



10-12 Whitworth Street West Addendum EIA Statement

October 2022

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1. Introduction

Introduction

- 1.1 This EIA Addendum (the 'Statement') accompanies an application for Minor Material Amendments to the approved plans and documents listed under Condition 2, and variations to the wording of the new condition added to the permission (as amended by 132193/NMC/2021), 7, 8, 9, 11, 13, 17, 18a, 19, 21, 29 and 30 of Planning Permission Ref.: 111003/FO/2016/C1 (as amended by Non-Material Amendment Refs.: 115544/NMC/2017, 123234/NMC/2019, 128109/NMC/2020, 129701/NMC/2021, 132193/NMC/2021 and 134907/NMC/2022) in respect of 10-12 Whitworth Street West.
- 1.2 The description of development, as set out on the Application form is as follows:
- “Application for Variation of Condition to the approved plans and documents listed under Condition 2, in addition to variation of Condition 7, 8, 9, 11, 13, 17, 18a, 19, 21, 29 and 30 of Planning Permission Ref.: 111003/FO/2016/C1 (as amended by Non-Material Amendment Refs.: 115544/NMC/2017, 123234/NMC/2019, 128109/NMC/2020, 129701/NMC/2021, 132193/NMC/2021 and 134907/NMC/2022) to reflect conditions discharged and amended.”*
- 1.3 The updates to the wording of condition 2 are required to reflect design changes. All other condition amendments are to reflect the conditions that have been discharged to date, or where an amendment to the information previously discharged needs updating because of the design changes.
- 1.4 This Statement sets out the assessment and original conclusions of the original EIA from 2015, the changes to the baseline for the proposals since permission was granted and a reassessment of the scheme in each of the relevant EIA topic areas. It provides a conclusion as to whether any significant EIA effects have been identified because of the changes.
- 1.5 The application is submitted to Manchester City Council by Vision Manchester Limited (the 'Applicant').

Planning Background

- 1.6 On 11th April 2016, the Planning Permission (supported by an Environmental Impact Assessment ('EIA')) was granted for the development of 10-12 Whitworth Street West through 111003/FO/2016/C1. The description of development for Planning Permission ref. 111003/FO/2016/C1 is as follows:
- “Demolition of existing building at 10-12 Whitworth Street West, and redevelopment of the site for a new 35 storey residential building (Use Class C3) comprising 327 apartments, with associated resident's services, facilities and communal spaces, servicing, highways, public realm and other associated works.”**
- 1.7 Since approval, the demolition works have been carried out and all conditions precedent have been discharged on the permission, as amended. This has therefore resulted in the permission being implemented.
- 1.8 Amendments to this permission have been agreed through previous non-material amendment applications as follows:
- 115544/NMC/2017 – design changes were agreed that allowed for minor refinements to lower external elevation, revisions to the roof top amenity area, revised cladding details, omission of windows at ground and first floor east and west elevations, replacement door, adjusted fence line, together with internal alterations including the omission of the basement, increase in number of cycling spaces, revisions to refuse area, alterations to lifts, and revisions to ground and first floor amenity areas.

- 123234/NMC/2019, 128109/NMC/2020, 129701/NMC/2021, 132193/NMC/2021 and 134907/NMC/2022 – adding a condition and amending the timescales to allow for the submission of the building contract. This was agreed with the Local Planning Authority to ensure that the implemented permission does not remain extant indefinitely.

1.9 The changes to the building, as set out in this application, are in line with the original planning permission and is considered to improve the quality of the internal spaces and the external appearance of the building. The proposed amendments will make sure that the regeneration benefits of the Proposed Development are fully realised once operational.

Proposed Amendments

1.10 Following a review of the scheme by the new owners, physical changes are required to the approved scheme and therefore necessitates an amendment application to be submitted for formal agreement.

1.11 The proposed amendments relate to internal and external changes, which seek to reconfigure the scheme and improve its overall appearance and deliverability, summarised as follows:

- Repositioning the lift core, the elevational treatment of the southern façade matches the north façade – the blank lift core elevation is no longer visible. Internal layouts have been updated accordingly.
- The ground floor entrance to the building to be repositioned to the east to align with the new location of the lift core and co-ordinate the design of the lobby areas. Additional entrance to commercial unit has been added to the west. All doors now to be 2.4m double doors.
- The rooftop pavilion is to be altered to accommodate the new position of the lift core and apartments have been relocated to the rooftop. Amenity space will be provided on the second floor of the development.
- Reducing the floor-to-floor heights and an additional floor but with no increase in the overall height of the development. This has allowed the inclusion of larger apartments and 2 no. guest rooms and 2 no. 1 beds to become 2 no. 2 beds and 2 no. 3 beds within the existing envelope. The overall number of apartments remains the same following this change and the relocation of apartments between the roof level and second floor.
- Reducing the depth of the picture frame to the south by 600mm (to 300mm) following consultation with Network Rail and their exclusion zones.

1.12 In summary, the changes relate to the building appearance to improve the quality of the development overall and improving the efficiency of the internal layout. It is considered that the proposed amendments will make the building more appealing to residents by providing more generously sized apartments.

1.13 There is no increase in the overall number of apartments included in the original scheme and the overall amount of amenity space as approved is retained within the development. The proposed quantum of development is therefore broadly consistent with the approved scheme.

1.14 Full details of the amendments are contained in Scheme Changes document prepared by JMA and Planning Statement Addendum reflected on the drawings as submitted in support of this application.

Pre-Application Consultation

1.15 This application is submitted following pre-application consultation with officers at Manchester City Council regarding the principles of the proposed amendments and the planning mechanism to be used.

- 1.16 Discussion with the Local Planning Authority (LPA) has confirmed support in-principle for the revised proposals. It has been agreed that the planning mechanism that should be used for handling the changes is an application under Section 73 of the Town and Country Planning Act 1990, to amend Planning Permission ref. 111003/FO/2016/C1 (as amended).
- 1.17 In line with EIA Regulations (2017), a Screening and Scoping EIA Request letter was submitted, accompanied by a location plan identifying the land in question, a description of the nature and purpose of the proposed amendments and an assessment of the possible effects on the environment, over and above those previously considered.
- 1.18 In summary, the amendments are not considered to result in a significant change to the conclusions of the original EIA, in line with Planning Practice Guidance (Paragraph: 033 Reference ID: 4-033-20170728).
- 1.19 However, given that there is a reasonable amount of time since the original approval, an update to the EIA is set out in this Statement. This is to detail the assessment of the respective EIA consultants and robustly confirm that there are no significant impacts beyond those originally retested or provide mitigation measures that may be required.

Non-EIA Application Documentation

- 1.20 This Statement should be read alongside the originally approved documents listed under Condition 2 of Planning Permission Ref. 111003/FO/2016/C1 (as amended). Amendments are also proposed to the wording of new additional conditions 29 and 30 (amended by 132193/NMC/2021), 2, 7, 8, 9, 11, 13, 17, 18a and 21. All other conditions attached to the permission have now been consolidated and updates are reflected within Appendix B.
- 1.21 In addition to this EIA Addendum Statement, the following documents have been submitted with this Minor Material Amendment (S.73, variation of condition) application to agree the amended details:
- Planning Application form, agricultural holdings certificate and ownership certificate B.
 - Application red-line boundary plan prepared by JMA;
 - Revised elevations, plans and sections prepared by JMA;
 - Design changes summary prepared by JMA; and
 - Planning Statement Addendum prepared by Deloitte.

Document Structure

- 1.22 The remainder of this Addendum Statement is structured as follows:
- Section 2 – provides an addendum statement to the original EIA, summarising any changes to the effects of the development and supported by technical appendices (Appendix A-D).

2. EIA Addendum

Introduction

- 2.1 As summarised in Section 1, the original permission (111003/FO/2016/C1) was supported by an Environmental Impact Assessment that covered several topic areas comprising heritage, noise, daylight/sunlight, and wind, and provided detailed assessment of the likely significant environmental effects that may be generated because of the Proposed Development.
- 2.2 As this application represents a material change to the scheme, the EIA that supported the originally approved application has been reviewed considering the proposed changes to understand whether there would be any significant Environmental Impacts beyond those previously approved, and the revised baseline and cumulative scenarios.
- 2.3 In summary, demolition has now taken place on Site to enable the site to come forward for redevelopment. Changes are sought to deliver a product that is reflective of the current residential market and to seek to provide larger apartments than those previously approved. These changes have been discussed in detail and agreed with the Local Planning Authority and are set out in detail within Section 2 of this Planning Statement and EIA Addendum and updated scheme drawings.
- 2.4 As noted above, the permission was supported by an EIA, the extent of which was informed by a formal EIA Scoping process undertaken in dialogue with the LPA and other relevant stakeholders. The design updates to the scheme have also been considered in the context of the approved EIA.
- 2.5 An updated Scoping Exercise was undertaken in line with the latest update to the EIA Regulations (2017) to reflect screening criteria, scoping and the methodology for technical assessment. This considered whether the conclusions of the approved EIA in respect of each of the above disciplines would need to be modified and require reassessment because of the proposed amendments and therefore whether the EIA needs to be updated for the Section 73 application.
- 2.6 The conclusions of the EIA technical assessments in terms of both stand-alone impacts and in cumulative impacts have not changed significantly because of the proposed amendment or additional developments in the area. However, to be robust, it was considered that technical analysis was undertaken on the new scheme to confirm this.
- 2.7 A summary has therefore been provided below, along with the technical updates contained in appendices to this Addendum Statement, to confirm that these technical elements of the project would remain unchanged.
- 2.8 As such, a summary of each topic area has been provided below that was assessed as part of the approved Environmental Impact Assessment, which provides the conclusions of the previous assessment and how the changes to the scheme have affected each topic area.

Environmental Impact Assessment Addendum

Construction Management and Phasing

- 2.9 In relation to the construction methodology approved (under condition discharge application reference CDN/17/0633), there is an updated construction methodology prepared by Russell's Construction submitted with this application. This should be referenced in updated wording for condition 19 attached to the planning permission, as amended.
- 2.10 This information and construction methodology provide details regarding site-specific mitigation measures required to control the impact of the Proposed Development. The demolition phase is now broadly complete, and the remaining works require the delivery of substructure, super structure, utilities, external and internal works, highways and public realm works and fit out. The updated Construction Management Plan is contained in Appendix A to this Statement.

Noise and Vibration

- 2.11 Fisher Acoustics have reviewed the package of information relating to the proposed amendments, including the proposed mitigation measures, and confirmed that the conclusions of the EIA will not change in relation to Noise and Vibration. In summary, the assessment approach, methodology, policy context and baseline conditions set out in the ES Volume 1 (dated June 2015) have been reviewed and are broadly up to date, save for where details have been provided below.
- 2.12 The original Acoustic Statement and EIA chapter stated that potentially significant effects were likely, pre-mitigation, in relation to construction noise and the impact on new residents within the development due to entertainment noise. The proposed changes to the development have required a reassessment of these mitigation measures based on the proposed acoustic attenuation strategy for the building. The updated background noise levels and the requirement mitigation measures are set out in the Acoustic Technical Note appended to this Statement.
- 2.13 The approved EIA chapter concluded that the effects of vibration are greatest when the piling and excavation works take place but are not of significance when the building is being constructed due to mitigation measures proposed. This remains consistent for the revised scheme.
- 2.14 Construction noise was of potentially minor adverse significance, and the construction programme alongside the process of mitigation and controlled site working is proposed to avoid a greater impact during this phase of work. Vibration effects on introduced receptors during the operational phase have also been considered and have been sufficiently mitigated in relation to the adjacent railway line.
- 2.15 The final details of acoustic attenuation, forming the mitigation measures for the project, were previously agreed by way of condition discharge for Condition 21. However, to account for new guidance on internal noise levels for apartments, in the context of Planning and noise – Technical Guidance (June 2022), the acoustic mitigation strategy for internal noise levels has been updated and is appended to this EIA Addendum (Appendix B).
- 2.16 On this basis, the original EIA chapter and information previously considered to be acceptable by way of approval remains broadly up to date. However, the changes to the proposed strategy have been consolidated within the updated technical acoustic report prepared by Fisher Acoustics to account for the design changes and updated technical guidance.

Built Heritage and Visual Impact

- 2.17 The author of the Heritage chapter from the June 2015 Environmental Statement, Stephen Levrant Heritage Architecture, has reviewed the proposed changes to 10-12 Whitworth Street West and confirmed that there will be no change in impact in relation to heritage. This is summarised qualitatively as set out and agreed through the EIA Scoping Report.
- 2.18 The original heritage assessment and EIA chapter stated that there were instances of minor adverse impact due to the introduction of a taller element in the surrounding context. The potential impacts generally relate to the setting of identified heritage assets and Conservation Areas.
- 2.19 The changes to Whitworth Street West are considered to improve the quality of the view of the Site approaching from City Road to the south due to the removal of the lift core from the rear elevation. Similarly, since approval of the original application, several other taller buildings have come forward in the surrounding area. This has further altered the setting of heritage assets previously affected, reducing the impact of the Proposed Development in the context of the proposed baseline and cumulative scenarios.
- 2.20 Mitigation for the scheme is brought about by the quality of the Proposed Development, which is primary mitigation embedded in the scheme. It is considered that any perceived instances of adverse harm would be accrued by the identified public benefits of the Proposed Development and meeting Manchester's Housing Target requirements.
- 2.21 On this basis, the original Heritage Chapter approved as part of June 2015 ES and planning application reference number remains up to date.

Sunlight, Daylight and Overshadowing

- 2.22 In relation to daylight, sunlight and overshadowing, the overall scheme was considered to have a negligible to minor adverse impact on identified residential receptors, as set out in the June 2015 Environmental Statement. The revised proposals have been reviewed by the original chapter author, Watts. It is noted that the bulk massing of the Proposed Scheme remains the same as 2016 consented massing, and thus no additional daylight, sunlight and overshadowing impacts will occur to the previously tested sensitive receptors.
- 2.23 Since the 2016 original application, additional sensitive receptors have been introduced by virtue of completing or commencing construction and therefore require daylight, sunlight, and overshadowing testing. These additional sensitive receptors are the Axis building (ref: 106490/FO/2014/C1) and Viadux (ref: 115871/FO/2017). 2-4 Whitworth Street West (ref: 126308/FO/2020) has been granted planning recently, and whilst the scheme is not considered a sensitive receptor, its massing has been included as part of the surrounding properties.
- 2.24 Watts have therefore assessed the likely significant effects of the Development with respect to daylight and sunlight on these new receptors. This EIA Chapter Addendum for Sunlight, Daylight and Overshadowing and its appendices (Appendix C) describes the methods used to determine the effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant negative effects; and the likely residual effects after these measures have been adopted.
- 2.25 This EIA Addendum Chapter contains a summary of relevant legislation, planning policy and guidance, and methodologies applicable to this assessment. The relevant baseline conditions and target criteria (against which the potential effects are assessed) are described in this Chapter. Finally, mitigation is set out as necessary, and the resulting likely residual environmental effects are identified.

Methodology

- 2.26 Established methodologies have been used to undertake technical assessments to determine the potential daylight and sunlight effects on the identified sensitive receptors. The test results have been interpreted by considering published guidance and considering the sensitivity of each receptor, the Site's location and the urban context to establish the significance of the effect.
- 2.27 Since the original permission was granted, the National Planning Policy Framework has been updated (2021), a National Design Guide has been introduced (2021) and Building Research Establishment Guidelines: Site Layout Planning for Daylight and Sunlight has been updated (2022, 3rd Edition). A summary of these updated policy and guidance documents is provided in the Daylight and Sunlight Assessment submitted with this EIA Addendum (Appendix C).

Baseline

- 2.28 The baseline daylight and sunlight conditions around the Site have been quantified and are described below. The individual receptors and their various sensitivities are also discussed.
- 2.29 The baseline levels of available daylight received by the surrounding residential properties have been quantified using the VSC test at the centre point of the windows and daylight distribution test on the working plane inside the rooms. The receptors that have been assessed are the windows and rooms that overlook the site in the properties listed in Table 2.1. these are shown outlined in beige on the drawings of the 3D computer model at Appendix C.

Table 2.1 Summary of baseline VSC Results

Property	Number of Windows		
	Assessed	Achieved VSC target (27%)	(%)
Axis	319	302	95%

Property	Number of Windows		
	Assessed	Achieved VSC target (27%)	(%)
Viaduct Tower	345	299	87%
TOTAL	664	601	91%

- 2.30 The BRE guidelines do not set a numerical target for satisfaction of the daylight distribution test, aside from the 0.8 retained target. The guidelines, however, refer to the fact that *“the distribution of daylight in a room will look poor if a significant area of the working plane (normally more than 20%) lies beyond the no sky line, i.e. if daylight is less than 80% of the working plane”*. It is to this level that the baseline daylight distribution results have been measured; the results of which are set out in Table 4.2 below.

Table 2.2 Summary of baseline DD Results

Property	Number of Rooms		
	Assessed	Lit to 80% or greater in baseline condition	(%)
Axis	260	238	92%
Viaduct Tower	125	125	100%
TOTAL	385	363	94%

Axis

- 2.31 This property is located to the north of the site and currently in residential use. Access to the property was not obtained, however, floor plans were obtained from Manchester’s planning portal and have been utilised within the 3D computer model.
- 2.32 Out of 319 windows assessed, 302 windows achieve either over 27% VSC or experience reductions no greater than 0.8 times their former values, which equates to 95% adherence to the BRE guidelines.
- 2.33 The daylight distribution test results show that out of 260 rooms tested, 238 rooms (92%) will receive daylight to at least 80% of the working plane.

Viaduct Tower

- 2.34 This property is located to the north of the site, behind Axis and currently under construction. Floor plans were obtained from Manchester’s planning portal and have been utilised within the 3D computer model.
- 2.35 Out of 345 windows assessed, 299 windows achieve over 27% VSC which equates to 87% adherence to the BRE guidelines.
- 2.36 The daylight distribution test results show that out of 125 rooms tested, all rooms (100%) will receive daylight to at least 80% of the working plane.

Sunlight to current sensitive receptors

- 2.37 The existing levels of available sunlight received by the surrounding residential properties have been quantified using the APSH test at their windows, both annually and in the winter months. The sensitive receptors that have been assessed are those windows that overlook the site and face within 90° of due south in the properties listed in table 10.7 below. Where rooms have multiple windows, some facing 90° of due north and others 90° of due south, all results have been included.

Table 2.3 Summary of baseline APSH Results

Property	Number of Windows Assessed	Annual Sunlight	Winter Sunlight
		Achieved Total APSH 25% target	Achieved Winter APSH 5% target
Axis	294	292	289
Viaduct Tower	281	281	281
TOTAL	575	573	570

Axis

- 2.38 Out of 294 windows assessed, 292 windows (99%) would meet the recommendations as set out in the BRE guidelines for access to annual sunlight and 289 windows (98%) would meet the recommendations as set out in the BRE guidelines for access to winter sunlight.

Viaduct Tower

- 2.39 This property is located to the north of the site, behind Axis and currently under construction. Floor plans were obtained from Manchester's planning portal and have been utilised within the 3D computer model.
- 2.40 Out of 281 windows assessed, all windows (100%) would meet the recommendations as set out in the BRE guidelines for access to annual and winter sunlight.

Summary of baseline daylight and sunlight results

- 2.41 It is evident that some of the neighbouring properties do not fully achieve the BRE guidelines target levels for daylight and sunlight availability due to the design of the individual buildings (i.e., overhanging balconies and recessed design features) which restrict the daylight and sunlight availability to the building occupants.
- 2.42 The BRE guidelines also highlight that within dense urban environment lower daylight and sunlight levels are inevitable, which is the case here.

Proposed Conditions

Daylight to current sensitive receptors

- 2.43 This section summaries the daylight effects of the proposed development, once completed, on the relevant sensitive receptors in the vicinity of the site. A summary of the VSC and DD results are provided below in tables 2.4 and 2.5.

Table 2.4 Summary of VSC effects

Property	Number of Windows / Significance of Effect				
	Assessed	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Axis	319	139	4	83	93
Viaduct Tower	345	338	7	0	0
TOTAL	664	477	11	83	93

Table 2.5 Summary of DD effects

Property	Number of Rooms / Significance of Effect				
	Assessed	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Axis	260	66	25	44	125
Viaduct Tower	125	125	0	0	0
TOTAL	385	191	25	44	125

Axis

- 2.44 The VSC results show that 139 out of 319 windows (44%) will experience negligible impacts, achieving over 27% VSC or ratio reductions no greater than 0.8 times former value. Of the remaining 180 windows, 4 windows (1%) will experience minor adverse impacts, 83 windows (26%) will experience moderate adverse impacts and 93 windows (29%) will experience major adverse impacts.
- 2.45 The daylight distribution test results show that out of 260 rooms tested, 66 rooms (25%) adhere to the BRE guidelines with negligible impacts, 25 rooms (10%) will experience minor adverse impacts, 44 rooms (17%) will experience moderate adverse impacts and 125 rooms (48%) will experience major adverse impacts.

Viaduct Tower

- 2.46 Out of 345 windows assessed, 338 windows (98%) will experience negligible impacts achieving over 27% VSC or reductions no greater than 0.8 times their former values. The remaining 7 windows (2%) will experience minor adverse impacts.
- 2.47 The daylight distribution test results show that all 125 rooms tested (100%) will satisfy the BRE guidelines by retaining in excess of 0.8 times their former values.

Sunlight to current sensitive receptors

- 2.48 This section summaries the sunlight effects of the proposed development, once completed. The properties in the vicinity of the proposed development that have windows that face within 90° of due south have been assessed and the results are summarised below in table 2.6.

Table 2.6 Summary of annual APSH effects

Property	Number of Windows / Significance of Effect				
	Assessed	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Axis	294	291	0	1	2
Viaduct Tower	281	271	10	0	0
TOTAL	575	562	10	1	2

Table 2.7 Summary of winter APSH effects

Property	Number of Windows / Significance of Effect				
	Assessed	Negligible	Minor Adverse	Moderate Adverse	Major Adverse
Axis	294	291	0	0	3
Viaduct Tower	281	281	0	0	0
TOTAL	575	572	0	0	3

Axis

- 2.49 Out of 294 windows assessed, 291 windows (99%) would meet the recommendations as set out in the BRE guidelines for access to annual and winter sunlight. The remaining 3 windows (1%) will experience major adverse impacts and are located beneath a deep overhang, as such that their access to sunlight is already reduced by the self-obstructing nature of the building design.
- 2.50 On this basis, it is therefore considered that the overall effect of the proposed development on this property will be of minor adverse significance.

Viaduct Tower

- 2.51 Out of 281 windows assessed, 271 windows (96%) would meet the recommendations as set out in the BRE guidelines for access to annual sunlight, with all windows (100%) meeting the recommendations for winter sunlight.
- 2.52 The remaining 10 windows (4%) will experience minor adverse impacts serve well-lit living rooms that are served by multiple windows. On this basis, it is therefore considered that the overall effect of the proposed development on this property will be negligible.

Residual Effects Summary

- 2.53 The technical assessment shows that the effects on the daylight and sunlight as a result of the proposed development would vary in significance from negligible to minor adverse, despite the major impact on specific windows within the Axis development in particular.
- 2.54 When considering the potential effects of the proposed development on the sensitive receptors, it is important to consider the following:

- The expectation of daylight and sunlight availability in densely populated urban environments is necessarily lower given the general site layouts and building-to-building relationships attributable to inner-city locations.
- The baseline daylight and sunlight results indicate that Axis tower experiences unusually high levels of daylight and sunlight for an urban environment. This is further compounded by the undeveloped character of the Whitworth Street West site.
- The results show that there are some windows and rooms within Axis tower that will experience reductions greater than the BRE guidelines recommendations. However, it is important to note that this property includes a number of open plan living/kitchen/dining rooms greater than 5m in depth, which makes achieving the daylight distribution assessment more difficult. The BRE guidelines highlight that where rooms are greater than 5m in depth, then a greater reduction in daylight distribution is unavoidable, which is the case here.
- Appendix F of the BRE guidelines also highlights the importance of setting alternative target values to the neighbouring buildings based on the proposed development's special requirements or location. The south elevation of Axis tower has windows that are reasonably close to the boundary and overlook the development site, thus taking more than their fair share of light. Therefore, in order to build any meaningful scheme on the development site, there are bound to be some transgressions beyond the BRE guidelines recommendations when reviewing the daylight and sunlight impacts to this property.
- Breaches of the BRE guidelines do not necessarily mean that the impacts are unacceptable, because the BRE guidelines should be applied flexibly with rigid application generally considered inappropriate in urban locations. In such circumstances where buildings are responding to townscape, a holistic view should be adopted.

2.55 Table 2.8 summaries the residual effects of the proposed development after considering the mitigation measures and identifies those likely significant environmental effects.

Table 2.8 Summary of residual effects during construction and refurbishment

Receptor	Description of effects	Residual effects significance	Nature of effects	Geographical scale
Axis	Loss of daylight amenity to surrounding residential properties	n/a during construction and refurbishment	Temporary (Medium-term)	Local
Viaduct Tower		n/a during construction and refurbishment	Temporary (Medium-term)	Local
Axis	Loss of sunlight amenity to surrounding residential properties	n/a during construction and refurbishment	Temporary (Medium-term)	Local
Viaduct Tower		n/a during construction and refurbishment	Temporary (Medium-term)	Local

2.56 It is not possible to assess the potential effects on levels of daylight and sunlight experienced by sensitive receptors in the vicinity of the site during the construction phases of the proposed development at any given time as they will gradually increase during the course of construction until the proposed development is completed and occupied – which represents a worst-case scenario as the effects will be no greater than when the proposed development is completed.

Table 2.9 Summary of residential effects once the proposed development is completed and occupied

Receptor	Description of effects	Residual effects significance	Nature of effects	Geographical scale
Axis	Loss of daylight amenity to surrounding residential properties	Minor adverse	Permanent (Long-term)	Local
Viaduct Tower		Negligible	Permanent (Long-term)	Local
Axis	Loss of sunlight amenity to surrounding residential properties	Minor adverse	Permanent (Long-term)	Local
Viaduct Tower		Negligible	Permanent (Long-term)	Local

2.57 Daylight and sunlight effects on the sensitive receptors as a result of the proposed development have been considered and will result in a range of **negligible to minor adverse effects**, which will be permanent (long term) and at a local scale.

2.58 These effects are considered acceptable given the location of the site within an urban inner-city environment, designated for high-rise residential development, where rigid application of the BRE guidelines would be inappropriate. A more flexible approach is required when determining the overall effects of proposed development on the level of daylight and sunlight to the sensitive receptors. Full details of the results and setting out relevant legislation is contained in Appendix C.

Wind Microclimate

2.59 The June 2015 ES has been reviewed by the chapter author, Urban Microclimate, considering the scheme amendments set out in this Statement.

2.60 In summary, the assessment approach, methodology, policy context and set out in the original ES Wind Microclimate chapter remain consistent with the current approach, although the baseline and the cumulative scenario have progressed since the original approval. On this basis, it was considered pertinent to undertake a new assessment of the scheme with the onsite and approved surrounds.

2.61 The proposed development represents a substantial structure with regards to wind effects but is partially sheltered from approaching winds by the built-up surrounding area and presents a narrow frontage to the most frequent extreme winds from the west-south-west.

2.62 As a result, the proposed development has no significant impact on wind conditions with regards to pedestrian safety. In terms of pedestrian comfort, thoroughfares alongside the site are generally suitable, and at least tolerable, for pedestrian access to, and passage past, the proposed development.

2.63 Entrances to the proposed development enjoy suitable conditions for pedestrian ingress / egress. With the purposely developed balustrades included, the proposed roof-top terraces are expected to enjoy acceptable conditions for associated recreational activities.

2.64 The proposed development has a mixed effect on the spill-out seating at Deansgate Locks but, overall, the effect is reduced relative to the effect of the consented scheme. Otherwise, the proposed development has no significant impact on the pedestrian level wind conditions within the surrounding area.

2.65 Cumulatively, with the introduction of consented future surrounding developments, part of the Deansgate Station platform, to the west of the site, becomes marginally windy. This is likely still tolerable for standing awaiting a train during winter, though this effect is expected to be largely driven

by the future neighbouring Hotel development. Otherwise, no significant cumulative effects with the
Otherwise, no significant cumulative effects with the future surrounding developments are expected.

- 2.66 Overall, the wind effects are generally reduced relative to those reported in the 2015 ES for the
consented scheme, with no significant impacts or safety concerns in relation to wind microclimate.
Full details of the updated Wind Microclimate Assessment are provided in Appendix D of this Planning
and EIA Addendum.

Appendix A – Updated Construction Management Plan



10-12 Whitworth Street West Construction Management Plan

Condition 9
REF: 111003/FO/2016/C1



Contents

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 - 1.5** Parking of Vehicles
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- 9.0** Control of Noise, Vibration & Dust
- 10.0** Adjacent premises access during works.
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Appendices

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- 2** RWBHO Waste Management Policy
- 3** Site Waste Management Procedure
- 4** Network Rail Submission Tracker
- 5** Crane Plan
- 6** Highway Closures & Traffic Management Plan
- 7** Neighbour Consultation Correspondence

1.0 Whitworth Street West Works

1.1 Introduction

The purpose of this Construction Management Plan is to discharge pre-commencement Planning Condition No.9 and to provide confidence to Manchester City Council regarding Russell WBHO's (RWBHO's) delivery of Whitworth Street West Project.

Planning Condition No.9 details:

The development hereby approved shall not commence unless and until a Construction Management Plan, has been submitted to and approved in writing by the City Council as Local Planning Authority. The Construction Management Plan shall include details of the following:

- o Hours of site opening/operation*
- o A Site Waste Management Procedure*
- o Air Quality Plan*
- o A Plan Layout showing areas of public highway agreed with the Highway Authority for use in association with the development during construction.*
- o The parking of vehicles of site operatives and visitors*
- o Loading and unloading of plant and materials*
- o Storage of plant and materials used in constructing the development*
- o Construction and demolition methods to be used, including the use of cranes*
- o The erection and maintenance of security hoarding*
- o Measures to control the emission of dust and dirt during construction and*
- o A scheme for recycling/disposing of waste resulting from demolition and construction works*
- o Details of and position of any proposed cranes to be used on the site and any lighting*
- o A detailed programme of the works and risk assessments*
- o Temporary Traffic Management measures to address any necessary bus rerouting and bus stop closures*
- o Details of safe methods of working adjacent to railway operational land*
- o Details on the timing of construction and scaffolding*
- o A Human Impact Management Plan, including community consultation*

Any approval granted shall be following a consultation process that includes Transport for Greater Manchester and Network Rail. The approved CMP shall be adhered to throughout the construction period.

Reason: To ensure that the appearance of the development is acceptable and in the interests of the amenity of the area, pursuant to policies EN15, EN16, EN17 and EN18 of the Core Strategy and Guide to Development 2 (SPG)

1.2 Description of the Works

Whitworth Street West may be summarised as:

- Demolition of existing building
- Piling and construction of ground floor raft foundation/slab
- Construction of in situ frame to 36 stories with 2 story steel frame roof.
- Unitized glazing with Corium cladding to facades.
- Fit out of 327 apartments.
- Minor external works.

1.3 Site Layout / Phasing Drawings

Please find attached Site Layout / Logistics drawings – Appendix 2

1.4 Working Hours

The Project working hours are such that the construction work will normally take place only between the following hours:

Monday to Friday **07:30 to 18:00**

Saturday **08:30 to 14:00**

Sunday / Bank Holidays **No Work**

Deliveries All reasonable endeavours will be taken to avoid peak morning and evening traffic congestion.

Workforce may arrive on site 30 minutes prior, but no working outside these times, unless changed by prior agreement Noise will be kept to the minimum during the first ½ hour.

Prior approval may be sought to work outside of these hours (for example abnormal construction plant manoeuvres, conclusion of concrete power floating, plant break-downs etc.)

1.5 Parking of Vehicles of Site Operatives and Visitors.

No parking will be available on site. RWBHO management team will make use of surrounding multi storey car parks and will hold several additional passes to accommodate visitors.

Site operatives will commute via one of the following: 1) Public Transport 2) Car Pooling and parking off site

2.0 Site Waste Management Procedure

- 2.1** The management and disposal of waste generated on Whitworth Street West Project will be managed in accordance with RWBHO Environmental Policy (please see Appendix 3).

Following selection / confirmation of the relevant sub-contractors & suppliers, we will develop a Site Waste Management Procedure. The 'template' for Whitworth Street West Site Waste Management Procedure may be found in Appendix 4.

We will appoint a specific member of the RWBHO Site Management Team as "Waste Management Co-ordinator".

3.0 Air Quality Plan

- 3.1** The following few paragraphs detail how air pollution will be managed and controlled during Whitworth Street West Works.

Background Definitions:

Statutory Nuisance

Dust, steam, smell or other effluvia from industrial, trade or business premises which are prejudicial to health, are defined as statutory nuisances under Section 79 of the Environmental Protection Act (EPA). In addition smoke (including soot, ash, grit), fumes and gases from any premises may also be a nuisance. The person responsible (in practice the contractor doing the work in question) can be required, by the local authority, to put a stop to the nuisance through an abatement notice. An aggrieved individual may apply to the magistrates for an abatement order. Breach of a notice or order is a criminal offence.

Clean Air Act

The Act is the main legislative means of control over smoke, grit, dust and fumes, and is generally enforced by local authorities. The main provisions of the Act co-exist with the statutory nuisance provisions of the EPA.

The Act applies to emissions of dark smoke from industrial or trade premises which originate from sources other than chimneys. Demolition has been found to be a trade process, and a bonfire on a demolition site emitting dark smoke could be found to be within the compass of the Act. There are, however, regulations which exempt emissions from the burning of timber and most other waste resulting from demolition of a building or of a site and also emissions from tar, pitch, asphalt or other matter used in connection with surfacing.

Some construction processes on Whitworth Street West Project may release pollutants into the atmosphere, for example dust from sub-structure alterations. However there is a clear need to keep them to a minimum to avoid undue nuisance to neighbouring areas and the workforce also to ensure that the more dangerous pollutants, for example paint sprays and sprayed formwork oils, are not released or are at least controlled.

Potential Hazards to Consider on Whitworth Street West Project include, but are not limited to:

- Dust from substructure alterations.
- Brick and silica dust
- Toxic substances in the ground or services
- Cement filler and plaster
- Solvents, glues and paints
- Weed-killers and other similar chemicals
- Fumes from welding
- Sprayed formwork oils
- Sprayed paint and other sealants

Control Measures we will adopt, include:

- Eliminate hazard by use of alternative methods and if this is not viable:
- Materials Management Plan (developed in conjunction with our Geotechnical Consultant)
- Site visits / inspection via our Geotechnical Consultant
- CoSHH assessments undertaken prior to certain activities commencing
- Dust from excavators and other vehicles on site – damp down using bowsers, or similar solution.
- Wood dust from joinery or other woodworking – use dust extractors on cutters and saws
- Site Standards will ban the use of fires on site as a waste disposal measure
- Securing of all loose materials that could become airborne in high winds
- Where possible, positioning of plant in order to ensure that exhaust fumes or dust etc. are vented away from occupied buildings and ensure they are fully maintained to avoid any nuisance
- Vehicles carrying dusty materials will be suitably sheeted, as may be appropriate
- Limit and enforce the speed limits of vehicles on site

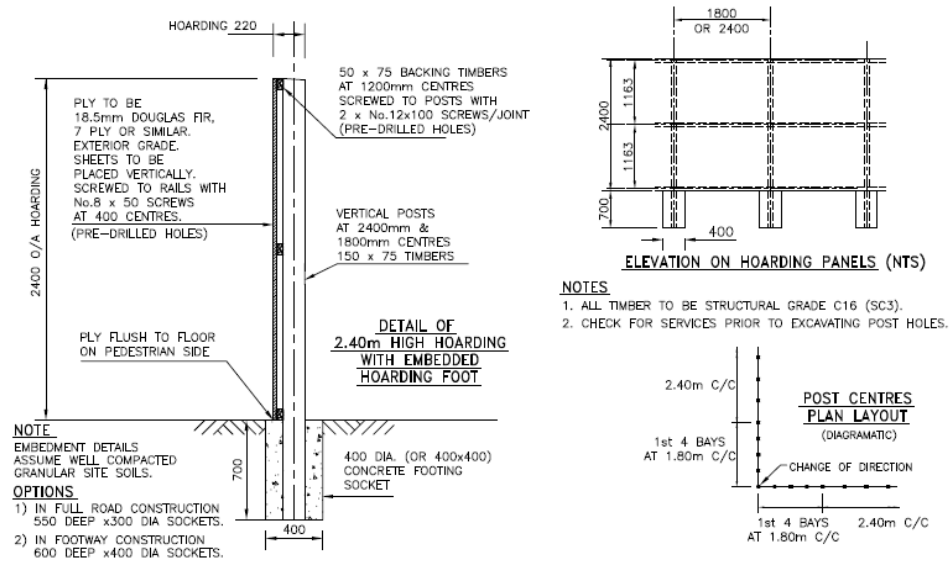
4.0 Hoarding & Public Highway Interface

4.1 Hoarding

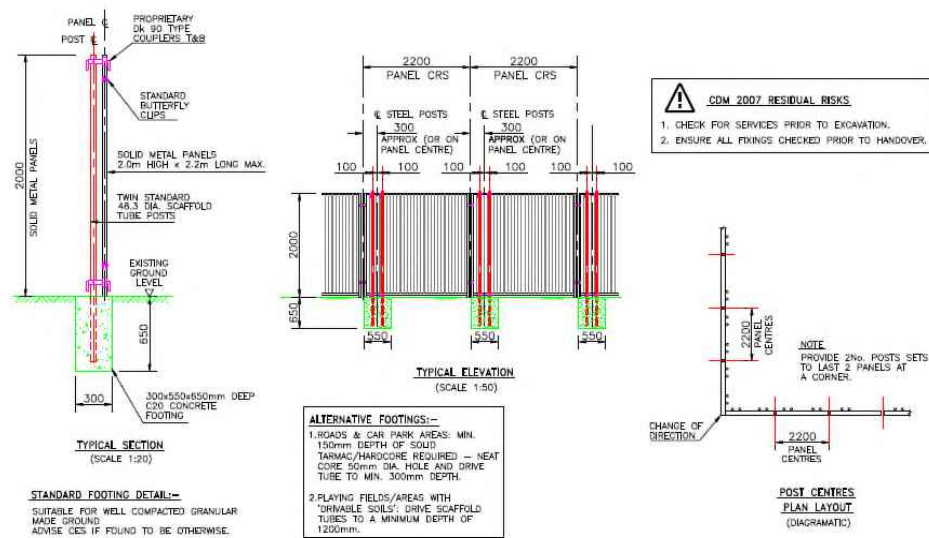
All areas of the construction site will be clearly demarcated / secure at all times (from non-construction related persons or vehicles), also to keep all construction activities confined within the defined areas.

