Noise Impact Assessment

The Peninsula, Cardiff - Plot 1

Orion Land & Leisure Ltd

21 June 2024

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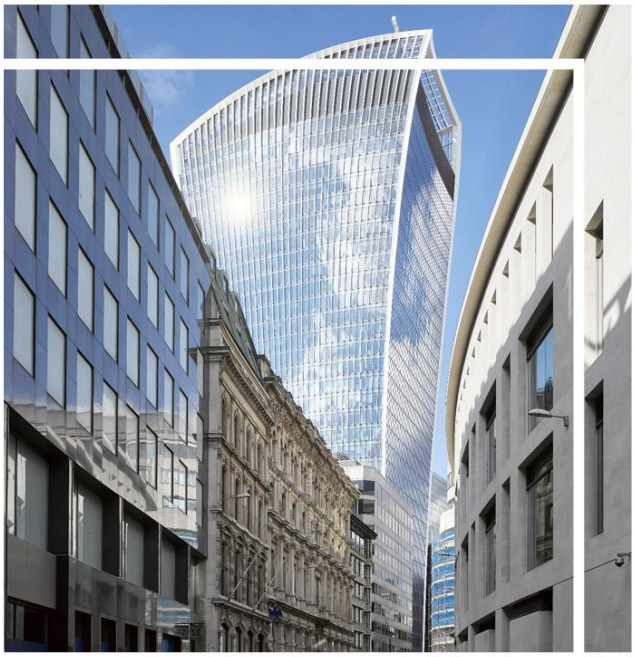
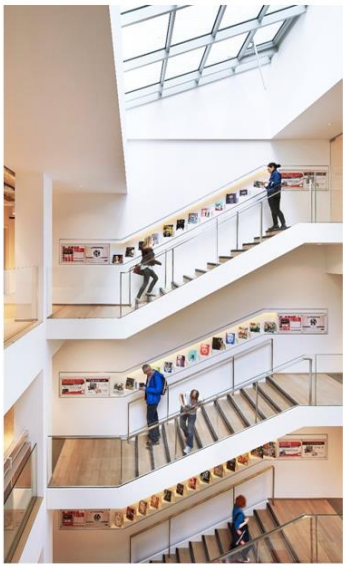
Issue P05





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Author:	Jerry Rees
Checker:	Martha Bird
Approver:	Jerry Rees
HM Project No:	35172

HM Office:

Neo
9 Charlotte Street
Manchester
M1 4ET

T: +44 (0)161 876 2700

hilsonmoran.com
hilsonmoran.com
@HilsonMoran
hilson_moran
Hilson Moran

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Issue	Date	Details
P01	26/4/2024	DRAFT FOR COMMENT
P02	17/5/2024	REVISED DRAFT
P03	6/6/2024	FINAL DRAFT
P04	14/6/2024	REVISED FINAL DRAFT WITH UPDATED MODEL
P05	21/6/2024	FINAL ISSUE

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Executive Summary

The Applicant is seeking planning consent for Plot 1, Cardiff Peninsula, Cardiff. The development includes senior living accommodation, as well as residential parking and landscaping.

A comprehensive noise impact assessment has been undertaken for the Proposed Development to determine the suitability of the Site for the proposed uses and the potential impacts of the Proposed Development upon nearby sensitive receptors.

Baseline noise surveys were undertaken which confirmed that noise levels at the site are relatively quiet for a location near urban use, but vary depending on proximity to the local road links. Future noise levels will be influenced by proposed changes to road traffic flows resulting from the development and committed schemes in the area.

Existing noise levels at the Site show the Site to fall into TAN 11 noise exposure category B. On that basis, it is considered that with good acoustic design and appropriate conditions limiting noise emissions where necessary, the Site would be considered suitable for residential use in terms of noise. Acoustic design in the form of preliminary environmental noise ingress specifications and assessment of external amenity has therefore been considered.

The prevailing noise levels at the Site indicate that standard double-glazing packages (29 dB R_w+C_{tr}) would be suitable for the residential façades of the Proposed Development, to achieve standard guideline internal noise levels for residential use. Passive ventilation strategies with acoustically rated trickle vents (36 dB $D_{n,e,w}$) would be appropriate where natural ventilation is targeted.

External amenity spaces are proposed for the development, with occupants having access to ground level amenity areas expected to have noise levels within guideline recommendations. In addition, glass balustrades are proposed on balconies, which are also expected to reduce noise levels to within recommendations.

The impact of noise from building services plant has been assessed in accordance with CC's plant noise criteria, with plant noise limits being set to which all fixed plant will need to be designed (collectively) to achieve.

Impacts of changes in road traffic flows resulting from the development are expected to be negligible.

Through the above, the Proposed Development is considered suitable for the proposed use and will minimise and mitigate the levels of noise emitted to the area surrounding it in line with the requirements of TAN 11 and Planning Policy Wales.

1. Introduction

This noise impact assessment has been prepared by Hilson Moran on behalf of Orion Land & Leisure Ltd (hereafter 'the Applicant') in support of the proposed development of Plot 1, Cardiff Peninsula, Cardiff. The Plot 1 development comprises a 5-story building, providing senior living accommodation (use Class C3) with associated car parking, cycle parking, and landscaping (hereafter the 'Proposed Development').

This assessment considers the Proposed Development's suitability for residential use in conjunction with the noise constraints of the site. Furthermore, it evaluates the potential impacts of the Proposed Development upon nearby, existing noise sensitive receptors (SRs).

As part of this assessment the following works have been carried out:

- Consultation with Cardiff Council (CC) over the preparation of this study to ensure that it meets their noise requirements;
- Baseline environmental noise surveys to quantify the existing climate affecting the site and at SRs;
- Assessment of the suitability of the site for residential use in terms of existing noise levels;
- Prediction of internal noise levels within the most noise exposed residential apartments to provide indication of the necessary façade sound insulation and ventilation strategy required to achieve appropriate internal noise levels;
- Assessment of noise levels in outdoor living areas;
- Specification of appropriate noise emission limits for new fixed building services plant to adhere;
- Assessment of changes in road traffic noise levels; and
- Recommendations for the control of noise, where necessary.

A glossary of the acoustic terminology used in this report is presented in Appendix A.

2. The Site, Site Setting and Proposed Development

2.1. Site Description

The application site is located within the Grangetown (The Bay) ward under the jurisdiction of Cardiff City Council, positioned on the Cardiff Peninsula, as detailed in Figure 2.1 (hereafter 'the Site').

The Site is currently occupied by a carpark, and devoid of any buildings. Adjacent to the water on the eastern side of the Site, there is a modest amount of overgrown grass, bushes, and trees.

Directly to the south of the Site is the mouth of the River Ely which houses several pontoons occupied by recreational boats. To the north-east of the Site is Cardiff International Sports Village, which houses state of the art sporting facilities, including a white-water rafting centre, international pool and gym, ice skating arena, as well as residential and retail developments.

2.2. Noise Climate in Summary

The Site could be considered relatively quiet, due to its location at distance from the nearest road noise sources. Nonetheless traffic noise does dominate at the Site, with constant noise from the A4055, and occasional noise from vehicles on local roads and carparks on and near the Site.

2.3. Noise Sensitive Receptors

Existing SRs identified for consideration in the assessment are detailed in Table 2.1 and illustrated on the site plan in Figure 2.1. It should be noted that only SRs most proximate (and therefore the worst affected) to the Site boundary are included.

