time setting on a sound level meter.*

As the railway line located to the east of the site is an above ground line and not within a tunnel the requirements for ground borne vibration is not required to be assessed based on the DNRCBR as detailed above.

As existing train line is above ground the impact of airborne noise on the future residence will be greater than the potential for structure borne noise levels. Providing suitable treatments for airborne noise impacts are included in the design of the project and tactile vibration levels comply with the relevant criteria then all relevant acoustic requirements will be achieved.

5.2 Train Pass Bye Vibration Measurements

As part of the assessment measurements of vibration impacts from a train pass bye on the railway line to the east of the site has been conducted.

To assess potential noise and vibration impacts on the proposed development measurements of train pass byes (at a representative location of the future building façade) has been conducted in this assessment.

Vibration measurements have been undertaken at the location detailed in Figure 1 above.

5.2.1 Vibration Measurements

This section of the report details the measured vibration levels associated with rail pass byes at the location detailed in Figure 1 of this report.

The assessment included attended vibration measurements conducted on the 21st October, 2019 between 9.30am and 11am. Vibration levels were undertaken using a Svan 958 type vibration meter and analyzer fitted with a triaxial accelerometer and included a minimum of 9 train pass byes.

Obtained vibration levels included a number of train pass beys which have been used to determine the period vibration exposure for the daytime and night-time periods Vibration Dose Values (VDV).

The results of the vibration level measurements including the calculations for VDV are detailed in the table below.

Table 6 Calculated VDV

Location	Period	Criteria VDV m/s1.75	Calculated VDV m/s1.75
Future Residential Dwellings	Daytime	**0.20**	**0.12**
	Night-Time	**0.13**	**0.09**

Based on the results of the assessment of tactile vibration no additional acoustic treatment (or building vibration isolation) is required to comply with the relevant standards and ensure a suitable acoustic amenity for future occupants of the development.

6 Environmental Noise Intrusion Assessment

This section of the report details the assessment of environmental noise intrusion into the proposed development and the recommended acoustic treatments to ensure the recommended internal noise levels detailed in the Sections above (including traffic and train noise intrusion) are achieved.

Internal noise levels within the future areas of the development will result from the noise intrusion into the building through the external façade including glass, masonry and other façade elements. Typically, the acoustic performance of building elements including the relatively light weight elements of the building façade, including glass and/or plasterboard constructions, will be the determining factors in the resulting internal noise levels.

Calculations of internal noise levels have been undertaken based on the measured traffic and calculated aircraft environmental noise levels at the site and the characteristics of the building, including window openings, buildings constructions and the like.

6.1 External Glass Elements

The recommended acoustic constructions to the buildings external façade glass elements are detailed in the table below to ensure the recommended internal noise levels detailed above are achieved, with the façade building openings closed.

Table 7 – External Glass Acoustic Requirements

Façade Orientation	Levels	Room Type	Recommended Glass Construction	Minimum Façade Acoustic Performance[1]
Eastern Façade facing train line	All Levels	Bedrooms	10.38mm Laminated	Rw 35
		Living Rooms	10.38mm Laminated	Rw 35
		Wet areas	6mm Float/Toughened	Rw 28
All Other Facades	All Levels	Bedrooms	6.38mm Laminated	Rw 30
		Living Rooms	6.38mm Laminated	Rw 30
		Wet areas	6mm Float/Toughened	Rw 28
Note 1: *The acoustic performance of the external façade includes the installed glazing and frame including (but not limited to) the façade systems seals and frame. All external glazing systems are required to be installed using acoustic bulb seals.*				

The recommended glass constructions detailed in the table above include those required to ensure the acoustic requirements of the project are achieved. Thicker glazing may be required to achieve other project requirements such as structural, thermal, safety or other requirements and is to be advised by others.

6.2 External Building Elements

The proposed external building elements including masonry or concrete external walls and roof are acoustically acceptable without additional acoustic treatment.

Any lightweight external pasteboard walls should be constructed from a construction with a minimum acoustic performance of Rw 50.

6.3 External Roof

The required external roof and ceiling constructions for the project are required to include the following:

1. Concrete external roof construction – no additional acoustic treatments required.
2. Metal deck roof construction – no additional acoustic treatments required.

6.4 External Opening and Penetrations

All openings and penetrations are required to be acoustically treated such that the performance of the building construction is not compromised. This may require lining of duck work behind mechanical service openings/grills, treatments to ventilation opening and the like.

6.5 Alternative Ventilation Requirements

The internal design sound levels to the façade east of the site and facing the railway line are required achieved with the external building openings closed.

As it is necessary for the windows and doors to remain closed to achieve compliance with specified internal noise levels an alternative method of providing outside air ventilation will be required to all units with openings fcing towards the railway line within the development.

The method of providing an alternative method of outside air ventilation is required to be provided in accordance with relevant regulations including the Building Code of Australia and AS1668.

The installation of the ventilation should not compromise the acoustic performance of the external building shell and is required to comply with the noise emission criteria detailed in the following section.

7 External Noise Emission Assessment

This section of the report details the relevant noise level criteria for noise emissions generated on the site once completed.

The relevant authority which provides the required noise level criteria for noise levels generated on the site includes the NSW Environmental Protection Authority's (EPA) Noise Policy for Industry (NPI).

7.1 NSW Environmental Protection Authority, Noise Policy for Industry

The NSW Environmental Protection Authority (EPA) Noise Policy for Industry (NPI), previously Industrial Noise Policy, details noise criteria for the control of noise generated from the operation of developments and the potential for impact on surrounding receivers.

The NPI includes both intrusive and amenity criteria which are summarised below.

1. Intrusive noise level criteria, The NPI states the following:

   'The intrusiveness of an industrial noise source may generally be considered acceptable if the level of noise from the source (represented by the LAeq descriptor), measured over a 15minute period, does not exceed the background noise level by more than 5 dB when beyond a minimum threshold. This intrusiveness noise level seeks to limit the degree of change a new noise source introduces to an existing environment.'

2. Amenity noise level criteria, The NPfI states the following:

   'To limit continuing increases in noise levels from application of the intrusiveness level alone, the ambient noise level within an area from all industrial noise sources combined should remain below the recommended amenity noise levels specified in Table 2.2 where feasible and reasonable. The recommended amenity noise levels will protect against noise impacts such as speech interference, community annoyance and some sleep disturbance.'