Hoarding will be temporary 'Herras' type fencing during initial weeks, then switched to 2400mm tall timber hoarding. Metal solid panel hoarding and water filled "Rhino Barriers" may be used in certain areas.

Timber hoarding will be painted 'white'. Any 'branding' will be the subject of separate negotiations between the client & MCC



4.4 RWBHO detail for solid metal panels:



4.5 Hoarding Licence Fee

We have held several site Meetings with MCC Highways & TfGM regarding the project. Perimeter hoarding to Whitworth Street West Project has been discussed and agreed. Refer to site logistic plans appendix 2 and Traffic Management Plans appendix 8. Hoarding Licence Fees are applicable to Whitworth Street and Cameron Street all of which will be in place prior to start.

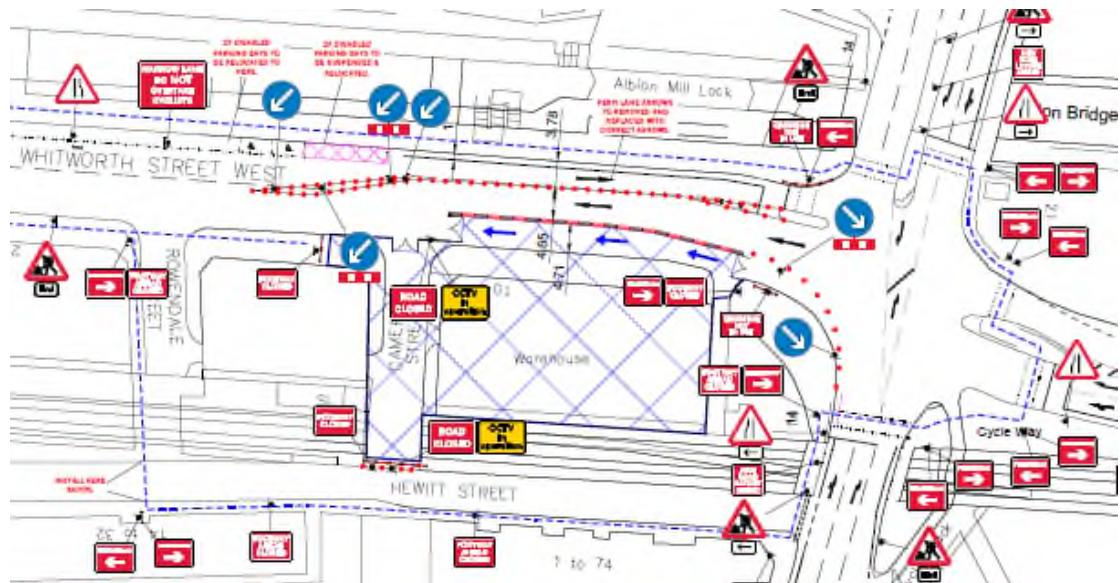
4.6 Public Highway Interface

We have engaged with Utilities Design & Planning Ltd. (UDP Ltd.) to carry-out key pavement / highways management works.

Proposed Traffic Management Plan (See below drawing number UDP-1107 section 4.7 & Appendix 8) has been approved in principle by MCC Highways & TfGM.

Traffic Orders will be in place for full closure of Cameron Street and single lane closure of Whitworth Street and prior to commencement on site.

4.7 Approved UDP Ltd. Traffic Management Drawing UDP-11071REV3:



5.0 Working Adjacent railway Operational Land

We have held several site meetings with Network Rail Asset Protection Manager (Mark Corser). Methodology agreed in principle and applications (forms A-C) currently being processed (See appendix 5 – Network rail Submission tracker).

Final draft submission to be submitted no later than 20 working days prior to commencement. All applications will be completed in advance of this deadline. Works will not commence on site until formal approval received from Network Rail.

All works will be carried out in accordance with NR/L2/RSE/02009 Module 02 – The Management and review of Engineering Deliverables. RWBHO will appoint a single member of the site team as “NR Coordinator” who will be responsible for submissions and monitoring/control of operations on site in accordance with Network rail requirements.

6.0 Lighting & Operation of Cranes

- 6.1** One static Tower Crane will be required at the Whitworth Street West scheme. Positioning of the crane has been given careful consideration and will be positioned within the light well of the building. Refer to attached crane logistics plan Appendix 6. All offloading will take place within the site boundary along George and Back George street. Although the crane over sails the boundary at no point will any loads be suspended outside the site boundary.

Oversailing Highway/Footpath

Crane Projection-Over Licence has been submitted in line with Section 178 Highways Act 1980 and will be in place prior to use of the Tower Crane on site.

Crane Type

We have assessed the various crane types and have decided that the Terex CTL 430-24 Luffing Jib Tower Crane is most suited to our requirements and will help maximise the efficiency in construction of the structural frame. The crane will initially be set up within the West side of the structure until the central core is complete (Phase 1). Upon completion of the core the crane will be relocated to the top of the core (Phase 2). See appendix 6 Crane Plans

6.2 Lighting and Hoarding

As with all construction lighting in proximity live buildings, we will develop a lighting scheme that satisfies all neighbours ensuring all lighting which could potentially effect neighbouring properties is adequately screened off. This will be developed and agreed before the works commence.

The Tower Cranes may have an illuminated signage box – displaying the name of the Sub-Contractor / RWBHO.

7.0 Human Impact Management Plan

On the Whitworth Street West project, we will manage “Human Impact” in two key ways:

- Environmental Impacts
- Community Plan / Community Consultation Strategy

7.1 Environmental Impacts

We will identify and manage environmental ‘impacts’ and ‘aspects’ throughout all phases of the Whitworth Street West development.

The following areas will be considered:

Aspect: The part of the RWBHO activities that can interact with the environment.

Impact: The effect on the environment, good or bad, that results from RWBHO's activity

Carbon: including carbon footprinting, carbon reduction plans, energy consumption, monitoring, recording, Green Travel and use of fuel

Waste and Resource Use: including minimisation, recycling, disposal, selling 'waste', waste streams, compliance, secondary aggregates, timber.

Biodiversity: including wildlife, conservation, invasive species, designated sites, biodiversity action plans

Land Management: including archaeology, heritage, contaminated land, rights of way

Community: including considerate constructors, engagement plans and registers, stakeholder mapping, communications matrix.

We will develop an Aspects and Impacts Register (A&I Register), this will form part of our detailed Health, Safety & Environmental Construction Phase Plan. The RWBHO Health, Safety & Environmental Advisor will provide support as necessary, throughout the life of the scheme.

Control measures to reduce the risk will be implemented and the risk regularly reassessed to ensure the control measures have, in fact, reduced the risk.

The Whitworth Street West RWBHO Site Management Team will ensure that the A&I Register is monitored and regularly reviewed (especially when there is a change in work activity or location).

7.2 Community Plan / Community Consultation Strategy

RWBHO recognise that we can have a significant impact on the communities in which we operate and by engaging, respecting and understanding our community stakeholders we can make a positive contribution to their environment and quality of life.

As such, we have developed a "Human Impact Method Statement" – please see Appendix 7.

7.3 Public Contact Numbers

The following contact numbers will be displayed on the main site entrance which is publically accessible. Numbers will be maintained throughout the development from commencement to completion.

- 1) Construction Manager
- 2) Site Manager
- 3) Out of ours emergency contact number (24/7).

This will allow members of the public to contact site/RWBHO representative at any time.

8.0 Deliveries & Waste Collection

Deliveries

The site set up facilitates 2no. entrance and exit points for deliveries and waste collection. Entrance 1 is located on George Street with exit via Dickenson Street. Entrance 2 is located on Back George Street with exit via Dickinson street. Both points are 1 way through routes which eliminates any need for reversing vehicles onto site. We have carried out swept path analysis to ensure feasibility and determine size of vehicles which can access both points (see Appendix 5)

Russell's internal management systems require a daily 'Co-ordination Meeting' to be held with all site based sub-contractor supervisors, led by the RWBHO Construction Manager. During this forum all notable deliveries / collections / major plant movements will be scheduled and co-ordinated.

This will facilitate:

- Just-in-time deliveries
- Deliveries to the correct Gate No.
- Prevention of double-booking
- Proactive traffic management
- Management of zones for off-loading
- Efficiency of waste material removal

The agreed delivery schedules will be issued to the RWBHO Gate personnel, who will monitor/manage the physical deliveries and communicate with the RWBHO Site Management Team.

Sub-contractors and Suppliers will be encouraged to deliver outside of peak traffic times. No 'queuing' will be permitted on surrounding streets, in the event that road network issues result in deliveries 'stacking', a holding zone will be allocated the surrounding area, or the drivers contacted to defer their arrival time.

Waste Collection.

Management of construction waste arising from the Whitworth Street West development will be managed strictly in accordance with RWBHO Environmental Policy and Waste Management Procedure (Appendix 3 & 4)

Due to the City Centre location and restricted access careful consideration has been taken to determine most efficient methodology for waste removal. Following Demolition a Wheelie Bin Waste Management Scheme will be put in place. The scheme consists of an initial delivery of 30 wheelie bins, distributing the containers throughout the site. An appropriate collection area will be positioned within back George Street to facilitate the mobile compaction vehicle to arrive and empty the bins.

This scheme provides high carbon emission savings in comparison to traditional skips. This is based on the fact that it takes 5 wheelie bins to remove the same amount of waste than an 8 yard skip, therefore using the method of 30 wheelie bins on site being emptied at once equals the same capacity of waste as 5.5 8 yard skips with only one journey made to collect them.

9.0 Control of Noise, Vibration & Dust

RWBHO Construction Ltd plan to construct Whitworth Street West in such a manner as to:-

- To prevent Noise, Vibration & Dust pollution
- Prevent any further adverse environmental impacts
- Ensure mitigation measures are implemented for non-preventable environmental impacts

Training

All Staff and Sub-Contractors will be made aware of the Projects Environmental requirements at the initial Site Induction and via our weekly "Tool Box Talk" Training Programme. This will include training/awareness of the following areas:

- Environmental legislation and its relevance to this project
- Individual environmental responsibilities and environmental constraints to specific operations.
- Areas of environmental sensitivity, how activities may affect them, methods and timing necessary to protect them and activities to be avoided.
- Procedures and equipment to use in case of an incident

Monitoring and Incident Reporting

To ensure procedures are being implemented and are effective, a comprehensive inspection, monitoring and reporting system will be put in place. In the event of an incident, the Accident/Incident/Near Miss Reporting Procedure and the Accident/Incident/Near Miss Investigation Procedure will be followed.

Noise, Vibration & Dust Risk Assessment

When carrying out the risk assessments to establish suitable controls for noise, vibration & dust, the following will be considered:

- Type of material / operation involved
- Activity to be carried out
- Environment the activity will take place in
- Period of exposure
- Position of employee / proximity of the public/residents
- Sensitive environmental receptors

Following the risk assessment, effective control measures will be established, including how the work will be monitored and supervised and how the effectiveness of control measures will be maintained throughout the activity.

The following hierarchy of controls will be considered:

- Designing the activity to avoid processes which will cause dust, fumes or vibration
- Capturing dust or fumes by using local exhaust ventilation.
- Using tools equipped with wet suppression or by keeping the work area damp, particularly in periods of dry weather
- Reducing the exposure of individuals by excluding non-essential personnel from the work area, and job rotation for those involved in the work
- Protect individuals by provision and use of respiratory protective equipment (RPE)

Noise, Vibration & Dust Pollution Prevention

When work activities are likely to create dust, fumes or vibration, specific control measures and protective clothing / equipment will be required. These precautions will be selected with advice from specialist Sub-Contractors, manufacturers, RWBHO Health, Safety & Environmental Manager and also from COSHH Assessments.

On the Whitworth Street West Project, we propose to manage the possible emission of noise, vibration & dust via the following:

- We will select, as far as possible, construction techniques which will minimise noise nuisance.
- All plant and machinery will have effective silencers fitted and kept in good condition. Noise pollution measures such as silenced equipment; controlled working hours and screening will be implemented on site.
- The Whitworth Street West Project will be hoarded to 2.4m (this will provide some noise deflection to the local residences).
- We will follow all current good practice and regulatory guidance when using and/or operating construction plant and equipment e.g. BS 5228: Noise control on construction sites and open sites.
- Spraying/dampening down of haul roads and areas of site where dust is likely to be created may be effective in reducing windblown dust – this will be assessed by the RWBHO Site Management Team.
- A 5 mph speed limit will operate on the site to reduce excessive airborne dust during dry spells.
- Haulage wagons carrying dusty loads will be covered.
- All cutting operations will use a dust suppression system.
- Noise control procedures will be implemented for all construction plant equipment and all site activities.
- No site operative parking space will be provided on-site – this will limit car / small commercial vehicular traffic into and off the site.
- Main site compound will be fully established, complete with associated access roads and dedicated material 'lay-down' areas.
- Where possible, areas of traffic movement will be designed to minimise reversing alarm use principally by the use of one way systems.
- Road licensed construction plant / vehicles leaving the site will be manually checked by the dedicated Gateman.

- The RWBHO Construction Manager will monitor the cleanliness of the highway / pavements abutting our Works on a daily basis.
- Should individuals have any specific concerns, contact details for the RWBHO Construction Manager will be posted on the Site Hoarding
- Noise from standard construction plant is generally of short duration therefore impact is minimised. Occasionally 24hr. operations will be necessary but discussions will take place with the local Environmental Health Officer before such operations are planned.
- Daily noise monitoring will be carried out along the site boundary (am and pm) to ensure noise levels do not exceed 85dB. In event that noise levels approach or exceed 85dB, works producing noise will be stopped and alternative methods adopted.
- Dust control and monitoring will be controlled in line with attached RWBHO Silica Dust Control and Monitoring procedure reference PR-HS 026 (Refer to Appendix 10)

10.0 Adjacent Premises Access During Works:

Access will be maintained to all neighbouring premises throughout the duration of Whitworth Street West development. This was a requirement in order for MCC Highways to approve our Traffic Orders.

As we are closing the footpath adjacent Cameron Street we have consulted with the adjacent property who have accepted restricted access during our works (see appendix 9 – Neighbour correspondence).

We have also consulted with the owners/occupiers of City Road Inn who's access will be fully maintained throughout the project.

11.0 Contractor Vehicle Wheel Cleaning (*Planning Condition 11*)

"The wheels of contractors vehicles leaving site shall be cleaned and the access roads leading to the site swept in accordance with a management scheme submitted to and approved in writing by the City Council as local planning authority prior to any works commencing on site".

11.1 Due to the constraints of this City Centre development, we propose to manage the possible migration of waste/material from the construction site onto the pavement / highway as follows:

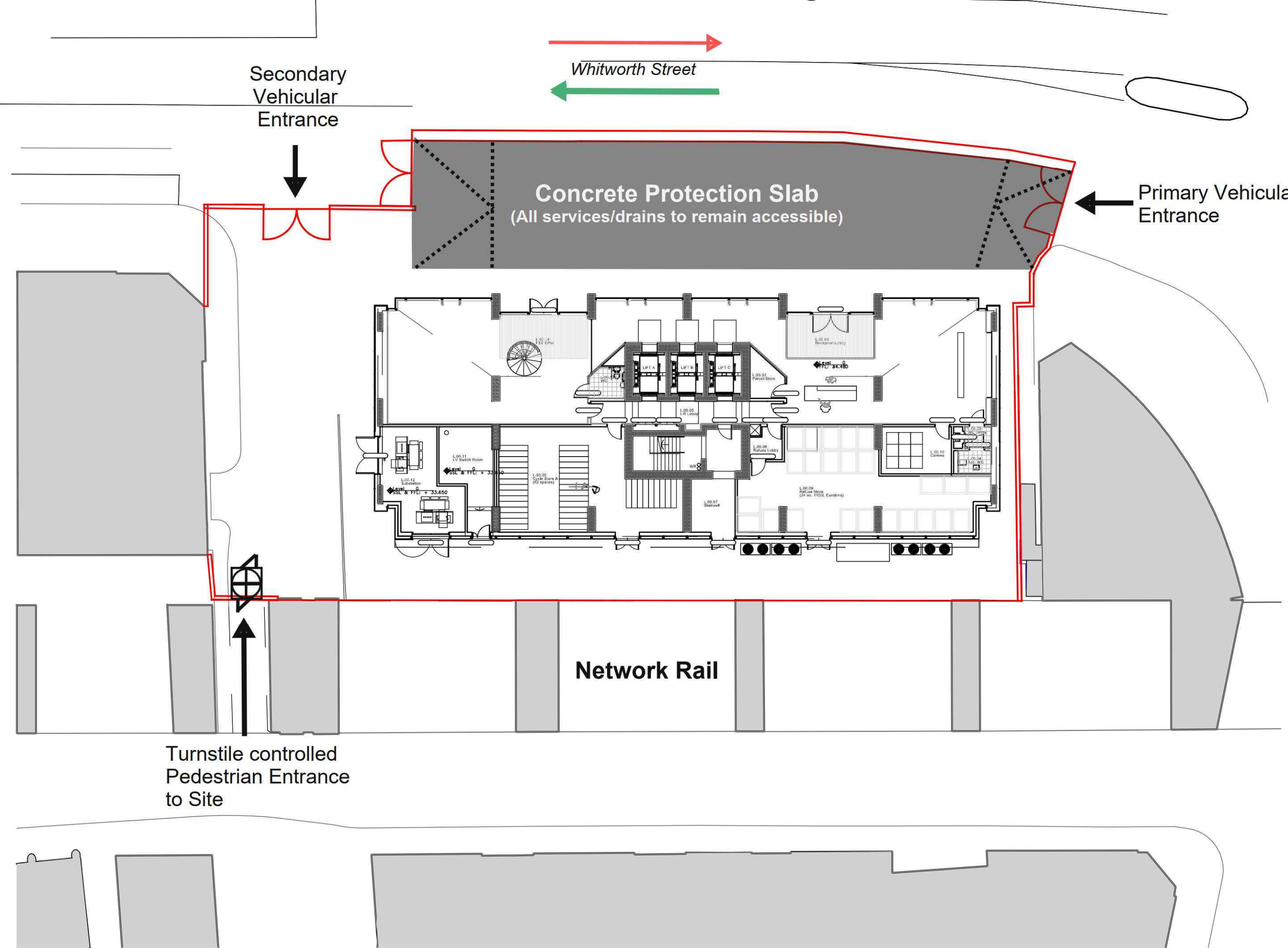
- Early stages (Piling and substructure works):
 - o No site operative parking space will be provided on-site – this will limit car / small commercial vehicular traffic into and off the site.
 - o Road licensed construction plant / vehicles leaving the site will be manually checked by the dedicated Gateman.
 - o We will procure all subcontractor packages with any plant & vehicle movements on and off site will have made due allowance for a manned pressure-washer arrangement. This will be located within the site boundary.
 - o In addition to the above, a 'Road Sweeper' will be deployed, as deemed necessary by the RWBHO Site Management Team.
 - o The RWBHO Construction Manager will monitor the cleanliness of the highway / pavements abutting our Works on a daily basis.
 - o Should individuals have any specific concerns, contact details for the RWBHO Construction Manager will be posted on the Site Hoarding.

- Balance of the Works:
 - o No site operative parking space will be provided on-site – this will limit car / small commercial vehicular traffic into and off the site.
 - o Main site compound will be fully established, complete with associated access roads and dedicated material 'lay-down' areas.
 - o Road licensed construction plant / vehicles leaving the site will be manually checked by the dedicated Gateman.
 - o A 'Road Sweeper' will be deployed, as deemed necessary by the RWBHO Site Management Team.
 - o The RWBHO Construction Manager will monitor the cleanliness of the highway / pavements abutting our Works on a daily basis.
 - o Should individuals have any specific concerns, contact details for the RWBHO Construction Manager will be posted on the Site Hoarding.

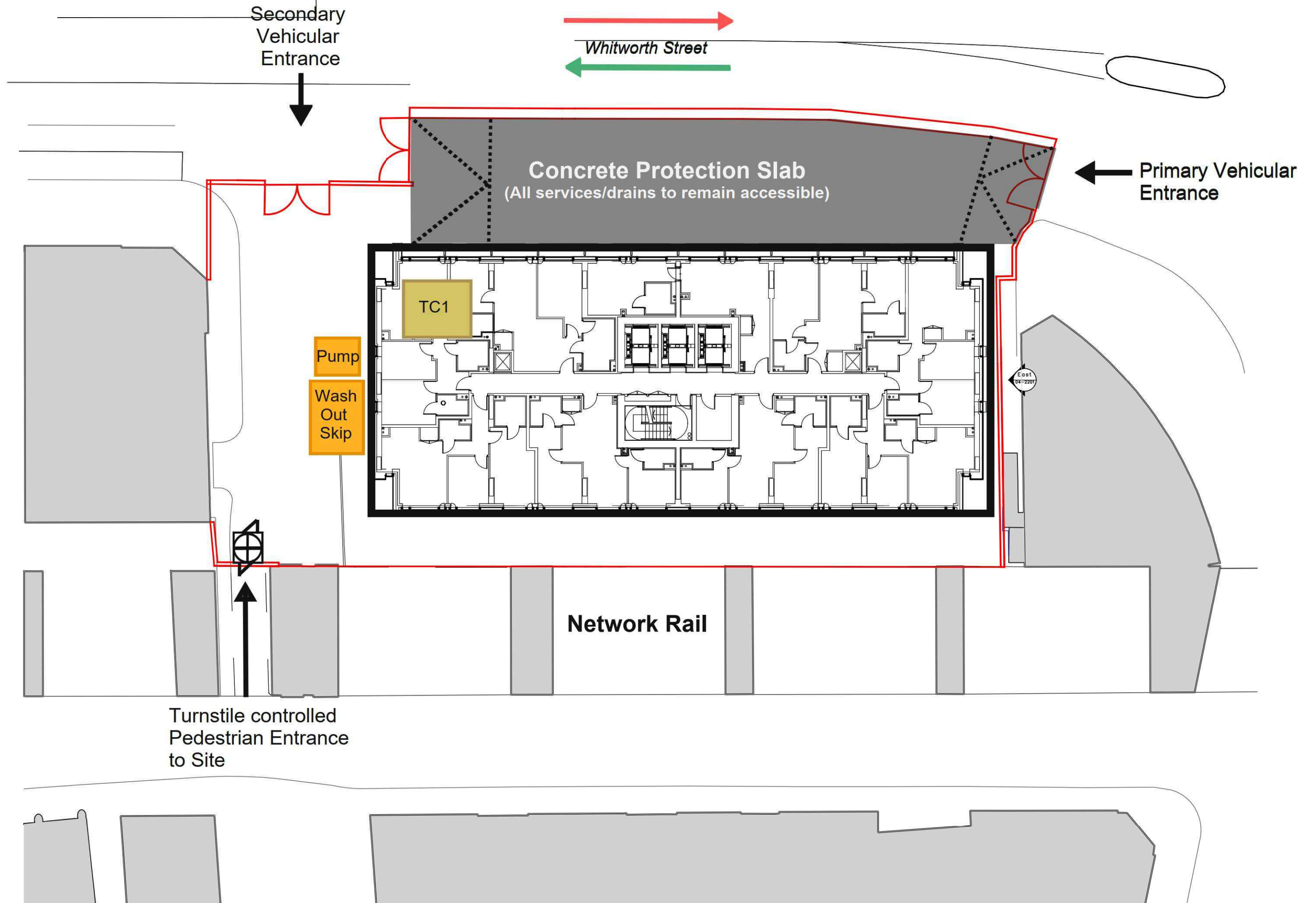
APPENDIX 1

SITE LAYOUT / LOGISTIC PLANS

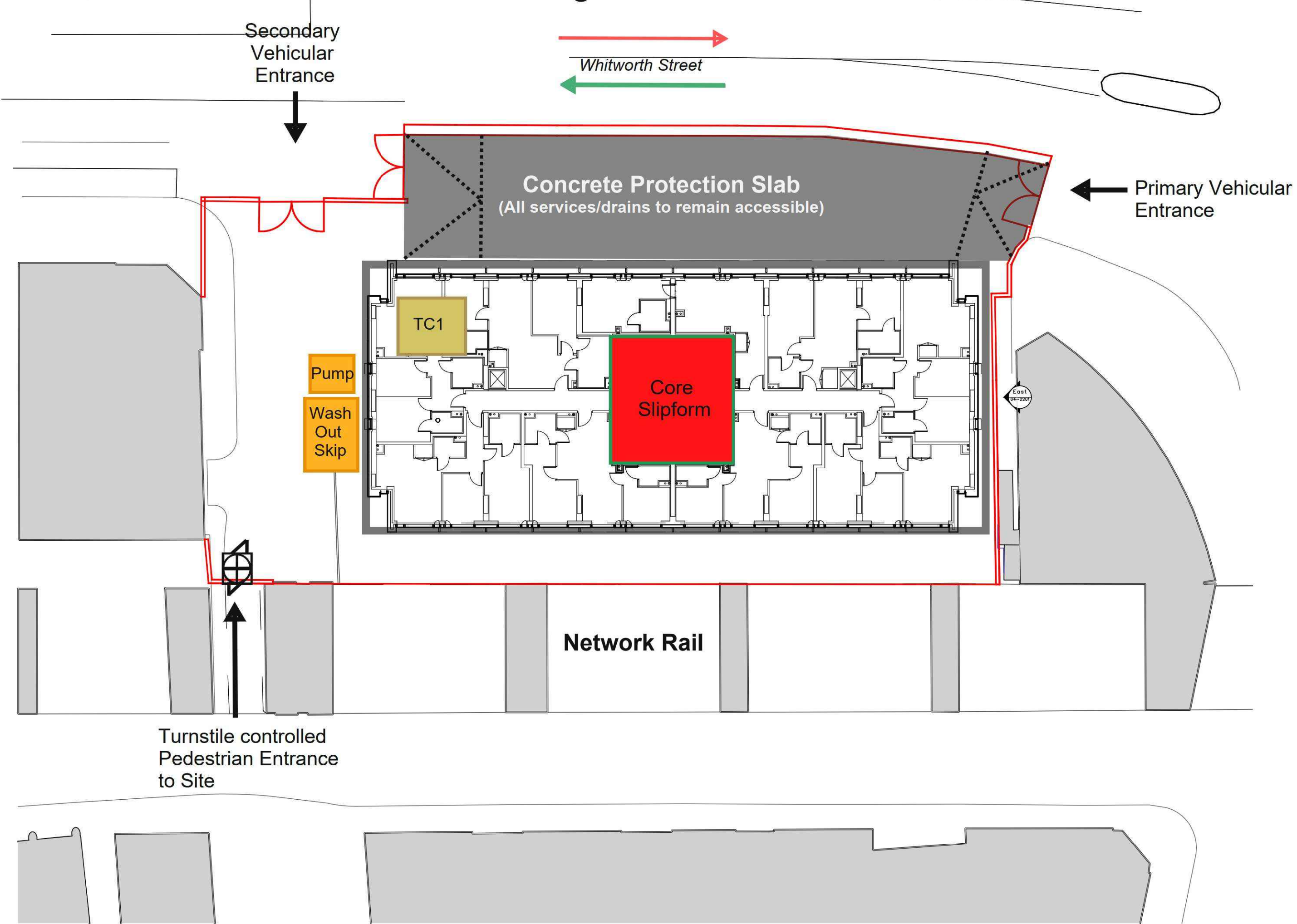
10 - 12 Whitworth Street West - Logistics Plan



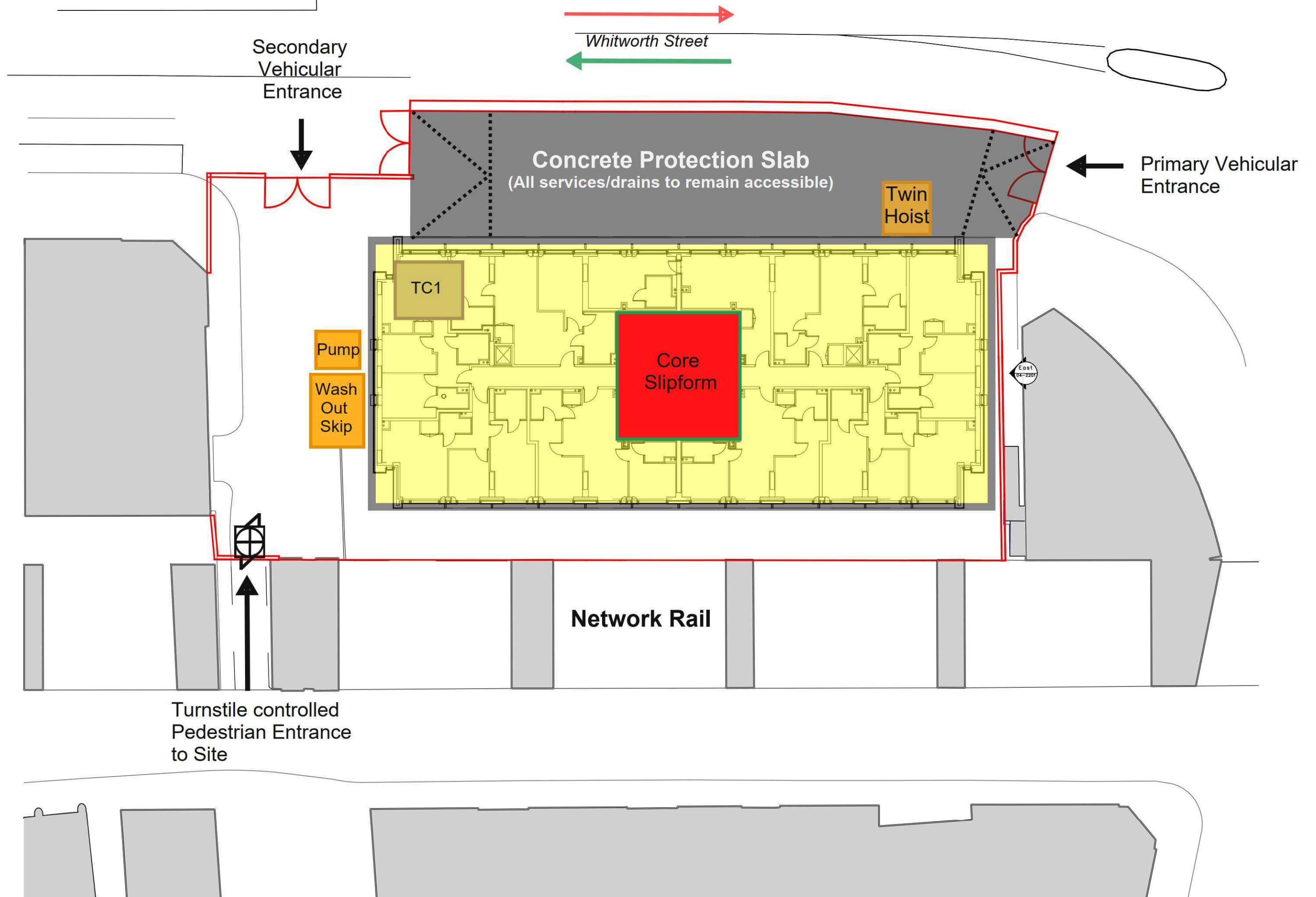
10 - 12 Whitworth Street West - Logistics Plan Phase 1 - Initial Logistics



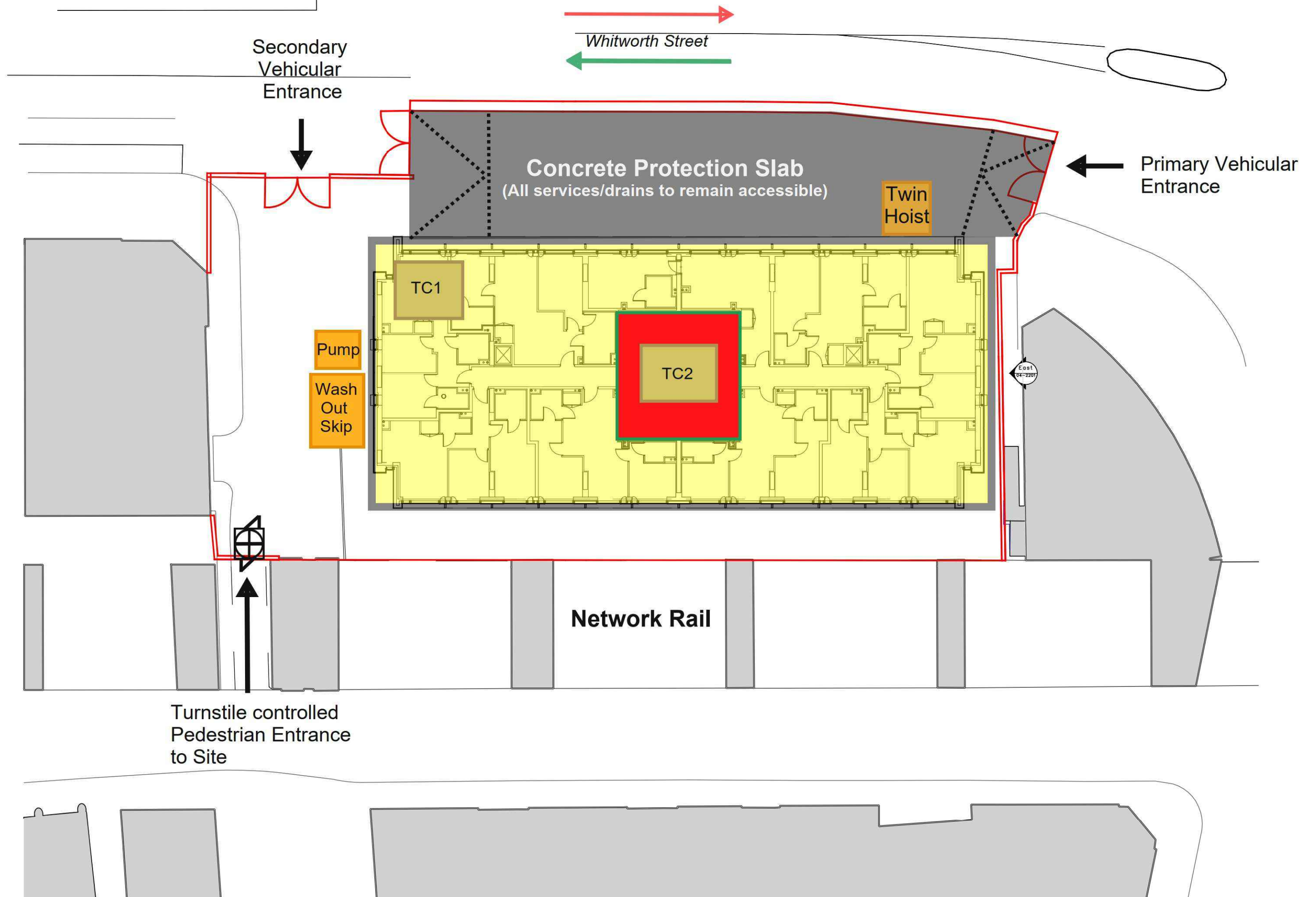
10 - 12 Whitworth Street West - Logistics Plan Phase 2 - Foundation and Core



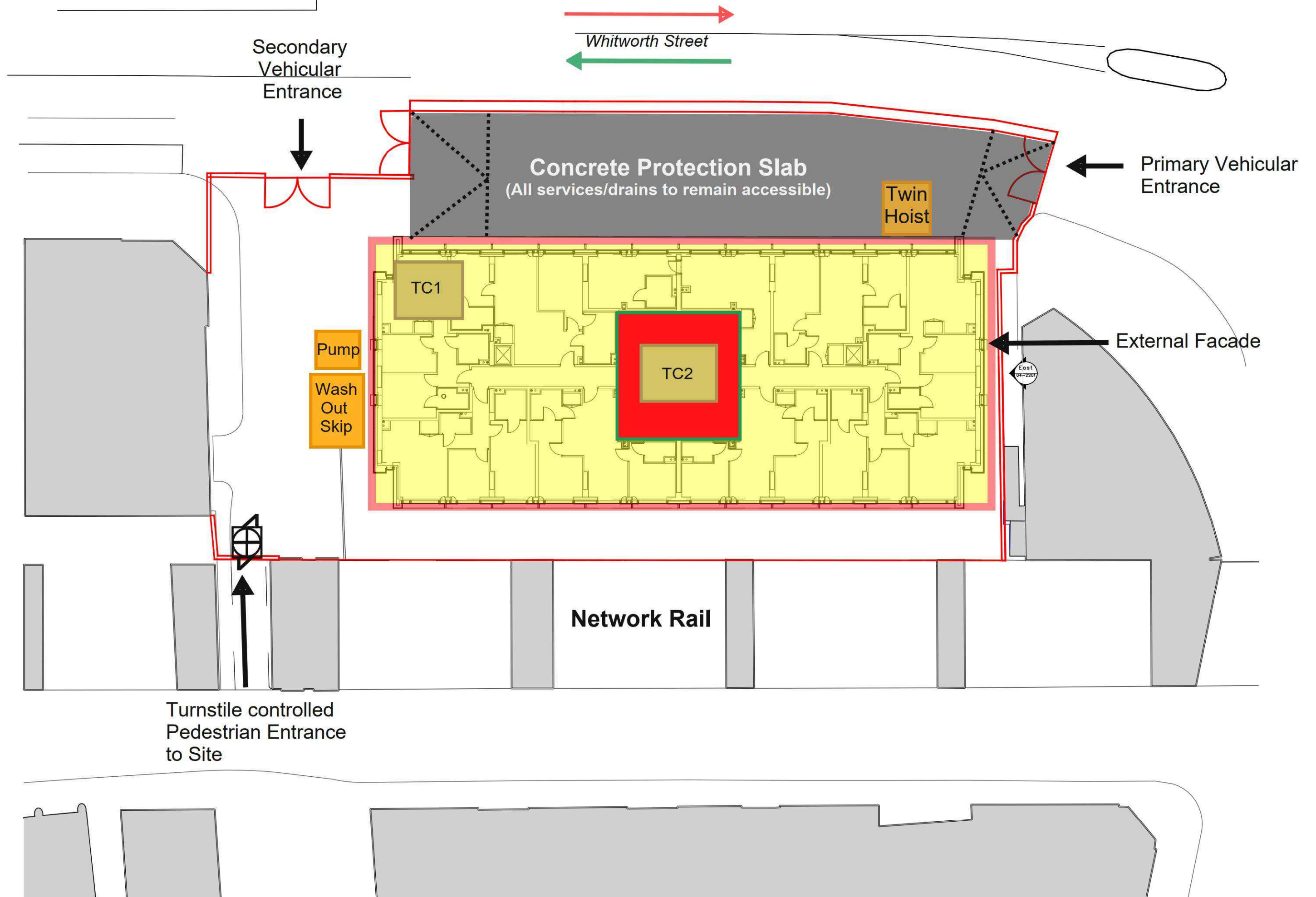
10 - 12 Whitworth Street West - Logistics Plan Phase 3 - Core, Slab & Columns



10 - 12 Whitworth Street West - Logistics Plan Phase 4 - Dismantle TC1 & Erect TC2



10 - 12 Whitworth Street West - Logistics Plan Phase 5 - Slab / Column & Facade



APPENDIX 2

RWBHO ENVIRONMENTAL POLICY

Russell WBHO & Russells Homes



Environmental Policy



POLICY OBJECTIVES

Russells Environmental Management System in time will have developed so that all our key issues pertinent to all our sites will have been addressed.