Table 2.1: Sensitive Receptors

Receptor Location (Figure 2.1)	Type of Receptor	Description/Name	Approximate Distance to Site Boundary
SR A	Residential	Cardiff Ponte	3 m east of the Site boundary

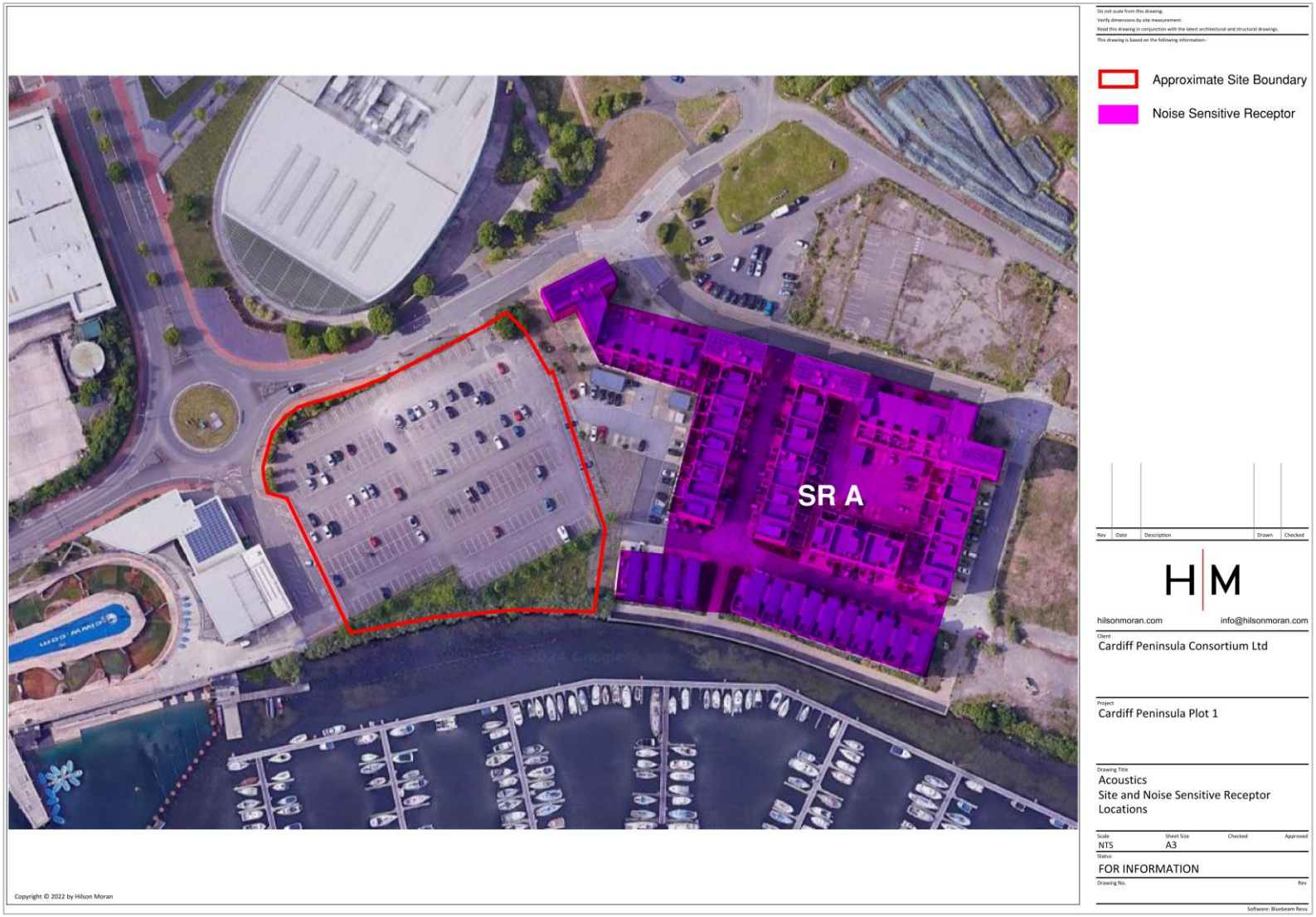
2.4. Proposed Development

The proposals for the development include:

Senior living accommodation with associated car parking, cycle parking, and landscaping

The Proposed Development will provide 77 units over a 5 storey building, classed as Use Class C3 (Residential).

Figure 2.1: Site and Sensitive Receptor Locations



3. Guidelines and Assessment Criteria

When selecting appropriate criteria for assessment, consideration was given to relevant planning policy and regulations, as follows;

- Planning Policy Wales (PPW)[1]
- Technical Advice Note (TAN) 11: Noise[2]
- Cardiff Local Development Plan (LDP)[3]

With regard to acoustic design and noise control, the PPW provides a set of overarching aims, broadly reflecting those contained in the TAN 11. They are directed towards the avoidance of significant adverse impacts and reduction of other adverse impacts on health and quality of life; set within the context of the Government's policy on sustainable development. These documents are described in further detail in Appendix B.

3.1. Residential Amenity

3.1.1. Site Suitability

TAN 11 defines Noise Exposure Categories to inform the overall suitability of the Site for residential development. Table 3.1 identifies the sources relevant to the Site so that the category can be identified, with consideration to the category definitions provided in Appendix B. The dominant noise source at the Site is road traffic noise, however could be considered 'mixed' as the dominant roads are not in the immediate vicinity of the Site. Nonetheless the noise levels of the categories for road and mixed sources are the same.

Table 3.1: TAN 11 Relevant Noise Exposure Categories for New Dwellings Near Existing Noise Sources

Noise Levels corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB					
Noise Source		**Noise Exposure Category**			
		A	**B**	**C**	**D**
Road Traffic/Mixed Sources	07:00 to 23:00	<55	55-63	63-72	>72
	23:00 to 07:00	<45	45-57	57-66	>66

3.1.2. Environmental Noise Intrusion

When considering the amenity of future occupants of the Proposed Development, the most relevant and credited guidance covering desirable levels of environmental noise for indoor environments is the World Health Organisation (WHO), 1999 'Guidelines for

[1] Llwodraeth Cymru Welsh Government (2024); *'Planning Policy Wales'*, Edition 12, February 2024.
[2] Llwodraeth Cymru Welsh Government (1997); *'Planning Guidance (Wales), Technical Advice Note (Wales) 11, Noise',* October 1997;
[3] Cardiff Council (2016); 'Cardiff Local Development Plan 2006 – 2026' Adopted Plan January 2016.

Community Noise'[4] and British Standard (BS) 8233:2014 'Guidance on sound insulation and Noise Reduction for Buildings'[5]. These levels have been adopted for the assessment of the residential noise ingress to support the residential site suitability assessment, with reference to the monitored and modelled baseline noise levels. A summary of the guideline noise levels relevant to the Proposed Development is presented in Table 3.2.

Table 3.2: Summary of Recommended Internal Noise Levels for Residential Premises

Room	Noise Level, dB $L_{Aeq,T}$	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Living Rooms	35	-
Dining Rooms	40	-
Bedrooms	35	30 & 45 L_{AFmax}[1]

Notes: [1] For a reasonable standard in bedrooms at night, the WHO, 1999 guidelines recommend that individual noise events (measured with F time-weighting) should be limited to/not normally exceed 45 dB L_{AFmax}. The WHO guidelines refer to research that identifies that 10-15 occurrences per night of the limiting maximum noise level may be considered acceptable.

3.1.3. External Amenity

BS 8233 and WHO, 1999 have been referred to for noise levels in outdoor environments, such as the external amenity spaces proposed (balconies, terraces, communal gardens).

A summary of the guideline external amenity noise levels relevant to the Proposed Development is presented in Table 3.3.

Table 3.3: Summary of Recommended External Noise Levels for Residential Premises

Space	Noise Level, dB $L_{Aeq,T}$
Outdoor Living Areas	50 (desirable), 55 (upper limit) [1+2]

Notes: [1] 50 dB is the BS 8233:2014 desirable noise level for external amenity space while 55 dB is the BS 8233:2014 upper guideline value. [2] 50 dB is the WHO guidelines limit for protecting the majority of people from moderate annoyance, whilst 55 dB is the WHO guidelines limit for protecting the majority of people from serious annoyance.

With regard to outdoor living areas, the WHO guidelines state that:

"*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB $L_{Aeq,16hr}$ on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor level should not exceed 50 dB $L_{Aeq,16hr}$. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.*"

The aspirational nature of the WHO guidance and the practicality of being able to achieve the stated guideline values is recognised in BS 8233:2014, which states:

"[regarding 55 dB $L_{Aeq,16hr}$ noise limit] *These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development*

[4] WHO (1999); '*Guidelines for Community Noise*', Geneva, WHO.
[5] BSI (2014); '*BS 8233:2014 Guidance on sound insulation and Noise Reduction for Buildings*', BSI.

should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."