   Project amenity noise level for industrial developments = recommended amenity noise level (Table 2.2) minus 5 dB(A)

   Where the resultant project amenity noise level is 10 dB or more lower than the existing industrial noise level. In this case the project amenity noise levels can be set at 10 dB below existing industrial noise levels if it can be demonstrated that existing industrial noise levels are unlikely to reduce over time.

The LAeq is determined over a 15-minute period for the project intrusiveness noise level and over an assessment period (day, evening and night) for the project amenity noise level. This leads to the situation where, because of the different averaging periods, the same numerical value does not necessarily represent the same amount of noise heard by a person for different time periods. To standardise the time periods for the intrusiveness and amenity noise levels, this policy assumes that the LAeq,15min will be taken to be equal to the LAeq, period + 3 decibels (dB), unless robust evidence is provided for an alternative approach for the particular project being considered.

Project amenity noise level (ANL) is urban ANL (Table 2.1) minus 5 dB(A) plus 3 dB(A) to convert from a period level to a 15-minute level (dB = decibel; dB[A] = decibel [A-weighted]; RBL = rating background noise level).

Noise level used in the assessment of noise emission from the site have been based on the noise level survey conducted at the site and detailed in this section of the report.

Consequently, the resulting noise level criteria are summarised in the table below. The criteria are nominated for the purpose of determining the operational noise limits for the operation of the site including mechanical plant associated with the development which can potentially affect noise sensitive receivers and operational noise levels from the future tenancies. For each assessment period, the lower (i.e. the more stringent) of the amenity or intrusive criteria are adopted. The calculated *Project Amenity Noise Level* includes either the Recommended Amenity Noise Level minus 5 dB(A) plus 3 dB(A) (for a 15minum period) or the measured existing Leq noise level – 10 dB if this is greater as determined by the NPfI.

7.2 Noise Emissions Summary

Based on the requirements of the EPA the resulting noise emissions criteria from the operation of services on the site are detailed in the table below.

Table 8 – External Noise Level Criteria in Accordance with the NSW NPI

Location	Time of Day	Project Amenity Noise Level, $L_{Aeq, period}$ [1] (dBA)	Measured $L_{A90, 15\ min}$ (RBL) [2] (dBA)	Measured $L_{Aeq, period}$ Noise Level (dBA)	Intrusive $L_{Aeq, 15\ min}$ Criterion for New Sources (dBA)
Suburban residences	Day	53	45	53	**50**
	Evening	**43**	40	45	45
	Night[4]	**38**	33	45	43

Note 1: Project Amenity Noise Levels corresponding to "Sub Urban" areas, recommended noise levels.

Note 2: L_{A90} Background Noise or Rating Background Level

Note 3: Project Noise Trigger Levels are shown in bold

Note 4: Noise from the operation of residential condensers are to be inaudible within a neighbouring residential premises

7.3 Noise Impact Assessment

An assessment of noise generated on the site has been undertaken on this section of the report. The assessment of noise levels generated on the site are summaries below:

1. Mechanical Services Equipment –Detailed selections of the proposed mechanical plant and equipment to be used on the site are not available at this time. All future plant and equipment are to be acoustically treated to ensure the noise levels at all surrounding receivers comply with noise emission criteria detailed within this report. Experience with similar projects indicated that it is both possible and practical to treat all mechanical equipment such that the relevant noise levels are achieved. Examples of the possible acoustic treatments to mechanical equipment includes the following:
    a. Basement Supply and Exhaust Fans – location of fans within the building and treated using internally lined ductwork or acoustic silencers.
    b. General supply and exhaust fans – general exhaust and supply fans such as toilet, kitchen, lobby and other small mechanical fans can be acoustically treated using acoustic flex ducting or internal lined ducting.

Details of the required mechanical services equipment and acoustic treatments to ensure the relevant noise level criteria is achieved will be provided as part of the CC submission of the project.

8 Conclusion

This report details the Noise Impact Assessment of the proposed 25 George Street, North Strathfield development.

This report has included an assessment of exiting environmental noise including road traffic noise and train noise well as vibration impacts from train pass byes on the railway line to the east of the site.

This report details the required acoustic constructions of the building's façade, including external windows, to ensure that the future internal noise levels comply with the relevant noise levels of the Australian Standard AS2107:2016 and the EPA's *Development Near Rail Corridor and Busy Roads – Interim Guideline*. Providing the recommended constructions detailed in this report are included in the construction of the project the required internal noise levels will be achieved.

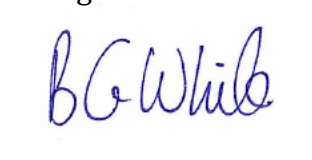
To achieve internal noise levels the windows facing towards the railway line are required to be closed. As a result an alternative means of mechanical ventilation is required to windows opening onto the railway line.

The vibration assessment has confirmed that vibration isolation is not required to ensure all vibration requirements of the *Development Near Rail Corridor and Busy Roads – Interim Guideline* are achieved.

External noise emissions from the site have been assessed and detailed in accordance with the NSW Environmental Protection Authorities Noise Policy for Industry (previously the Industrial Noise Policy). The future design and treatment of all building services associated with the project can be acoustically treated to ensure all noise emissions from the site comply with the EPA NPfI criteria. Details of the equipment and associated acoustic treatments will be provided as part of the CC submission of the project.

For any additional information please do not hesitate to contact the person below.