Our Environmental Management System will be paying particular attention to the following policy objectives.

- Minimise the Environmental impacts of existing activities/processes and to ensure that the implications of any new processes are fully assessed prior to introduction.
- Manage and control effectively and efficiently authorised processes.
- Disposal of wastes, and effluent in a safe and responsible manner.
- Reduce and limit the likelihood of environmental accidents and incidents, by the proper use of risk assessments and action planning.
- To strongly promote control and ownership of environmental issues at departmental levels.
- Provide all necessary training and update training and support to staff in order to ensure that the company is able to fulfil its commitments to the Environmental Policy and sustainable development.
- Introduce and promote programmes, whose aim is to minimise waste.
- Introduce and promote programmes, which minimise energy use through efficient energy management.
- Being considerate to our neighbours whilst conducting our day to day work activities.
- Ensuring continuous improvement in our waste control and management systems, in line with our Health Safety and Environmental Plan.
- Develop systems which promote best environmental practice, covering both design and development.

It is Russells Philosophy to safeguard the environment in which we work and any adjoining environment in order to support sustainable development, whether it be at the Company's construction sites or offices and to ensure the relevant Environmental Health, Safety and Welfare Legislation, associated Codes of Practice and Environmental Standards are complied with.

Contents

- 1 Environmental Policy Amendments and Reviews
- 2 Roles and Responsibilities
- 3 Training and Competence
- 4 Systems Monitoring
- 5 Client Relations
- 6 Energy and Efficiency
- 7 Control of Substances Hazardous to Health (COSHH)
- 8 Waste Management Control
- 9 Noise Control
- 10 Vibration Control
- 11 Dust and Fumes
- 12 Pollution Control
- 13 Ecology
- 14 Emergency Response

2. Roles & Responsibilities

Management of the system is the responsibility of the **Head of Environmental & ISO** who reports to the Board Member responsible for Environmental issues, John Millward, Construction Director.

The day-to-day management of environmental on site will be the responsibility of the Project Lead who will co-ordinate the on-site labour and ensure the availability of all necessary plant, equipment and materials to allow the environmental controls are in place on site.

At the outset of the project the project team will work with the Client, Principal Designer & relevant Design Professionals to ensure that the design of the project takes and that the appropriate pre-tender documents are issued.

The Health, Safety and Environmental Department will work closely with the Project Lead to ensure that each project is conducted in accordance with the Construction Phase Health, Safety and Environmental Plan and specific legislation.

To avoid duplication, please refer to POL-001 H&S Policy section 3 for the list of responsibilities:

- 2.1. The Board of Directors of Russells
- 2.2. Director with Responsibility for Championing Health, Safety and Environment Matters
- 2.3. Health, Safety & Environmental Managers
- 2.4. The Project Directors / Contracts Managers / Project Lead
- 2.5. The Site Managers / Site Engineers
- 2.6. The Assistant Site Managers / Assistant Site Engineers
- 2.7. Weekly Paid Staff

3. Training and Competence

Training will be provided to the company' employees through attendance at in-house seminars, presentations and the like, to make them aware of the Company's corporate philosophy regarding environmental management and, to ensure their competence in reducing any adverse impact of the Company's activities on the environment. The Company Management undertakes to ensure that this policy is understood, implemented and reviewed at all levels of the organisation, and is committed to the continual improvement of its Environmental Management System in accordance with the requirements of ISO 14001.

All Russell employees will be committed to sustainable development, Environmental Policies and training programmes.

Russells will also educate the following parties on environmental requirements, as and when required:

- All none Russells employees involved in any designing, project or contract work in which Russells is the main contractor.
- Members of the public who may be involved in any way directly or indirectly by Russells project work.

4. Systems Monitoring

We will monitor and update the staff training programme whenever the need is identified.

5. Client Relations

It is an integral part of our approach to fully discuss with clients, the environmental issues, implications and effects of a contract, to ensure full compliance with their Environmental Policies together with the requirements of current relevant legislation and guidelines.

Within our normal construction and operational procedures, the following are examples of measures taken to limit adverse environmental impact:

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- Close liaison with clients, their consultants and local organisations.
- Ensuring the safety of the Public and Site Personnel, not only with regards to Russells operations, but also arising from all sustainable and environmental factors.
- The strict control and demarcation of working areas controlled by the Site managers, Foremen, HS&E Manager and resident Engineer.
- Awareness of and compliance with safe working operational practices involving the Transportation, Handling, Storage and Disposal of Hazardous Chemicals and/or other toxic or harmful substances.
- Appraisal of operational techniques during construction and operation of plant with particular regard to noise, dust, odour, aerosol and emission levels.
- Full compliance with all Health, Safety and Environmental legislations to ensure the efficient and safe execution of a contract.
- Identification to the client of any matter arising throughout a contract which might have environmental implications.

Additionally, where Russells is taking a lead role as a Main Contractor employing Civil Engineering Sub-contractors, particular attention is given to the following:

- Appraisal of working techniques with particular regard to ground vibration.
- Awareness of contaminated materials, their transportation and disposal.
- This list is not exhaustive and there can be many other considerations to be taken into account. A full detailed assessment is carried out for each individual contract.

6. Energy Efficiency

Efficient energy use not only reduces operating costs, but also produces important environmental benefits. The production and use of energy in all its forms is one of man's key impacts on the environment.

Using energy efficiently and thereby reducing unnecessary pollution is recognised as one of the most effective ways of slowing down global warming. Consideration should be given to how energy is used. As far as reasonably practicable, control measures will be implemented to the following areas of operation in order to reduce energy consumption:

- Power & Lighting
- Heating Systems
- Ventilation
- Air Conditioning
- Transport
- Paper

For further details please refer to document reference [PR-EN008 – Energy Efficiency and Improvement](#).

7. Control of Substances Hazardous to Health (COSHH):

If there is a requirement to store and use substances which may be hazardous to health in accordance with the COSHH Regulations, written assessments will be in place for the specific substance. Sub-contractors will require approval prior to bringing any such materials onto the site.

Great care will be taken in handling any such material and substances and the following steps will be implemented:

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- Eliminate the use of hazardous materials and chemicals whenever possible.
- If not presently possible then substitute that material or chemical with a less hazardous one.
- If no substitute is available then ensure that any hazardous material or chemical is used strictly according to its COSHH data sheet and only used to its minimum.

It will be the Company Policy that where practicable the most environmentally friendly chemicals will be used.

Copies of the Manufacturers Safety Data Sheet (MSDS) will NOT be accepted as a COSHH assessment and must therefore not be sent to site with any substance. All COSHH assessments must reflect not only the hazardous natures of the substance but the environment in which it is to be used on site, information on storage, handling, transportation and safe disposal, emergency firefighting & First Aid information must be included with any substances brought onto site.

Emergency spill kits are issued to all construction sites and the site manager will ensure that responsible individuals are trained to the specific spill kit's manufacturers' operating instructions.

For further information, please refer to our PR-HS008 – COSHH Procedure

8. Waste Management Control

Waste materials are produced at Russells Headquarters and construction sites. Our Headquarters main waste stream is paper which is shredded and recycled by an Environmental Agency approved waste contractor. Other waste streams are ink, food waste, cardboard and domestic waste. The general waste is removed by an Environmental Agency approved waste contractor.

Russells and its sub-contractors will ensure that measures are put into place and maintained in order to protect the environment and prevent pollution from occurring.

All waste materials will be stored and disposed of (i.e. appropriate labelled skips provided) in accordance with the procedures / requirements appropriate to the circumstances of the project.

Sub-contractors are responsible for removing their own hazardous waste, e.g. used spill kits, used aerosols etc. Russells can provide a facility for hazardous waste collection if requested by the sub-contractor. Hazardous waste must NOT be placed in any general skip.

Russells and its sub-contractors will ensure that when waste changes hands, a transfer note/ticket is completed, in duplicate, and signed by both parties. A member of Russells Project Management team will complete a Russells waste transfer note which will be kept for a minimum of 2 years. Sub-contractors producing waste and responsible for removing their waste will be required to provide a compliant Waste Transfer Note in accordance with current legislation.

All those who produce or handle wastes from demolition, earthworks and construction activities have legal responsibilities – Duty of Care – for its safe keeping, transport and subsequent recovery or disposal. Failure to comply can result in an unlimited fine.

Duty of Care is a legal requirement under Section 34 of the Environmental Protection Act 1990. Detailed requirements for waste transfer notes are set out in The Waste (England and Wales) Regulations 2011.

A Site waste management plan (company policy albeit not a legal requirement) will be produced and will be reviewed and updated on a regular basis detailing all waste on the project. Copies of all relevant waste carriers' licences, waste management licences and waste transfer notes will be obtained.

Russells and its sub-contractors will ensure that when hazardous waste (as defined in EWC (European Waste Catalogue) code - within parts 2 to 6 of this guide) is removed from site that the following actions take place:

- A consignment note must accompany the waste in accordance and comply with the Hazardous Waste Regulations 2009 (England and Wales) and be completed and signed as dictated by the form
- All hazardous waste consignment notes will be kept for a minimum of 3 years

Waste materials fall into two categories for management, these are:

- Re-use
 - If surplus materials can be used in the permanent works they are classified as materials, which have been re-used. If they are surplus to requirements and need to be removed from site and they can be removed and used in their present form, they can be removed from site for reuse.
 - Where waste is re-used, the appropriate Waste Exemption permit must be applied for.
- Recycle
 - If the surplus material cannot be re-used in its present form but could be used in a different form, it is sent for recycling.
 - Surplus or waste materials arise from either the materials imported to site or from those generated on site.
 - Imported materials are those which are brought to the project for inclusion into the permanent works.
 - Generated materials are those which exist on the project such as topsoil, sub-soil, trees and materials from demolition works etc.
 - All items that are recyclable for example paper, plastics, glass, metals etc. will be identified in the Site Waste Management Plan.

8.1. Segregate

Where possible and site constraints permit, an active programme will be implemented of segregating waste on site into the following main categories:

- Mixed
- Metal
- Wood
- Packaging
- Gypsum

Wherever possible, all non-environmentally safe materials will be eliminated and replaced with environmentally friendly and sustainable materials.

8.2. Site Waste Disposal

All work will produce waste. The Company in its efforts to reduce the unnecessary need to use landfill will follow the following procedures:

- Site Management will ensure that all materials that can be re-used are separated and reused (as many times as possible) where possible.
- All materials that can be recycled are segregated into separate containers/skips, stored and removed by an Environmental Agency approved waste contractor for processing and recycling at an Environmental Agency licenced recycling plant.
- The use of landfill facilities will be kept to a minimum.
- Site Management will keep a record of all waste movement to landfill.
- The Company Health, Safety Environmental Manager will check, as part of their visit, what is being placed into the skips for disposal.
- Plaster board and Gypsum based products are not to be disposed of in general mixed waste skips/containers.

9. Noise Control

Russells and its sub-contractors will ensure that, where reasonably practicable, nobody on site is exposed to noise exceeding occupational action levels in compliance with the Control of Noise at Work Regulations 2005. Noise level requirements will be assessed by following the hierarchy of controls prior to commencement of works. The Health, Safety and Environmental Department will advise the Project team accordingly.

Under Section 60 and 61 of the Control of Pollution Act 1989 permissible levels of environmental noise may have been stated by the local authority, in this instance the levels stated will be adhered to.

On completion of the noise assessment Russells and its sub-contractors will provide relevant information, instruction and training to employees at risk from excessive noise levels.

Noise nuisance pollution will be controlled using the appropriate means to prevent nuisance in accordance with BS.5228 – 2:2009 - Sound suppressed equipment etc.

All Russells directly employed site-based personnel will be issued with suitable hearing protection if and when required.

10. Vibration Control

Russells and its sub-contractors will, through the careful planning and design of the works, take reasonable steps to eliminate the need for vibrating tools and equipment to be used on site. Where this cannot be achieved equipment suppliers will be required to provide adequate information to allow Russells or its sub-contractors to carry out a suitable risk assessment. Affected personnel will be trained on vibration reduction techniques and, where appropriate, included in a health surveillance scheme.

Completed Vibration Exposure from Powered Hand Tools Assessments will be recorded by Russells and its sub-contractors together with a daily record that operatives have not exceeded the 'exposure limit value' while on site.

The Site Management and sub-contractors will select the best tool for the task at hand with strict consideration to the reduction and time in use of the equipment.

11. Dust & Fumes

All operations will be assessed for the generation of dust, particularly silica and suitable safe systems of work will be implemented prior to any work commencing. A hierarchy of controls will be implemented and the effectiveness of control measures will be maintained throughout the duration of the specific activity being carried out. If dust is generated, then suppression or extraction methods will be employed. If, as a last resort, PPE is to be used employing respiratory protection then masks to at least PP3 level of protection must be used. All personnel using respiratory protection must have been face fit tested (a standard requirement for all Russells operatives).

For further information, please refer to our Dust Control Procedure.

12. Pollution Control

A pollution control plan will be implemented on Russells construction projects. At the earliest stage possible a site survey will be carried out through a combination of desktop reviews of plans, site drawings, contract documents and review of local authority information and by a site walkover for a physical check. The desktop survey will identify if any technical surveys will be required, such as noise, ecology and contaminated land surveys, etc. The source-pathway-receptor model will be used to identify the site risks. Suitable pollution prevention measures will be put in place to the following:

- Flooding
- Silt
- Fuel

- Chemicals / COSHH
- Dust
- Fumes
- Noise
- Vibration
- Ecology

13. Ecology

Suitable control measures will be implemented to protect the natural habitat in accordance with current legislation. Control measures identified by specialists, such as Ecologists or Geotechnical Consultants, will be implemented where required on Russells projects.

Russells will comply with any requirements in accordance with The Wildlife & Countryside Act 1981 to protect animals, plants and habitats.

14. Emergency Response

Emergency spill response kits will be made available on all construction sites and located in appropriate areas such as near fuel stores, in mobile bowzers and at refuelling locations. In any pollution event, Russells Head of Environmental must be notified.

Any spillages or pollution incidents should be reported in line with the Accident Reporting Procedure. There is no minimum volume figure above which a spill must be reported.

When an incident threatens which may lead to potential pollution or a prosecution, it is essential that such potential occurrences are properly anticipated and planned for at an early stage and addressed within the Emergency Response Plan (F-HS033).

APPENDIX 3

SITE WASTE MANAGEMENT PROCEDURE

PR-EN013 – Site Waste Management Procedure

1. Responsibilities

- a. The requirements for a SWMP is no longer a legal requirement since January 2014, however can be requested by the client or required for BREEAM certification. It is an offence by the principal contractor if the waste produced is not recorded and waste described on the Waste Transfer Notes. In a principal contractor role, RUSSELLS is responsible for:
 - obtaining relevant information from sub-contractors;
 - updating the SWMP as the project progresses;
 - identifying waste removal contractors;
 - keeping the SWMP up to date;
 - ensuring that other sub-contractors know where the SWMP is kept;
 - allowing other sub-contractors and the client access to the SWMP during the project;
 - handing the completed SWMP back to the client at the end of the project, if required/requested
 - keeping a copy of the SWMP for two years.
- b. Ultimate responsibility for achieving the above lies with the business Managing Director. Operational responsibility must be assigned to the Project Lead who will implement Russells areas of responsibility of the SWMP.
- c. This person needs to:
 - negotiate during the tender process to define contractual responsibilities for completion and maintenance of the SWMP;
 - be able to communicate to everyone working on-site and motivate them to follow the SWMP;
 - be able to provide or source the necessary resources and training;
 - have a good knowledge of the contract and the various parties involved.

2. General

- a. The SWMP must identify:
 - the person responsible for waste management on-site;
 - the types of waste that will be generated;
 - waste management options for these waste streams;
 - the use of appropriate and licensed waste management contractors and sites;
 - a plan for monitoring and reporting on the quantity of waste.
- b. To be effective, it is vital that the SWMP is simple and easy to follow, with clear procedures for waste management.
- c. A SWMP involves the following stages:
 - writing the SWMP;
 - assigning responsibility for implementation;
 - identifying likely waste arisings, types and amounts;
 - determining the best waste management methods (on-and off-site) for the different wastes;
 - optimising the supply and procurement of materials;
 - communicating the plan on how it will be implemented;
 - setting up systems to segregate and handle wastes on-site to encourage recovery;
 - making sure the site complies with the Duty of Care;
 - collecting data on waste generated during the project;
 - reviewing and updating the SWMP upon a change in the project, waste management status
 - drawing up recommendations for future projects.

3. Creating the SWMP

- a. The responsibilities for the production of the SWMP must be agreed at the start of the contract. The principal contractor is responsible for its production, implementation and use.
- b. If the SWMP is written at the pre-planning stage to take account of design and waste minimisation issues, then the developer or client or the architect's representative may be responsible, if the client requires a SWMP to be in place at this stage.
- c. If the SWMP is written at the tender stage or at the beginning of the construction phase, then the principal contractor will be largely responsible. The principal contractor may also have to develop and use any SWMP produced by the client. Sub-contractors will need to comply with the principal contractor's SWMP.
- d. It is important that the person or team writing the SWMP has adequate knowledge of waste issues and the construction programme. Ideally, they must also be responsible for implementation of the SWMP.
- e. The writer of the SWMP should be supported by the wider project team, which must be consulted in a partnership approach.
- f. The project team may include:
 - client;
 - design team;
 - regulators;
 - project team members;
 - HSEQ department;
 - sub-contractors (especially the demolition contractor);
 - relevant supply chain organisations,
- g. To ensure the SWMP is completed fully, a SWMP checklist should be used.

4. Making the SWMP work

- a. The SWMP must be:
 - viewed as common practice on-site;
 - embedded within the businesses existing policies and site procedures.
- b. It is essential that the SWMP is supported by the management team and accepted by the project team (including sub-contractors). It is also important that the SWMP is communicated effectively to everyone on-site and be made widely available. Training should be given as required and records kept of this training.

5. Identifying likely waste arising, types and amounts

- a. Knowledge of the types of waste and the estimated amounts arising from each part of the work programme is essential in order to determine:
 - what types/numbers of containers are needed for the different project stages;
 - when best to implement segregation for different waste streams.
- b. Estimates should be recorded using table on the "Waste Data Chart" once the waste types have been identified. Waste can be split into three categories; Demolition, Excavation, Construction.

6. Planning for waste management

- a. The various options for the likely waste generated on-site should follow the waste hierarchy e.g. initially prevent and reduce waste; followed by re-use and recycling (on-and off-site); recovery of energy and finally disposal.
- b. Planning for waste management will help to:
 - decide whether any specialised equipment is required on-site, e.g. a mobile crusher for recycling aggregates;
 - provide advance warning if exemptions or licences are required;
 - plan for the appropriate use of space and containers.
- c. This information can be combined with the waste estimates to set targets for:
 - segregation on-site;
 - recycling of materials;
 - diversion of waste from landfill.

7. Optimising material supply and procurement

- a. The amount of waste generated on-site can be reduced significantly by looking at the way in which materials are procured and supplied to site.
- b. Wastage rates for materials can be reduced through:
 - better ordering systems;
 - less packaging;
 - take-back schemes.
- c. The business individual with the procurement responsibilities may therefore become part of the SWMP process.

8. Communication and training

- a. Communication of the SWMP is essential in order for all Russells' staff, subcontractors and third parties to be aware of their responsibilities. The SWMP can be communicated through means such as site induction, toolbox talks and project review meetings. The SWMP must be held on site and be readily available to all sub-contractors and other third parties.

9. Segregation of materials and waste handling on-site

- a. To promote effective waste management, where practicable, waste materials must be segregated on-site. Information on construction recycling segregation is available in the CIRIA Environmental Good Practice on Site Pocket Book.

10. Working with sub-contractors

- a. All Russells' appointed sub-contractors must segregate the waste they produce where stated in the SWMP.
- b. Where sub-contractors remove their own waste, they must provide a waste transfer note containing the legally required information as per Environmental Protection Act 1990, Section 34; and the necessary certification.

11. Hazardous waste

- a. All hazardous wastes must be segregated in separate skips for disposal.
- b. Hazardous waste skips must have adequate identification signage and be secure.
- c. Avoid contaminating other wastes with hazardous materials (to avoid even higher disposal costs).
- d. Where sub-contractors remove their own waste, they must provide a hazardous waste consignment note containing the legally required information as per The Hazardous Waste (England and Wales) Regulations 2016; and the necessary certification. All 5 section must be completed.
- e. For advice on all aspects of hazardous waste, including the rules governing its transfer off-site and disposal, contact the HSEQ Department.

10. Complying with the Duty of Care

- a. A SWMP must provide a framework to ensure that Russells complies with the Duty of Care requirements. These include:
 - ensuring that all wastes are stored safely and securely;
 - checking that all waste contractors have the appropriate licences;
 - filling out waste transfer notes properly;
 - filling out consignment notes for hazardous waste properly;
 - keeping copies of all waste transfer notes for two years, and hazardous waste consignment notes for three years.
- b. Practical ways for complying with Duty of Care requirements can be obtained from the business Health and Safety Department. Or by information available in the CIRIA Environmental Good Practice on Site Pocket Book.

11. Data collection and analysis

- a. Collection and analysis of data is required to monitor the effectiveness of the SWMP. A designated person is required to collect and report on relevant data at site level.

11.1 Data collection

- a. Data on the waste generated from the project may include:
 - i. type of waste generated on-site;
 - ii. amount of waste generated on-site;
 - iii. segregation rates;
 - iv. re-use on- and off-site, recycling rates and diversion of waste from landfill;
 - v. wastage rates of different materials;
 - vi. costs and savings;
 - vii. waste movements;
 - viii. sources of waste;
 - ix. waste profile over the course of project;
 - x. levels of damaged materials.
- b. The appointed waste management contractor may be able to provide waste data as follows:
 - i. the type of waste generated (broken down by EWC codes);
 - ii. tonnages generated/removed;
 - iii. amounts recycled (typically for the waste facility overall and not per construction site).

11.2 Data analysis, benchmarking and setting targets

- a. Waste generated as part of the project must be analysed to:
 - i. provide feedback about the SWMP to site workers, clients, designers and other members of the project team;
 - ii. monitor performance in minimising waste;
 - iii. set realistic targets within the SWMP;

11.3 Key performance indicators

- a. KPI data can be used to compare performance across projects, against previous projects and - if appropriate - national averages. The two most common are typically:
 - i. volume of waste (m3) per £100,000 of project value;
 - ii. volume of waste (m3) per 100 m2 of project floor area.

12. Updating the SWMP

- a. Once the SWMP is implemented it must be reviewed by the project team to ensure it is:
 - i. being followed;
 - ii. practical and appropriate;
 - iii. amended as necessary.
- b. Whenever waste is removed from the site Russells, as a principal contractor, must record on the site waste management plan
 - i. the identity of the person removing the waste;
 - ii. the types of waste removed; and
 - iii. the site that the waste is being taken to.
- c. At project completion, Russells as principle contractor to sign the SWMP and explain deviations applied, if any.
- d. When any waste is removed the principal contractor must record on the plan
 - i. the identity of the person removing the waste;
 - ii. the waste carrier registration number of the carrier;
 - iii. a copy of, or reference to, the written description of the waste required by section 34 of the Environmental Protection Act 1990; and
 - iv. the site that the waste is being taken to and whether the operator of that site holds a permit under the Waste (England and Wales) Regulation 2011 or is registered under those Regulations as a waste operation exempt from the need for such a permit.
- e. As often as necessary to ensure that the plan accurately reflects the progress of the project, and as a minimum within six months, Russells, as the principal contractor must:
 - i. review the plan;
 - ii. record the types and quantities of waste produced;
 - iii. record the types and quantities of waste that have been—
 - (a) re-used (and whether this was on- or off-site);
 - (b) recycled (and whether this was on- or off-site);
 - (c) sent for another form of recovery (and whether this was on- or off-site);

- (d) sent to landfill; or
- (e) otherwise disposed of; and

- iv. update the plan to reflect the progress of the project.

13. Record Keeping of Waste off Site

The responsible person will be required to create the Waste Transfer Consignment Notes and include an accurate description of waste which will also be described on the Waste Carrier tickets who is removing the waste off site. The Waste Transfer Consignment Notes must be issued as a season ticket for a period of maximum 12 months given that the waste description remains unchanged.

Russells Waste Transfer Notes will be kept electronically for the required 2 years. The responsible person will issue the WTN to the Registered Waste Carrier to complete the WTN by signing the Transferee section.

The waste figures recorded will then be transferred into the SWMP.

The original Waste Carrier tickets are sent into the Russells Head Office and is stored with the invoices and can be pulled up by the Russells Financial Department if requested by a third party. Some of the waste carrier contractors keep records of waste movements electronically which can be accessed by Russells remotely.

14. Applying the lessons learnt

- a. It is important that recommendations and lessons learnt from the implementation of one SWMP can be applied to other sites, throughout the business and throughout Russells.
- b. This can be achieved by various means:
 - i. debrief the client and project team in terms of the successes, targets, recommendations, good and bad practice.
 - ii. Include the SWMP as an agenda item for post-contract reviews.
 - iii. establish benchmarks and new targets based on SWMP experience, aiming for continual improvement.
 - iv. sharing best practice within Russells to improve SWMP efficiency.

15. Further Information Sources

- a. Further free advice on how to reduce the volume of raw materials and other resources used during a construction build is available from Government website - <https://www.gov.uk/waste-legislation-and-regulations>

16. Document retention

- a. Waste Transfer Notes must be retained for a period of two years.

APPENDIX 4

NETWORK RAIL SUBMISSION TRACKER

NETWORK RAIL SUBMISSION TRACKER

Date: 29.07.22

Rev:4

Document Reference Key	
CPP	
Form A	
Form B	
Form C	
RAMS	
Doc	

Status Key	
Closed	
Open	
Response Overdue	



No.	Construction Activity	Type Of Document	Document Originator	Checking Category	Planned Issue Date	Date Issued to NR	Expected Response Date	Date NR Response Received	DRN CAT	Response to DRN Issued	Status	Notes
1	Construction Phase Plan	CPP	Russells WBHO									1. Confirmation of access requirements required. IKON to liaise with NR.
2	Foundation Design	Form A	MNP									
		Form B	MNP									
3	Superstructure Design	Form A	MNP									
		Form B	MNP									
4	Façade Design	Form A	Russells WBHO									1. (19.07.22) MC has been sent façade design pack, MC has stated he would like to wait for phase 3 Glare study results before commenting further.
		Form B	Russells WBHO									
5	Tower Crane Base Design Submissions	Form C	Russells WBHO/MNP									1.MNP to confirm with NR they are happy with this being included in Form B as permanent structure is to form crane base. 2. NR confirm crane base design should still sit within Form C (10.05.22)
6	Temp Works mobile crane to erection and dismantling to demonstrate outrigger loads suitable for ground conditions	Form C	Russells WBHO									1. MNP to confirm with NR if this is required as mobile crane only required on Whitworth St. Elevation. 2. NR confirm this should be included.