3.2. Building Services Plant Noise

BS 4142:2014[6] provides an assessment and rating method to assess adverse effects from a range of commercial noise sources, including fixed building services plant. The measured or predicted noise level from the source in question, the 'specific noise' level ($L_{Aeq,T}$), immediately outside the SRs is compared with the 'background noise' level ($L_{A90,T}$). Where the sound contains certain acoustic features at the assessment location (e.g. tones, impulses, intermittency etc.), then a scaled character correction is added to the specific noise level to obtain the 'rating noise' level ($L_{Ar,Tr}$). The significance of effect is dependent on the context, having consideration to pertinent factors such as the sensitivity of the receptor and the level and nature of the sound.

The significance of building services noise impacts depends upon a number of factors. These include:

- the absolute noise level;
- the nature of the noise;
- the time and duration at which the noise occurs;
- whether the noise is temporary, intermittent or permanent;
- whether the impact is as a result of a new source; and
- whether it is a change to an existing source and/or the sensitivity of the receptor.

At this stage in the design of the Proposed Development, details of the building services plant are yet to be fixed and therefore, accurate predictions to determine the significance of the likely effects of their noise emission are not possible. Consequently, suitable plant noise emission limits have been set to which the plant must adhere and these are based on the measured background (L_{A90}) noise levels and the plant noise requirements of CC.

3.3. Road Traffic Noise

Existing SRs are currently exposed to a certain level of road traffic noise. In assessment terms, it is therefore the difference in noise level resulting from the Proposed Development that is important.

The changes in noise levels attributable to changes in operational road traffic flows and volumes resulting from the Proposed Development have been calculated using traffic data provided by the Applicant's Transport Consultant (Apex). Traffic flow data was provided for the scenarios detailed below:

- 2024 baseline
- 2036 baseline + committed developments
- 2036 baseline + committed developments + Plot 1 operational

The 2024 baseline data was used to calibrate the noise model. The road links covered by the traffic flow assessment were included in noise modelling of the existing and operational development. Data for each road was input including the 18-hr Average

[6] British Standards Institution (2019); '*BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound*', BSI Standards Limited, London.

Annual Weekday Traffic (AAWT) flow, % HGV composition and average vehicle speed for each road link. The noise levels were then modelled across the Site, and at the SRs, for use in the site suitability assessment.

Changes in road traffic noise have been assessed by considering the long-term increase in traffic flows as a result of the Proposed Development, following the principles of CRTN and DMRB. The criteria for the assessment of long-term traffic noise changes arising from the operation of the Proposed Development have been taken from Table 3.54b of DMRB and are provided in Table 3.4.

The Design Manual for Roads and Bridges document LA111[7] provides significance criteria for changes in operational road traffic noise levels which are reproduced in Table 3.4, and which have been used in this assessment.

Table 3.4 Effect of Road Traffic Noise

Effect	Change in Noise Level (dB $L_{Aeq,18hr}$)
Major Beneficial	≤ -10
Moderate Beneficial	-9.9 to -5.0
Minor Beneficial	-4.9 to -3.0
Negligible	-2.9 to 2.9
Minor Adverse	3.0 to 4.9
Moderate Adverse	5.0 to 9.9
Major Adverse	≥ 10

3.4. Consultation

The Neighbourhood Services at the Shared Regulatory Services (SRS) were consulted between Tuesday 2nd April and Friday 5th April 2024 to agree the assessment approach for residential amenity and for assessing impacts from the Proposed Development. SRS cover the areas of Bridgend, Cardiff and the Vale of Glamorgan. SRS confirmed that the guidance in TAN 11 and BS 8233:2014 should be followed for the assessment of residential suitability.

It was also agreed that impacts from building services plant should be assessed in line with BS 4142:2014, targeting a rating level of 10 dB below background.

[7] Highways England (2020); '*LA 111 - Noise and vibration*', Highways England.

4. Baseline Noise Conditions

Environmental noise surveys have been undertaken at the Site to determine prevailing noise levels affecting the Site and its surroundings.

Continuous long-term monitoring was carried out over a 5-day period between Thursday 22nd February and Tuesday 27th February 2024 at three positions, considered to represent noise levels at the Site, in the surrounding area and at the identified SR. Supplementary attended short-term noise measurements were also undertaken to determine the spatial variation in noise levels across the Site and surrounding area.

The monitoring locations are described in Table 4.1 and shown in Figure 4.1.

Table 4.1: Noise Monitoring Positions

Position	Period	Description	Observations and Predominant Noise Sources
LT1	Unattended measurement 22/02/24 to 27/02/24	Free-field position near Empire Way Car Parking, south of Plot 1. Microphone positioned 1.5 m above ground level (AGL).	Traffic noise from A4055 dominates. Traffic noise from surrounding roads contributes to a certain degree.
LT2	Unattended measurement 22/02/24 to 27/02/24	Free-field position at Pals Bowles, northwest of Plot 2. Microphone positioned 2.5 m AGL.	Traffic noise from A4055 dominates. Traffic noise from surrounding roads contributes to a certain degree.
LT3	Unattended measurement 22/02/24 to 27/02/24	Free-field position, 30m from International Drive, north of Plot 6. Microphone positioned 1.5 m AGL.	Traffic noise from A4232 dominates. Traffic noise from surrounding roads contributes to a certain degree.
ST1	Attended 20 minutes measurement – 27/02/24	Free-field measurement within Ice Arena Wales Car Park. Microphone positioned approximately 1.5 m AGL.	The noise climate at this location is dominated by traffic noise from A4055. Noise from human activities and private vehicles using the roads surrounding the Cardiff International Pool & Gym contribute. Four aircraft movements have been noted during measurement period.
ST2	Attended 20-minute measurement – 27/02/24	Free-field measurement at the southeast corner of Cardiff International Pool & Gym.	The noise climate at this location is dominated by traffic noise from A4055 and minor surrounding roads noise. Noise from human activities and building services contribute. Four aircraft