Regards



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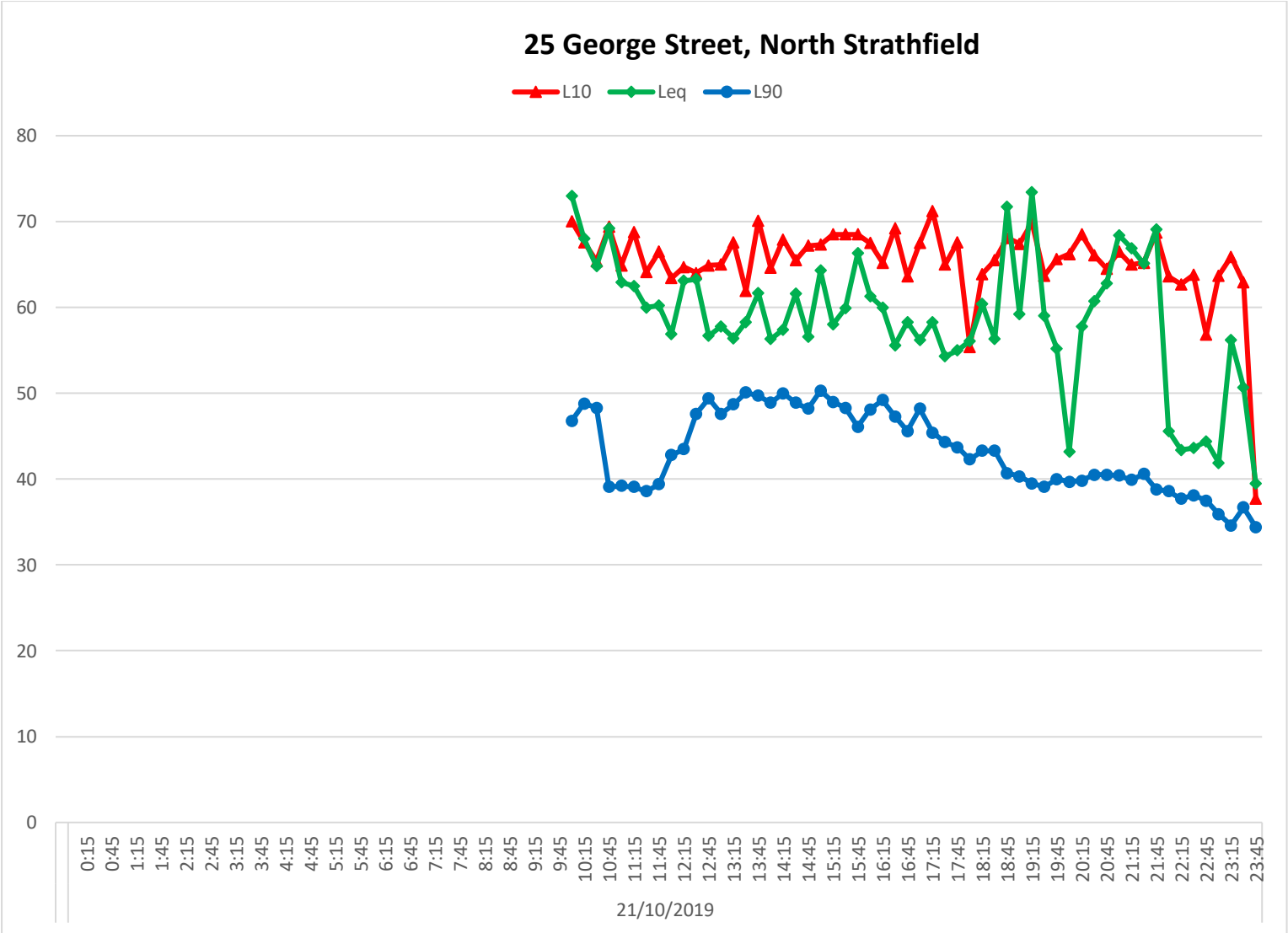
9 Appendix A – Glossary of Terms

Ambient Sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.
Audible Range	The limits of frequency which are audible or heard as sound. The normal ear in young adults detects sound having frequencies in the region 20 Hz to 20 kHz, although it is possible for some people to detect frequencies outside these limits.
Character, acoustic	The total of the qualities making up the individuality of the noise. The pitch or shape of a sound's frequency content (spectrum) dictate a sound's character.
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. The following are examples of the decibel readings of every day sounds; 0dB the faintest sound we can hear 30dB a quiet library or in a quiet location in the country 45dB typical office space. Ambience in the city at night 60dB Martin Place at lunch time 70dB the sound of a car passing on the street 80dB loud music played at home 90dB the sound of a truck passing on the street 100dB the sound of a rock band 115dB limit of sound permitted in industry 120dB deafening
dB(A)	*A-weighted decibels* The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.
Frequency	Frequency is synonymous to *pitch*. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
Loudness	A rise of 10 dB in sound level corresponds approximately to a doubling of subjective loudness. That is, a sound of 85 dB is twice as loud as a sound of 75 dB which is twice as loud as a sound of 65 dB and so on
L_{Max}	The maximum sound pressure level measured over a given period.
L_{Min}	The minimum sound pressure level measured over a given period.
L_1	The sound pressure level that is exceeded for 1% of the time for which the given sound is measured.
L_{10}	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L_{90}	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L_{90} noise level expressed in units of dB(A).
L_{eq}	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Background Sound Low	The average of the lowest levels of the sound levels measured in an affected area in the absence of noise from occupants and from unwanted, external ambient noise sources. Usually taken to mean the L_{A90} value
Ctr	A frequency adaptation term applied in accordance with the procedures described in ISO 717.
dB (A)	'A' Weighted overall sound pressure level

Noise Reduction	The difference in sound pressure level between any two areas. The term “noise reduction” does not specify any grade or performance quality unless accompanied by a specification of the units and conditions under which the units shall apply
NR Noise Rating	Single number evaluation of the background noise level. The NR level is normally around 5 to 6 dB below the “A” weighted noise level. The NR curve describes a spectrum of noise levels and is categorised by the level at 1000 Hz ie the NR 50 curve has a value of 50 dB at 1000 Hz. The NR rating is a tangential system where a noise spectrum is classified by the NR curve that just encompasses the entire noise spectrum consideration.
R_w	Weighted Sound Reduction Index - Laboratory test measurement procedure that provides a single number indication of the acoustic performance of a partition or single element. Calculation procedures for Rw are defined in ISO 140-2:1991 “Measurement of Sound Insulation in Buildings and of Building Elements Part 2: Determination, verification and application of precision data”.
R'_w	Field obtained Weighted Sound Reduction Index - this figure is generally up to 3-5 lower than the laboratory test determined level data due to flanked sound transmission and imperfect site construction.
Sound Isolation	A reference to the degree of acoustical separation between any two areas. Sound isolation may refer to sound transmission loss of a partition or to noise reduction from any unwanted noise source. The term “sound isolation” does not specify any grade or performance quality and requires the units to be specified for any contractual condition
Sound Pressure Level, L_P dB	A measurement obtained directly using a microphone and sound level meter. Sound pressure level varies with distance from a source and with changes to the measuring environment. Sound pressure level equals 20 times the logarithm to the base 10 of the ratio of the rms sound pressure to the reference sound pressure of 20 micro Pascals.
Sound Power Level, L_W dB	Sound power level is a measure of the sound energy emitted by a source, does not change with distance, and cannot be directly measured. Sound power level of a machine may vary depending on the actual operating load and is calculated from sound pressure level measurements with appropriate corrections for distance and/or environmental conditions. Sound power levels is equal to 10 times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power of 1 picoWatt
Speech Privacy	A non-technical term but one of common usage. Speech privacy and speech intelligibility are opposites and a high level of speech privacy means a low level of speech intelligibility. It should be recognised that acceptable levels of speech privacy do not require that speech from an adjacent room is inaudible.
Transmission Loss	Equivalent to Sound Transmission Loss and to Sound Reduction Index in terminology used in countries other than Australia. A formal test rating of sound transmission properties of any construction, by usually a wall, floor, roof etc. The transmission loss of all materials varies with frequency and may be determined by either laboratory or field tests. Australian Standards apply to test methods for both situations.