Document Reference Key	
CPP	
Form A	
Form B	
Form C	
RAMS	
Doc	

Rev:4

Status Key	
Closed	
Open	
Response Overdue	



No.	Construction Activity		Type Of Document	Document Originator	Checking Category	Planned Issue Date	Date Issued to NR	Expected Response Date	Date NR Response Received	DRN CAT	Response to DRN Issued	Status	Notes
16		Screen erection/reloc	RAMS	Russells WBHO									
17	Vibration/movement moitoring plan		Doc	Russells WBHO									1. Awaiting client confirmation on fee (20.04.22) 2. RH to produce report and send to MC for comment (29.07.22)
18	Results of dilapitdation survey		Doc	Russell WBHO and MNP									1. Survey undertaken on 26th April. 2. MNP issued survey to Russell WBHO for comment (6.05.22). 3 Updated report issued to Russells with additional elevation included (09.06.22) 4. MC no comments (29.07.22)
19	Access and maintenance strategy for façade and roof top plant (if applicable)		Doc	Sub-consultant									1.MC No comments (19.07.22)
20	EMC Study		Doc	Sub-consultant									1.MC No comments (19.07.22)
21	Glare Study Update		Doc	Q-Sustain									1. Client to confirm price for additional modelling is acceptable (04.05.22). 2 Glare study instructed results expected WC 12.06.22. 3. Phase 2 srudy results show that there are some glare issues, phase 3 study has been instructed, Q sustain to undertake (29.07.22)
22	CV Submissions	Design CRE CV	Doc	MNP - SP									MC No coments (19.07.22)
		Construction CRE CV	Doc	MNP - KL									MC No coments (19.07.22)
		CEM CV	Doc	Russells WBHO									MC No coments (19.07.22)

Document Reference Key	
CPP	
Form A	
Form B	
Form C	
RAMS	
Doc	

Rev:4

Status Key	
Closed	
Open	
Response Overdue	



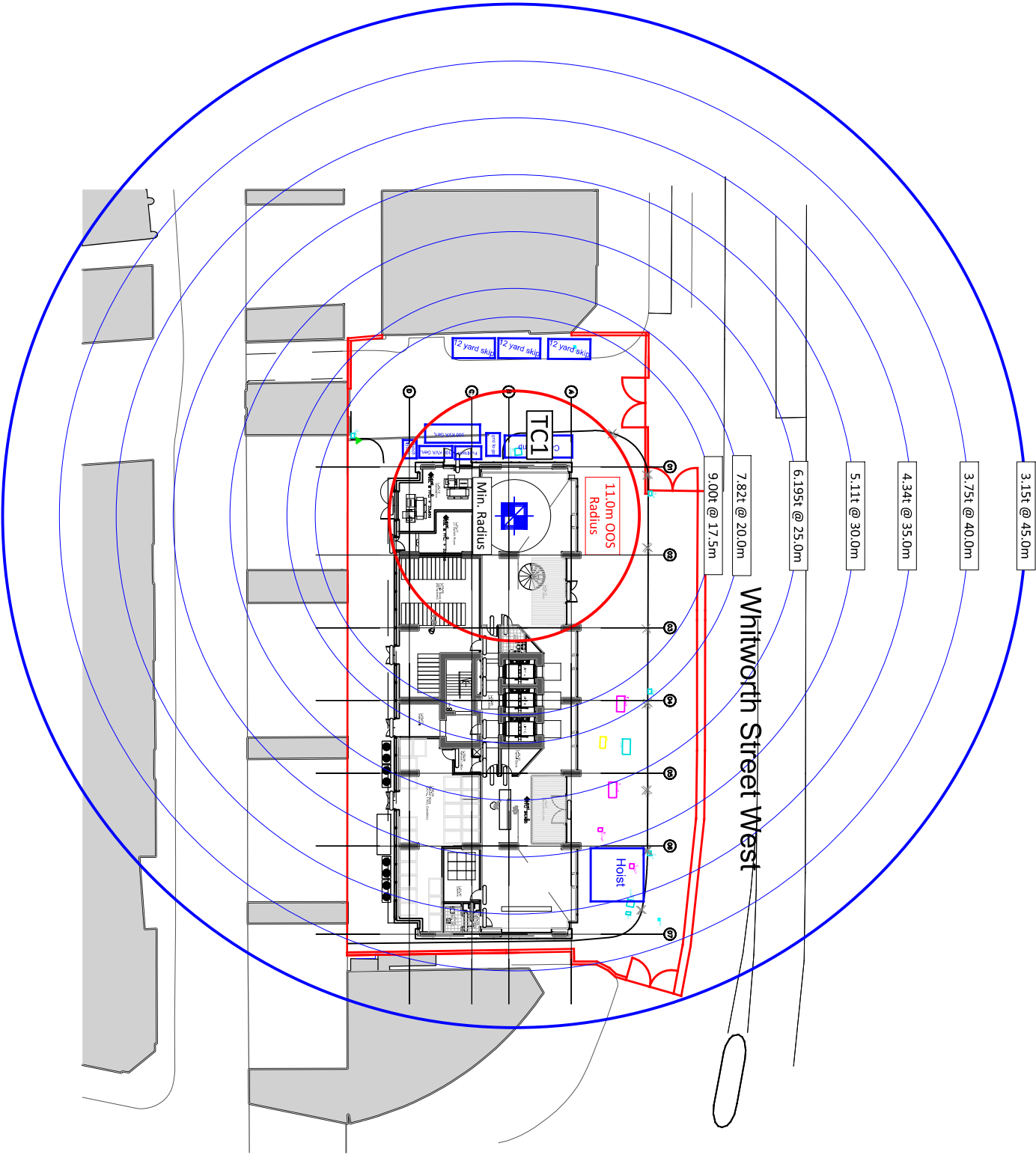
No.	Construction Activity		Type Of Document	Document Originator	Checking Category	Planned Issue Date	Date Issued to NR	Expected Response Date	Date NR Response Received	DRN CAT	Response to DRN Issued	Status	Notes
		Temp Work CRE CV	Doc	Russells WBHO									MC No coments (19.07.22)

APPENDIX 5

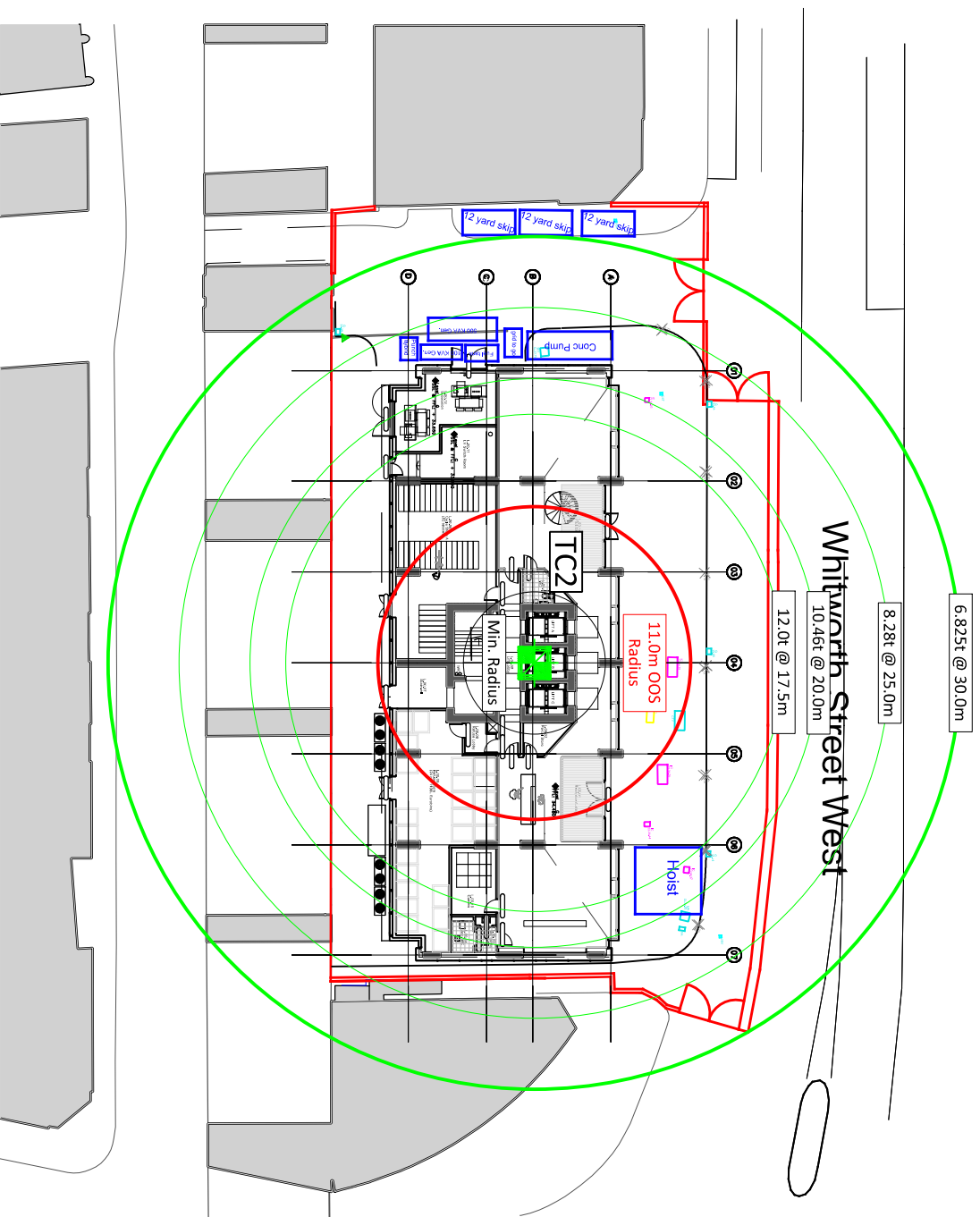
CRANE PLAN

Whitworth Street West - Tower crane plan

Phase 1



Phase 2



APPENDIX 6

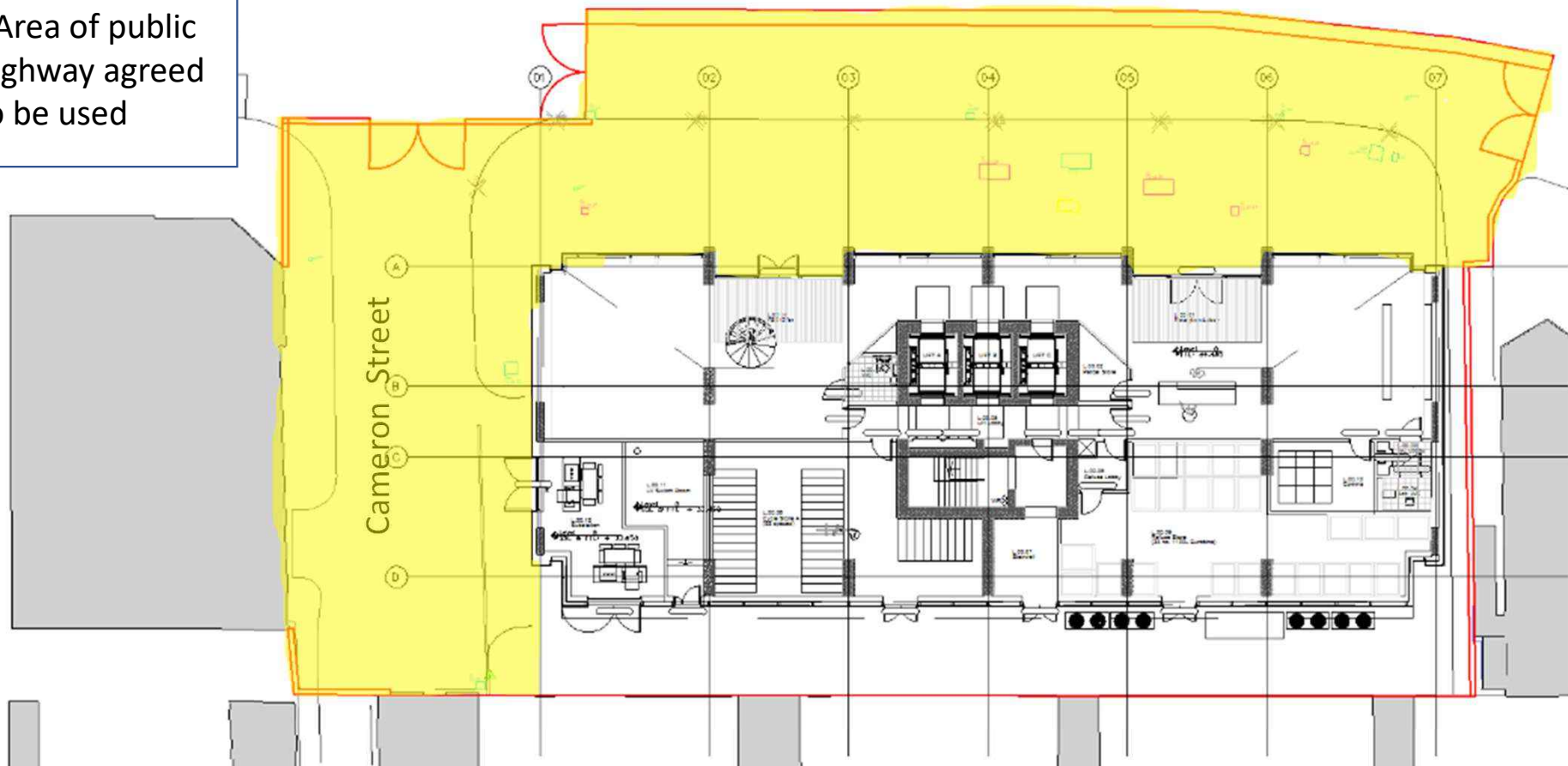
HIGHWAY CLOSURE & TRAFFIC MANAGEMENT PLAN

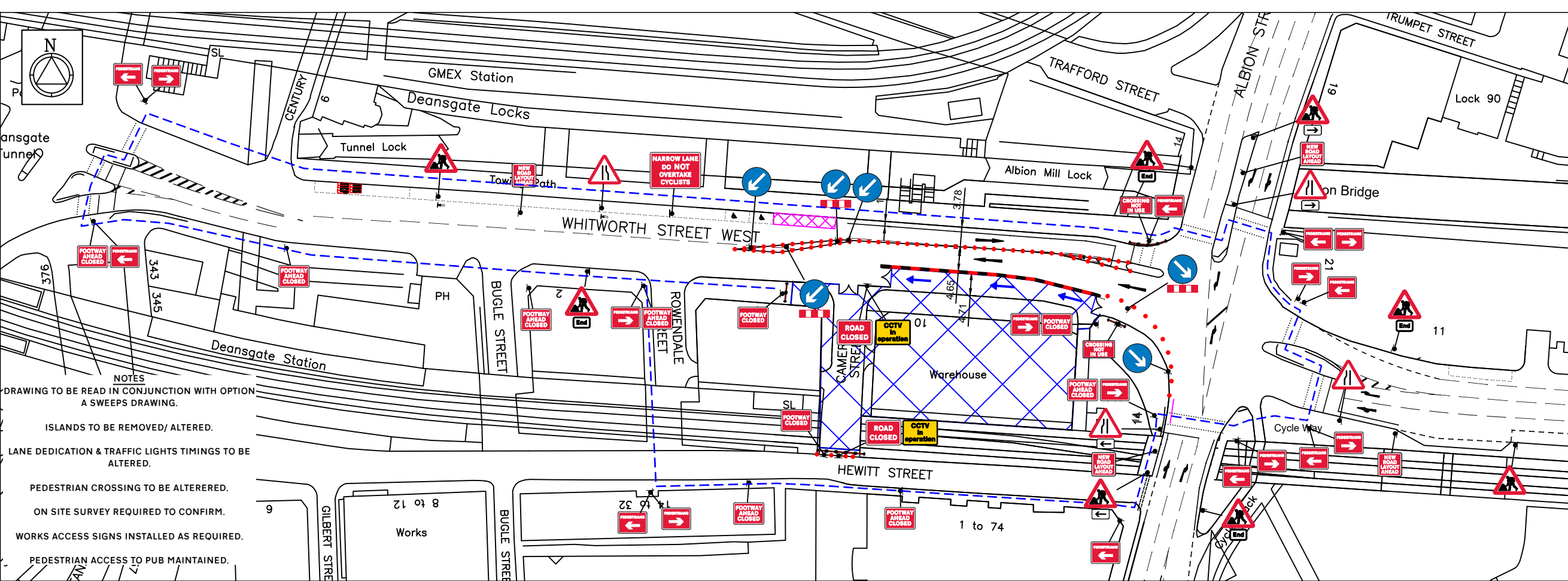
**Areas of public highway agreed with the highway authority for
use in association with the development during construction**

KEY

-  - Area of public highway agreed to be used

Whitworth Street West





- NOTES
- DRAWING TO BE READ IN CONJUNCTION WITH OPTION A SWEEPS DRAWING.
- ISLANDS TO BE REMOVED/ ALTERED.
- LANE DEDICATION & TRAFFIC LIGHTS TIMINGS TO BE ALTERED.
- PEDESTRIAN CROSSING TO BE ALTERED.
- ON SITE SURVEY REQUIRED TO CONFIRM.
- WORKS ACCESS SIGNS INSTALLED AS REQUIRED.
- PEDESTRIAN ACCESS TO PUB MAINTAINED.

- NOTES
- 1 All traffic signs shall comply with Chapter 8 of the Traffic Signs Manual
 - 2 Maximum distance between any two temporary traffic signals to be 249m. Minimum distance between any two temporary traffic signals to be 30m.
 - 3 Temporary traffic signals shall not occur within 150m of an existing level crossing, Pelican crossing or signalised junction without the consent of the Engineer. The Engineer shall consult with the authority responsible for any of these types of facility prior to traffic management being installed in adjacent areas.
 - 4 Coning shall be installed at 45° to the edge of carriageway, as generally indicated.

ROAD CLOSURE :

- NOTES
- 1 All traffic signs shall comply with Chapter 8 of the Traffic Signs Manual
 - 2 All traffic management equipment shall be provided by the Contractor, unless otherwise specified.
 - 3 All signs shall be positioned so as not to be obscured by any other objects and shall not obstruct any other sign, permanent or temporary as much as is reasonably practicable.
 - 4 All traffic signs shall meet the reflectorisation requirements of BS 673 : Part 6 : 1983, Table 1.
 - 5 Works Access/Egress to be positioned to suit ongoing works.

KEY

- Sign
- Traffic Cone
- Works Area
- Safety Zone
- Water Filled Barrier
- Pedestrian Barrier
- Pedestrian Route
- Hoarding Line
- Site Traffic Flow
- Island Removal

3	AMEND DETAILS	GB	CH	26/06/2022
2	ADS ISLAND REMOVAL DETAIL	GB	CH	09/06/2022
1	AMEND LAYOUT AND PEDS	GB	CH	24/05/2022
Rev	Description	By	Chkd	Date
Client	Revisions			



OPTION A REV 3

Project

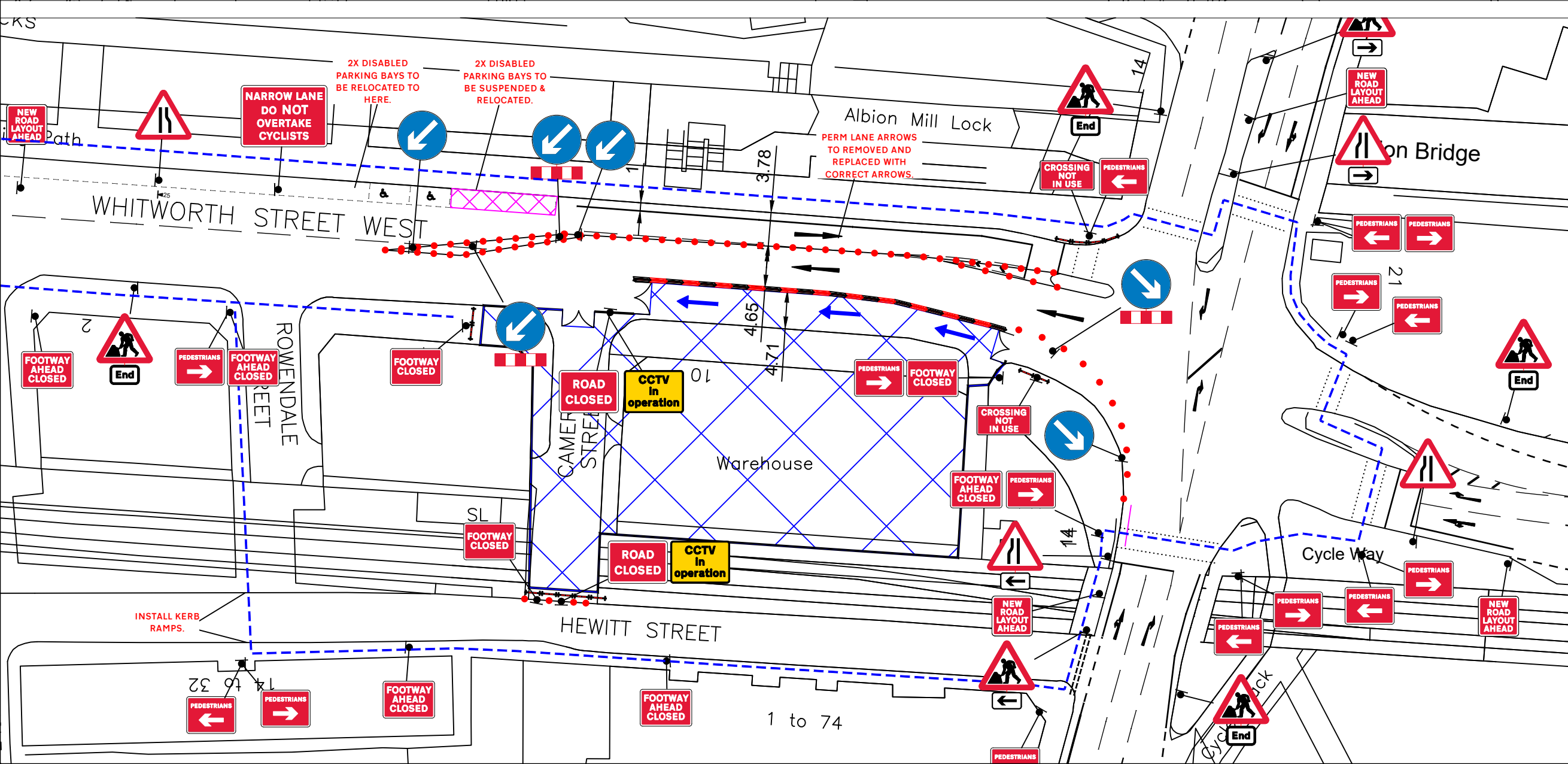
WHITWORTH STREET WEST,
MANCHESTER
M1 5WY

Title

ROAD NARROWS,
FOOTWAY CLOSURE &
ROAD CLOSURE



Design: GB	Drawn: GB	Chkd: NW
Date: 09/05/2022	Date: 09/05/2022	Date: 09/05/2022
Scale: NTS @ A3	Status: FOR-ISSUE	
Drawing No	UDP-11071	Rev: 3



APPENDIX 7

NEIGHBOUR CORRESPONDENCE

Joe Rawlinson

From: Steven Millar
Sent: 28 July 2022 11:57
To: Richard Sumner; Nigel Powell; Joe Rawlinson
Subject: FW: Whitworth Street - Manchester

Morning,

The asset managers who own the building next door to Whitworth Street don't have an issue with the footpath being closed on Cameron Street, see below.

They are going to sell the plot/building subject to planning but this will take, by their estimation, around 18 months and at that point we may have to amend hoarding to suit the new owner.

Steve



Steven Millar | Senior Quantity Surveyor

t: 0161 868 4310 | **m:** 07387 023 497

13 Westpoint Enterprise Park, Clarence Avenue, Trafford Park, Manchester, M17 1QS

russellwbho.co.uk

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From: Baddeley, Matthew <Matthew.Baddeley@Schroders.com>

Sent: 28 July 2022 11:33

To: Steven Millar <SMillar@russellwbho.co.uk>

Cc: Arnold, Christine <Christine.Arnold@eu.jll.com>; Joe Rawlinson <JRawlinson@russellwbho.co.uk>

Subject: RE: Whitworth Street - Manchester

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Hi Steven

This is fine in principle. If you can structure it in such a way that the footpath could be reopened if needed that would be fab.

Kind regards

Matt

Matthew Baddeley

Asset Manager

M 07972 000072

D 0207 658 1575

matthew.baddeley@schroders.com

Two St Peter's Square, Manchester, M2 3AA

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From: Steven Millar <SMillar@russellwbho.co.uk>

Sent: 28 July 2022 08:35

To: Baddeley, Matthew <Matthew.Baddeley@Schroders.com>

Cc: Arnold, Christine <Christine.Arnold@eu.jll.com>; Joe Rawlinson <JRawlinson@russellwbho.co.uk>

Subject: RE: Whitworth Street - Manchester

External Mail

Good morning Matthew,

It will likely be for a period of around 3 years whilst we construct the new tower next door. We would be able to allow access to the roller shutter via the site via arrangement. It's currently not being used.

If your building is to be demolished then we'd have to talk through logistics with you anyway.

Please feel free to give me a ring if you'd like to discuss this.

Kind regards



Steven Millar | Senior Quantity Surveyor

t: 0161 868 4310 | **m:** 07387 023 497

13 Westpoint Enterprise Park, Clarence Avenue, Trafford Park, Manchester, M17 1QS

russellwbho.co.uk

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From: Baddeley, Matthew <Matthew.Baddeley@Schroders.com>
Sent: 27 July 2022 13:54
To: Steven Millar <SMillar@russellwbho.co.uk>
Cc: Arnold, Christine <Christine.Arnold@eu.jll.com>
Subject: RE: Whitworth Street - Manchester

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Hi Steven

How long would the road be closed for?

Kind regards
Matthew

Matthew Baddeley
Asset Manager

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D 0207 658 1575
matthew.baddeley@schroders.com

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From: Arnold, Christine <Christine.Arnold@eu.jll.com>
Sent: 27 July 2022 13:42
To: Baddeley, Matthew <Matthew.Baddeley@Schroders.com>
Subject: FW: Whitworth Street - Manchester

External Mail

Matt

Please see below from Russells who are developing the scheme next door. I have attached a street view showing Cameron Street which may help in understanding the proposal.

I am away from tomorrow until end of next week so if you have any queries or require any further details could you liaise with Steven.

Thanks

Chris



Christine Arnold

Associate - Property & Asset Management

JLL

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M [+44 7710 048790](tel:+447710048790)
Christine.Arnold@eu.jll.com
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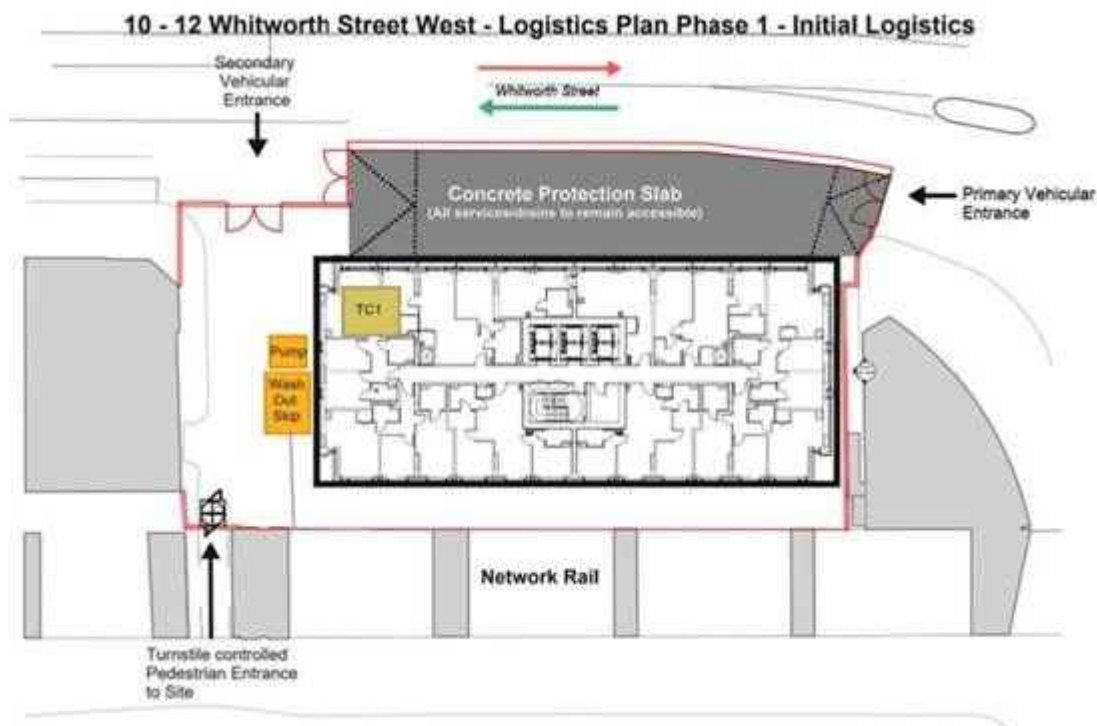
From: Steven Millar <SMillar@russellwbho.co.uk>
Sent: 27 July 2022 13:12
To: Arnold, Christine <Christine.Arnold@eu.jll.com>
Cc: Joe Rawlinson <JRawlinson@russellwbho.co.uk>
Subject: [EXTERNAL] RE: Whitworth Street - Manchester

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Good afternoon Christine,

We are currently putting together a logistics plan for the Whitworth Street Site.

I have inserted the current proposal for this below, but I'd like to run it past you and the building owners as it involves closing Cameron Street in its entirety and would mean that you would not be able to access the loading bay via the roller shutter door on Cameron Street.



We'd like to know if the building owner would have any objection to this? From memory there is a wall internally, with a hole in it, so the loading bay isn't actually usable at the moment.

Kind regards

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From: Steven Millar
Sent: 13 June 2022 12:40
To: Arnold, Christine <Christine.Arnold@eu.jll.com>
Subject: RE: Whitworth Street - Manchester

Good afternoon Christine,

We wouldn't look to sign up to a 28 day break clause so this may not work for us.

On another point though, if they are looking to get planning on the development would they be willing to speak to us regarding building it?

We are currently going through the processes required at the site next door so could bring our expertise to the table.

Kind regards



Steven Millar | Senior Quantity Surveyor

t: 0161 868 4310 | **m:** 07387 023 497

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From: Arnold, Christine <Christine.Arnold@eu.jll.com>
Sent: 09 June 2022 13:58
To: Steven Millar <SMillar@russellwbho.co.uk>
Subject: RE: Whitworth Street - Manchester

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Steven

The transfer has now completed and I have spoken to the new asset manager who has advised that they are looking to market the properties in the next month or so, on a subject to planning basis. Obviously we do not know how long planning will take but if we were to agree a lease this would need to be on a flexible basis with probably 28 days notice to terminate.

I am not sure if this will be acceptable but let me have your thoughts.

Regards

Christine

Christine Arnold

Associate - Property & Asset Management

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Christine.Arnold@eu.jll.com

jll.co.uk

From: Steven Millar <SMillar@russellwbho.co.uk>

Sent: 08 June 2022 15:43

To: Arnold, Christine <Christine.Arnold@eu.jll.com>

Subject: [EXTERNAL] Whitworth Street - Manchester

Caution: Message from external sender

Hi Christine,

I thought I'd email to see if there had been any movement in the ownership of the building on Whitworth Street?

Our project appears to be gaining some traction and we'd be looking to use it from September/October time for 3 years if possible?

Have you had any updates?

Kind regards



Steven Millar | Senior Quantity Surveyor

t: 0161 868 4310 | **m:** 07387 023 497

13 Westpoint Enterprise Park, Clarence Avenue, Trafford Park, Manchester, M17 1QS

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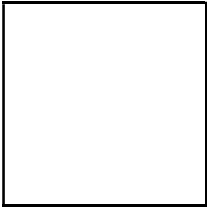
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Appendix B – Acoustic Report EIA Addendum

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Whitworth Street West, Manchester

Environmental Noise & Vibration Study

August 2022

Report Reference: PR0668-REP01A-MPF

Flint Glass Works, 64 Jersey Street, Manchester, M4 6JW

0161 605 0905 

info@fisheracoustics.co.uk 

fisher acoustics

PROJECT TITLE WHITWORTH STREET WEST, MANCHESTER

REPORT TITLE ENVIRONMENTAL NOISE & VIBRATION STUDY

CLIENT FEATHERFOOT WHITWORTH STREET LTD
EMPIRE HOUSE
92-98 CLEVELAND STREET
DONCASTER
DN1 3DP

REPORT REFERENCE PR0668-REP01A-MPF

DATE 8 AUGUST 2022

AUTHOR MATT FISHER, BENG (HONS) CENG MIOA

DOCUMENT HISTORY

FIRST ISSUE 3 FEBRUARY 2022

REVISION A 8 AUGUST 2022

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1.0 SUMMARY

Summary of previous acoustic assessments at the development site

Acoustic assessments carried out by Hilson Moran for the original planning application for 10-12 Whitworth Street West in January 2016 concluded that entertainment noise from the night clubs at Deansgate Locks was not expected to cause nuisance to the occupants of the proposed apartments. For instance, the Noise and Vibration Chapter of the Environmental Statement stated that in relation to an 'assessment of the impact on occupants of the proposed development due to levels of entertainment noise arising from the existing night clubs along Deansgate Locks....It has been demonstrated that sufficient masking of entertainment noise will be provided by the proposed building services (designed to achieve NR 25) to achieve the requirements of MCC'.

In addition, the Stage 4 Acoustic Report issued by Hilson Moran on 12 August 2016 concluded that based on the provision of a high-specification double glazed unit, compliance with appropriate music noise limits within the apartments on the north elevation could be achieved.

Fisher Acoustics was appointed in September 2016 to provide design advice relating to the curtain wall to the south elevation of the proposed building. For this assessment Fisher Acoustics was not instructed to carry out a noise survey at the site to determine the levels at external noise due to the entertainment venues at Deansgate Locks.

However, at this stage the layout of the apartments to the north elevation was revised such that the glazing area to the master bedroom of corner apartments increased. This increase in glazing area prompted a review by Fisher Acoustics of potential external music noise levels at the apartments on the north elevation.

This review found that the level of music noise from the Deansgate Locks bar 'Sugar Buddha' able to impact upon the north elevation was potentially greater than those discussed in the Hilson Moran Stage 4 Acoustic Report.

In addition, since the review in 2016, the operators of Sugar Buddha took over the commercial unit adjacent to Sugar Buddha (the former 'Baa Bar'). As the operators of Sugar Buddha were under no obligation to carry out acoustic remedial works to the entrance of the former Baa Bar, Fisher Acoustics advised that higher levels of music noise would be expected at 10-12 Whitworth Street West than were allowed for in the building design at that time. It was further advised that the control of music noise ingress to the apartments of 10-12 Whitworth Street West could be expected to incur significant additional costs to the project.

With regard to the remaining entertainment venues at Deansgate Locks, as discussed above, the Noise and Vibration Chapter of the Environmental Statement for the Development stated that noise ingress due to entertainment noise from the existing night clubs along Deansgate Locks was expected to achieve the requirements of Manchester City Council.

Notwithstanding the above statement in the Noise and Vibration Chapter, Fisher Acoustics undertook a subjective assessment of music noise egress from Deansgate Locks on 17 June 2017. Although Sugar Buddha was closed at the time of this subjective assessment, Fisher Acoustics Stage 4 report advised that music noise from Revolution bar, and to a lesser extent from Lola-Lo, was audible at the Whitworth Street West Development site at a level of that was considered sufficient to pose a risk in relation to the achievement of appropriate internal noise levels within the apartments.

Recent acoustic assessments

Fisher Acoustics Ltd was commissioned in December 2021 by Featherfoot Whitworth Street Limited to conduct an intrusive noise study relating to the proposed residential development at 10 - 12 Whitworth Street West, Manchester. The noise study was specifically to include a weekend night time noise survey to determine the prevailing noise levels at the site due to the bars and venues within Deansgate Locks.

Environmental noise measurements at the proposed site have identified the pre-existing environmental noise levels during the day and night at all elevations of the development.

The recommended acoustic performance of facade elements to achieve the recommended internal noise levels within habitable rooms has been determined. In particular, it has been determined that double glazed units, supplemented by secondary glazing in certain zones, of specific acoustic performances would be acoustically suitable for the vision panels of the curtain wall to the proposed apartments.

The recommended acoustic performances of the non-vision elements of the curtain wall are also identified.

Compliance with the sound insulation performances for the façade elements recommended herein is expected to allow full compliance with the daytime and night time 'average' noise level criteria identified in the planning approval in relation to noise from the road and rail network.

Given the recommended sound insulation performances for the façade detailed herein, compliance with the recommendations of the World Health Organisation in relation to maximum (LA_{max}) internal noise events is expected, albeit with no comfort margin. In particular, if full compliance with the recommended sound insulation performances for the curtain wall elements is achieved, then based on the measured noise survey data, there would be fifteen train pass-by events between 11pm and 7am that generated an internal noise level greater than 45dB LA_{max} in the smallest bedrooms on the lower levels of the south elevation. These fifteen 'excess' events are predicted to typically generate internal noise levels of up 50dB LA_{max}.

Compliance with the requirement of extant planning condition 21 relating to entertainment noise ingress to apartments is not expected to be achieved given the maximum practicable acoustic performance of the curtain wall elements, including secondary glazing. A noise level of approximately 22dB LA_{eq} due solely to music noise ingress is possible. This noise level would be approximately 7dB lower than the potential background noise level generated by the MVHR system within an apartment bedroom. Planning condition 21 requires that the noise level in apartments due to entertainment noise ingress is at least 10dB lower than the background noise level in the apartments.

However, given full compliance with the recommended sound insulation performances for the façade elements, the expected noise levels in apartments comply with the recommendations of Section 3.6.1.2 'Entertainment Venues' of 'Planning & Noise, Technical Guidance', published by Manchester City Council, in that music noise levels in the 63Hz and 125Hz octave centre frequency bands are not expected to exceed 47 dB (+/- 1dB) Leq and 41 dB Leq respectively in habitable rooms. It has been confirmed by Manchester City Council that compliance with the octave band noise levels identified above would be acceptable in lieu of compliance with the entertainment noise criterion of extant planning condition 21.

It should be noted that if noise levels of 47 dB Leq and 41 dB Leq in the 63Hz and 125Hz octave centre frequency bands respectively are achieved, low level music noise is expected to be just audible in apartment rooms.

As assessment of groundborne vibration due to train movements on the rail viaduct that lies on the southern perimeter of the site indicates that no mitigation measures are required in order to maintain residential amenity in relation to feelable vibration. Structureborne noise levels in apartments due to train movements are expected to allow compliance with the requirements of the planning approval in relation to average and maximum noise levels in apartments.

2.0 INTRODUCTION

Fisher Acoustics Ltd has been commissioned by Featherfoot Whitworth Street Limited to conduct an environmental noise assessment relating to a proposed residential development at 10 - 12 Whitworth Street West, Manchester.

Planning approval for the proposed development was granted in April 2016 (planning reference 111003/FO/2016/C1). A non-material amendment of the proposals was approved in December 2021 (planning reference 129701/NMC/2021).

This report identifies the results of environmental noise surveys at the site and the determination of the required sound insulation performance of façade elements to habitable rooms to achieve recommended internal noise criteria. The findings relating to vibration measurements at the site are also presented.

The steps undertaken in compiling this study are as follows:

- The carrying out of daytime and night time external noise surveys to determine the typical levels of noise at the site during daytime and night time periods.
- 3D modelling of the proposed development and surrounding buildings and structures to calculate the potential external noise across the building facades due to the principal external noise sources.
- Calculation of the required sound reduction index of the vision panels and non-vision panels of the curtain wall to habitable rooms to allow the achievement of appropriate internal noise levels due to external noise sources.
- Measurement of groundborne vibration levels due to train movements in order to assess 'feelable' vibration and to calculate the potential levels of structureborne noise in apartments due to train movements on the adjacent viaduct.

3.0 DESCRIPTION OF SITE

General Site Description

The site lies to the South of Manchester city centre and is currently cleared ground. The site is bounded by Whitworth Street West to the north, to the east by the City Road Inn public house and to the west by Cameron Street. Directly adjacent and to the south of the site is a railway viaduct that carries train lines serving nearby Manchester Oxford Road and Deansgate Stations.

The Rochdale Canal runs parallel to and just to the north of Whitworth Street West. Beyond the canal is a viaduct that carries Metrolink trams. Within the archways of the viaduct are a number of bars and a comedy club (collectively known as 'Deansgate Locks').

Further to the south of the site on Hewitt Street lies residential apartments and the Manchester School of Acting. To the west lie unoccupied office buildings and Deansgate railway station. Further to the east, is the A5103 (Medlock Street) and residential apartments, hotels, restaurants, bars and retail outlets.

The A5103 (Medlock Street) is a main arterial route into the central City of Manchester area.

Medlock Street and Whitworth Street are heavily trafficked by buses, car and HGVs. Metrolink trams run frequently on the lines to the north of the site. Rail traffic on the viaduct directly to the south of the site runs frequently both day and night, with passenger and freight trains.

Figure 1 shows the site location plan.