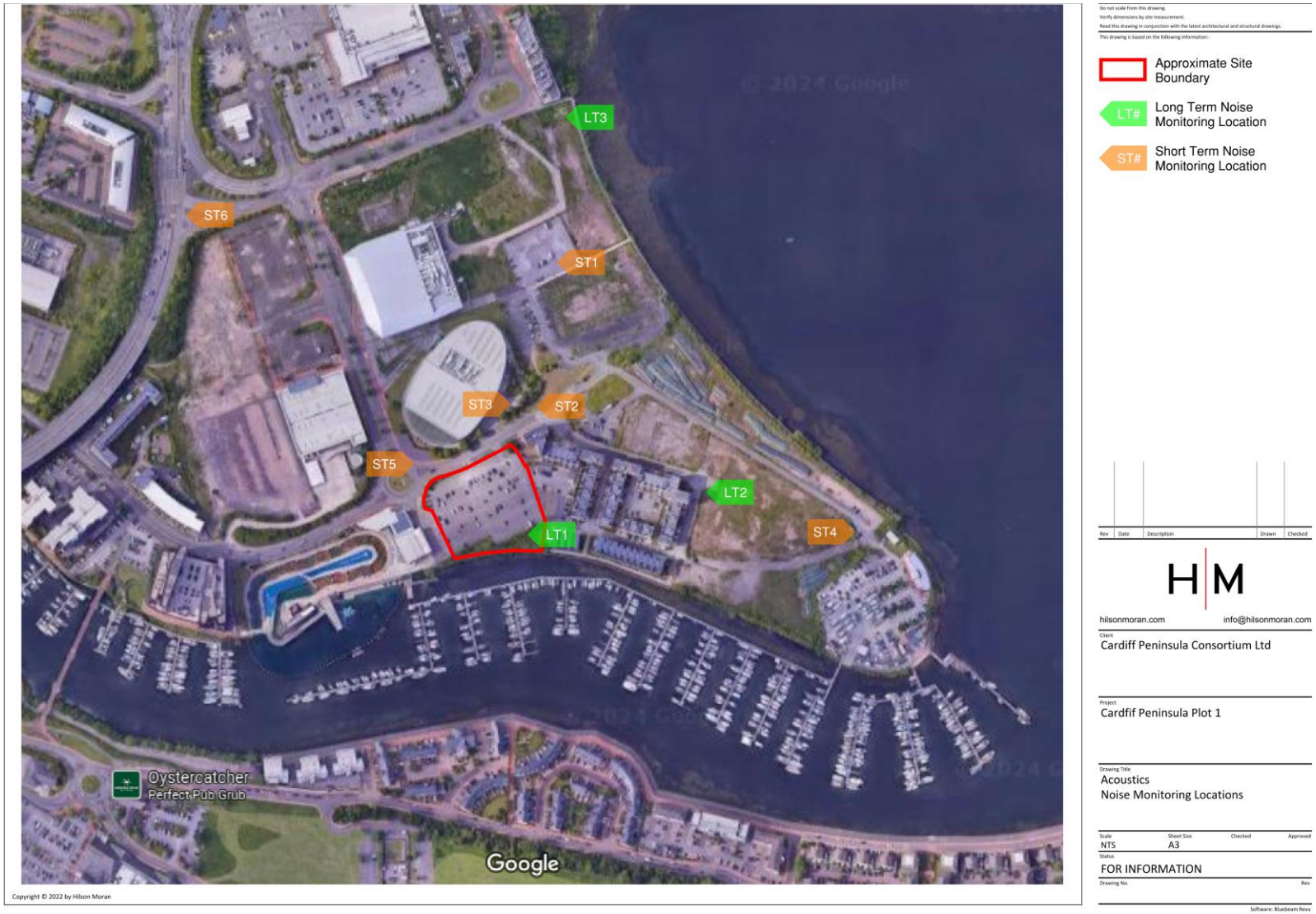
		Microphone positioned 1.5 m AGL.	movements have been noted during measurement period. Only private vehicles have been noted during survey period, with an estimate of 5 cars per minute.
ST3	Attended 1-minute measurement – 27/02/24	Free-field measurement at 1 m from Cardiff International Pool & Gym's louvres. Microphone positioned 1.5 m AGL.	This measurement was taken to determine whether building services noise from Cardiff International might affect the Proposed Development. While building services noise dominated at 2m from the louvres, it was low enough so as not to be discernible at any location on the Site.
ST4	Attended 20-minute measurement – 27/02/24	Free-field measurement at Cardiff Bay Yacht Club: Yacht Club & Sailing School. Microphone positioned 1.5 m AGL.	Occasional passing on Empire Way contributes to the background noise levels influenced by constant distant road traffic, assumed to be from the A4055.
ST5	Attended 20-minute measurement – 27/02/24	Free-field measurement at Olympian Drive roundabout. Microphone positioned 1.5 m AGL.	The noise climate at this location is dominated by traffic noise from Olympian Drive and Empire way. The mixture of vehicles included HGVs (Three HGVs movements have been noted during survey period). Four aircraft movements have been noted during measurement period.
ST6	Attended 20-minute measurement – 27/02/24	Free-field measurement at 2 m from A4055. Microphone positioned 1.5 m AGL.	The noise climate at this location is dominated by traffic noise from A4055. The mixture of vehicles included HGVs (11 HGVs movements have been noted during survey period). One aircraft movement has been noted during measurement period.

All noise measurements were taken with calibrated precision grade (Class 1) frequency (one-third-octave band) sound level meters to provide a detailed description of the prevailing environmental noise characteristics. The sound level meters were set-up to record over consecutive 10-minute periods the L_{eq}, L_{90}, L_{10} and L_{max} noise indices in the A-weighting network over a 125 ms fast response time constant interval for the duration of the survey. The indices are described in Appendix A, but roughly translated they describe in turn the average, background, road traffic and maximum noise level.

Full details of the instrumentation used for the noise measurements, including calibration certificates are available on request.

Weather conditions, whilst not actively measured during the survey period, were monitored remotely throughout. Weather conditions were ideal for the measurement of noise until 25th and 26th February, where high wind speeds (>5 ms^{-1}) occurred and appeared to influence the data. Data from these two days has therefore been excluded from the dataset.

Figure 4.1: Noise Monitoring Locations



4.1. Noise Survey Results

A summary of the measured daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) noise levels for the survey period is provided in Table 4.2, while time histories of the noise data at the long-term survey positions are provided in Appendix C.

Table 4.2: Summary of Baseline Noise Monitoring Results – Free Field Values

Monitoring Location (Figure 4.1)	Period	Duration	$L_{Aeq,T}$ dB	$L_{A90,10min}$ dB		$L_{AFmax,1min}$ dB
			Ave[1]	10th%ile[2]	Ave[3]	Range (10th Largest)[4]
LT1	Day	16 hours	51	41	46	46 – 79
	Night	8 hours	46	37	41	40 – 72 (60)
LT2	Day	16 hours	53	44	49	46 – 76
	Night	8 hours	49	38	43	43 – 75 (71)
LT3	Day	16 hours	54	45	50	54 – 80
	Night	8 hours	50	40	44	49 – 79 (70)[5]
ST1	Day	20 mins	49	46 [6]		66 [7]
ST2	Day	20 mins	51	45 [6]		70 [7]
ST3	Day	1 min	58	57 [6]		62 [7]
ST4	Day	20 mins	46	42 [6]		68 [7]
ST5	Day	20 mins	62	54 [6]		76 [7]
ST6	Day	20 mins	77	68 [6]		87 [7]

Notes: [1] Logarithmic average over the day/night survey periods; [2] 10th percentile of the $L_{A90,10min}$ values over the day/night survey period; [3] Arithmetic average over the day/night survey periods; [4] Maximum of the 10th largest measured L_{AFmax} levels for each night-time survey period; [5] The sound level meter used for this position only allows 5-minute data to be processed, so the 10th largest value has been assumed using the 95th percentile value of all the 5-minute L_{AFmax} values over the night-time period; [6] L_{A90} over the short-term measurement period; [7] Maximum value over the survey period. All figures rounded to nearest whole decibel.

5. Assessment of Site Suitability

5.1. Noise Model

Owing to the complexity of the interaction between the Proposed Development, existing building structures and existing and future noise sources, a three-dimensional noise model of the Site has been prepared using the acoustic software package CadnaA. The model has been used to predict and help illustrate the levels of noise at the different residential building façades and external amenity areas of the Proposed Development. The model was constructed using architectural plans, elevations and section drawings. The results of the model were calibrated by comparing modelled results with monitored noise levels to give confidence in the accuracy of the modelling results.

The model was first calibrated using the existing Site layout, baseline measured noise levels and baseline road traffic flows provided by the project Transport Consultant (Apex). The likely noise levels on the Proposed Development were then assessed by adding in the proposed buildings, and entering the potential future traffic flows from the Proposed Development and future traffic flow increases from committed schemes in the area.

Modelled noise contour plots showing predicted ambient (L_{Aeq}) daytime (07:00-23:00) and night-time (23:00-07:00) noise levels across the Proposed Development are presented in Appendix D. The different coloured noise contours correspond to different levels of noise exposure, with the highest exposures relating to where the Proposed Development faces north-west towards the A4055.

5.2. Site Suitability

Referring to the modelling images provided in Appendix D and the categories defined in Table 3.1, the Site falls into Category B of TAN 11. This is defined as:

"*Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.*"

It is considered that, with good acoustic design, the Site is suitable for residential uses in terms of noise. Acoustic design in the form of controlling environmental noise intrusion to the residential dwellings, and noise in external amenity areas is considered in the following sections.

5.3. Environmental Noise Intrusion

The degree of environmental noise intrusion to residential areas depends on the acoustic performance of all elements of the façade, but is generally determined by the components providing the least airborne sound insulation, in this case the glazing; especially when residents open windows to provide natural background or purge ventilation.

The glazing performance requirements are dependent on the use type, what percentage of the façade is glazed, the frequency composition of noise incident on the façade and the ventilation strategy.

Preliminary calculations have been undertaken to determine the sound insulation performance requirements of the glazing for the residential façades exposed to the highest noise levels. The calculations adopt the detailed methodology set out in BS 8233:2014 and are based on the following assumptions:

- To ensure favourable resting/sleeping conditions are provided for, assessment has been based on determined $L_{Aeq,16hr}$ daytime and $L_{Aeq,8hr}$ and L_{AFmax} night-time values. The 10th largest L_{AFmax} value (per night) has been used in the night-time assessment in bedrooms to align with the guidance in WHO,1999.
- The internal finishes of the room will affect the reverberant component of the overall noise level, with a degree of soft furnishing (carpet and curtains) assumed in the calculations. All walls and ceilings are assumed to be plastered and painted.
- It has been assumed that the external wall element constructed as a part of the development achieves an acoustic performance of not less than 47 dB R_w+C_{tr}, which can be achieved with masonry constructions or carefully designed lightweight cladding.
- The calculated noise levels are based on the glazing areas shown in the Architect's elevation drawings. Should the glazed area change by +/-10% of the façade area then the performance of the proposed glazing units may need to be adjusted accordingly.