10 Appendix B – Noise Logging Results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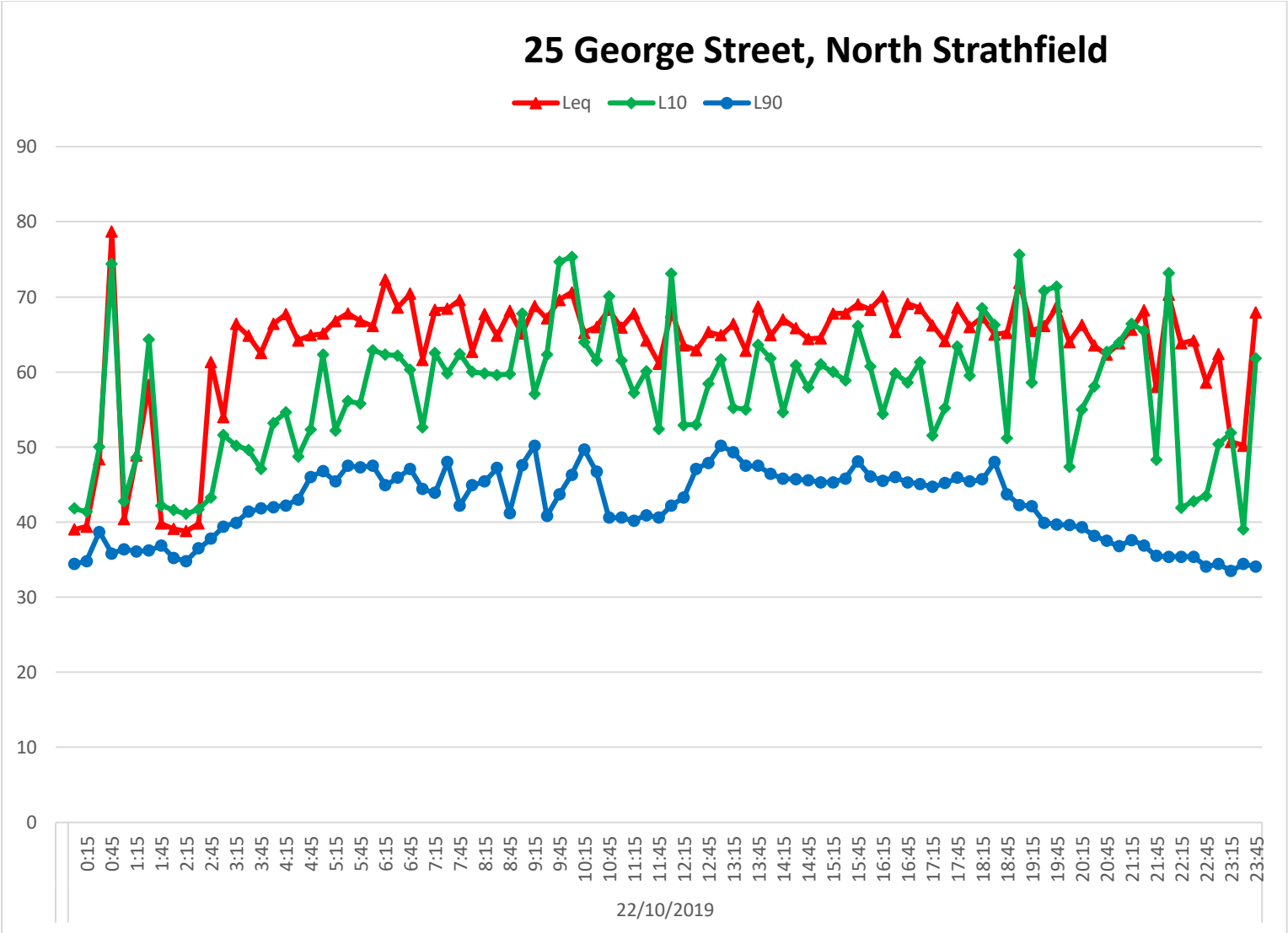
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