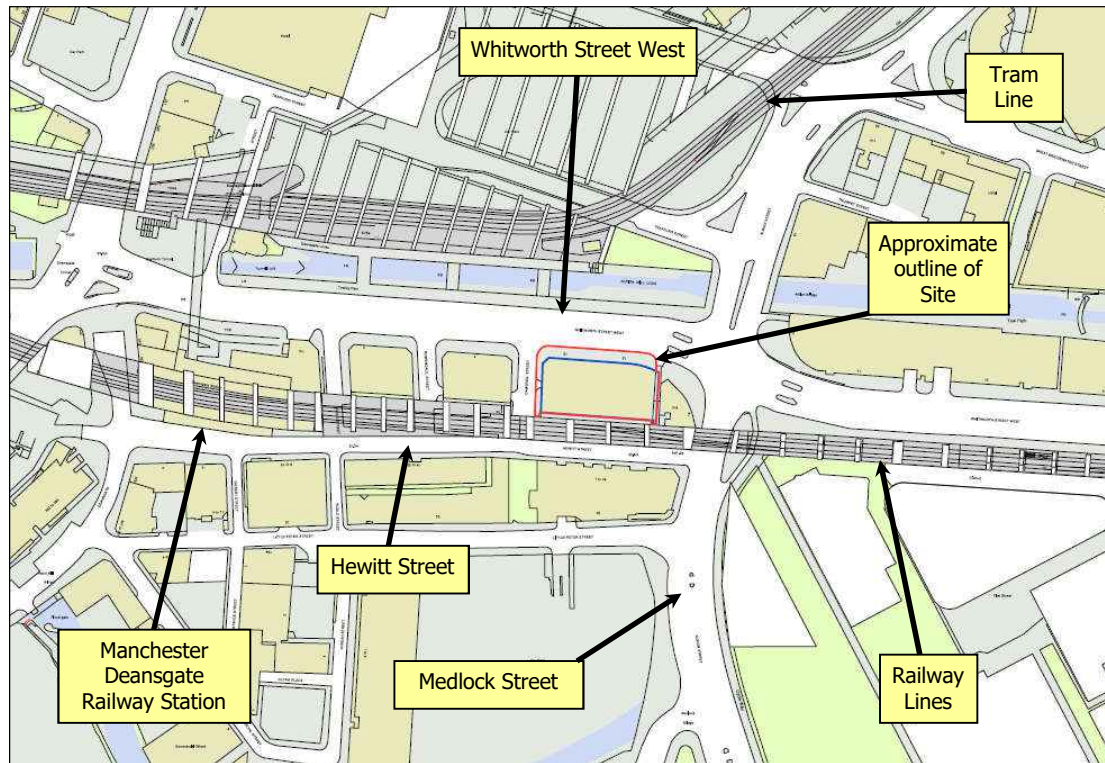


Figure 1: Site location plan

4.0 DESCRIPTION OF PROPOSED DEVELOPMENT

The formal description of the Development proposals is as follows:

- Construction of a 38 storey residential building (Use Class C3), comprising 327 apartments with associated residents services, facilities and communal spaces, servicing, highways, public realm and associated works.

The proposal is for a residential-led redevelopment, accommodating three hundred and twenty-seven residential apartments together with residents' amenity space including gym.

The proposed uses within the building are as follows:

- Ground floor: Reception/Lobby, Food & Beverage offer, WCs, Parcel Store, Refuse store, Cycle Store, Substation, LV Switch Room, Comms
- Level 11st floor: Void over Reception/Lobby, Food & Beverage offer, WCs, Amenity area (potential gym), Cycle Store, Plantroom
- 2nd floor: Amenity Spaces, WC, Plant
- 3rd floor: Apartments, Plantrooms
- 4th floor to 18th floor: Apartments
- 19th floor: Apartments, Plantrooms
- 20th floor to 35th floor: Apartments
- 36th and 37th floor: Penthouse apartments

The apartments of the proposed Development are to be provided with continuously running supply and extract ventilation in order to achieve the background ventilation requirements of Approved Document F of the Building Regulations. Therefore, no passive background trickle ventilators are required to the external wall or within the window frames of the proposed habitable rooms. Purge ventilation is to be achieved through the opening of solid purge vent panels.

Figure 2 shows the proposed site layout plan.

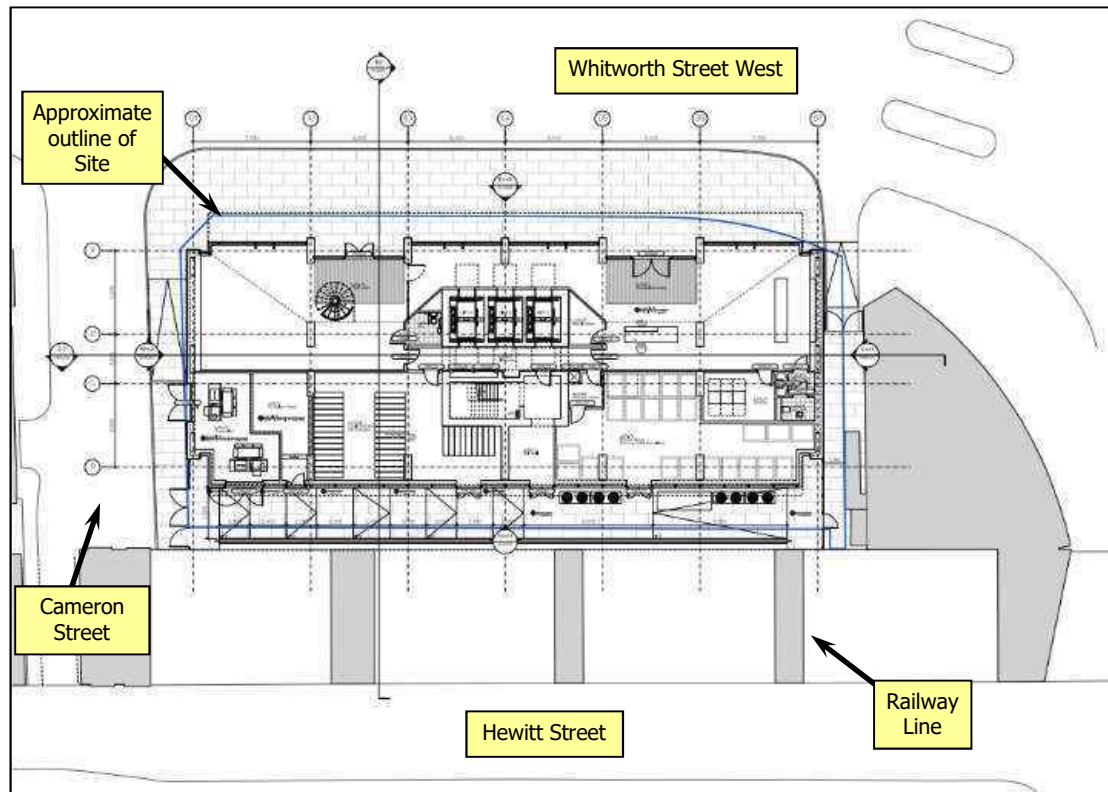


Figure 2: Proposed Site layout plan

5.0 INTRUSIVE NOISE CRITERIA

The planning approval for the proposed development include planning conditions relating to intrusive noise due to external noise sources, as described below.

Planning condition 21 of the planning permission ref:111003/FO/2016/C1, as amended by 129701/NMC/2021, states:

- *'Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from the nearby road and rail network shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied. Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary. The internal noise criterion are as follows:*

<i>Bedrooms (night time - 23.00 - 07.00)</i>	<i>30 dB LAeq (individual noise events should not normally exceed 45 dB L_{Amax} by more than 15 times)</i>
<i>Living Rooms (daytime - 07.00 - 23.00)</i>	<i>35 dB LAeq</i>
<i>Gardens and terraces (daytime)</i>	<i>55 dB LAeq</i>

Additionally, as there are other sources of noise situated close to the site which require consideration, such as the nearby licensed premises collectively known as 'Deansgate Locks' other noise requirements will need to be achieved. For entertainment noise the sound insulation scheme shall be designed to achieve LAeq (entertainment noise) levels to be controlled to 10 dB below the internal LA90 (without entertainment noise), and not to Occupy the Development until the scheme has been completed in accordance with the approved details

Reason: To secure a reduction in noise from traffic or other sources in order to protect future residents from noise disturbance.'

Music noise design criterion

Extant planning condition 21 requires that entertainment noise within apartments due to noise egress from the nearby licensed premises (when measured as an 'LAeq' noise level) must be 10dB below the background noise level in apartments in the absence of entertainment noise (measured as an LA90 noise level).

However, it has been confirmed by Manchester City Council (email dated 12 April 2022 from Laura Miller of Manchester City Council to Matt Fisher of Fisher Acoustics Ltd) that compliance with the octave band noise levels identified in Section 3.6.1.2 'Entertainment Venues' of 'Planning & Noise, Technical Guidance', published by Manchester City Council would be acceptable in lieu of the compliance with the entertainment noise criterion of extant planning condition 21.

In particular, Section 3.6.1.2 of 'Planning & Noise, Technical Guidance', states that a criterion that may be applicable for new residential developments that are structurally separate from an existing entertainment venue in order for music noise to be 'inaudible/virtually inaudible' in apartments is as follows:

- 'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq), respectively'.

6.0 ENVIRONMENTAL NOISE SURVEY

In order to determine the prevailing ambient noise levels at the site, surveys of the existing noise environment at the proposed site has been carried out by Fisher Acoustics over the following periods:

- 14:20 Wednesday 15 December 2021 to 11:20 Thursday 16 December 2021
- 16:00 Saturday 18 December 2021 to 10:40 Sunday 19 December 2021

The measurement locations used for the surveys are identified in Figure 3 and are representative of the positions of the façades of the proposed residential building. The measured noise levels can therefore be used to assess the expected internal noise levels within the proposed building.

The noise measurement locations were as follows:

- Location 1: 4.2 metres from the train viaduct and 21 metres from the site fence at the City Road Inn overlooking the railway line at a microphone height of 13.5 metres above site ground level,
- Location 2: 4.2 metres from the viaduct and 2.5 metres from the site fence at the City Road Inn, overlooking the railway line at a microphone height of 12 metres above site ground level
- Location 3: 5.2 metres from the kerb of Whitworth Street West, at a microphone height of 9 metres above site ground level, midway along the proposed site boundary.
- Location 4: 7.4 metres from the kerb of Whitworth Street West, at a microphone height of 12 metres above ground level, at the north-west corner of the proposed site boundary

Full survey details are given in Appendix A. Appendix A also contains a summary of the results obtained from the surveys.

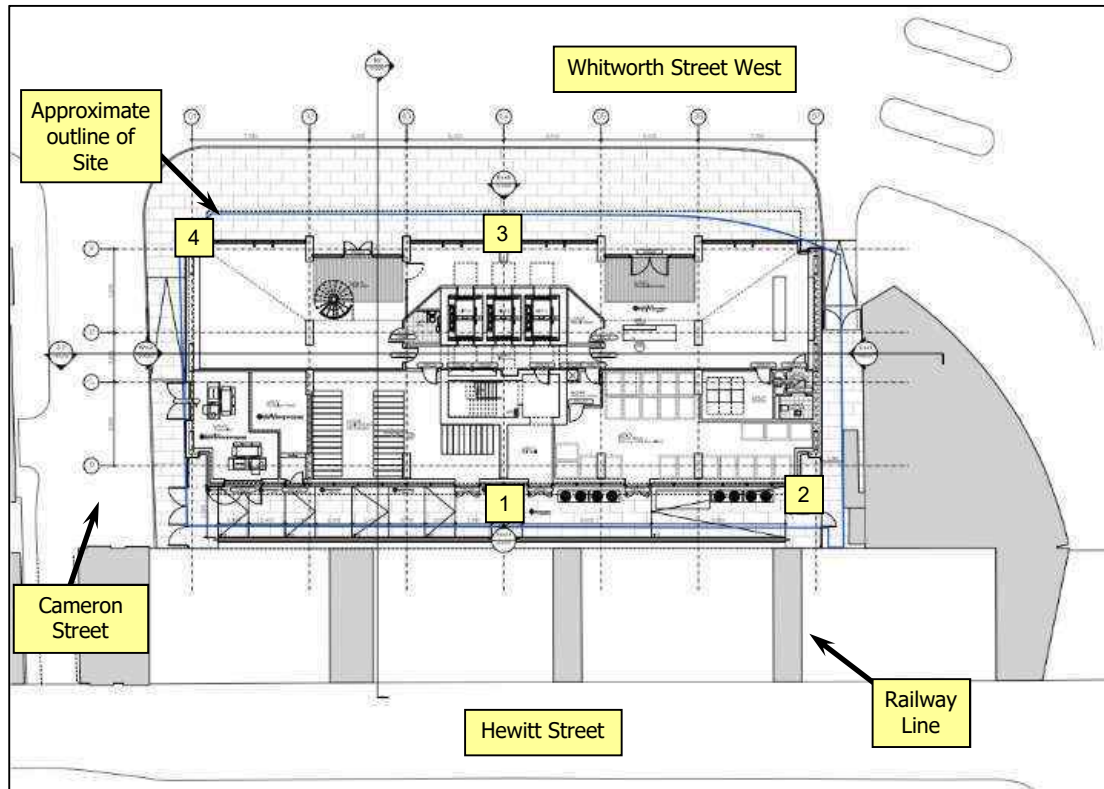


Figure 3: Noise survey measurement locations

The existing daytime and night time noise environment at the site is principally determined by vehicles on Whitworth Street West and by train movements on the adjacent rail viaduct. In addition, music noise egress from bars at Deansgate Locks caused elevated low-frequency noise levels at the site. During the night time noise survey on Saturday 18 December 2021, the entrance doors to the bars were generally only opened to allow the access and egress of patrons. This short-term, intermittent opening of doors for access and egress is in accordance with the premises licences for the bars at Deansgate Locks.

Typical maximum night time noise levels were generated by rail traffic on the viaduct and by road traffic on Whitworth Street West.

The broadband noise levels measured during the noise surveys are summarised in Table 1.

Measurement Location	Measured Noise Levels					
	Daytime (Defined as 7 am to 11 pm)			Night time (Defined as 11 pm to 7 am)		
	dB, LAeq	dB, L _{Amax}	dB LA ₉₀	dB, LAeq	dB, L _{Amax}	dB LA ₉₀
1 (15 Dec 2021)	71	62 to 97	55 to 74	69	53 to 111	49 to 72
1 (16 Dec 2021)	70	57 to 93	55 to 67	-	-	-
2 (15 Dec 2021)	69	62 to 96	54 to 74	67	51 to 107	49 to 73
2 (16 Dec 2021)	69	62 to 89	55 to 68	-	-	-
3 (18 Dec 2021)	68	63 to 102	56 to 69	67	58 to 101	51 to 67
3 (19 Dec 2021)	61	58 to 67	51 to 61	-	-	-
4 (18 Dec 2021)	68	65 to 103	56 to 67	66	57 to 101	51 to 67
4 (19 Dec 2021)	61	58 to 83	52 to 62	-	-	-

Table 1: Summary of measured environmental noise levels

The statistical noise levels ('L_{Amax}' and 'LA₉₀') given in Table 1 show the range of noise levels measured over the sample periods. The quoted average (LAeq) noise levels are the average noise levels measured over the full measurement periods in question at each measurement position.

Figure 4 shows the measured low frequency external noise levels measured at location 4. It can be seen that the 'Leq' average levels at 63 Hz and 125 Hz increased by approximately 5dB after approximately 22.00 hrs. This increase was as a consequence of low frequency music noise egress from the bars at Deansgate Locks.

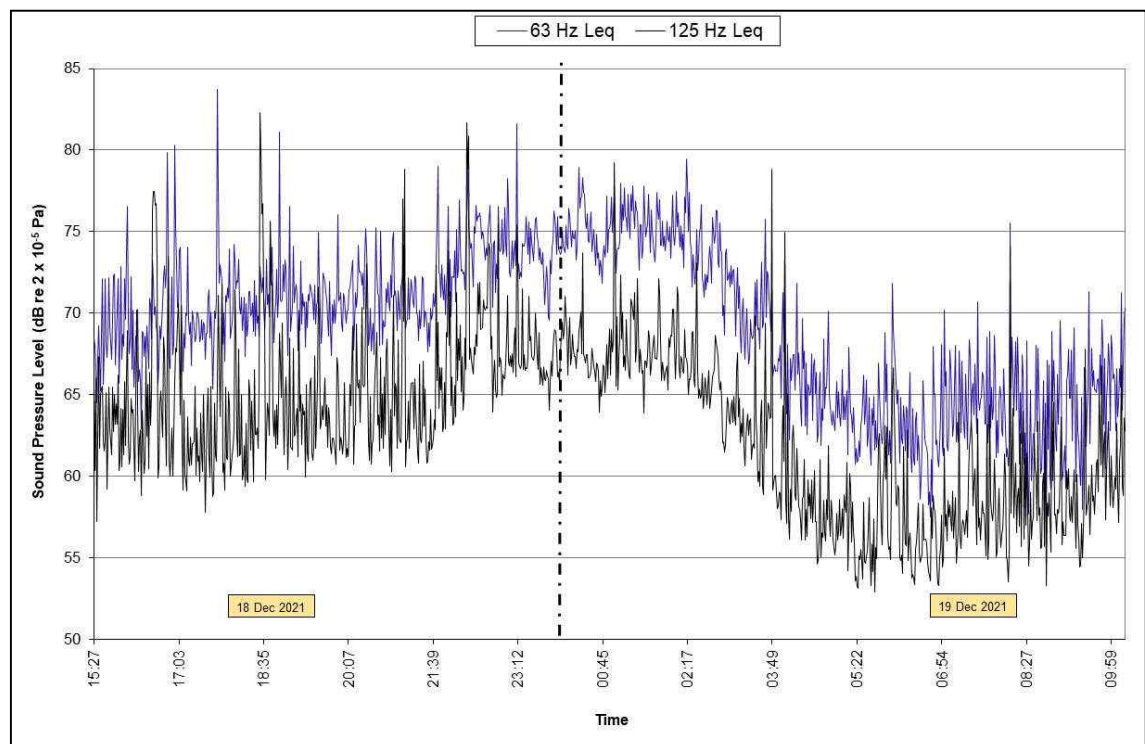


Figure 4: Measured low frequency 'Leq' noise levels at Position 4, Sat 18 Dec 2022 to Sun 19 Dec 2022

The results of the noise survey have been used to develop a 3D model of the site, from which the external noise levels across the facades of the proposed residential building have been calculated. The 3D model includes the buildings and structures around the proposed development site, including the train viaduct and the arches at Deansgate Locks.

Figure 5 shows the calculated free-field noise levels incident upon the facades, viewed from the north west.

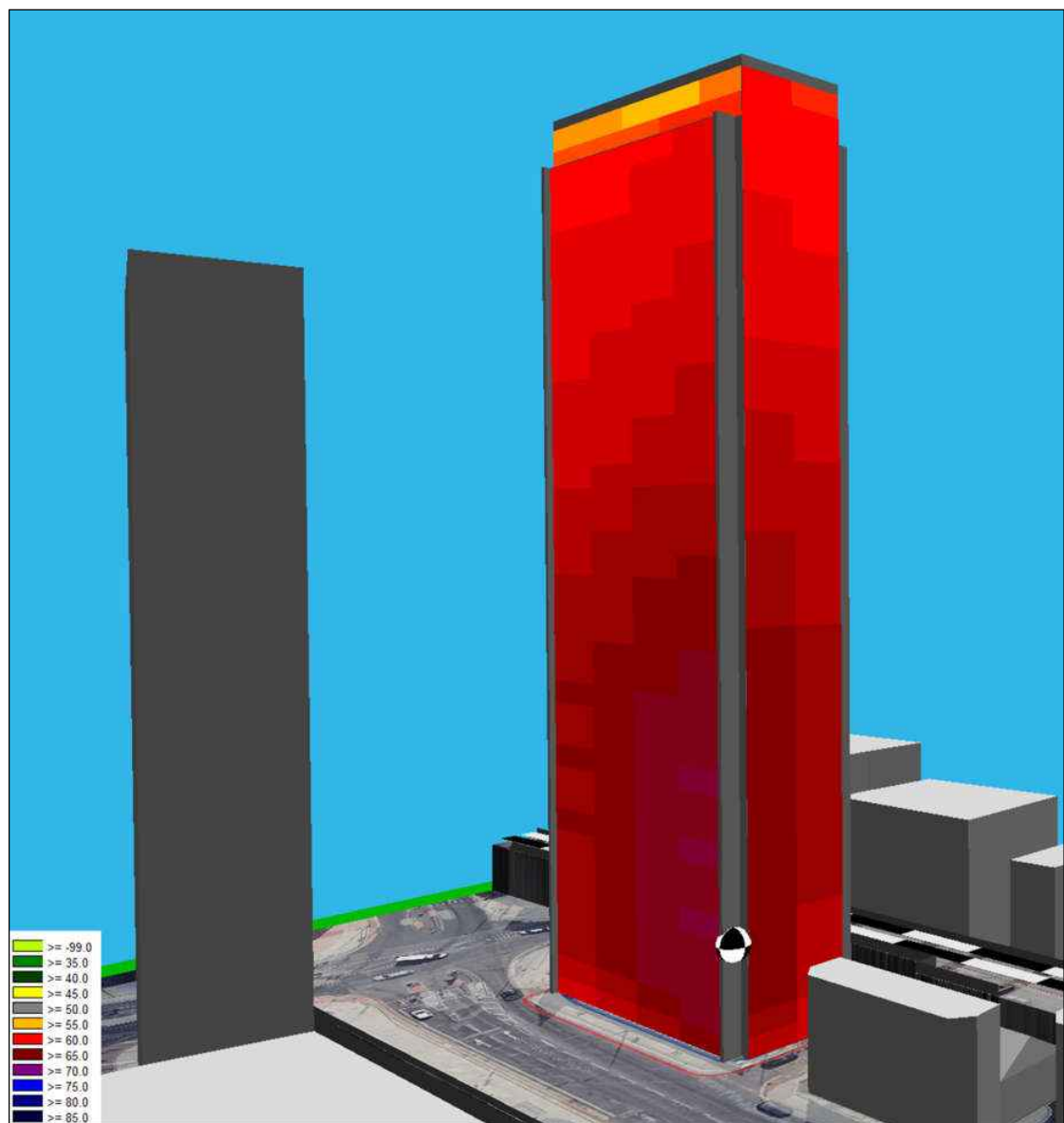


Figure 5: 3D model of development proposals & predicted incident noise levels – north & west facades

Figure 6 shows the calculated free-field noise levels incident upon the facades, viewed from the south west.

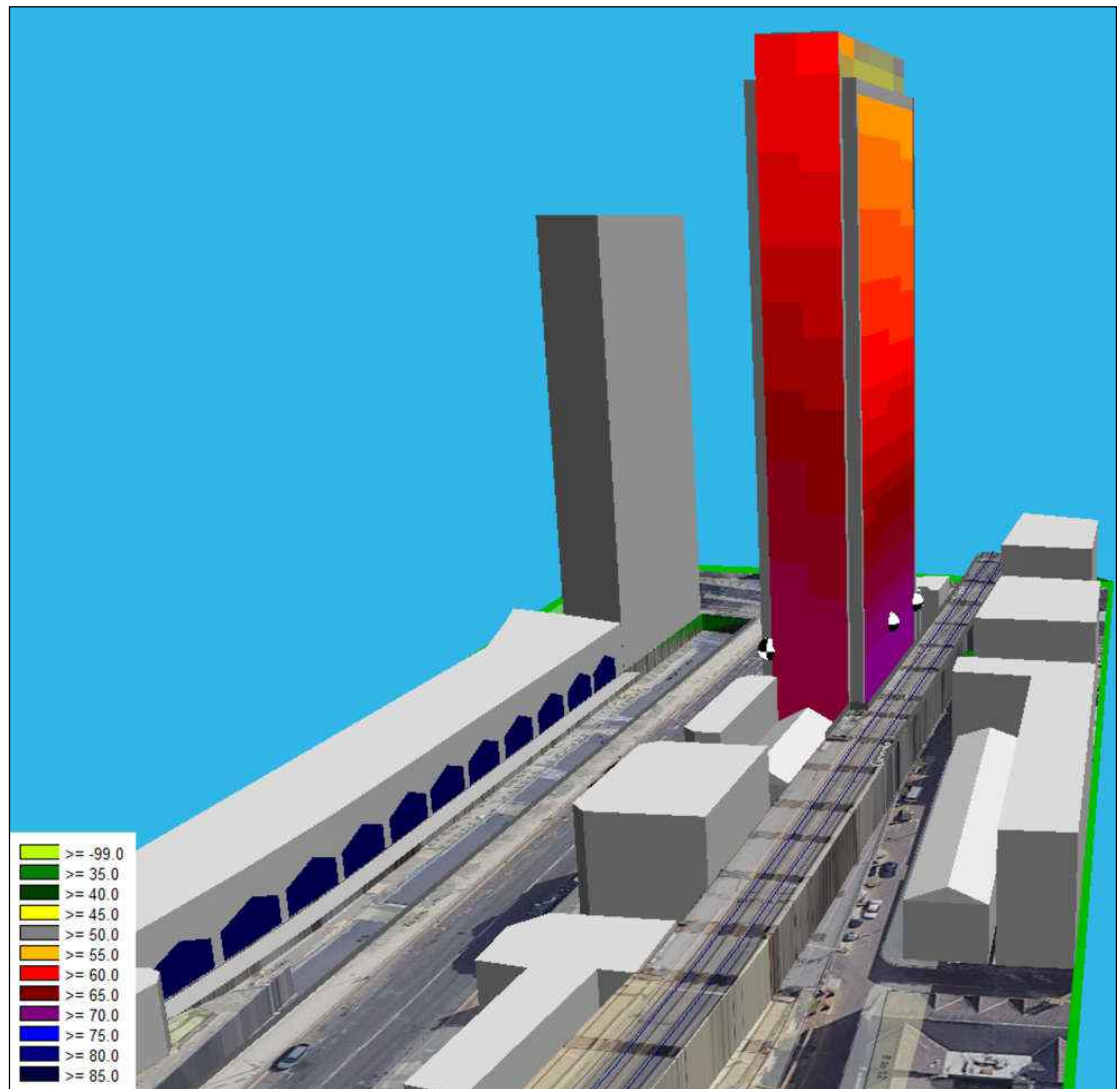


Figure 6: 3D model of development proposals & predicted incident noise levels – south & west facades

Figure 7 shows the calculated daytime free-field L_{Aeq} train noise levels incident upon the facades, viewed from the south west.

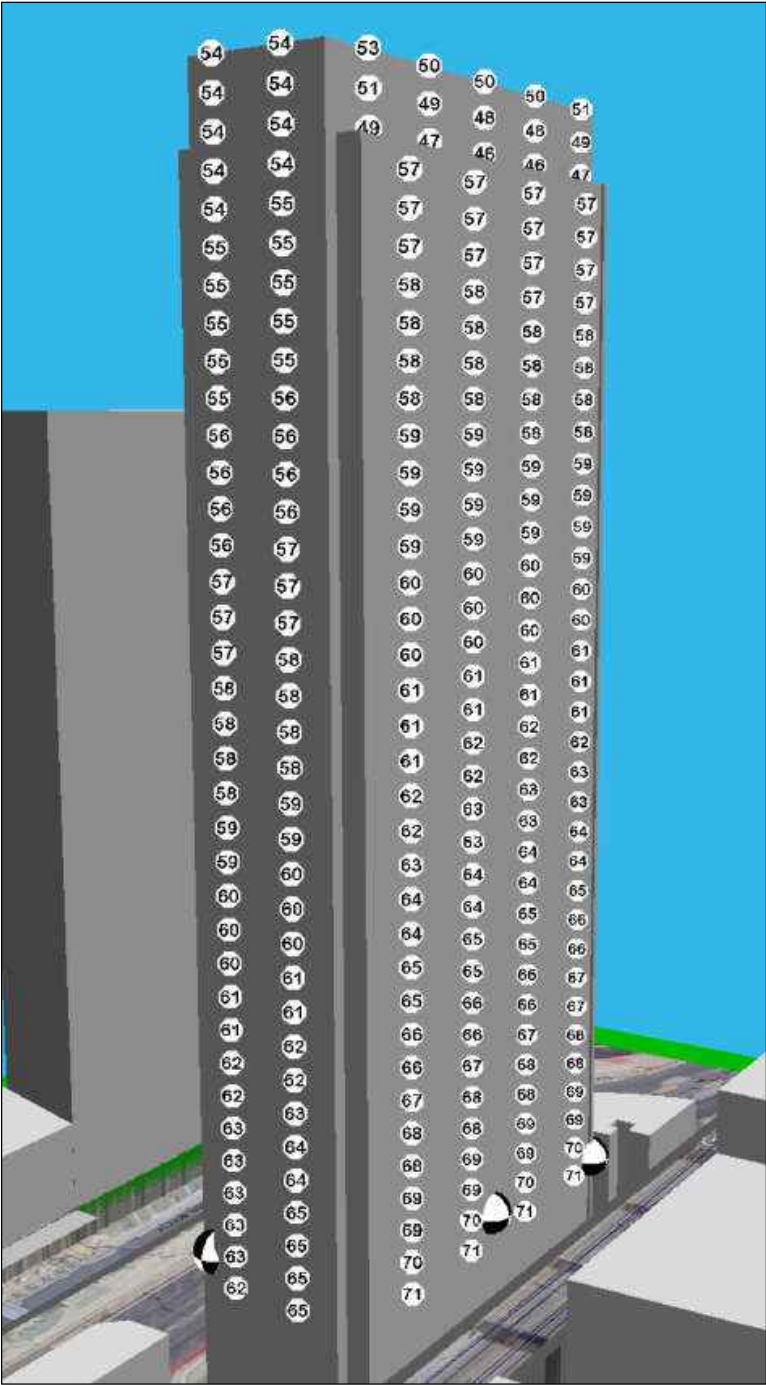


Figure 7: Calculated daytime noise level (L_{Aeq}) due to trains – south and west façades

Figure 8 shows the calculated night-time free-field LAeq train noise levels incident upon the facades, viewed from the south west.

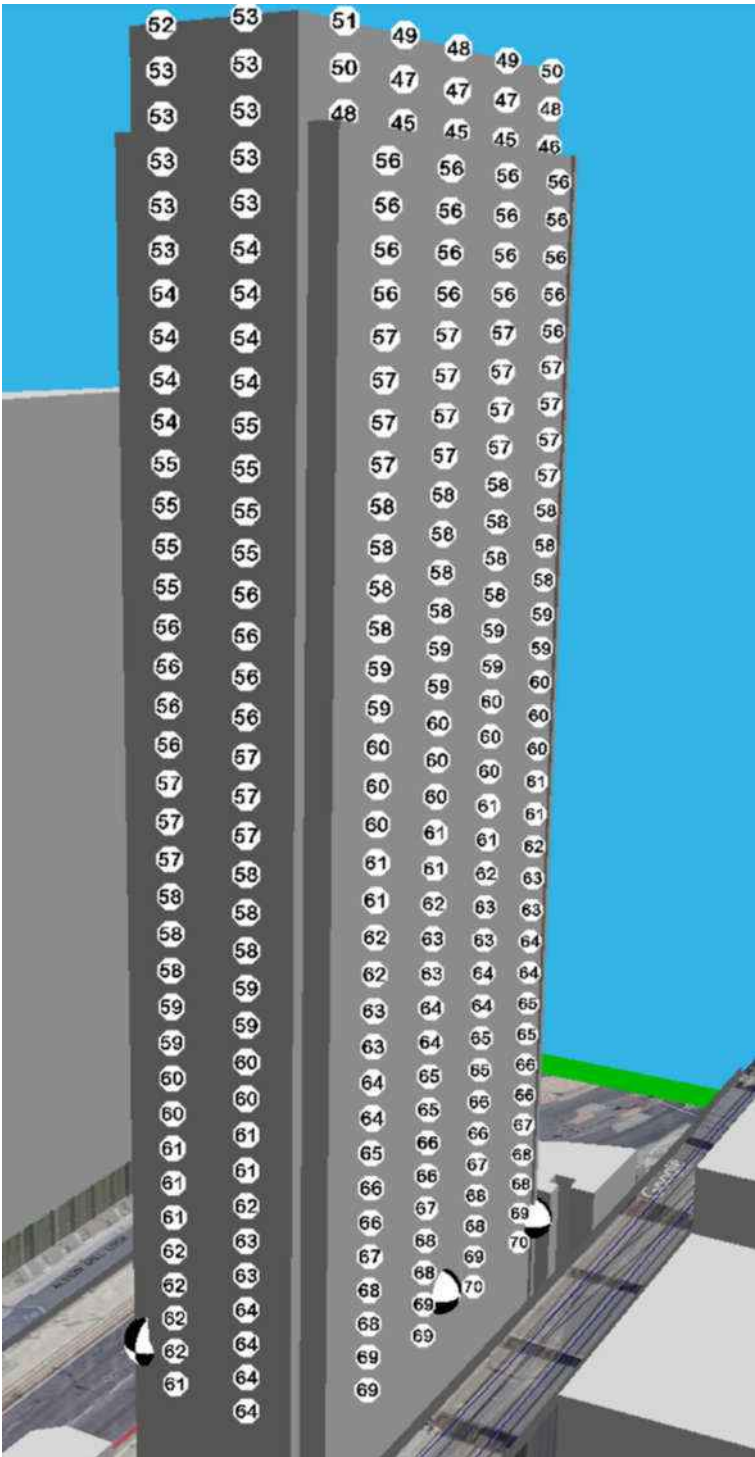


Figure 8: Calculated night time noise level (LAeq) due to trains – south and west façades

Figure 9 shows the calculated night-time free-field LAeq noise levels incident upon the facades due to music noise breakout from the bars at Deansgate Locks, viewed from the north east.

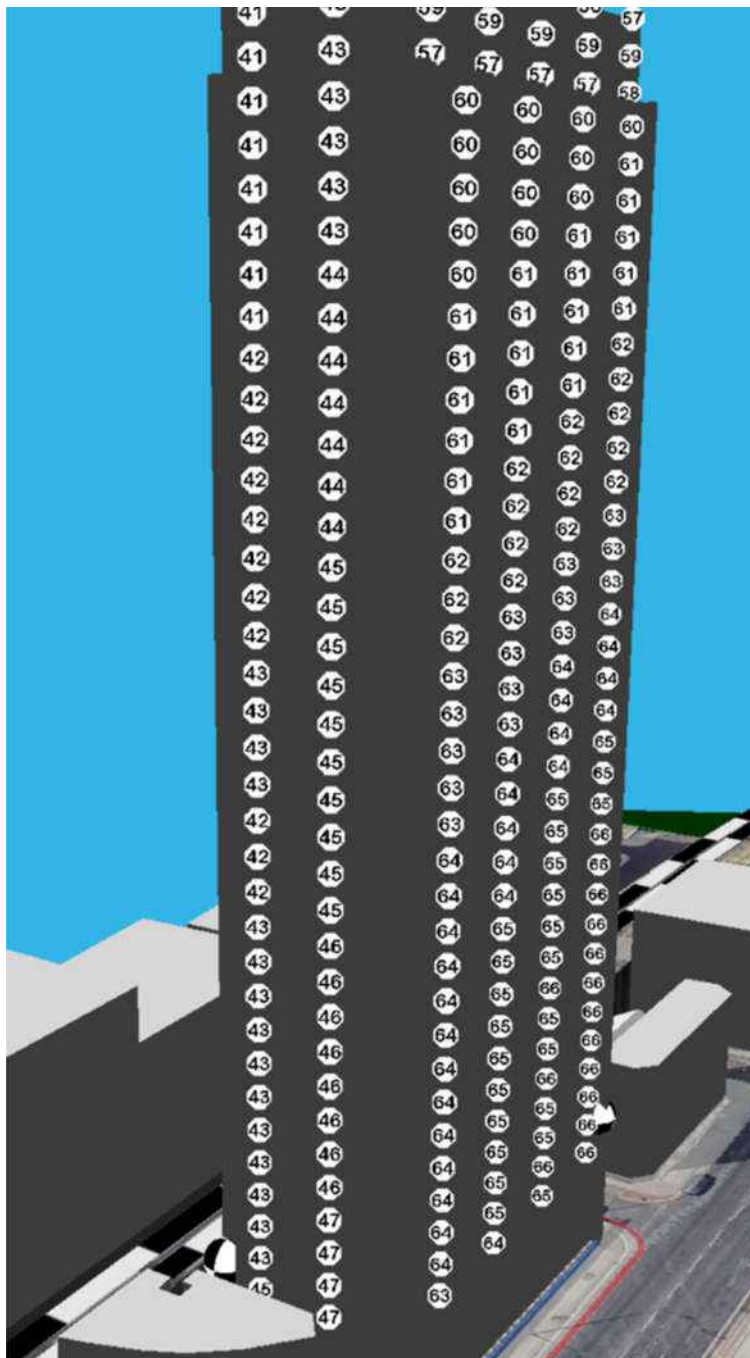


Figure 9: Calculated night time noise level (LAeq) due to bars– north and east façades

Figure 10 shows the calculated night-time free-field LAeq noise levels incident upon the facades due to music noise breakout from the bars at Deansgate Locks, viewed from the south west.