The assessment results are presented in Table 5.1 in terms of the Weighted Sound Reduction Index (R_w), a single number quantity used to characterise the airborne sound insulation performance of a system or material over the frequency range 100 to 3150 Hz, with C_{tr} adjustment factor (a negative number) used to take account of the low frequency noise spectrum characteristics from road traffic (R_w+C_{tr}) as incident at the Proposed Development.

Table 5.1: Indicative Facade Sound Insulation Performance of Glazing

Elevation	Period	Façade Noise Levels, dB	Target Criterion, dB	Min Sound Insulation of Glazing, dB R_w+C_{tr}	Example Glazing Configuration (or equal and approved)
All Residential Façades	Day, $L_{Aeq,16hr}$	57	35	29	6:12:4 mm standard double glazing
	Night, $L_{Aeq,8hr}$	51	30		
	Night, L_{AFmax}	71	45		

Provided that the glazing system as a whole (including framing, seals, openable lights etc.) meets or exceeds the stipulated performance specified in Table 5.1 then the noise ingress criteria are expected to be met.

The noise levels predicted on the façades of the Proposed Development would be appropriate for natural ventilation solutions such as acoustically rated trickle vents, achieving a minimum sound reduction of 36 dB $D_{n,e,w}$ (per bedroom), if desired. If a mechanical ventilation system is proposed noise ingress via façade louvres and duct systems that are part of the mechanical ventilation system should be considered in the detailed design of the project.

5.4. External Amenity

The Proposed Development provides a mix of external amenity areas including private balconies to apartments, communal terraces, and a ground level external amenity space.

There are areas of predicted daytime noise levels on the north-west and south-west façades that are over 55 dB $L_{Aeq,T}$, with levels up to 57 dB $L_{Aeq,T}$. Where balconies are proposed, there is therefore the potential for noise levels on these to exceed the WHO guideline limit for protecting the majority of people from serious annoyance, and the BS 8233 recommended upper limit. As noted in Section 3 however, BS 8233:2014 does recognise that the guideline limit is just that (i.e. a guideline) and that specification of noise limits in balconies and terraces is not necessarily appropriate.

Notwithstanding the above solid, imperforate glass balustrades are proposed on balconies, which would be expected to reduce noise levels on the noisiest façades below the upper guideline value. Noise levels in balconies on the other façades are anticipated to be below the desirable 50 dB $L_{Aeq,T}$ target and would offer a good level of acoustic amenity without any specific design measures.

Noise levels in the ground level external amenity areas are below the 50 dB $L_{Aeq,T}$ value for desirable external amenity spaces in BS 8233, as they are shielded from surrounding noise but the Proposed Development building. This will provide a tranquil space for occupants to use, particularly where their balconies may be subject to higher noise levels.

The Proposed Development is consequently considered to offer a good level of external amenity space to occupants, with no specific mitigation measures.

6. Noise Impact Assessment

6.1. Building Services Plant Noise Limits

Any items of fixed plant associated with the operation of the Proposed Development would have the potential to generate noise. At this stage in the design of the Proposed Development, specific details of the type, number and configuration of building services plant have not been fixed and therefore it is not possible to accurately predict plant noise emission levels. Consequently, suitable limits to which plant should adhere have been set.

It should be noted that BS 4142 recognises that its method of assessment is not suitable when background and rating noise levels are both very low. Background noise levels below about 30 dBA and rating levels below about 35 dBA are considered to be very low (as supported by the Association of Noise Consultants (ANC) document 'BS 4142:2014+A1:2019 Technical Note'[8]). In such circumstances, it is recommended that a minimum plant noise limit of 35 dB $L_{Ar,Tr}$ is set where the prevailing background noise levels minus 10 dB are below this value due to the difficulty in designing plant to noise levels lower than this.

Based on the results of the baseline noise survey (Section 4) and CC's plant noise policy (Section 3), suitable noise limits to which fixed building services plant should adhere have been set and are presented in Table 6.1.

Table 6.1: Plant Noise Limits at Nearest Noise Sensitive Premises

Location	Period	10th%ile Background Noise Level (dB $L_{A90,10min}$)	Plant Noise Emission Limit at 1m from Façade (dB $L_{Ar,Tr}$)
SR A	Daytime	41	≤35
	Night-time	37	

The plant noise limits apply to the total contribution of noise from all new plant items associated with the Proposed Development that may run during any particular period and are to be met 1 m from the nearest habitable window of the SR detailed in Section 2.

For the emission limits in Table 6.1 to be met by the cumulative total level of noise generated by all building services plant, careful attention would need to be paid to plant selection, installation and noise attenuation, which would be addressed prior to installation of plant.

The plant specification is sufficiently flexible to ensure that suitably quiet, non-tonal plant can be procured and/or practical, cost-effective mitigation options incorporated into the design to ensure that guideline noise criteria are met. During the detailed design of the Proposed Development efforts will focus on optimising the layout of plant and procuring

[8] ANC (2020); '*BS 4142:2014+A1:2019 Technical Note*', Association of Noise Consultants, Northallerton.

the quietest yet most efficient plant for the job before considering applying individual noise control measures (e.g. silencers, louvres), where assessed as necessary.

6.2. Road Traffic Noise

Based upon traffic data provided by the transport consultant, the likely change in road traffic noise on the road network due to traffic generated by the occupation of the completed and fully operational Proposed Development is presented in Table 6.2, with additional details provided in Appendix E. The assessment includes traffic increases due to natural traffic growth and cumulative schemes to identify the likely effects solely resulting from the Proposed Development.

Table 6.2: Differences in Road Traffic Noise Level, dB $L_{A10,18hr}$

Road Link	Difference in dB $L_{A10,18hr}$			Predicted Effect
	2036 Baseline Without the Proposed Development	2036 Baseline with the Proposed Development	Change	
Empire Way (W)	54.4	54.4	0.0	Negligible
Empire Way (E)	60.4	60.4	0.0	Negligible
Olympian Drive	66.2	66.2	0.0	Negligible
International Drive	65.2	65.3	+0.1	Negligible
Ferry Road	65.3	65.3	0.0	Negligible
Clive Street	67.6	67.6	0.0	Negligible
A4160 Penarth Road	71.7	71.7	0.0	Negligible
A4119 Corporation Road	65.6	65.6	0.0	Negligible
Watkiss Way	62.4	62.4	0.0	Negligible
Dunleavy Drive (S)	62.6	62.6	0.0	Negligible
Dunleavy Drive (N)	61.0	61.0	0.0	Negligible
A4055	74.2	74.2	0.0	Negligible
A4232 E	78.8	78.8	0.0	Negligible
A4232 W	80.5	80.5	0.0	Negligible

As shown in Table 6.2, changes in noise levels from road traffic are expected to result in a negligible effect on all roads, and consequently on all SRs.

Appendix A: Glossary of Acoustic Terminology

The table below provides a layperson's explanation of the acoustics terms that commonly appear in reports. It is not intended to give full scientific definitions and explanations or go into detail on how and why things are as they are. Some obsolete terms and abbreviations have been included as they still appear in documents from time to time.