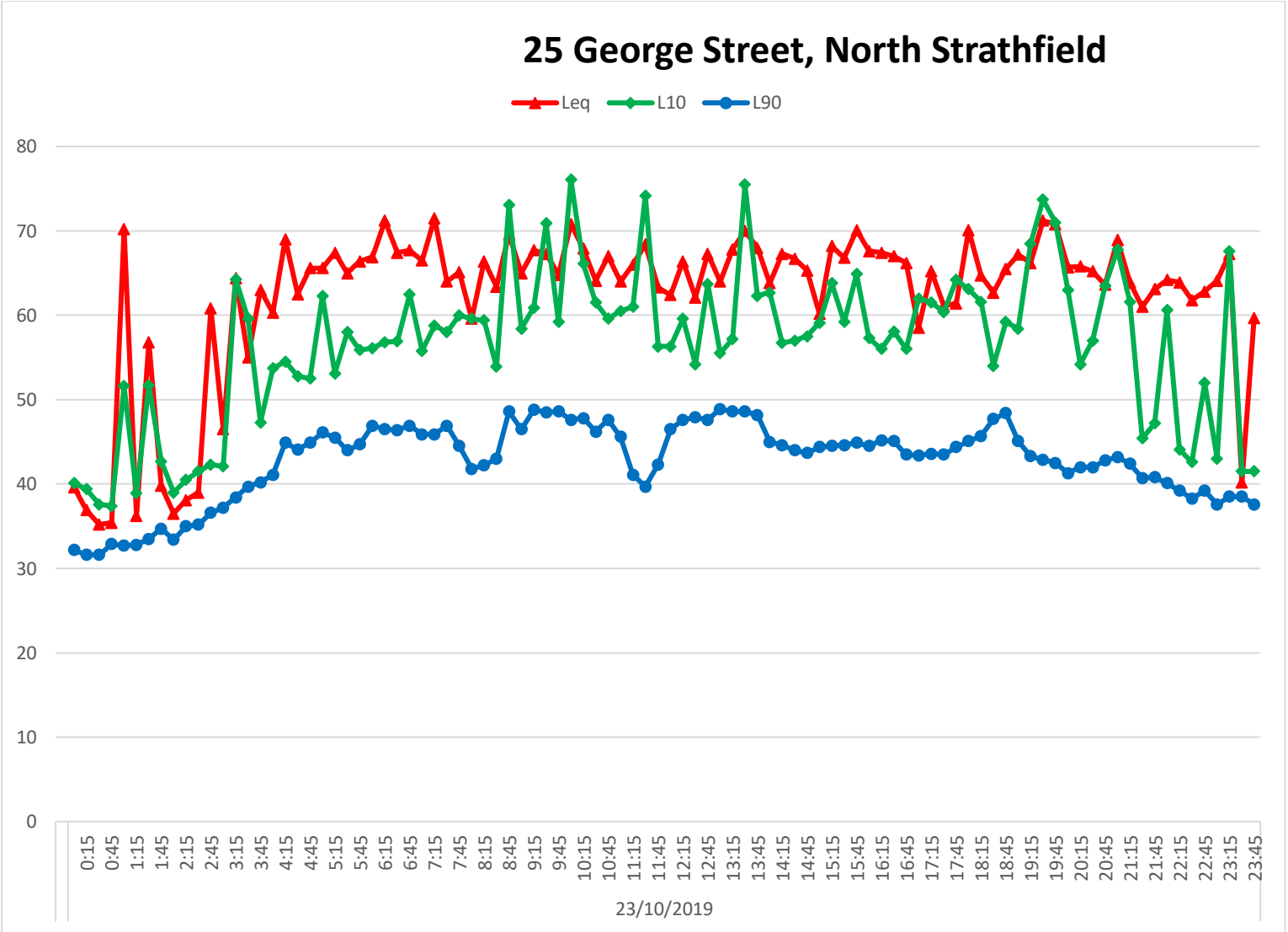
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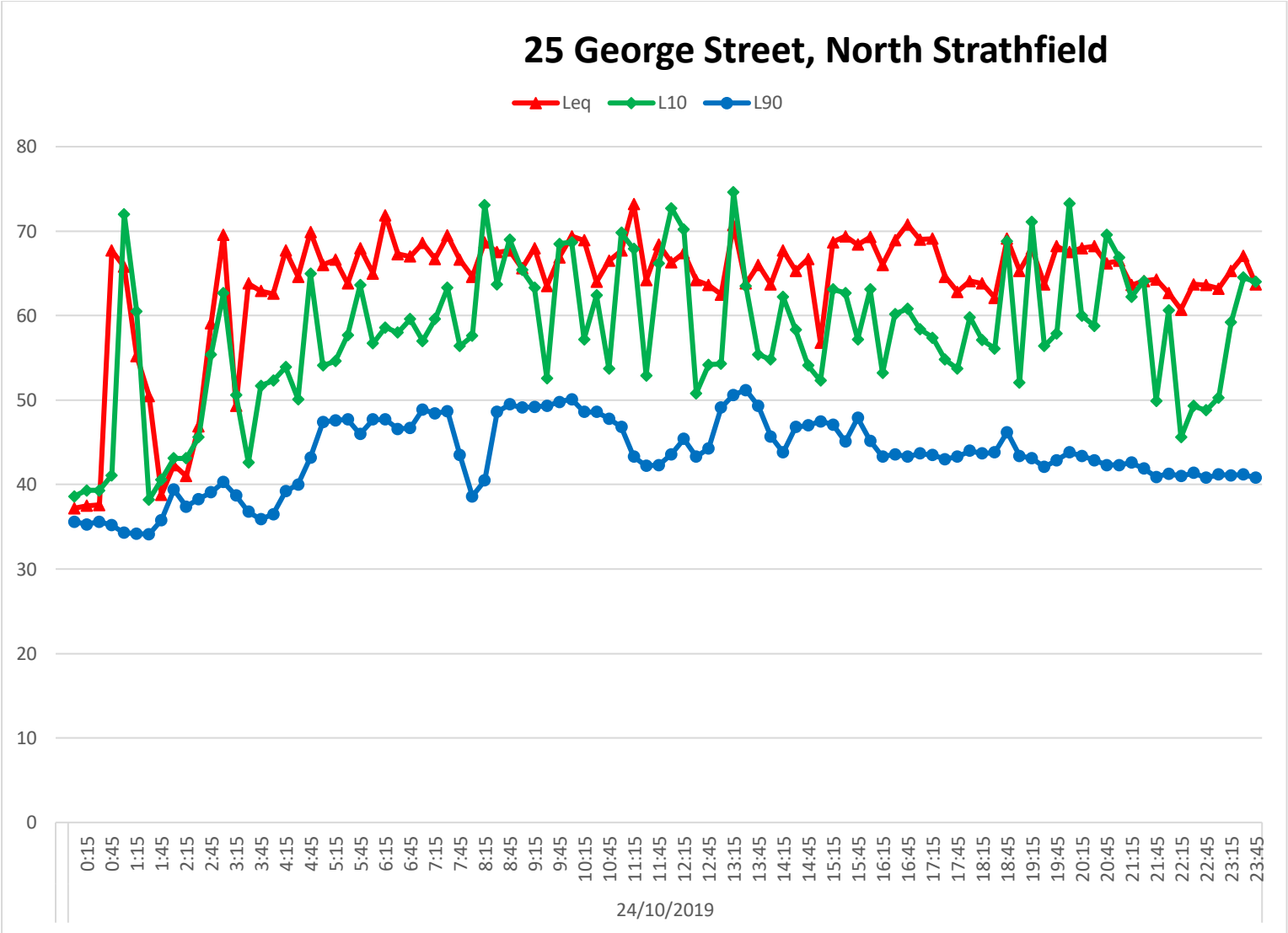