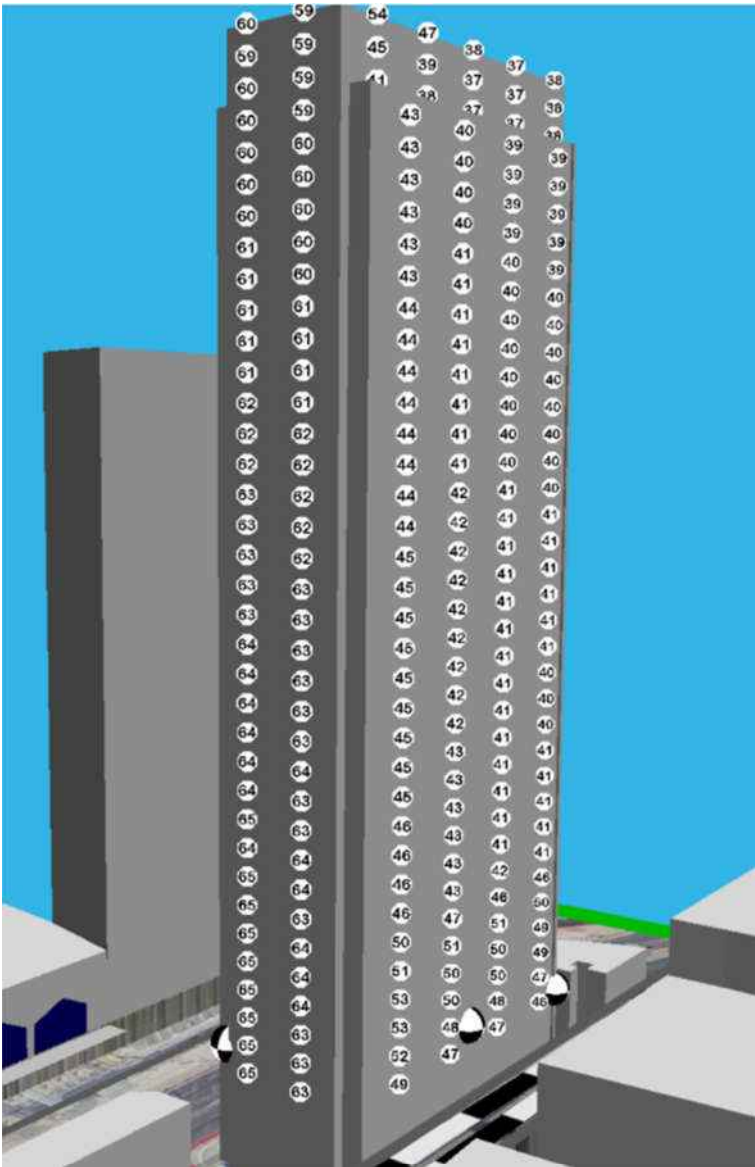


Figure 10: Calculated night time noise level (LAeq) due to bars– south and west façades

7.0 NOISE INGRESS

By taking into account the measured and calculated levels of noise at the façades of the proposed development, the areas of façade elements and the likely reverberation time of the apartment rooms, the required sound insulation performance of the facade elements to achieve the target internal noise criteria can be determined.

Design recommendations

Calculations of noise ingress have been carried out to determine the façade specifications to achieve the internal noise criteria detailed in Section 5 of this report. The calculations are based upon the glazing areas and room sizes and layouts identified on drawings issued to Fisher Acoustics on 13 July 2022.

CURTAIN WALL VISION PANELS

It has been determined that a range of acoustic specifications for the vision panels to the proposed habitable rooms will be required to achieve the recommended internal noise levels. Figures 11 to 14 identify the locations of the various recommended specifications. The vision panel acoustic specifications are detailed below.

Table 2 identifies the minimum recommended sound reduction index of the vision panel specifications referred in Figures 11 to 14. The recommended performance values in Table 2 relate to the composite performance of the glazing and the curtain wall frames and seals.

Vision panel type	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Type A	35	44	48	55	55	58	63
Type B	28	31	40	44	45	48	52
Type C	28	29	36	43	44	46	50
Type D	28	28	36	36	39	45	50

Table 2: Minimum Recommended Sound Reduction Index of vision panels, including frame

Examples of the glass thicknesses and type that are likely to be required to allow compliance with the above acoustic performance values, based on a triple glazed unit to achieve thermal requirements, are as follows:

- Type A: 16.8mm acoustic laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm acoustic laminate / secondary glazing of 14.8mm acoustic laminate spaced a minimum of 200 mm from the primary unit. The secondary glazing frame must be supported independently of the primary vision panel frame.
- Type B: 16.8mm acoustic laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm acoustic laminate
- Type C: 16.8mm acoustic laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm laminate
- Type D: 16.8mm laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm laminate

Other considerations may require that, in complying with the performance values given in Table 2, glazing thickness and cavity sizes differ from the examples given above.

Given the very high performance requirements for the vision panels, it is considered to be imperative that the curtain wall sub-contractor conducts laboratory testing to demonstrate that the proposed glazing and framing configurations achieve the acoustic requirements identified above.

It should be noted that, given the above specifications to Living Rooms, the calculated maximum noise levels due to train pass-bys are expected to lie between 50dB LAmax and 60dB LAmax in Living Rooms at the lower levels of the south elevation. An 'LAmax' criterion is not stipulated in published guidelines for living rooms. The above noise levels are therefore provided for information only. As a subjective guide, noise maxima in Living Rooms due to train pass-bys are expected to subjectively sound twice as loud as noise maxima in bedrooms due to train pass-bys.

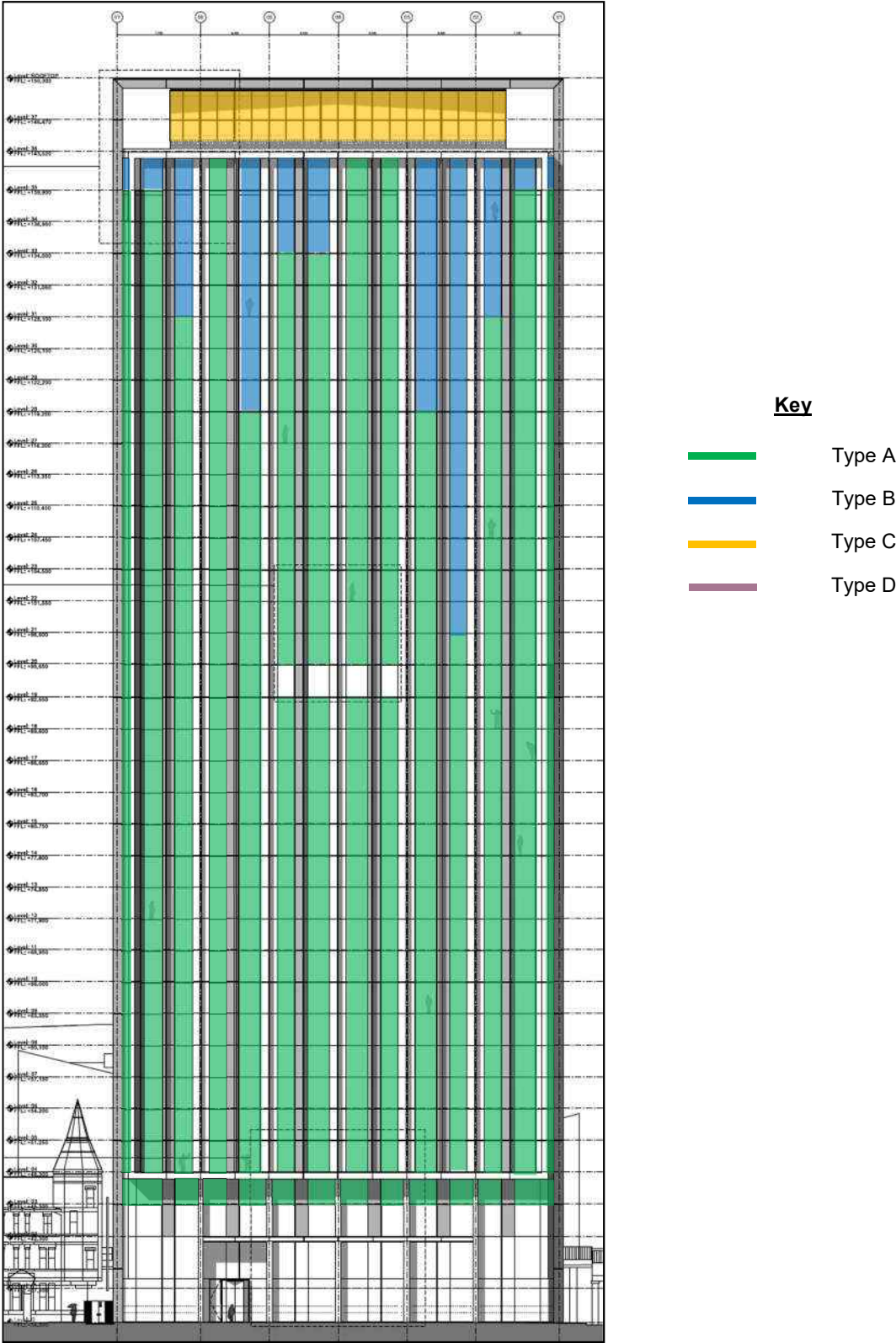


Figure 11: Glass specification location plan, Whitworth Street elevation (North Elevation)

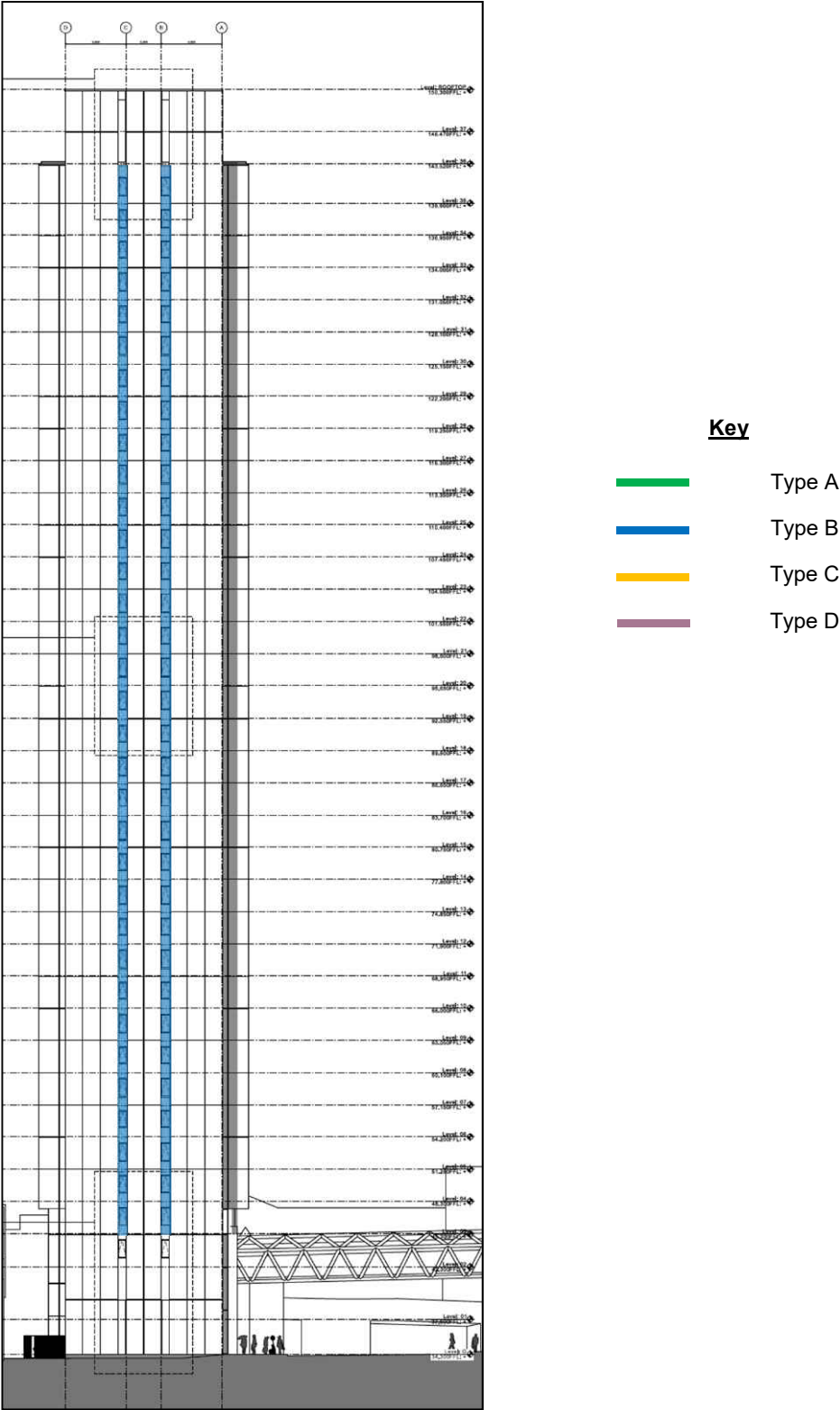


Figure 12: Glass specification location plan, East Elevation

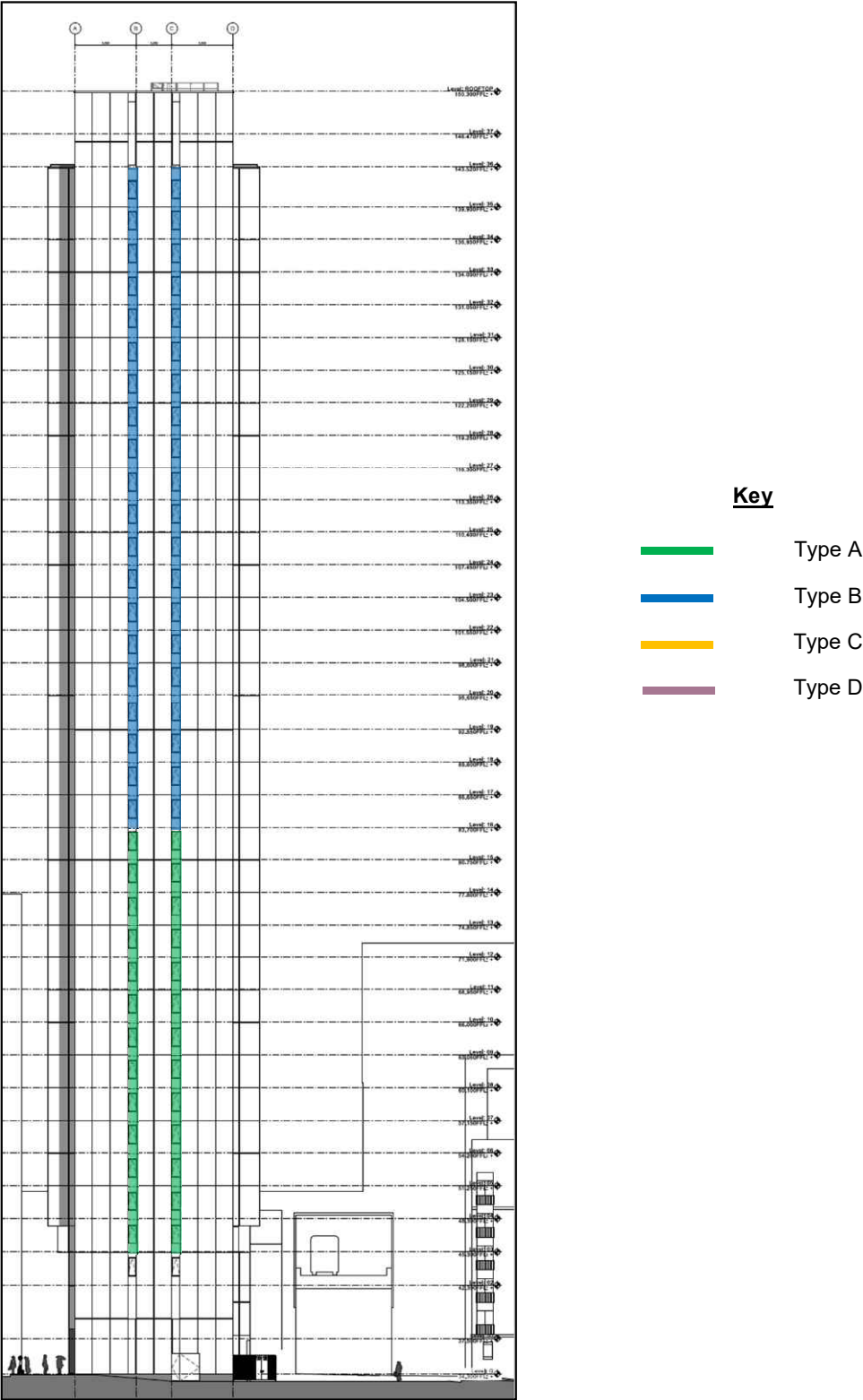


Figure 13: Glass specification location plan, West Elevation

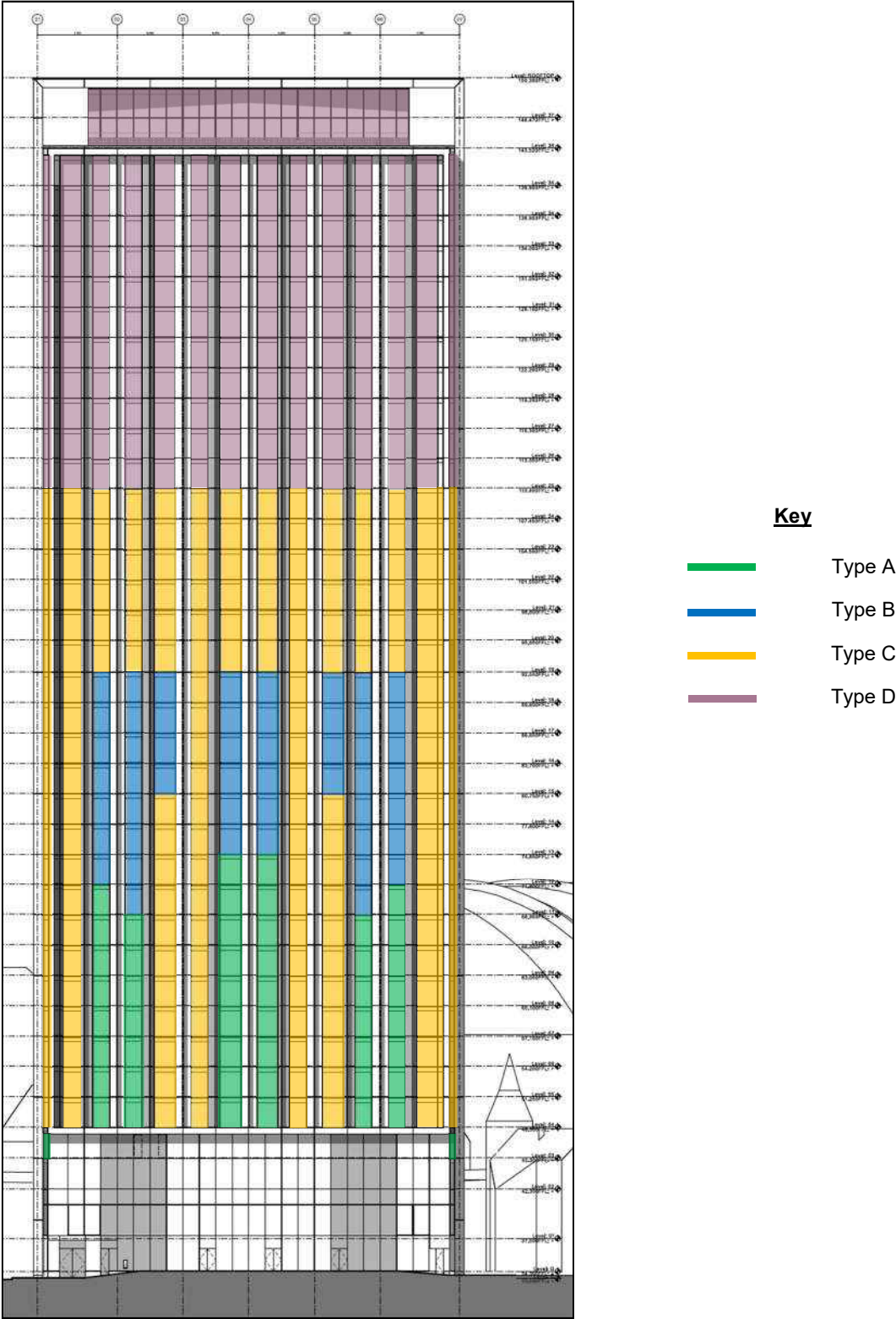


Figure 14: Glass specification location plan, South Elevation

CURTAIN WALL PURGE PANELS

Table 3 identifies the minimum recommended sound reduction index of the purge panels. Figures 15 and 16 identify the recommended locations of the purge panel specifications. The recommended performance values in Table 3 relate to the composite performance of the purge panel and its associated frame and seals.

Purge Panel Type	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Type i	36	44	45	45	45	53	53
Type ii	25	35	43	45	45	53	53

Table 3: Minimum Recommended Sound Reduction Index of purge panels, including frame

Given the very high performance requirements for the purge panels, it is considered to be imperative that the curtain wall sub-contractor conducts laboratory testing to demonstrate that the proposed panel and framing configurations achieve the acoustic requirements identified above.

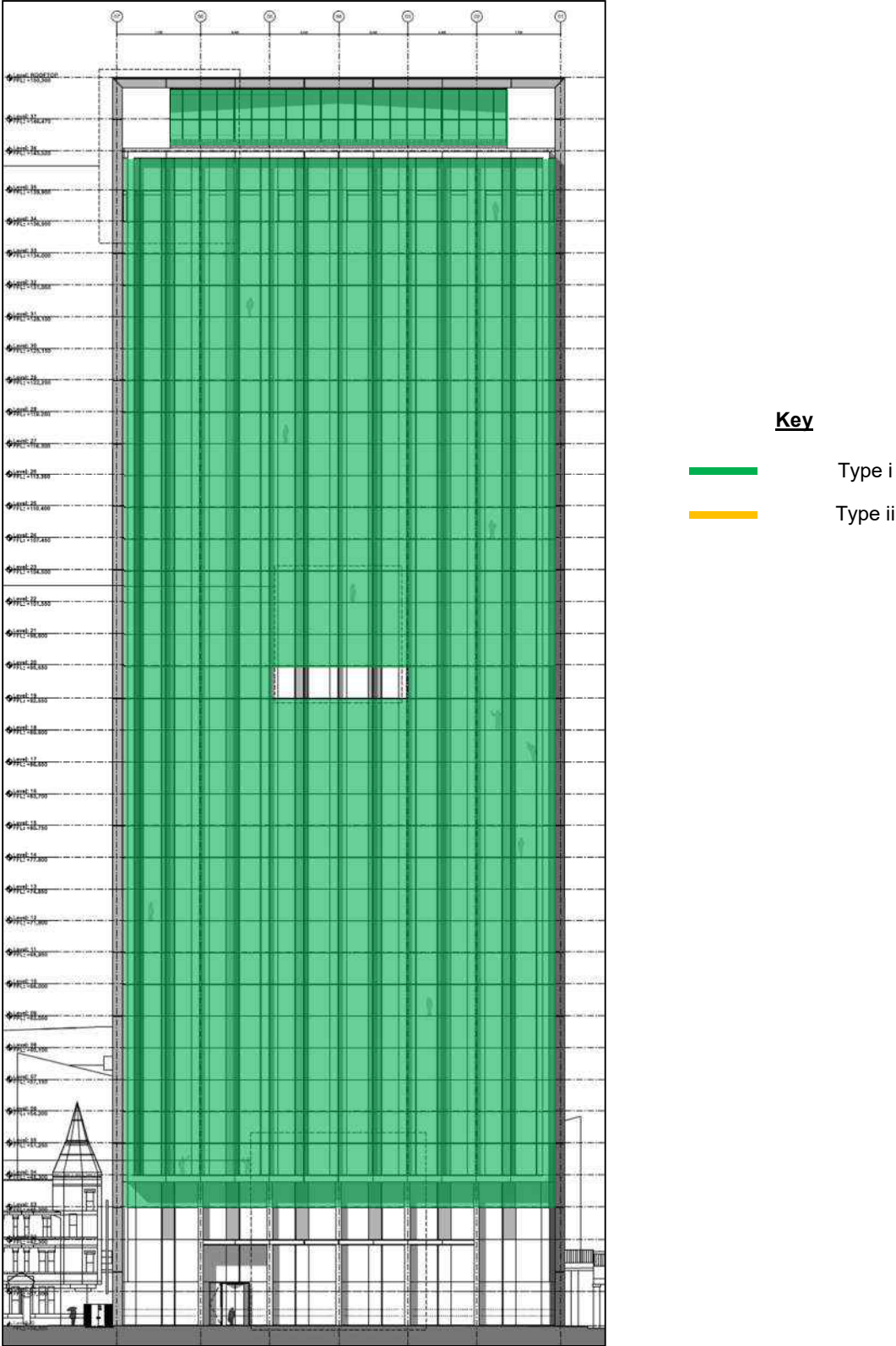


Figure 15: Purge Panel specification location plan, Whitworth Street elevation (North Elevation)

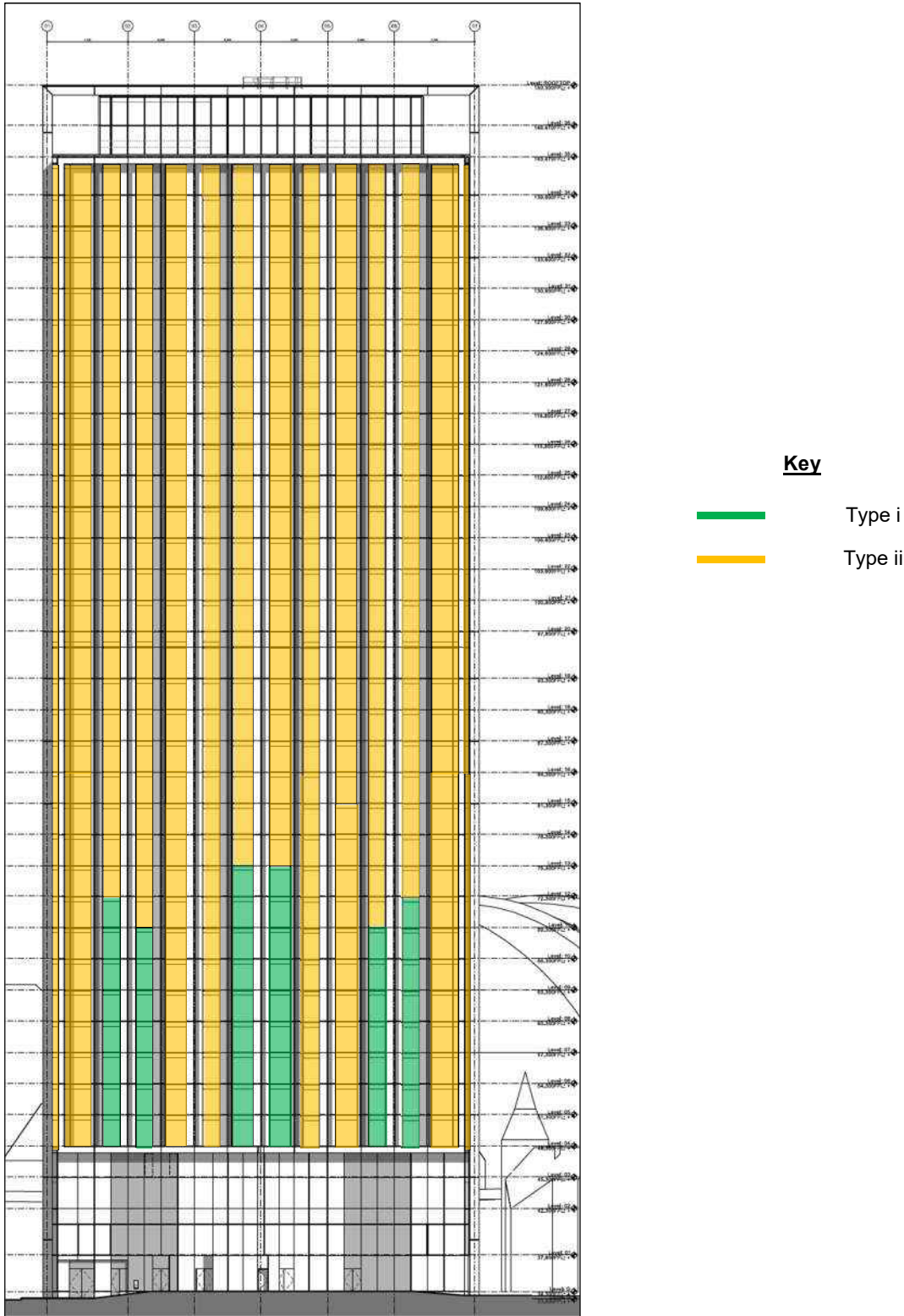


Figure 16: Purge Panel specification location plan, South Elevation

FIXED NON-VISION PANELS

Table 4 identifies the minimum recommended sound reduction index of the fixed non-vision areas of the curtain wall. Figures 17 to 20 identify the recommended locations of the specifications. The recommended performance values in Table 4 relate to the composite performance of the fixed non-vision areas, the associated frame and internal drylining.

ELEMENT	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Curtain wall non-vision panel - NG1	36	44	45	45	45	53	53
Curtain wall non-vision panel - NG	25	35	43	45	45	53	53
Brick Slip - BS	38	50	60	65	65	65	65

Table 4: Minimum Recommended Sound Reduction Index of external wall construction

Given the very high performance requirements for the fixed non-vision panels, it is considered to be imperative that the curtain wall sub-contractor conducts laboratory testing to demonstrate that the proposed panels, framing and associated drylining achieve the acoustic requirements identified above.

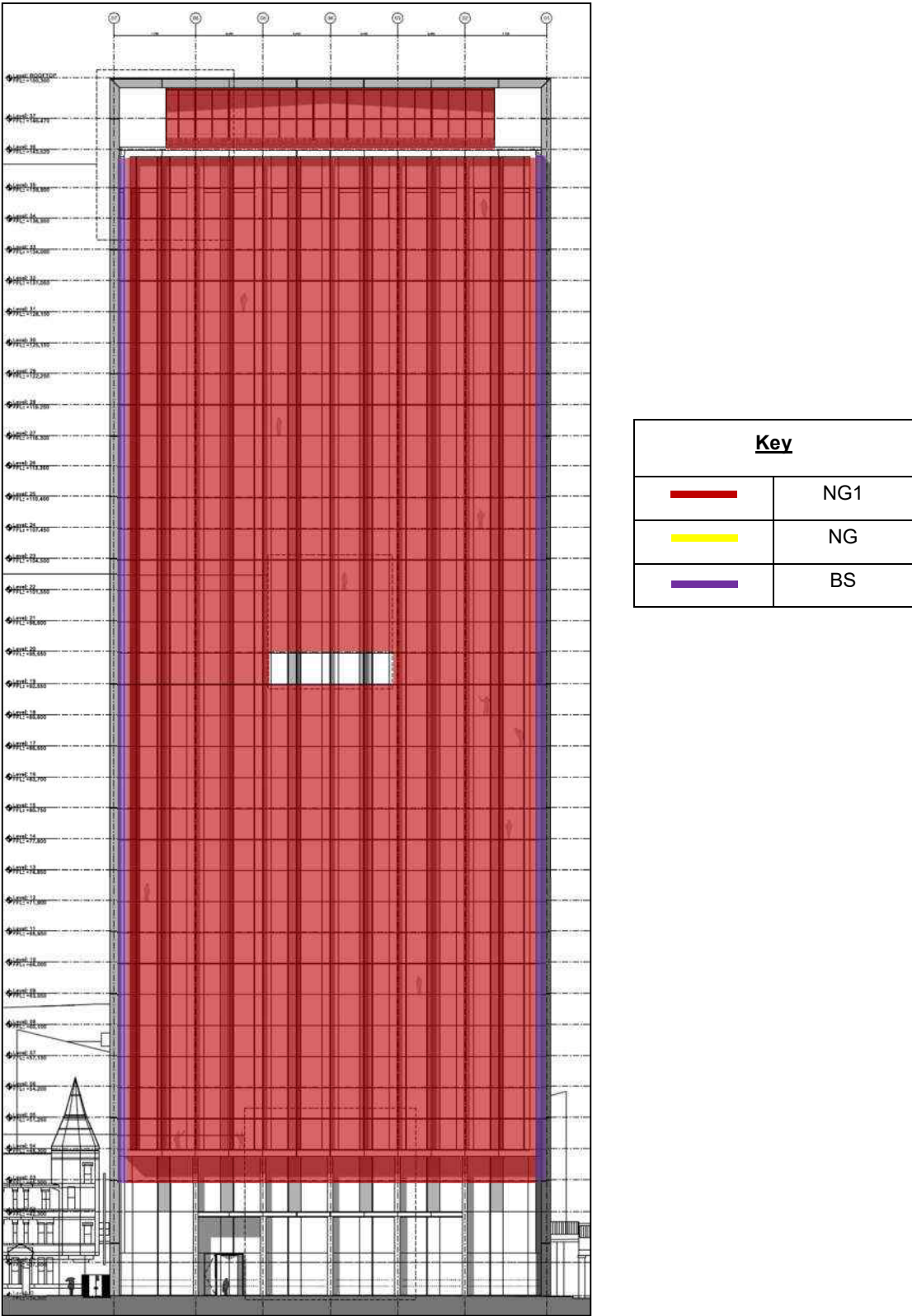


Figure 17: Wall specification location plan, Whitworth Street elevation (North Elevation)