Term	Description
Decibel, dB	The decibel is a logarithmic unit of measurement used for quantifying sound. It is derived from the logarithm to base 10 of the ratio of two quantities. Use of a logarithmic scale has the advantage that it compresses the very wide range of sound pressures to which the ear may typically be exposed to a more manageable range of numbers.
Frequency, Hz	In sound, the number of cycles per second of a pressure fluctuation and frequency in sound is proportional to its pitch. Different frequencies are divided into octave and one third octave bands.
Sound Pressure Level, *Lp*	This is the unweighted or linear level which is measured prior to any weightings being applied. The sound pressure level is 20 times the logarithm to base 10 of the ratio of the reference sound pressure ($2x10^{-5}$) and the measured sound pressure.
Sound Power Level, L_W	This is the total sound energy radiated from a given source. The sound power Level is 10 times the logarithm to base 10 of the ratio of the reference sound power level ($1x10^{-12}$) and the measured power.
Frequency Weightings	Weightings can be applied to a spectrum of sound and act as a filter to account for different sensitivities and conditions.
Time Weightings	A time weighting to denote the response of the sound level meter. For most measurements the Fast time weighting is selected (F) however, a slow time weighting (S) is often used to for the measurement train noise and vibration.
A-weighted sound pressure level, L_{pA}	The sound pressure level with the A-weighting applied. The A-weighting is used for most environmental noise measurements and is used to weight a spectrum of sound to match the sensitivity of the human ear.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	The L_{Aeq} is an energy average and defined as the level of sound which, over a given period of time, would equate to the same A-weighted sound energy as the actual fluctuating sound.
Octave Bands	A band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Maximum noise Level, L_{AFmax}	The maximum instantaneous noise level measured during a given period of time. The time weighting to which the meter is set for this measurement parameter is always indicated by either an F or S.
Minimum Noise level, L_{AFmin}	The minimum instantaneous noise level measured during a given period of time. The time weighting to which the meter is set for this measurement parameter is always indicated by either an F or S.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting F, which is exceeded for N% of a specified time interval. An example of this is background noise which is quantified with the L_{A90} descriptor, which is the A-weighted level which is exceeded for 90% of the measurement period.
Sound exposure level L_{AE}	A level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.

Rating Level, $L_{Ar,Tr}$	The equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Ambient Noise Level	The noise level in a given environment whilst it is subject to all of its normal sources of noise.
Background Sound / Noise Level, L_{A90}	These are amongst the lowest noise levels measured over a given period of time and exclude short term, intermittent noise sources. The background noise level is quantified by the L_{A90} descriptor and is therefore the level which is exceeded for 90% of a given period of time.
Reverberation Time, *T*	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor *T,* often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Absorption, A	The acoustic absorption derived from the multiplication of the absorption coefficient by the surface area of a given material.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
Sound Reduction Index, *R*	The laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
Weighted Sound Reduction Index, R_w	A single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
Weighted Level Difference, D_w	The weighted level difference between a pair of rooms, stated as a single figure.
Standardized Weighted Level Difference, $D_{nT,w}$	The standardized, weighted difference in sound level between a pair of rooms, stated as a single figure. The level difference in octave bands is first normalized to a reference reverberation time and then plotted against a set of reference curves to establish a single figure value.
Weighted, Normalised Flanking Level Difference, D_{nFw}	The normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
Normalised Element Level Difference D_{ne}	The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.

Weighted, Normalised Element Level Difference, D_{new}	The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	A correction term applied to the sound insulation single-number values (R_w, D_w, and $D_{nT,w}$). Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.
Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking on a floor structure.
Weighted standardized impact sound pressure level, $L_{nT,w}$	A single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
Dynamic Insertion Loss, DIL	The reduction of noise level due to the presence of a noise control device such as an attenuator, including any regeneration noise created by its presence.
NR	The Noise Rating level. This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.
Vibration	The vibratory motion of a surface can be characterised by: (a) displacement (m), (b) velocity (m/s), or (c) acceleration (m/s^2). The magnitude of the vibration can be quantified in several ways: **Peak to Peak** - The total excursion of the oscillation about the zero datum. **Peak** - This value gives the maximum excursion of the oscillation above or below the zero datum. **r.m.s.** - This value gives the root mean square of the time history over a specific time interval (time constant). **dB** - Vibration levels can be expressed in dB. A reference level of 10-6 m/s^2 r.m.s. is usually used for acceleration.
Ground borne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground
Structure borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.
V.D.V,	The VDV is the Vibration Dose a person is expected to be exposed to over the course of the day or night. The VDV is given by the fourth root of the time integral of the fourth power of the acceleration after it has been frequency-weighted.
eVDV	The estimated vibration dose value based on short duration measurements of transients with known durations and occurrences

Appendix B: Planning Policy and Noise Guidelines

Legislative Framework

The applicable legislative framework is summarised as follows.

Control of Pollution Act 1974

The Control of Pollution Act 1974[9] gives local authorities special powers for controlling noise and vibration arising from construction and demolition works. These powers may be exercised either before or after works have been started.

Section 60 enables the local authority of an area in which works are scheduled or currently underway, to serve a notice of its requirements for the control of construction site noise/vibration on the person who appears to the local authority to be undertaking the works.

Section 61 provides a mechanism for the contractor or developer to take the initiative in approaching the local authority to ascertain its noise/vibration requirements before construction work starts.

The Act also covers Noise Abatement Zones, Codes of Practice and Best Practicable Means (BPM) regarding noise pollution.

Environmental Protection Act 1990, Part III

Section 79 of the Environmental Protection Act 1990[10] defines statutory nuisances and the requirement for local authorities to inspect their area for statutory nuisances, taking such steps as are reasonably practicable to investigate any complaint of a statutory nuisance.

Section 80 of the act gives local authorities the right, where a statutory nuisance exists or is likely to be caused, to serve an abatement notice requiring the abatement, prohibition or restriction of the nuisance.

Section 82 of the act allows a person aggrieved by a statutory nuisance to make a complaint to a Magistrates Court in an attempt to seek an abatement notice served on the person responsible for the nuisance.

Planning Policy

Planning Policy Wales

Planning Policy Wales (PPW) [11] provides overarching aims and principles concerning noise management in the planning process. These aims typically include:

- **Avoidance of Significant Adverse Impacts:** PPW aims to prevent significant adverse effects of noise on health and quality of life. This involves considering the

[9] Her Majesty's Stationery Office (1974); '*Control of Pollution Act 1974*', HMSO, London.
[10] DEFRA (1990); '*Environmental Protection Act Part III*', DEFRA, 1990.
[11] Llwodraeth Cymru Welsh Government (2024); *'Planning Policy Wales'*, Edition 12, February 2024.

potential noise impacts of development and taking measures to mitigate or avoid them where possible.

- **Reduction of Other Adverse Impacts:** PPW also aims to reduce other adverse impacts of noise that may not be significant but still affect health and well-being. This could involve implementing measures to minimize noise disturbance to nearby residents or sensitive receptors.
- **Context of Sustainable Development:** PPW places these aims within the broader context of sustainable development, emphasizing the need to balance environmental, social, and economic considerations. This includes promoting development that enhances the quality of life while minimizing negative environmental impacts, including noise pollution.

Technical Advice Note 11

Technical Advice Note (TAN) 11 provides guidance on noise considerations in planning, particularly concerning potentially noise-generating developments near existing sensitive uses. Its key points include:

- **Assessment:** TAN 11 emphasizes the importance of conducting thorough noise impact assessments for proposed developments, especially when they are near existing sensitive uses such as residential areas, schools, hospitals, or places of worship.
- **Standards and Criteria:** It sets out standards and criteria for acceptable noise levels in different land use contexts, helping planners and developers understand the permissible noise levels and the need for mitigation measures.
- **Mitigation Measures:** TAN 11 outlines various mitigation measures to minimize noise impacts, including building design, layout, orientation, and the use of acoustic barriers or landscaping to shield sensitive receptors from noise sources.
- **Sensitive Hours:** It addresses the significance of considering noise impacts during sensitive hours, such as nighttime, when people are more susceptible to disturbance, and recommends stricter standards during these periods.
- **Consultation and Engagement:** TAN 11 highlights the importance of consulting with relevant stakeholders, including affected communities, during the planning process to address concerns and incorporate feedback regarding noise impacts.
- **Monitoring and Enforcement:** Finally, TAN 11 underscores the need for monitoring and enforcement mechanisms to ensure compliance with noise standards and mitigation measures post-development.

Overall, TAN 11 serves as a guide for planners, developers, and local authorities to assess and manage noise impacts effectively, particularly concerning developments near existing sensitive land uses.

Specifically, Tan 11 states the following with regards to noise generating development:

"Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions."

TAN 11 also provides noise exposure categories for Local Authorities in Wales to assess proposals for residential development against. The categories and their related noise levels are replicated in Tables B.1 and B.2.