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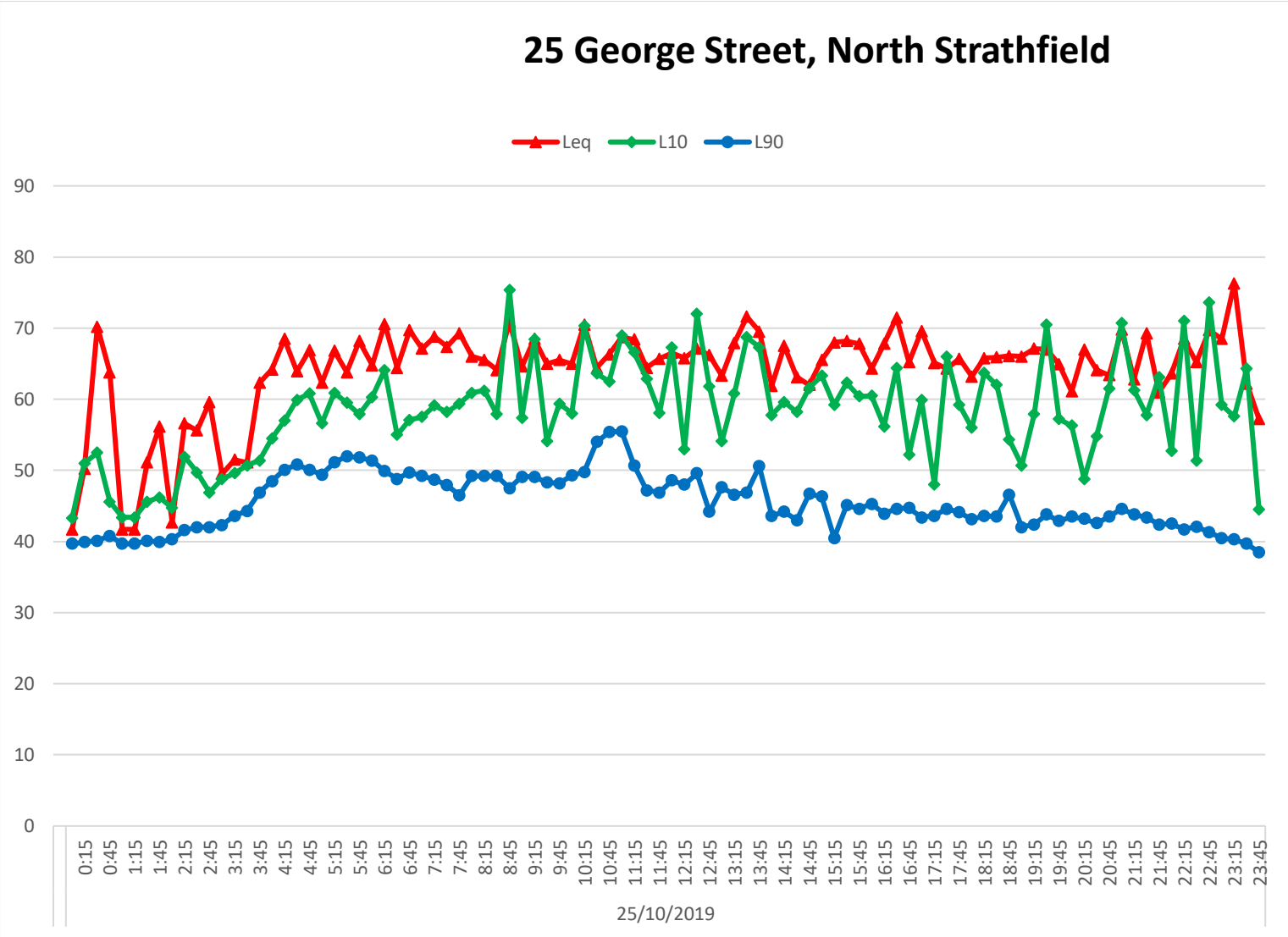
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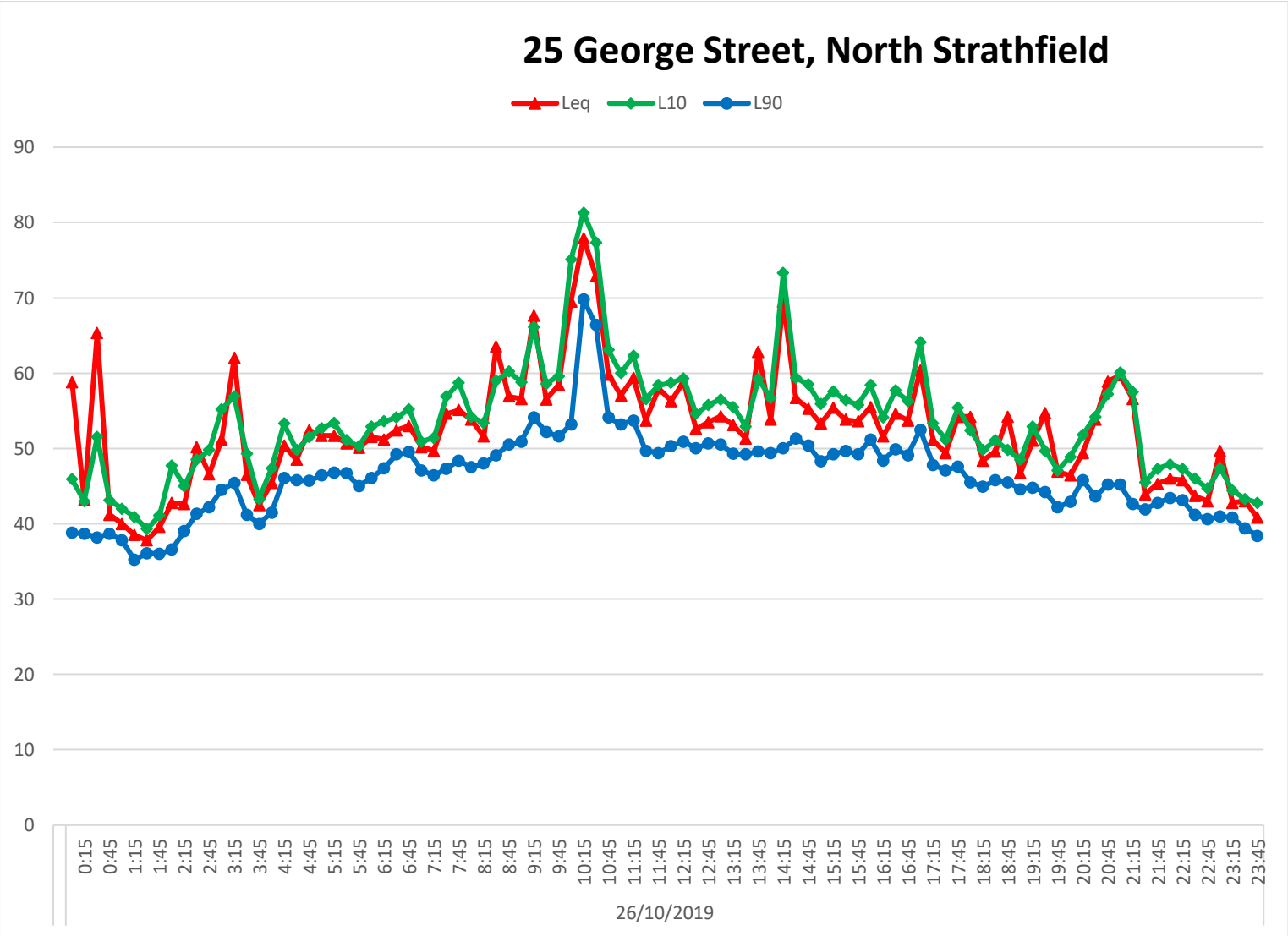