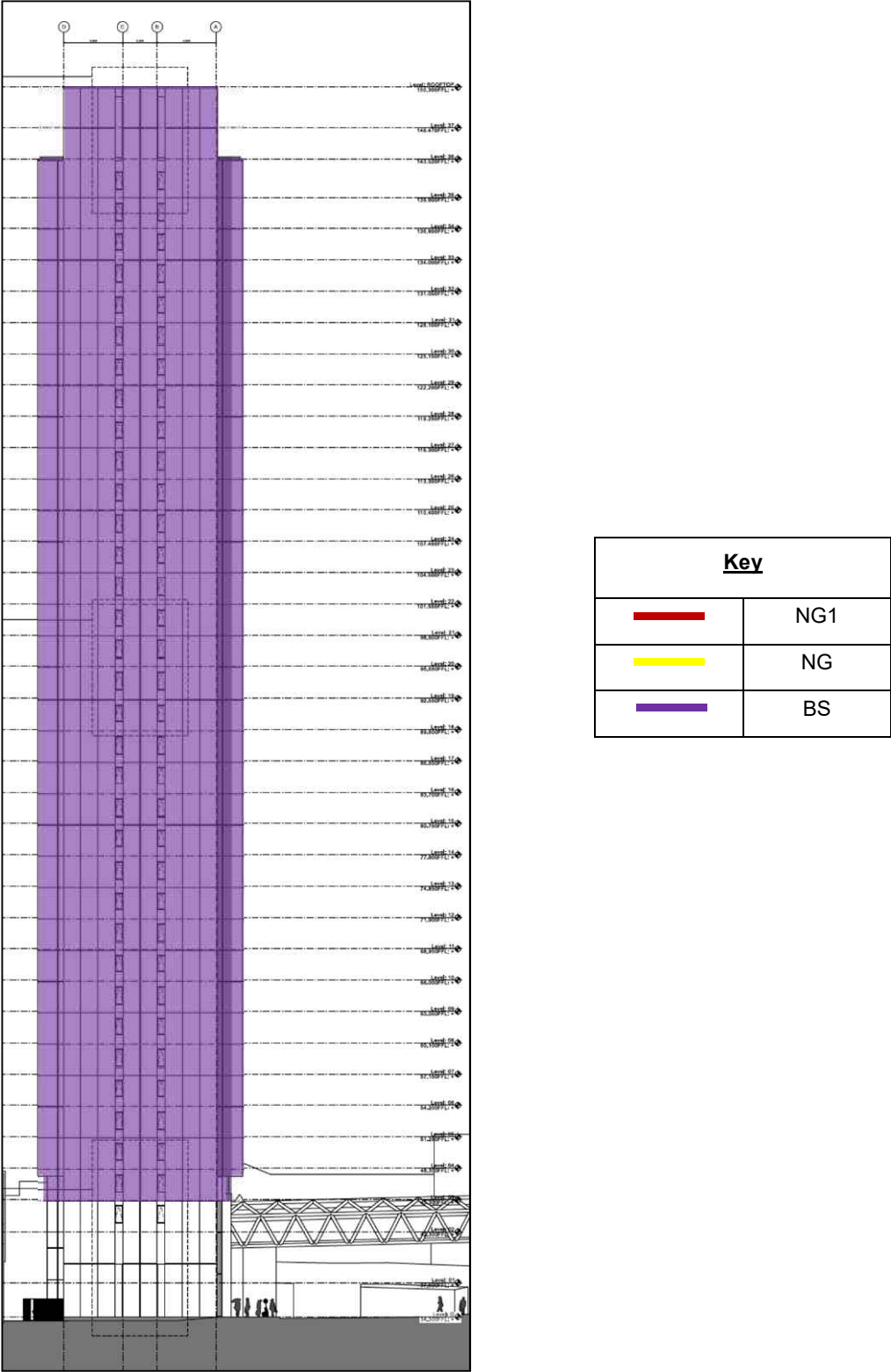


Figure 18: Wall specification location plan, East Elevation

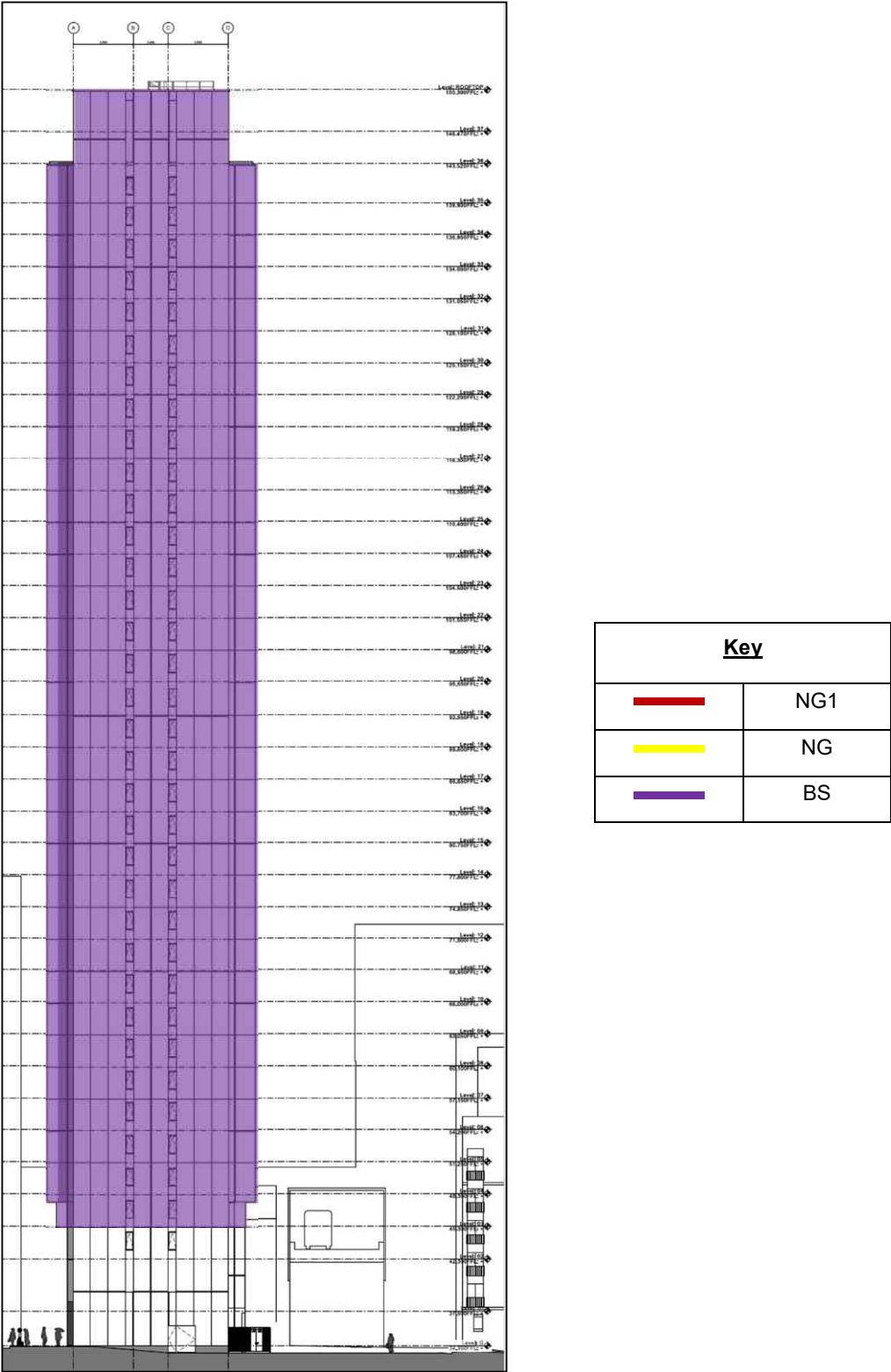


Figure 19: Wall specification location plan, West Elevation

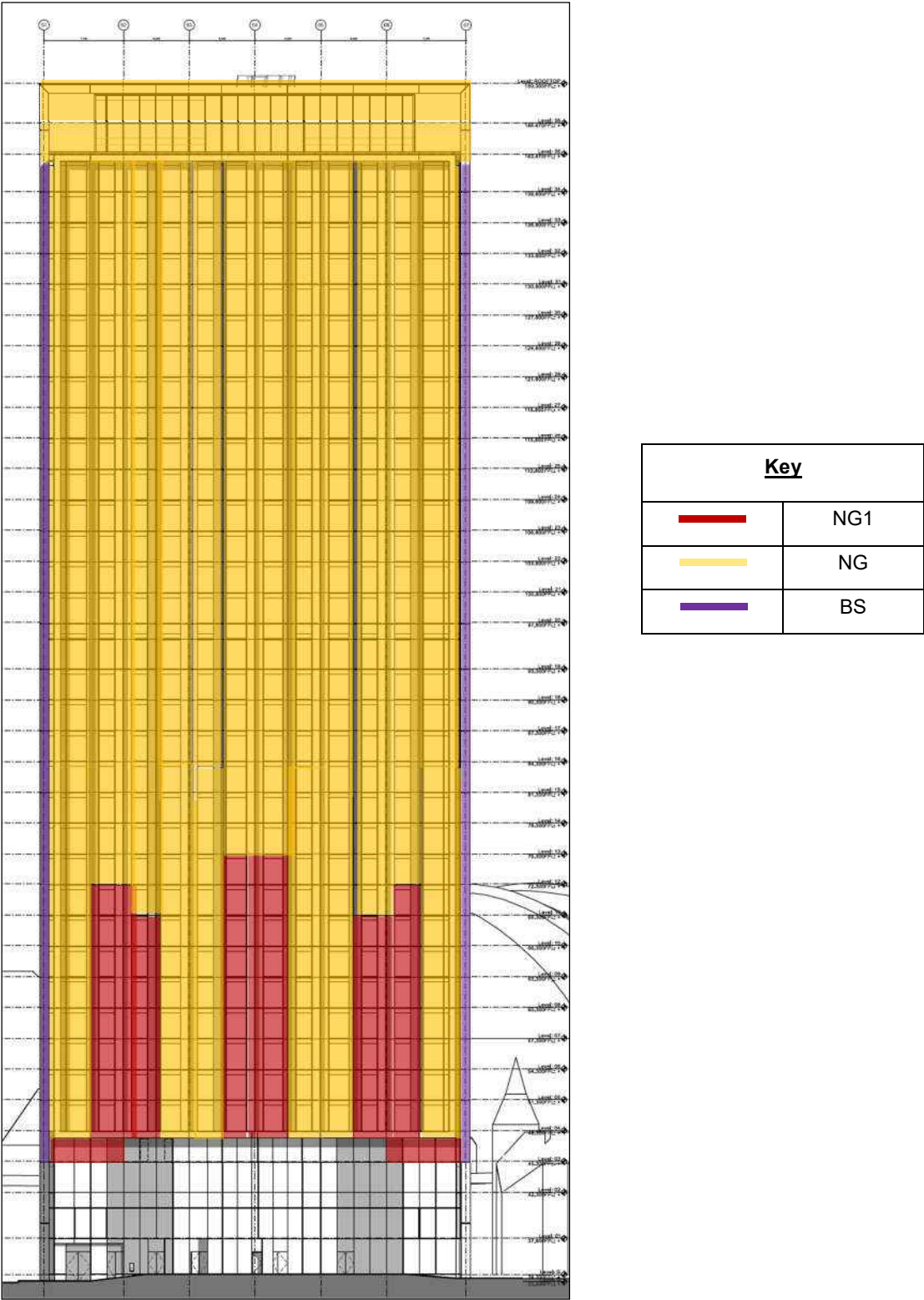


Figure 20: Wall specification location plan, South Elevation

Roof

The principle acoustic elements of the proposed roof of the development are a concrete slab and a ceiling that comprises a single layer of 12.5 mm wallboard fixed to a suspended metal frame. The expected minimum weighted sound reduction index of the roof construction is 60dB Rw. This performance is fully commensurate with the achievement of the target internal noise levels within the proposed serviced apartments.

External noise ingress via MVHR ductwork

It is expected that in-line ductwork silencers would need to be introduced to the proposed apartment MVHR systems to reduce external noise ingress via the atmosphere terminations of the MVHR systems (i.e. the intake and exhaust of the MVHR fans) and to achieve the recommended internal noise. In addition, it is expected that any ductwork between the façade and in-duct silencers would need to be acoustically lagged with a proprietary heavy duct lagging with a minimum mass of 10kg/m².

As the detailed design progresses, the acoustic requirements of the in-line ductwork silencers and duct lagging will need to be assessed.

Conclusion

Compliance with the recommended sound insulation performances of the façade elements is expected to allow full compliance with the daytime and night time 'average' noise level criteria identified in Section 5.0 above in relation to noise from the road and rail network.

Given the recommended sound insulation performances given above for the façade, compliance with the recommendations of the World Health Organisation in relation to maximum (L_{Amax}) internal noise events is expected, albeit with no comfort margin. In particular, if full compliance with the recommended sound insulation performances for the curtain wall elements is achieved, then based on the measured noise survey data, there would be fifteen train pass-by events between 11pm and 7am that generated an internal noise level greater than 45dB L_{Amax} in the bedrooms on the lower levels of the south elevation. These fifteen 'excess' events are calculated to generate internal noise levels of up to 50dB L_{Amax}.

Given full compliance with the recommended sound insulation performances for the façade elements, the expected noise levels in apartments comply with the recommendations of Section 3.6.1.2 'Entertainment Venues' of 'Planning & Noise, Technical Guidance', published by Manchester City Council, in that music noise levels in the 63Hz and 125Hz octave centre frequency bands are not expected to exceed 47dB (+/- 1dB) (Leq) and 41dB (Leq), respectively in habitable rooms.

It should be noted that if noise levels of 47 dB Leq and 41 dB Leq in the 63Hz and 125Hz octave centre frequency bands respectively are achieved, low level music noise is expected to be just audible in apartment rooms.

8.0 TRAIN VIBRATION

'Feelable' Vibration

BS6472-1: 2008 'Guide to evaluation of human exposure to vibration in buildings - part 1: Vibration sources other than blasting' provides guidance on typically acceptable limits for vibration within residential and office buildings during the day and night. This document provides guidance on typically acceptable limits for perceived 'feelable' vibration, such that annoyance is likely to be avoided.

Table 5 gives the applicable criteria from BS6472-1: 2008. The applicable assessment criterion is the 'Vibration Dose Value' (VDV). Values of VDV within certain ranges indicate the likelihood or otherwise of adverse comment from occupants of the building due to feelable vibration.

	Low Probability of Adverse Comment $\text{ms}^{-1.75}$	Adverse Comment Possible $\text{ms}^{-1.75}$	Adverse Comment Probable $\text{ms}^{-1.75}$
Daytime (07:00 - 23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Night Time (23:00 - 07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.6

Table 5: Vibration Dose Value ranges which might result in various probabilities of adverse comment within residential buildings

Measurements of vibration have been carried out in order to determine the potential for vibration generated by train movements to cause adverse comment within the buildings of the proposed Development.

Measurements of groundborne vibration were carried out at one external location, 'V1', shown in Figure 21.

The measurements have been conducted in accordance with the guidance given in 'Measurement and Assessment of Groundborne Noise and Vibration' published by The Association of Noise Consultants.

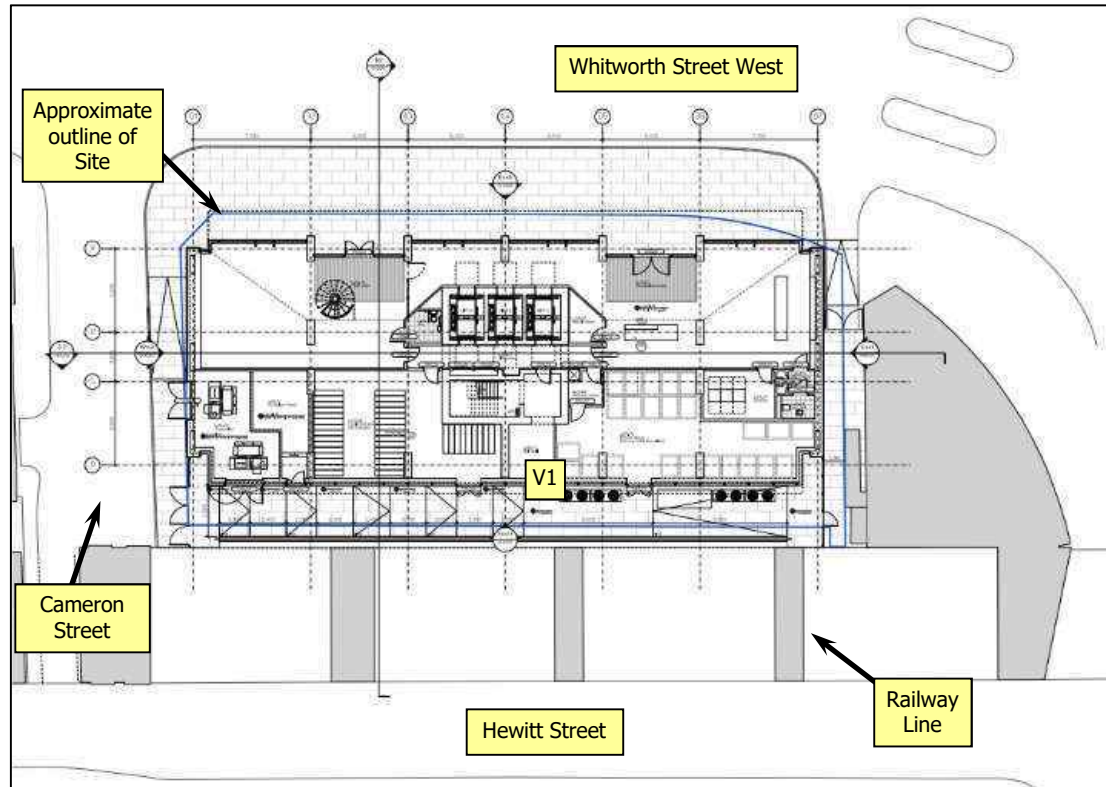


Figure 21: Vibration survey measurement location

Analysis of the measured vibration levels indicates that Vibration Dose Values at the base of the proposed Development is $0.11 \text{ ms}^{-1.75}$ during the day and $0.08 \text{ ms}^{-1.75}$ during the night. With reference to BS8472: 2008, these results indicate a 'low probability of adverse comment' due to feelable vibration in the proposed closest apartments to the rail viaducts.

The result indicates that no measures to mitigate levels of structureborne vibration should be required to maintain residential amenity.

Structureborne noise due to train movements

Groundborne vibration can generate audible structureborne noise within a building, which could cause adverse impact. The results of the groundborne vibration measurements have therefore been used to calculate the potential levels of structureborne noise within the proposed building.

The predicted typical maximum structureborne noise levels within bedrooms during the passage of a train between 11pm and 7am is 46dB LA_{max}. The trains that could potentially generate this level of noise are typically the same trains that could generate airborne noise levels in bedrooms of greater than 45dB LA_{max} (i.e. due to airborne noise ingress through the curtain wall).

Therefore, the predicted number of night time noise events in bedrooms greater than 45 dB LA_{max} is not expected to increase due to structureborne noise generated by train movements.

Compliance with the requirements of planning condition 21 is therefore expected with regard to structureborne noise levels due to train movements.

The above assessment indicates that no mitigation measures would be required to achieve levels of structureborne noise that comply with published guidance, although it should be noted that there is no margin of comfort between the stated requirements and the predicted noise levels in the apartment rooms.

In order to minimise the structureborne noise within the apartments generated by train movements, it is recommended that the stiffness of the concrete slabs is maximised as far as possible.

9.0 ACOUSTICS, VENTILATION AND OVERHEATING

An aspect of building design that has become more important since the original scheme was developed in 2017 is the risk of apartment overheating. Approved Document O 'Overheating mitigation' came into effect on 15 June 2022, but it does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work for the building is started before 15 June 2023.

Requirement O1 is as follows:

- 1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel ("residences") to –
 - (a) limit unwanted solar gains in summer;
 - (b) provide an adequate means to remove heat from the indoor environment.
- 2) In meeting the obligations in paragraph (1) –
 - (a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and
 - (b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.

With regard to requirement O1(2)(a), this is considered to be met from a noise perspective if, in achieving the building's mitigation strategy, the following noise levels are not exceeded within bedrooms:

- a) 40dB LAeq,T, average over 8 hours (between 11pm and 7am)
- b) 55 dB LAFmax, more than 10 times a night (between 11pm and 7am)

In areas of high external night time noise, such as those prevalent at the proposed development site, it would be necessary to keep any openable purge doors or windows closed throughout the night to achieve the above noise criteria. It is understood that thermal studies of the building have confirmed that windows to all bedrooms within the development can remain closed throughout the night whilst complying with appropriate thermal comfort criteria.

On the most recent schemes, in line with Building Regulations Approved Document O Manchester City Council has sought confirmation that in areas of relatively high external noise, purge doors and windows can remain closed at night whilst suitable temperatures can be maintained in apartments. Therefore, the proposed development is expected to comply with the requirements of Approved Document O and the expected requirements of Manchester City Council in relation to overheating and noise.

APPENDIX A: NOISE & VIBRATION SURVEY DETAILS AND SUMMARY RESULTS

LOCATION

10 - 12 Whitworth Street West, Manchester

DATES AND TIMES

14:20 Wednesday 15 December 2021 to 11:20 Thursday 16 December 2021

16:00 Saturday 18 December 2021 to 10:40 Sunday 19 December 2021

WEATHER DURING SURVEYS

Wednesday 15 December 2021 (Day time)	2/8 cloud cover, 2 m/s light breeze, no rain, 11 °C
Wednesday 15 December 2021 (Night-time)	2/8 cloud cover, < 1 m/s light breeze, no rain, 6 °C
Thursday 16 December 2021 (Day time)	2/8 cloud cover, 1 m/s light breeze, no rain, 9 °C
Saturday 18 December 2021 (Day time)	2/8 cloud cover, 2 m/s light breeze, no rain, 6 °C
Saturday 18 December 2021 (Night-time)	2/8 cloud cover, < 1 m/s light breeze, no rain, 1 °C
Sunday 19 December 2021 (Day time)	2/8 cloud cover, 1 m/s light breeze, no rain, 7 °C

PERSONNEL PRESENT DURING SURVEY

Matt Fisher – Fisher Acoustics

INSTRUMENTATION

Norsonic Type 118 IEC 60651 Type 1 Integrating-Averaging Sound Level Meter (serial no. 31498)
Norsonic Type 140 IEC 60651 Type 1 Integrating-Averaging Sound Level Meters (serial no. 1406387)
Norsonic Type 140 IEC 60651 Type 1 Integrating-Averaging Sound Level Meters (serial no. 1403193)
Norsonic Type 1251 IEC 60942-1997 Class 1 Sound Calibrators (x2) (serial nos. 31971, 27878)

MEASUREMENT METHODOLOGY

Before and after the noise survey the sound level meters were checked calibrated to an accuracy of ± 0.3 dB using the Norsonic Type 1251 Calibrators - no drift in sensitivity was detected. The measurement microphones were installed at the locations identified in this report. All survey measurements were in 'free field' conditions.

Figures 22 to 25 identify the free-field noise levels measured at the site between 15 December 2021 and 16 December 2021 and between 18 December 2021 and 19 December 2021.

Measurement locations are shown on Figure 3 and described below.

The noise survey measurement locations were as follows:

- Location 1: 4.2 metres from the viaduct, overlooking the railway viaduct at a microphone height of 13.5 metres above site ground level, 21 metres from the site fence at the City Road Inn.
- Location 2: the 4.2 metres from the viaduct, overlooking the railway viaduct at a position of 2.5 metres from the site fence, a microphone height of 12 metres above site ground level, 2.5 metres from the site fence at the City Road Inn
- Location 3: 5 metres from the kerb of Whitworth Street West, at a microphone height of 9 metres above ground level, midway along the proposed site boundary.
- Location 4: 5 metres from the kerb of Whitworth Street West, at a microphone height of 12 metres above ground level, at the north-west corner of the proposed site boundary

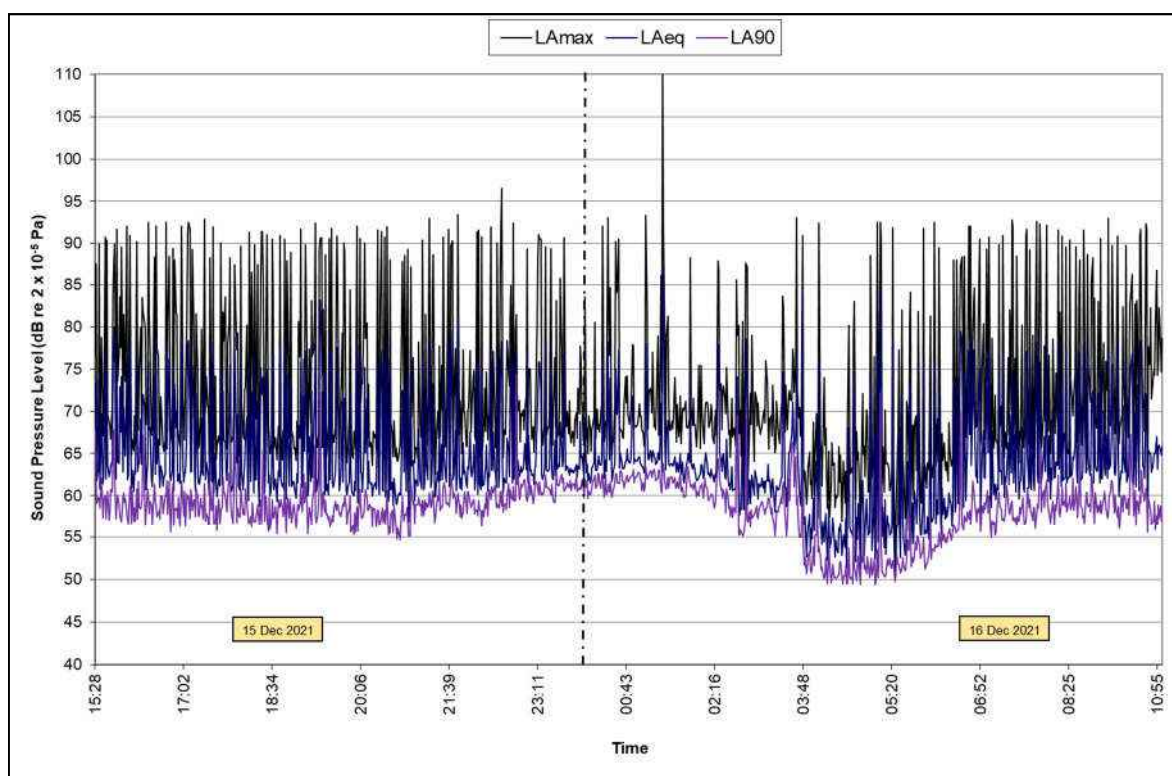


Figure 22: Position 1 noise measurements, Thursday 15 December 2021 to Friday 16 December 2021, maximum (LAmax), average (LAeq) and background (LA90) noise levels

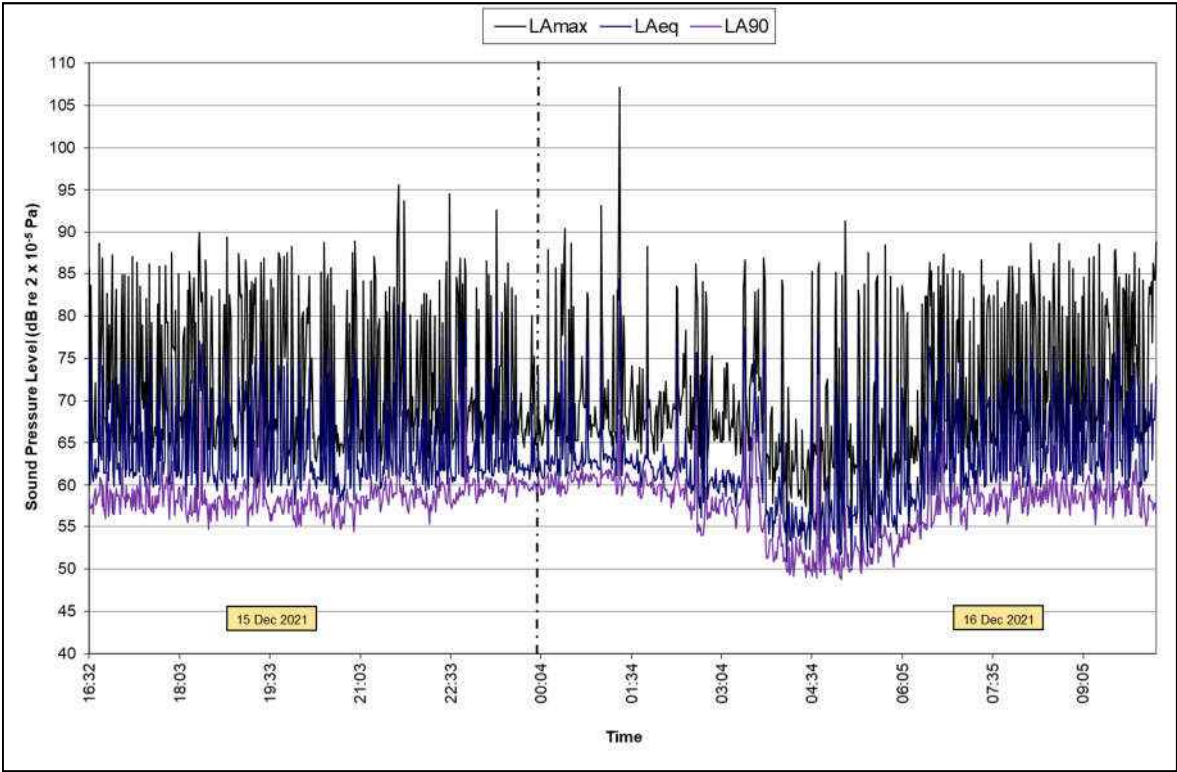


Figure 23: Position 2 noise measurements, Thursday 15 December 2021 to Friday 16 December 2021, maximum (LAmax), average (LAeq) and background (LA90) noise levels

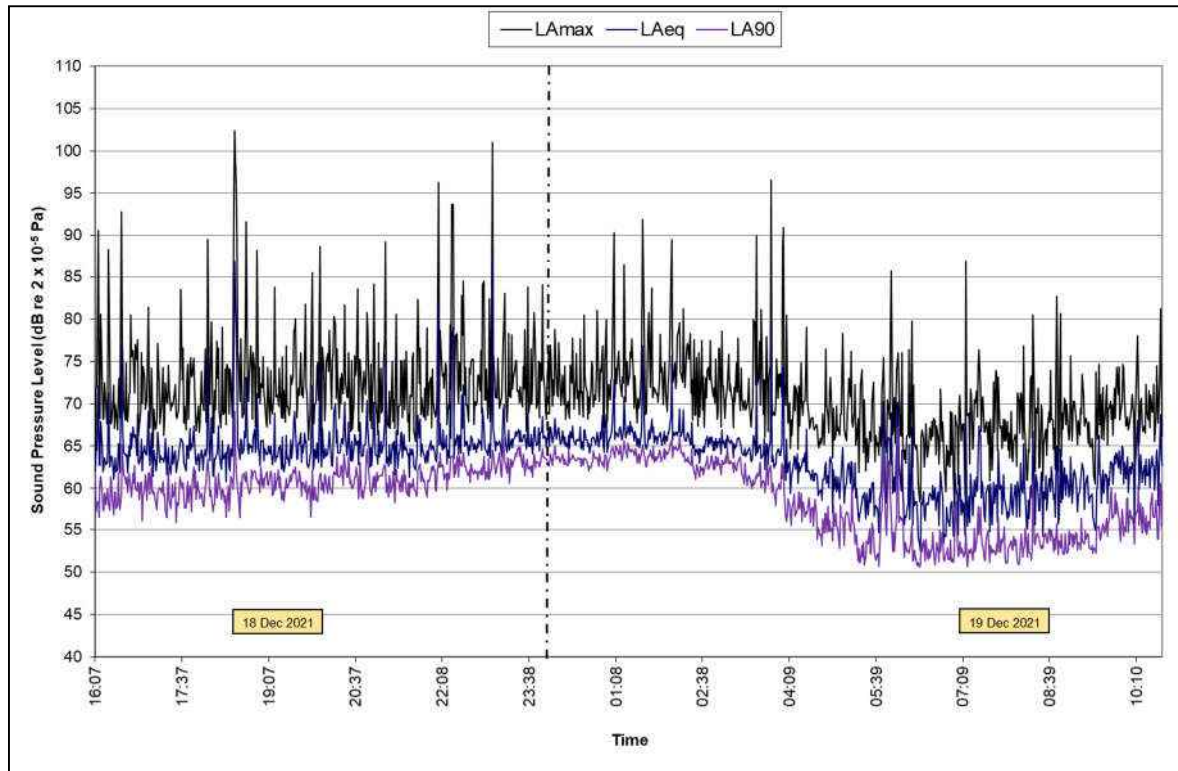


Figure 24: Position 3 noise measurements, Saturday 18 December 2021 to Sunday 19 December 2021, maximum (LAmx), average (LAeq) and background (LA90) noise levels

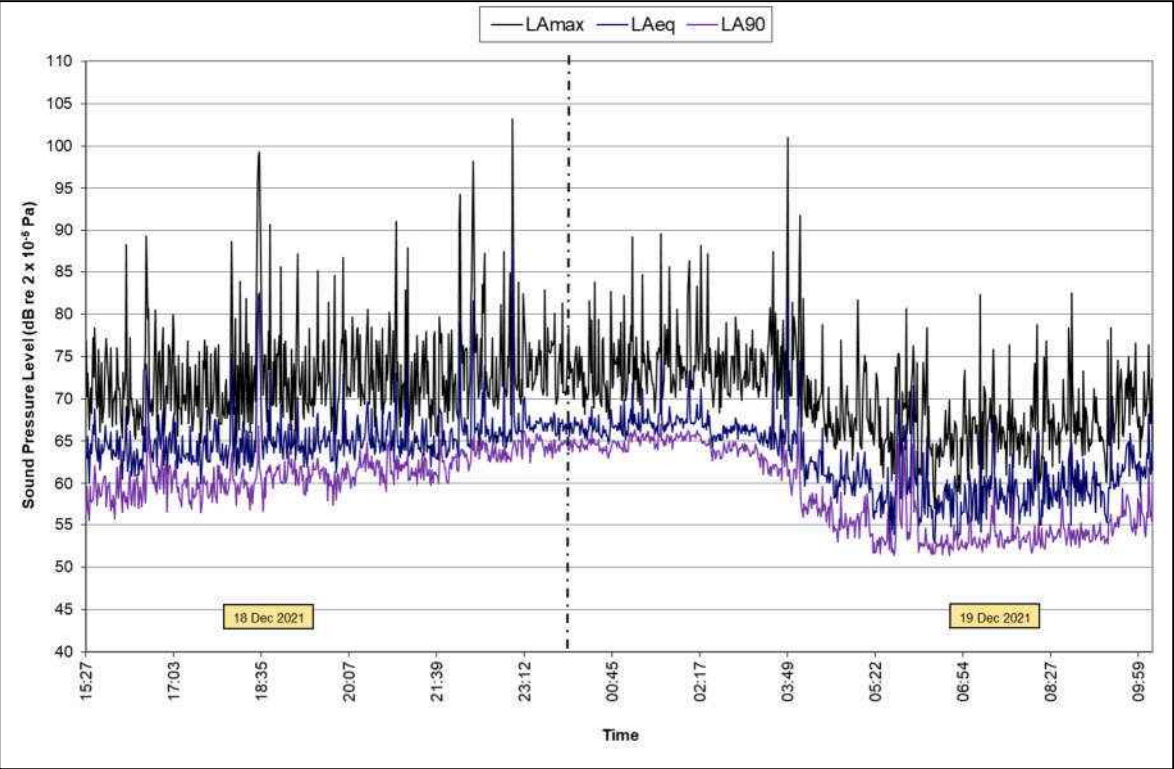


Figure 25: Position 4 noise measurements, Saturday 18 December 2021 to Sunday 19 December 2021, maximum (LAmx), average (LAeq) and background (LA90) noise levels

fisher acoustics

Whitworth Street West, Manchester

Acoustic Strategy

August 2022

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1.0 INTRODUCTION

Fisher Acoustics Ltd has been commissioned by Featherfoot Whitworth Street Limited to provide acoustic design advice relating to a proposed residential development at 10-12 Whitworth Street West, Manchester, with a view to identifying and satisfying the applicable internal sound insulation performance requirements described within Approved Document E of the Building Regulations.

The numerical performance requirements of Approved Document E of the Building Regulations relating to airborne and impact sound insulation must be achieved prior to completion of the development. Approved Document E also stipulates constructional requirements for individual items such as doors and soil & vent pipes. These requirements are discussed herein.

Recommended noise limits for internal and external building services plant are provided.

A summary of the recommendations relating to external noise ingress and structureborne noise due to train movements is also provided.

This report must be read in conjunction with the following report, issued by Fisher Acoustics:

- Whitworth Street West, Manchester, Environmental Noise & Vibration Study, report reference PR0668-REP01B-MPF dated 17 August 2022

Others must advise on the fire and thermal requirements of the internal building elements.

2.0 DESCRIPTION OF PROPOSED DEVELOPMENT

The formal description of the development proposals is as follows:

- Construction of a 38 storey residential building (Use Class C3), comprising 327 apartments with associated residents services, facilities and communal spaces, servicing, highways, public realm and associated works.

The proposal is for a residential-led redevelopment, accommodating three hundred and twenty seven residential apartments together with residents' amenity space including gym.

The proposed uses within the building are as follows:

- Ground floor: Reception/Lobby, Food & Beverage offer, WCs, Parcel Store, Refuse store, Cycle Store, Substation, LV Switch Room, Comms
- Level 11st floor: Void over Reception/Lobby, Food & Beverage offer, WCs, Amenity area (potential gym), Cycle Store, Plantroom
- 2nd floor: Amenity Spaces, WC, Plant
- 3rd floor: Apartments, Plantrooms
- 4th floor to 18th floor: Apartments
- 19th floor: Apartments, Plantrooms
- 20th floor to 35th floor: Apartments
- 36th and 37th floor: Penthouse apartments

The apartments of the proposed development are to be provided with continuously running supply and extract ventilation in order to achieve the background ventilation requirements of Approved Document F of the Building Regulations. Therefore, no passive background trickle ventilators are required to the external wall or within the window frames of the proposed habitable rooms. Purge ventilation is to be achieved through the opening of solid purge vent panels.

3.0 ACOUSTIC PERFORMANCE REQUIREMENTS

Approved Document E

The numerical performance requirements of Approved Document E of the Building Regulations, relating to airborne and impact sound insulation, must be achieved prior to completion of the development. Approved Document E also stipulates constructional requirements for individual items such as SVPs.

Airborne and Impact Sound Insulation

Table 1 gives the acoustic performance requirements of party floors and party walls stipulated by Approved Document E of the Building Regulations (2010). The stated values are a statutory requirement.