Table B.1: TAN 11 Noise Exposure Categories for Dwellings

Noise Exposure Categories	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Table B.2: TAN 11 Recommended Noise Exposure Categories for New Dwellings Near Existing Noise Sources

Noise Levels corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB					
Noise Source		**Noise Exposure Category**			
		A	B	C	D
Road Traffic	07:00 to 23:00	<55	55-63	63-72	>72
	23:00 to 07:00	<45	45-57	57-66	>66
Rail Traffic	07:00 to 23:00	<55	55-66	66-74	>74
	23:00 to 07:00	<45	45-59	59-66	>66
Air Traffic	07:00 to 23:00	<57	57-66	66-72	>72
	23:00 to 07:00	<48	48-57	57-66	>66
Mixed Sources	07:00 to 23:00	<55	55-63	63-72	>72
	23:00 to 07:00	<45	45-57	57-66	>66

Cardiff Development Local Plan

The Cardiff Development Local Plan aims to provide a coherent and sustainable framework for managing growth and development in the city while addressing social, economic, and environmental challenges. It plays a crucial role in guiding decision-making

processes related to land use, development proposals, and infrastructure investments within Cardiff.

The Local Plan recognises that noise can have a harmful impact on people's health and quality of life. Policy EN13: Air, Noise, Light Pollution and Land Contamination of the Local Plan states the following:

"Development will not be permitted where it would cause or result in unacceptable harm to health, local amenity, the character and quality of the countryside, or interests of nature conservation, landscape or built heritage importance because of air, noise, light pollution or the presence of unacceptable levels of land contamination."

Guidance

WHO,1999

The World Health Organisation (1999) 'Guidelines for Community Noise' provides guidance on desirable levels of noise structured according to specific environments to ensure the critical effects of noise on sleep, annoyance and speech interference are guarded against. One of the tenets of the WHO guidelines is the protection of the most vulnerable and sensitive of the population, with the WHO guideline values for environmental noise set at the level of the lowest adverse health effect below which the occurrence rates of particular 'effects' can be assumed to be negligible.

The WHO recommends specific internal noise levels that will provide an acoustic environment that is conducive to uninterrupted speech and sleep, whilst daytime external noise limits aim to prevent the majority of the population being moderately or seriously annoyed by noise. Table B.3 presents a summary of the WHO guideline values.

Table B.3: Summary of WHO Recommended Environmental Noise Levels

Environment	Critical Health Effects	dB L_{Aeq}	Time Base (hours)	dB L_{AFmax}
Outdoor living area	Serious annoyance (daytime and evening)	55	16	n/a
	Moderate annoyance (daytime and evening)	50	16	n/a
Dwelling, indoors	Speech intelligibility and moderate annoyance (daytime and evening)	35	16	n/a
Inside bedrooms	Sleep disturbance, night-time	30	8	45[1]
Outside bedrooms	Sleep disturbance, window open	45	8	60

Notes: [1] For a reasonable standard in bedrooms at night, the WHO,1999 guidelines recommend that individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{AFmax}. The WHO guidelines refer to research that identifies that 10-15 occurrences per night of the limiting maximum noise level may be considered acceptable.

BS 8233:2014

British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' builds on the WHO guidelines, providing guidance for the control of noise in and around both new and refurbished buildings. The guidelines recommend internal ambient noise criteria for a range of indoor spaces including residential land uses. The indoor ambient noise levels for unoccupied spaces relevant to this assessment are presented in Table B.4.

Table B.4: BS 8233 Guideline Noise Levels for Residential Spaces

Activity	Location	Daytime dB $L_{Aeq,16hr}$ (07:00 to 23:00)	Night-time dB $L_{Aeq,8hr}$ (23:00 to 07:00)
Resting	Living room	35	n/a
Dining	Dining room	40	n/a
Sleeping (daytime resting)	Bedroom	35	30

Unlike the previous version, BS 8233:2014 does not provide recommendations in relation to maximum noise levels in residential bedrooms at night from individual noise events such as vehicle or aircraft movements. Instead, it advises:

"*Regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL (Sound Exposure Level) or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values.*"

When considering external amenity spaces such as gardens, balconies and terraces, the guidance provided in BS 8233 states:

"*For traditional external areas that are used for amenity space, such as gardens or patios it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.*"

It goes on to state:

"*Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation.*

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

BS 4142:2014

British Standard 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound' describes methods for rating and assessing sound of an industrial and/or commercial nature for the purposes of: (a) investigating complaints, (b) assessing sound from proposed, new, modified or additional sources of sound of an industrial/commercial nature, and, (c) assessing sound at proposed new residential premises, with a view to determining the likelihood and degree of adverse impact, having regard to the context in which the sound occurs.

Road Traffic Assessment Guidance

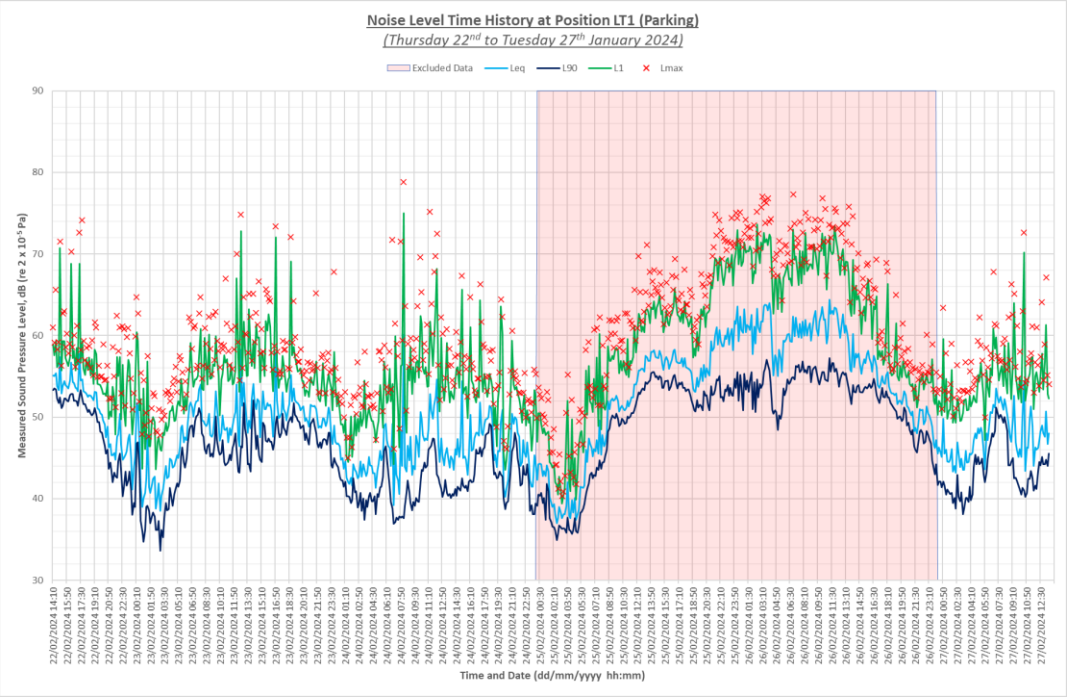
The following documents are relevant in predicting and assessing traffic noise affecting existing and proposed development:

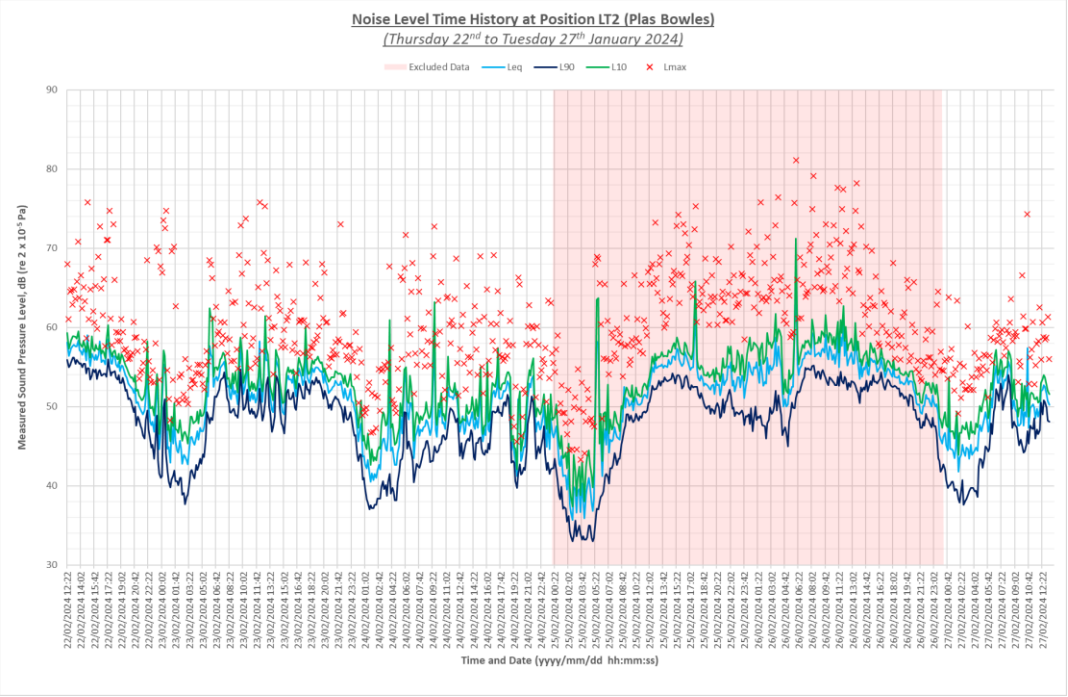
- Department of Transport / Welsh Office Memorandum Calculation of Road Traffic Noise (CRTN)[12] describes procedures for predicting and measuring noise from road traffic noise in terms of the L_{A10} (the noise level exceeded for 10% of the time) and is suitable for environmental assessments of development proposals where changes in road traffic noise may have a significant effect.
- IEMA 'Guidance Note No.1 Guidelines for the Environmental Assessment of Road Traffic'[13] provides guidance on the impact assessment of traffic noise. The guidance note recommends assessment where traffic flows will increase (as a result of development) by more than 30% (or the number of Heavy Good Vehicles (HGVs) will increase by more than 30%), and where specifically sensitive areas experience traffic flow increases of 10% or more. The guidance note indicates that projected changes in traffic of less than 10% create no discernible environmental effect.
- The Design Manual for Roads and Bridges (DMRB) document LA 111 – Noise and Vibration provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration effects arising from all road projects, including new construction, improvements and maintenance.

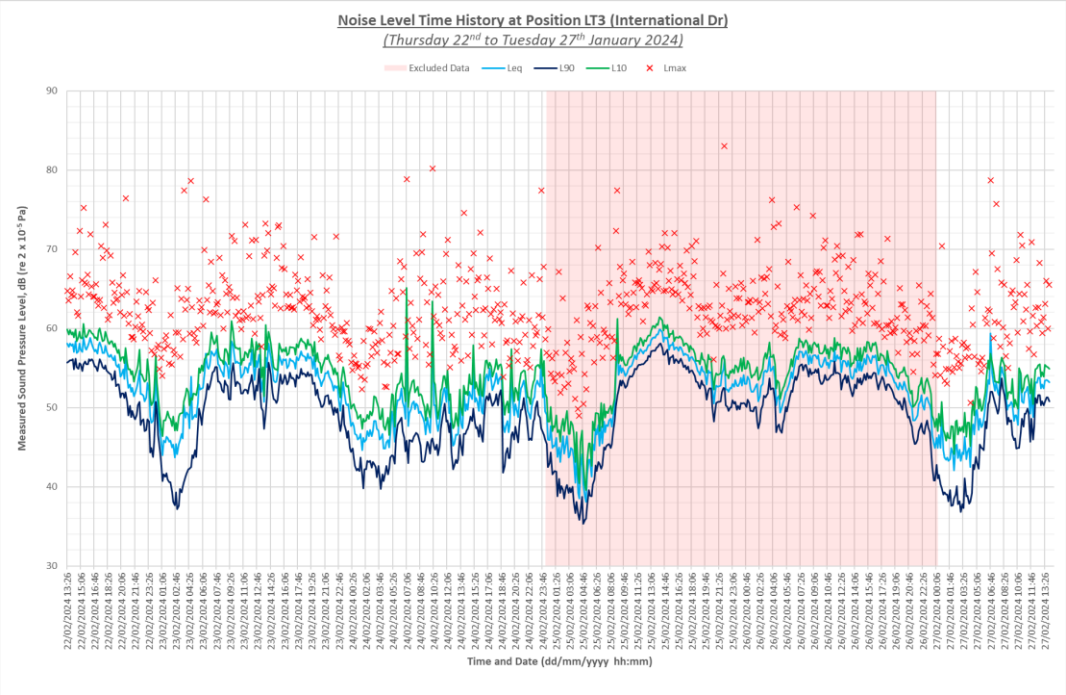
[12] Department for Transport Welsh Office (1988); '*Calculation of Road Traffic Noise*', The Stationery Office Ltd, London.

[13] IEMA (1993); '*Guidance Notes No. 1 Guidelines for the Environmental Assessment of Road Traffic*', IEMA, London.

Appendix C: Baseline Noise Levels






Noise Level Time History at Position LT3 (International Dr)
(Thursday 22nd to Tuesday 27th January 2024)
Excluded Data
Leq
L90
L10
Lmax
Measured Sound Pressure Level, dB (re 2 x 10-5 Pa)
90
80
70
60
50
40
30
Time and Date (dd/mm/yyyy hh:mm)

Appendix D: Modelled Noise Contours

Scale 1 : 1001

Cardiff Peninsula
Plot 1

35172

Modelled Noise Contours and Facade Noise Levels Daytime

Version	Date	Name
01	06/06/24	JeR
02	13/06/24	JeR

H|M

LAeq in dB
Building Noise Levels at Maximum

Plot 1 Site Boundary

- > -99.0 dB
- > 35.0 dB
- > 40.0 dB
- > 45.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB
- > 85.0 dB

Scale 1 : 1001

Cardiff Peninsula
Plot 1

35172

Modelled Noise Contours and Facade Noise Levels Night-time

Version	Date	Name
01	06/06/24	JeR
02	13/06/24	JeR

H|M

LAeq in dB
Building Noise Levels at Maximum

Plot 1 Site Boundary

- > -99.0 dB
- > 35.0 dB
- > 40.0 dB
- > 45.0 dB
- > 50.0 dB
- > 55.0 dB
- > 60.0 dB
- > 65.0 dB
- > 70.0 dB
- > 75.0 dB
- > 80.0 dB
- > 85.0 dB

Appendix E: Road Traffic Noise Assessment

	Road	Base Year			Base Year + Development					BNL 18hr		
		2036			2036	+ Development						
		% HGV	Speed kph	Flow	% HGV	Speed kph	Flow	% Flow Change		Base Year	Base Year + Development	Change
1	Empire Way (W)	2	25	1387	2	25	1387	0.0		54.4	54.4	0.0
2	Empire Way (E)	3	39	3273	3	39	3273	0.0		60.4	60.4	0.0
3	Olympian Drive	6	31	9527	6	31	9647	1.3		66.2	66.2	0.0
4	International Drive	4	40	8549	4	40	8567	0.2		65.2	65.3	+0.1
5	Ferry Road	7	40	6707	7	40	6725	0.3		65.3	65.3	0.0
6	Clive Street	9	31	11094	9	31	11112	0.2		67.6	67.6	0.0
7	A4160 Penarth Road	16	53	15996	16	53	16002	0.0		71.7	71.7	0.0
8	A4119 Corporation Road	9	30	6866	9	30	6866	0.0		65.6	65.6	0.0
9	Watkiss Way	12	35	2881	12	35	2881	0.0		62.4	62.4	0.0
10	Dunleavy Drive (S)	11	39	3078	11	39	3078	0.0		62.6	62.6	0.0
11	Dunleavy Drive (N)	10	45	2210	10	45	2210	0.0		61.0	61.0	0.0
12	A4055	11	50	36394	11	50	36400	0.0		74.2	74.2	0.0
13	A4232 E	23	80	56118	23	80	56186	0.1		78.8	78.8	0.0
14	A4232 W	31	89	59968	31	89	59996	0.0		80.5	80.5	0.0

Hilson Moran

People. Places. Planet.