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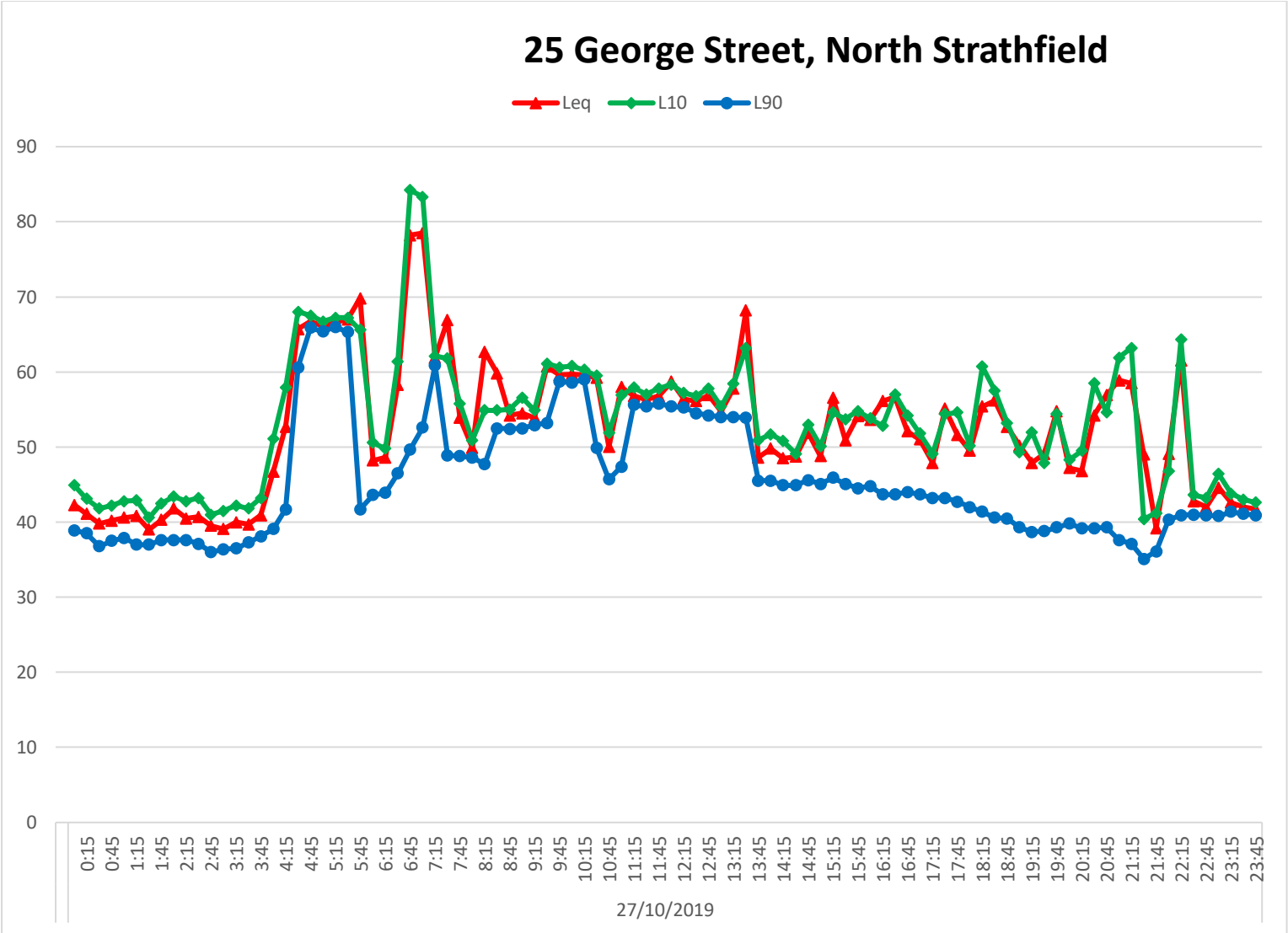
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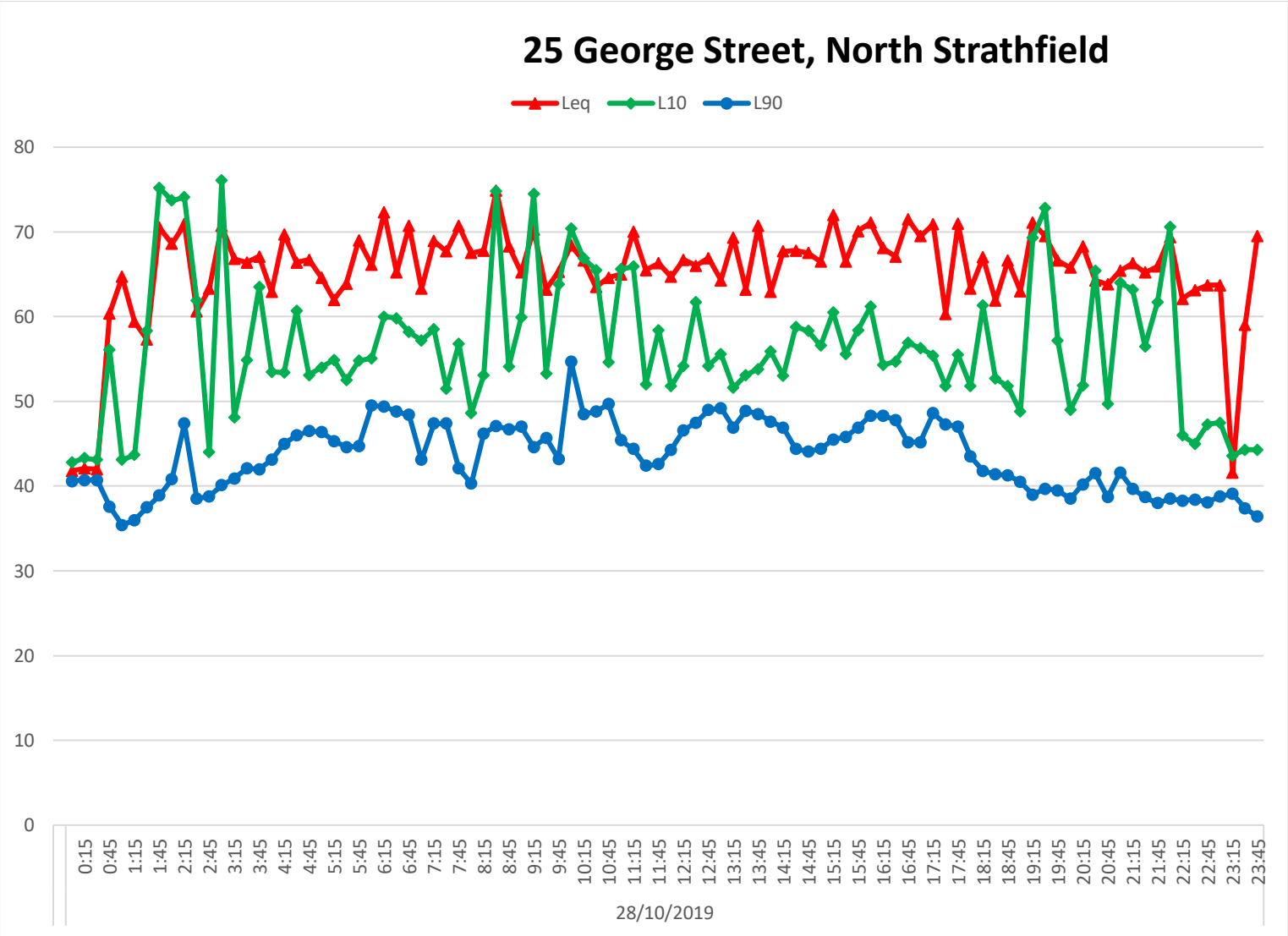
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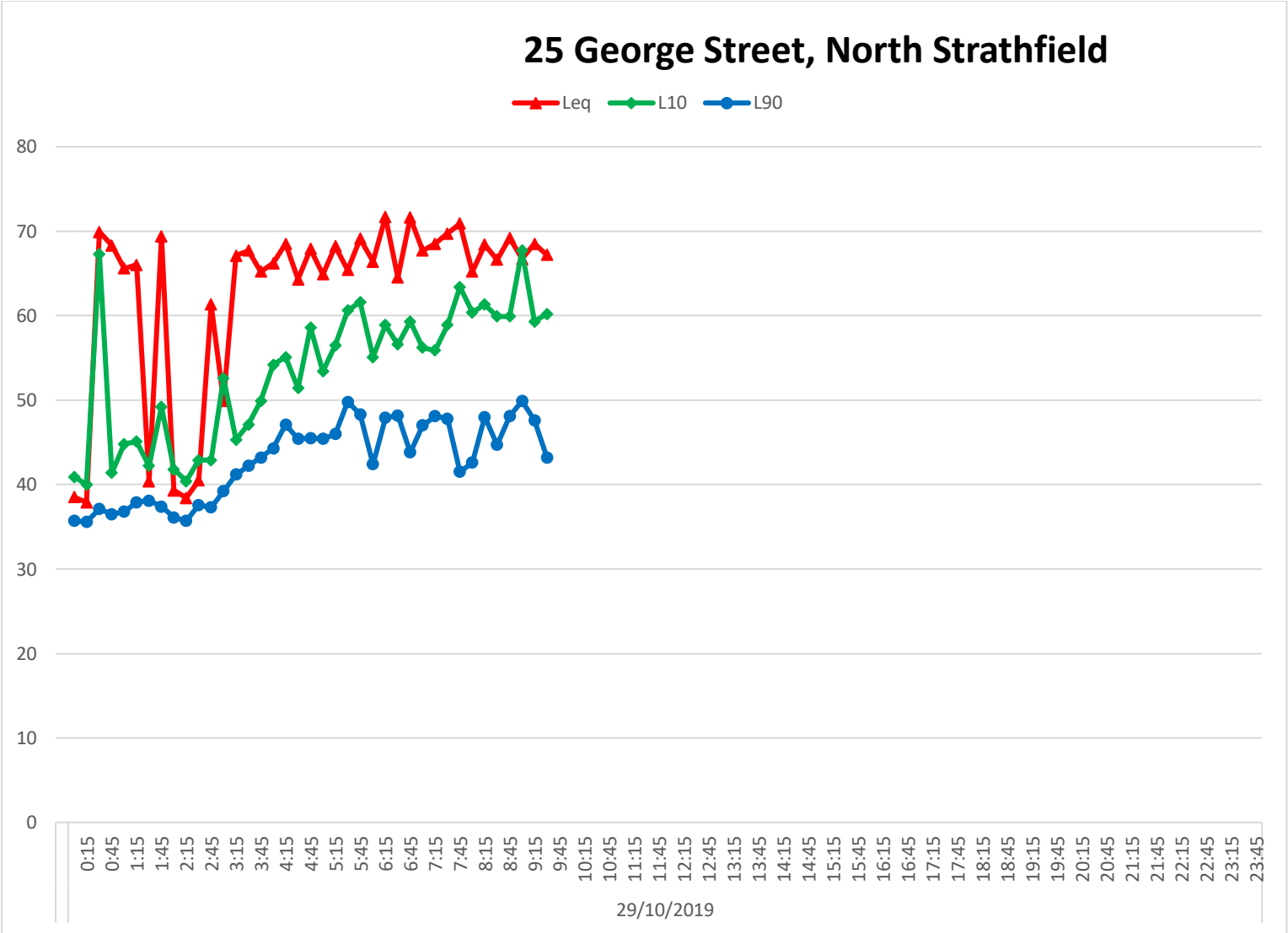
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