Purpose built dwellings houses and flats	Airborne sound insulation $D_{nT,w} + C_{tr}$ (Minimum values)	Weighted standardised impact sound pressure level $L'_{nT,w}$ (Maximum values)
Party Walls	45	-
Party Floors	45	62

Table 1: Performance standards for walls and floors that have a separating function

Airborne and Impact Sound Insulation between non-Residential areas and Apartments

There are a number of walls and floors that separate apartments from non-residential spaces. As the noise levels in the non-residential areas may be greater than in domestic settings, sound insulation performances in excess of the minimum requirements of Approved Document E may be appropriate. In relation to noise transfer from non-domestic spaces, Approved Document E states:

- 'a higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level'.

Tables 2 and 3 identify the recommended minimum airborne sound insulation between spaces via the separating walls and floors in question to achieve appropriate internal conditions.

Wall	Weighted Standardised Level Difference $D_{nT,w}$
2nd Floor	
Amenity to Amenity	65 dB
Cinema Room to Gym	60 dB
3rd Floor	
Plant to Apartment	60 dB
19th Floor	
Plant to Apartment	60 dB

Table 2: Minimum recommended weighted standardised level difference between spaces via walls

Floor	Weighted Standardised Level Difference $D_{nT,w}$
Ground floor to 1st Floor	
All areas of 1 st floor to all areas of ground floor	58 dB
1st Floor to 2nd Floor	
Amenity to Gym	65 dB
All other areas of 1 st floor to 2 nd floor	58 dB
2nd Floor to 3rd Floor	
Gym to Apartment	65 dB
Gym Studio to Apartment	65 dB
Cinema Room to Apartment	68 dB
All other areas of 2 nd floor to Apartments	58 dB
3rd Floor to 4th Floor	
Plant to Apartment	58 dB
18th Floor to 19th Floor	
Plant to Apartment	58 dB
19th Floor to 20th Floor	
Plant to Apartment	58 dB

Table 3: Minimum weighted standardised level difference between adjacent spaces via floors

Table 4 gives the recommended impact sound insulation of floors to the non-residential rooms to achieve appropriate internal conditions in the apartments and other sensitive rooms.

Floor	Weighted standardised impact sound pressure level $L'_{nT,w}$ dB (Maximum values)
Gym to Apartment	22 dB
Gym to 1 st floor areas	35 dB
Plant Room to Apartment	62 dB

Table 4: Minimum weighted standardised impact sound pressure level of floors

4.0 WALLS

In order to achieve the required sound insulation performances on site, it is recommended that separating walls achieve the Weighted Sound Reduction Index values given in Table 5. Weighted Sound Reduction Index is measured in a laboratory in accordance with BS EN ISO 10140-2: 2021 and rated in accordance with BS EN ISO 717-1: 2020.

Wall	Sound Reduction Index R _w
General Areas	
Apartment to Apartment	59 dB (53 dB R _w + C _{tr})
Apartment to Stairwell	59 dB (53 dB R _w + C _{tr})
Apartments L35.04 & L35.05 to common corridor	59 dB (53 dB R _w + C _{tr})
Bedrooms to common corridor	59 dB (53 dB R _w + C _{tr})
All other apartments to common corridor	50 dB
Smoke Shaft to Apartment	56 dB
Smoke shaft to common corridor	45 dB
Riser B to corridor	35 dB
Ground Floor	
F & B Offer to WC	40 dB
F&B Offer to Reception (glazed screen)	35 dB
Reception/Lobby to Parcel Store	30 dB
Reception/Lobby to Refuse Store	50 dB
Reception/Lobby to Comms	35 dB
Parcel Store to Lift Lobby	35 dB
Refuse Store to Accessible WC	50 dB
Comms to Accessible WC	50 dB
Comms to Refuse Store	40 dB
Refuse Lobby to Refuse Store	40 dB
Refuse Store to Stairwell	45 dB
F&B Offer to Cycle Store	45 dB
Cycle Store to Lift Lobby	45 dB
Cycle Store to LV Switch room	25 dB
LV Switch room to Substation	25 dB
LV Switch room to F&B Offer	50 dB
Substation to F&B Offer	50 dB

Wall	Sound Reduction Index R _w
1st Floor	
F & B Offer to Accessible WC	45 dB
F & B Offer to Plant room	60 dB
Store to Mezzanine E	40 dB
Mezzanine E to Amenity Space 01	40 dB
Amenity Space 01 to Cycle Store B	50 dB
Cycle Store to Riser	45 dB
Cycle Store to Mezzanine E	45 dB
Cycle Store to Plantroom	45 dB
Cycle Store to Riser	45 dB
2nd Floor	
Amenity to Amenity	60 dB
Amenity to Plant	55 dB
Amenity to Smoke Shaft	46 dB
Amenity to Corridor	50 dB
Cinema Room to Gym	65 dB
Plant to Riser C	45 dB
Plant to Accessible WC	45 dB
Accessible WC to Riser C	45 dB
Plant to Plant	35 dB
Plant to Common Corridor	50 dB
3rd Floor	
Plant to Apartment	65 dB
Plant to Common Corridor	55 dB
Plant to Plant	35 dB
Plant E to Riser C	45 dB
Riser C to corridor	45 dB
19th Floor	
Plant to Apartment	65 dB
Plant Lobby to Apartment	65 dB

Table 5: Minimum recommended weighted sound reduction index of walls

APARTMENT SEPARATING WALLS

In order to achieve the required sound insulation performance between apartments, it is recommended that the party wall construction achieves a minimum weighted sound reduction index (i.e. as measured in laboratory) of 59 dB (53 dB R_w + C_{tr}).

Non-loadbearing drywall partitions

The suggested options for the non-loadbearing party wall construction are as follows:

Party Wall option Type 1

- 90 mm metal Acoustic studs (e.g. Gypframe Acoustuds) drylined each side with two layers of 15 mm dense plasterboard (minimum density 830 kg/m³), with 100 mm Isover Modular Roll in the cavity.

Party Wall option Type 2

- Twin frame wall incorporating metal 50 mm C studs braced at 1500 mm, spaced a minimum 20 mm apart (e.g. determined by column thickness), drylined each side with two layers of 12.5 dense plasterboard (minimum density 830 kg/m³), with 50 mm mineral wool of minimum density 22 kg/m³ within the cavity.

The following recommendations must be followed to maximise the acoustic performance of the walls on site:

1. The full perimeter of the drylining to the party walls must be acoustically sealed using non-hardening acoustic sealant.
2. Party walls must extend full-height to the structural soffit.
3. Care must be taken to ensure that the plasterboard fixing screws do not compromise the acoustic integrity of the acoustic studs in party wall option Type 1. In particular, the screws must not pass into the central 'web' of the acoustic stud. Therefore 25 mm maximum length screws must only be used to fix the first layer of plasterboard and 42 mm maximum length screws must be used to fix the second layer of plasterboard to the studs, in order to avoid any screws contacting the central protruding section of the acoustic stud (see Figure 1 in relation to Gypframe Acoustuds).



Figure 1: Plasterboard fixing to acoustic studs (© British Gypsum)

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4. (For Wall Type 2 only) At the location of columns, only a single layer of 12.5 mm dense plasterboard would need to continue past the face of the column, fixed to metal channels to form a 35 mm cavity, with 25 mm mineral wool within this cavity. The use of adhesive plaster ('dot and dab') to fix plasterboards to concrete elements within apartments must be avoided.
 5. The party walls must be drylined and acoustically sealed against any concrete element prior to the drylining of the concrete, such that the concrete drylining plasterboards are discontinuous on the line of the party wall (e.g. columns within the party wall or columns at the external wall).
 6. The plasterboards of the party wall must break the plasterboard drylining of the external wall to minimise flanking transmission of noise at the interface of the party wall and external wall.
 7. The plasterboards of the party wall must break the room-side plasterboard drylining of the corridor wall and any riser wall on the line of the party wall to minimise flanking transmission of noise at the interface of the party wall and corridor wall and riser walls (i.e. the room-side plasterboards of the corridors walls or riser walls must be discontinuous on the line of the party wall).
 8. Penetrations in plasterboard party walls to accommodate mains sockets and switches must be acoustically treated to maintain the sound insulation of party walls. Intumescent putty pads (e.g. Knauf Putty Pads, Hilti CP617, Quelfire etc) can be installed within all electrical penetrations in party walls to maintain the acoustic integrity of walls. Care must be taken to ensure that the acoustic and fire integrity of the putty pads is maintained following the installation of mains cables.

Concrete Shear Wall between Apartments

The structural design of the building has determined that in a small number of locations, the walls between apartments will be formed by a 300 mm thick in-situ concrete shear wall.

The concrete shear walls can achieve the airborne sound insulation requirements between apartments without further treatment or linings. However, to achieve the impact sound insulation requirements between apartments, the drylining to these shear walls would be as follows:

Party Wall Type 3 – drylining to concrete shear walls

- 12.5 mm wallboard fixed to metal liner channels to form a minimum cavity of 35 mm, with 25 mm mineral wool within this cavity.

DRYLINING OF LIFT SHAFT WALLS

The structural design of the building has determined that the walls between lift shaft walls and the living accommodation will be 500 mm thick in-situ concrete. In order to control structureborne noise via the lift shaft walls, it is recommended that the lift shaft walls are drylined in the living accommodation with a single layer of 15 mm dense plasterboard (minimum density 830 kg/m³) fixed to metal liner channels to create a minimum cavity of 30 mm, with 25 mm mineral wool of minimum density 10 kg/m³ in the cavity. This drylining is not required between the lift shaft and the bathroom pods.

APARTMENT TO STAIRWELL WALLS

The structural design of the building has determined that the walls between stairwell walls and the living accommodation will be 500 mm in-situ concrete.

In order to achieve the required vertical impact sound insulation between studios, it is recommended that the stairwell walls are drylined in apartments with a single layer of 12.5 mm wallboard fixed using metal wall liner channels to create a minimum cavity of 35 mm. .

If a plasterboard drylining is required to the stairwell walls within common areas, then from an acoustic perspective the drylining can comprise a single layer of 12.5 mm wallboard fixed using adhesive plaster ('dot & dab').

APARTMENTS TO CORRIDOR

Approved Document E advises that walls between flats and common corridors should be of the same type that form the party walls between dwellings. However, the Document recognises that 'it is likely that the sound insulation will be reduced by the presence of a door'.

Calculations show that on the assumption that the entrance door achieves the sound insulation requirements of Approved Document E of 29 dB R_w (see Section 7 below), then a wall that achieves a weighted sound reduction index of 50 dB R_w will allow the maximum possible sound insulation to be achieved between apartments and the corridor (i.e. partition constructions that achieve performances of 50 dB R_w and 60 dB R_w would achieve same the sound insulation on site between a room and a corridor).

Therefore, where an apartment living room is separated from the corridor by only the apartment entrance door, the corridor wall need only achieve a weighted sound reduction index of 50 dB R_w . This performance can be achieved by the following wall construction:

- Two layers of 15 mm wallboard each side of 70mm C studs, with 25 mm mineral wool of minimum density 24 kg/m³ in the cavity.

The plasterboards of the party wall must break the room-side plasterboard drylining of the corridor wall to minimise flanking transmission of noise at the interface of the party wall and corridor wall.

The corridor wall must be acoustically sealed on both sides at the head, base and vertical interfaces with non-hardening acoustic mastic.

On levels 4 to 14, bedrooms located at the end of the common corridors are directly adjacent to the corridor. In these instances, the corridor wall must achieve a minimum sound insulation performance of 59dB R_w (53 dB R_w + Ctr) as advised in Table 5.

BATHROOM PODS TO CORRIDOR

Approved Document E requires that the airborne sound insulation between apartment bathrooms and corridors is $45 \text{ dB DnT,w} + \text{Ctr}$.

The required sound insulation can be achieved by the combination of the corridor wall (specified above at 50 dB Rw) and the bathroom pod wall.

To maintain the required acoustic performance between the corridor and the bathroom pod at the location of bathroom pod risers, it is recommended that any access door to the bathroom riser achieves a weighted sound reduction index of 35 dB Rw . To achieve this performance, it is recommended that the riser door has a mass of 20 kg/m^2 and is provided with acoustic seals to the full perimeter of the door frame.

INTERNAL WALLS WITHIN APARTMENTS – APPROVED DOCUMENT E REQUIREMENT

Approved Document E requires that internal walls between a bedroom or a bathroom and other rooms within apartments that do not contain a connecting door achieve a Weighted Sound Reduction Index of 40dB R_w . Acoustic testing on site of internal walls is not required. Internal walls that contain a door between the rooms are not required to achieve a specific acoustic performance.

Given the location of internal doors within the apartments, only a minority of internal walls are required to achieve a performance of 40dB R_w .

The suggested drylined wall constructions to achieve a sound insulation performance of 40 dB R_w are as follows:

- 1) 12.5 mm wallboard / 70 mm metal stud with 25 mm mineral wool (density 12 kg/m³) in cavity / 12.5 mm wallboard
- 2) 12.5 mm dense plasterboard (830 kg/m³) / 70 mm metal stud / 12.5 mm dense plasterboard (830 kg/m³) (no mineral wool in cavity)

If option 1 is taken, then the mineral wool can be omitted from internal walls that are not required to achieve a sound insulation performance of 40 dB R_w .

In a number of locations, a sound insulation performance of 40dB R_w must be achieved by the drylined bathroom pod wall.

Internal walls can be allowed to terminate at the internal ceiling level if compatible with the required fire protection. Where internal walls are required to achieve a certain fire protection, the walls must be built up to and sealed against the structural soffit.

ANCILLARY SPACES

The minimum recommended sound insulation performances identified in Table 5 in relation to the ancillary spaces can be achieved by the wall constructions identified in Table 6. It should be noted that thermal considerations may require additional insulation and or greater cavity sizes.

Weighted Sound Reduction Index R_w	Blockwork	Metal Stud partition
25 dB / 30 dB	Standard grade blockwork of minimum mass 100 kg/m^2 , drylined on one side with plasterboard on dabs, or plastered on one side OR Paint grade blockwork of minimum mass 100 kg/m^2	1 x 12.5 mm wallboard each side of 70 mm metal studs
35 dB	Standard grade blockwork of minimum mass 100 kg/m^2 , drylined on both sides with plasterboard on dabs, or plastered both sides OR Paint grade blockwork of minimum mass 100 kg/m^2	1 x 12.5 mm wallboard each side of 70 mm metal studs
40 dB	Standard grade blockwork of minimum mass 100 kg/m^2 , drylined on both sides with plasterboard on dabs, or plastered both sides OR Paint grade blockwork of minimum mass 100 kg/m^2	1 x 12.5 mm wallboard each side of 70 mm metal studs, 25 mm mineral wool in cavity
45 dB	Standard grade blockwork of minimum mass 145 kg/m^2 , drylined on both sides with plasterboard on dabs, or plastered both sides OR Paint grade blockwork of minimum mass 145 kg/m^2	1 x 12.5 mm dense plasterboard (830 kg/m^3) each side of 70 mm metal studs, 25 mm mineral wool in cavity
45 dB (shaft wall)	-	Shaftwall construction of 60 mm Shaftwall studs drylined with two layers of 15 mm dense plasterboard (minimum density 830 kg/m^3) on the room-side of the wall, and 19 mm Core Board secured between the studs, 25 mm mineral wool in the cavity.

Weighted Sound Reduction Index R _w	Blockwork	Metal Stud partition
50 dB	Standard grade blockwork of minimum mass 180 kg/m ² , drylined on both sides with plasterboard on dabs, or plastered both sides OR Paint grade blockwork of minimum mass 180 kg/m ²	2 x 12.5 mm wallboard each side of 70 mm metal studs, 50 mm mineral wool in cavity OR 1 x 12.5 mm dense plasterboard (830 kg/m ³) each side of twin frame metal studs, 50 mm mineral wool within cavity of minimum depth 200 mm
55 dB	Paint grade blockwork of minimum mass 180 kg/m ² , drylined on one side with one layer of 12.5 mm wallboard fixed to metal wall liner channels to create minimum cavity of 50 mm, 50 mm mineral wool between channels	2 x 15 mm dense plasterboard (830 kg/m ³) each side of 70 mm metal studs, 50 mm mineral wool in cavity OR 2 x 12.5 mm wallboard (630 kg/m ³) each side of twin frame metal studs, 50 mm mineral wool within cavity of minimum depth 120 mm
56 dB (shaft wall)	-	Shaftwall construction of 60 mm Shaftwall studs drylined with three layers of 15 mm fire board on the room-side of the wall, and 19 mm Core Board secured between the studs, 25 mm mineral wool in the cavity, additional independent drylining of two layers of 15 mm fire board fixed to 50 mm I-studs to create a cavity of minimum depth 60mm, 50 mm mineral wool in the cavity
60 dB	Paint grade blockwork of minimum mass 180 kg/m ² , drylined on one side with two layers of 15 mm dense plasterboard (830 kg/m ³) fixed to independent studs to create minimum cavity of 70 mm, 50 mm mineral wool in cavity	2 x 15 mm dense plasterboard (830 kg/m ³) each side of 70 mm metal stud with a Resilient Bar fixed horizontally to one side of the studs, with 50 mm mineral wool (minimum density 10 kg/m ³) in the cavity OR 2 x 12.5 mm dense plasterboard (830 kg/m ³) each side of twin frame metal studs, 50 mm mineral wool within cavity of minimum depth 160 mm
65 dB	Paint grade or standard grade blockwork of minimum mass 180 kg/m ² , drylined on one side with two layers of 15 mm dense plasterboard (830 kg/m ³) fixed to independent studs to create minimum cavity of 100 mm, 100 mm mineral wool in cavity,	2 x 15 mm dense plasterboard (830 kg/m ³) each side of twin frame metal studs, 50 mm mineral wool within cavity of minimum depth 150 mm

Table 6: Potential wall constructions to achieve acoustic requirements of walls to ancillary areas

The following recommendations must be followed to maximise the acoustic performance of the walls on site:

1. The full perimeter of the plasterboard drylining to the walls must be acoustically sealed using non-hardening acoustic sealant.
2. The head of blockwork walls must be fully acoustically sealed on both sides of the walls prior to the drylining of the wall.
3. Walls must extend full-height to the structural soffit.
4. The plasterboards of the separating walls between rooms must break any plasterboard drylining of the external wall to minimise flanking transmission of noise at the interface of the party wall and external wall (i.e. any plasterboards to the inner leaf of the external wall must be discontinuous on the line of party wall).
5. The plasterboards of the separating walls between rooms must break the room-side plasterboard drylining of the corridor wall to minimise flanking transmission of noise at the interface of the separating wall and corridor wall (i.e. the room-side plasterboards of the corridors walls must be discontinuous on the line of the separating wall).
6. The separating walls must be drylined and acoustically sealed against any concrete element prior to the drylining of the concrete, such that the concrete drylining plasterboards are discontinuous on the line of the party wall.
7. Penetrations to accommodate mains sockets and switches in plasterboard separating walls that achieve a performance of 50 dB Rw or greater must be acoustically treated to maintain the sound insulation of the wall. Intumescent putty pads (e.g. Knauf Putty Pads, Hilti CP617, Quelfire etc) can be installed within all electrical penetrations in party walls to maintain the acoustic integrity of walls. Care must be taken to ensure that the acoustic and fire integrity of the putty pads is maintained following the installation of mains cables.

5.0 PARTY FLOORS

APARTMENT TO APARTMENT FLOORS - AIRBORNE SOUND INSULATION

The structural design of the building has determined that the party floor between apartments will be a 225 mm thick solid concrete flat slab. In addition, the slab is to be underdrawn within apartments with a plasterboard ceiling.

The predicted minimum vertical sound insulation between apartments via the structural slab alone is 48 dB $D_{nT,w} + C_{tr}$. The structural slab therefore provides the basis for compliance with the acoustic requirements of Approved Document E. Care will need to be taken with flanking noise transfer at the slab edge. This is discussed in Section 6.0.

The ceiling between apartments can comprise a single layer of 12.5 mm wallboard suspended on a metal frame. No acoustic measures would need to be taken where the ceiling is penetrated by light fittings or detectors.

APARTMENT TO APARTMENT FLOORS - IMPACT SOUND INSULATION

Approved Document E of the Building Regulations requires that the party floor impact sound level within a habitable room does not exceed 62dB $L'_{nT,w}$ (a lower figure signifies an improvement in the impact sound insulation of the floor).

As the occupants will be free to change the floor coverings, the decorative floor coverings cannot automatically be assumed to be permanent and cannot therefore be allowed to contribute to the impact sound insulation of the party floors to comply with Approved Document E. However, by arrangement with the Building Control Officer, it would be possible to allow the benefit of decorative floor coverings to be included in assessments if the lease for each apartment includes a clause that requires any replacement floor coverings to achieve a certain impact sound insulation performance.

It is understood that the proposed floor finishes within the apartments are carpet to bedrooms, vinyl flooring to living rooms and kitchens and ceramic tiles within the floorless bathroom pods.

As identified above, columns and shear walls within apartments are to be drylined with plasterboard fixed to metal wall liner channels. This method of fixing leads to lower levels of impact sound transmission from apartments above than fixing plasterboards with adhesive plaster dabs.

Given a flat concrete slab of thickness 225 mm, a ceiling of 1 x 12.5 mm wallboard fixed to a suspended metal frame, the impact sound insulation requirement of the Building Regulations between apartments is expected to be achieved without any proprietary acoustic layers on the floor slab.

This result is on the basis that compliance with the drawn details in relation to party walls, internal walls, and the drylining of the external wall and internal columns and shear walls is achieved. In particular, the use of 'dot and dab' adhesive plaster within apartments must be avoided and there must be no direct contact between the plasterboards and the soffit of the structural slabs at the head of the drylined walls.

The calculated impact sound level of the apartment party floors given the current proposals is 57dB LnT,w. There is therefore a margin in relation to compliance with Approved Document E of 5dB.

Given this relatively small margin, it is recommended that an impact sound insulation test is conducted at an early stage of the construction programme (e.g. when a sample room has been formed and drylined) to confirm that the required impact sound insulation performance has been achieved without the contribution of decorative floor coverings.

NON-RESIDENTIAL AREAS TO APARTMENTS - AIRBORNE SOUND INSULATION

The minimum airborne sound insulation requirements of Approved Document E must be achieved between any non-residential area and the vertically adjacent apartments. In addition, the airborne sound insulation of the floor must take into account the potential activity noise levels within the non-residential areas such that disturbance of residential occupants can be avoided.

The currently proposed structural floor slab thickness is as follows:

- 225 mm thick in-situ concrete flat slab

Given the proposed party floor of 225 mm thick in-situ concrete, in order to achieve the acoustic requirements identified in Table 3, a plasterboard ceiling is to be installed within certain rooms, as follows:

Level 1 Amenity below Gym, Level 2 Gym & Level 2 Gym Studio

- One layer of 15 mm Gyproc SoundBloc plasterboard (minimum density 830 kg/m³), fixed to a metal frame to create a minimum cavity of 200 mm, 100 mm mineral wool of minimum density 10 kg/m³ in the ceiling void.

Level 2 Cinema Room

- Two layers of 15 mm Gyproc SoundBloc plasterboard (minimum density 830 kg/m³), fixed to a metal frame to create a minimum cavity of 200 mm, 100 mm mineral wool of minimum density 10 kg/m³ in the ceiling void.

Compliance with the remaining acoustic requirements of Table 3 can be achieved by the proposed structural slab alone. Any ceiling specification to these areas need not be influenced by acoustic considerations.

Recommended maximum allowable noise levels in non-residential areas

Given the above-recommended provision of ceilings, Table 7 identifies the maximum allowable noise levels in the non-residential areas to avoid disturbance of the residential areas above or below.

Room	Sound Pressure Level (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Level 1 Amenity below Gym, Level 2 Gym & Level 2 Gym Studio	83	78	80	83	85	85	85
Level 2 Cinema Room	86	82	83	85	85	85	85
Plant	83	75	73	74	76	77	77

Table 7: Maximum recommended sound levels in rooms

The noise levels identified in Table 7 represent reasonably loud listening levels for the Amenity Spaces at Levels 1 and 2. Subjectively, the noise levels are substantially higher than would be deemed to be 'normal' living room listening levels. For instance, in relation to televisions, an external sound system with a subwoofer would be needed to generate the noise levels detailed.

If an external sound system with a subwoofer is to be provided, then it would be possible to exceed the above noise levels with a reasonably powerful amplifier set to high volume when listening to music or watching music videos or films with low-frequency sound effects. In this case, it may be necessary to install an electronic noise limiter on any amplifier to prevent too great a noise level being produced such that the occupants of the apartments below were not disturbed.

Corridor to Apartment floors - Impact sound insulation

The impact sound insulation requirement between common corridors and apartments is the same as that for apartments to apartments. Compliance with the recommendations for the party floors between apartments will achieve compliance with the requirements for the party floors between corridors and apartments.

Plantroom to Apartments – impact sound insulation

The impact sound insulation requirement from the plantroom at level 19 to the apartment below is the same as that for apartments to apartments. Compliance with the recommendations for the party floors between apartments will achieve compliance with the requirements for the party floors between the plantroom and apartments.

As noted in Section 13, it is expected that all M&E plant would be provided with appropriately specified anti-vibration mounts to minimise the transmission of structureborne noise to the apartments and to achieve the building services noise limits stated in Table 15, 16 and 17.

Gym - impact sound insulation

The dropping of free weights on the floor of the gym and the dropping of weight stacks would be able to generate high levels of impact noise that could cause disturbance to the apartments above unless a suitable flooring system is installed. Impact noise due to the dropping of weights could also cause disturbance to areas on the levels below the gym.

It is recommended that areas of the gym that may be subject to the dropping of free weights or the dropping of resistance machine weight stacks are overlaid with the following proprietary gym floor, or acoustically equivalent build-up, in order to reduce low frequency impact noise to vertically adjacent residential and non-residential areas:

- TVS RESi Dry floating floor comprising 18 mm T&G chipboard and 1 x 18 mm cement bonded particle board on metal channels on 50 mm x 50 mm Sylomer SR450 isolators. Floating floor overlaid with 10 mm Sportec Color-15 on 40 mm TVS VIBsorb 250; 20 mm TVS Perimeter Isolation at all perimeters and at interfaces with columns; 25 mm Knauf Acoustic Roll within floating floor void

In the remaining areas of the gym, it is recommended that any floor covering achieves a minimum impact sound reduction of 16dB dLw.

If required as addition localized treatment, any weight resistance machines and running machines can be installed on proprietary impact absorbers, such as g-fit Gear T-300 pads by Getzner.

It must be noted that given the above floating floor treatment, it is still possible that heavy weight impacts (e.g. 20 kg dumbbells dropped from knee height) may lead to audible impact noise in the vertically adjacent apartments.

It is therefore recommended that all users of the gym are instructed in the safe and proper handling of weights, such that free weights are placed, rather than dropped, on the floor between exercise sets and weight stacks are returned slowly to their resting position.

6.0 SOUND TRANSMISSION VIA SLAB EDGE & CURTAIN WALL

Apartments to Apartments - Unitised curtain walling

Achievement of the vertical sound insulation performance requirements between the apartments will be influenced by the sound insulation achieved at the slab edge and by flanking sound transmission within the curtain wall frame. Figure 2 shows the situation in relation to vertical sound transmission.

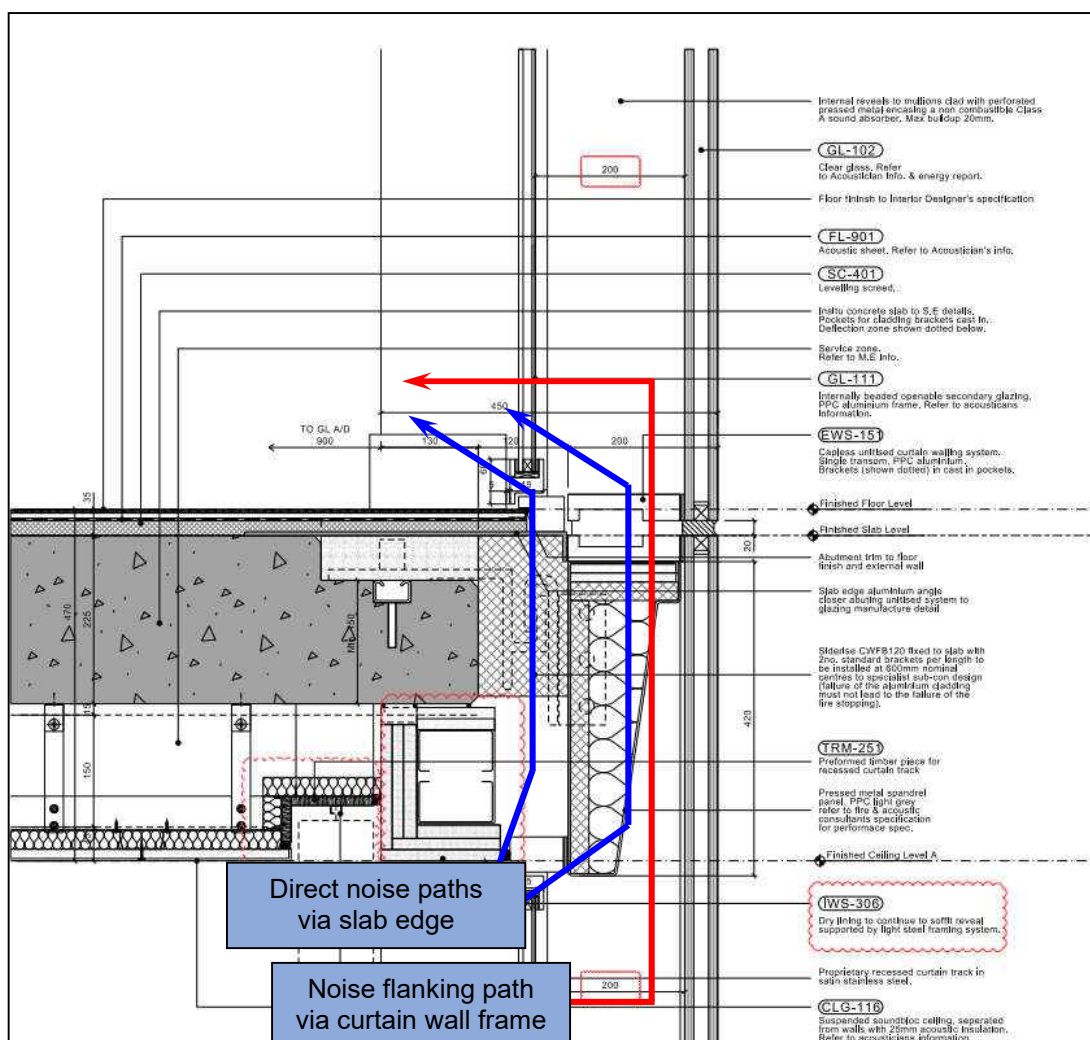


Figure 2: Noise transmission paths at junction of curtain wall and slab

In order to achieve the acoustic performance requirements of Approved Document E, it is recommended that the flanking sound insulation of the curtain wall, for both vertical and horizontal flanking, is no less than the value stated in Table 8.

Room pairings	D _{n,f,w}
Apartment to Apartment	55 dB
Non-residential areas to Apartments	65 dB

Table 8: Minimum flanking sound insulation of curtain wall, vertical and horizontal

Noise transmission via the direct noise paths highlighted in Figure 2 will be influenced by the ceiling plasterboard, the fire barrier at the slab edge and the gap closer between the slab and the curtain wall transom.

A proprietary cavity barrier to assist in the achievement of the acoustic requirements is the 120 mm thick Siderise CW-FS120 by Siderise Insulation Limited. Other elements of the curtain wall system must be carefully selected to allow the achievement of the recommended sound insulation performance.

The interface of the ceiling plasterboard and the curtain wall transom must be acoustically sealed, with thought given as to how any potential deflection of the curtain wall frame (e.g. due to wind loading) will be accommodated.

The slab edge barrier and the treatment of the transoms must also achieve the required fire performance. The junction detail at the interface of the party floors and the curtain wall will need to be carefully considered to take into account the acoustic requirement, the deflection tolerances and the fire resistance requirements.

Where the party walls between apartments meet the mullions of the unitised curtain wall, the mullions are located behind the drylining of the external wall, such that the curtain wall framing at the party wall junction is not directly exposed to noise within an apartment. On the basis that good acoustic sealing is achieved between the drylining and the curtain wall frame, it is expected that full compliance with the acoustic requirements can be achieved without treatment of the mullions in the party wall zone relating to horizontal noise transfer.

7.0 DOORS

Apartment Entrance doors

Approved Document E of the Building Regulations requires that main doors between living accommodation and common areas achieve a minimum weighted sound reduction index of 29 dB R_w . In addition to the minimum requirements of the Building Regulations, it is recommended that apartment entrance doors that lie within five metres of a lift achieve a minimum weighted sound reduction index of 35 dB R_w to reduce disturbance due to lift announcements and tones.

In order to achieve these performances, entrance doors to apartments must be provided with acoustic seals to the full perimeter, including the threshold.

It must be ensured that the acoustic integrity of the acoustic seals at the head and jambs of the doors is maintained at the location of the door ironmongery (i.e. the acoustic seals must be continuous past the ironmongery).

Ancillary rooms

Table 9 identifies the minimum recommended weight sound reduction index of doors to the apartments and ancillary rooms.

Location	Sound Reduction Index R_w
Residential Levels	
Apartment doors within 5 metres of lift	35 dB
All other apartment entrance doors	29 dB
Ground floor	
F & B Offer to Lift Lobby	30 dB
F & B Offer to WC	30 dB
F & B Offer to Reception/Lobby	30 dB
Reception/Lobby to Comms	30 dB
1st floor	
F & B Offer to Lift Lobby	35 dB
Plant to Lift Lobby	35 dB

Location	Sound Reduction Index R _w
2nd floor	
Cinema Room to Lift Lobby	40 dB
Amenity Spaces to Lift Lobby	30 dB
Plant to Lift Lobby	30 dB
3rd floor	
Plant to Common Corridor	35 dB
19th floor	
Common Corridor to Plant Lobby	30 dB

Table 9: Minimum weighted sound reduction index of doors**Common Areas**

All doors within common areas should be fitted with a means of reducing impact noise when closing. Examples of such devices include slow closers and resilient pads on door frames.

8.0 APPROVED DOCUMENT E REQUIREMENT E3

Requirement E3 of Approved Document E is as follows:

'The common internal parts of buildings which contain flats or rooms for residential purposes shall be designed and constructed in such a way as to prevent more reverberation around the common parts than is reasonable'.

Requirement E3 only applies to corridors, stairwells, hallways and entrance halls which give access to a flat or room for residential purposes.

This requirement is aimed at minimising the potential for disturbance caused to occupants due to activity noise in common areas. The underlying principle of Requirement E3 is to provide sound absorbent finishes within the spaces such that the reverberant noise level in common areas is reduced.

Appraisal Methods and assessment - Corridors

Section 7 of Approved Document E gives guidance on providing 'reasonable' conditions in common parts.

Two possible assessment methods are described in Section 7 for corridors. Method A recommends the covering of an area equal to or greater than the floor area with an acoustically absorptive material of specified acoustic properties. Typically, this would be achieved by the installation of a ceiling of absorption Class C over the full ceiling area. Method B recommends that, in corridors, a minimum of 0.25m² total absorption area per cubic metre of the total volume is provided. This recommendation applies to frequencies between 250 Hz and 4 kHz inclusively.

It is understood that the architectural preference is for the residential corridors that give access to the apartments to be provided with solid plasterboard ceilings. Solid plasterboard ceilings would not fulfil the requirements of either Method A or Method B of Section 7. However, an equivalent acoustic benefit of acoustic absorption within the corridors can be provided, as discussed below.

If 0.25 m² total absorption area per cubic metre of the total volume of the corridors is provided, then the resultant reverberation time (RT) in the corridor would be approximately 0.64 seconds. Thus the effective recommendation of Method B of Section 7 is that the RT in a corridor should be 0.64 seconds at each octave band between 250Hz and 4kHz.

The fundamental reason for providing a certain reverberation time in common parts is to reduce the reverberant noise level in these spaces, so that the noise able to intrude into apartments is reduced.

It has been determined that the reverberant noise level in a corridor of similar dimensions to those proposed at the development would increase by 2 dB(A) if a plasterboard ceiling was provided in lieu of strict compliance with Method B of Section 7 of Approved Document E. This change in noise level is not significant, as it is generally accepted that a noise level must change by 3 dB(A) before a subjective increase or decrease noise level is perceived by listeners 'in the field'.

Therefore, the introduction of additional acoustic absorption to the proposed corridors is not expected to provide a subjectively noticeable reduction in noise transfer from corridors to apartments.

In addition, there is a more effective method of reducing noise transfer to apartment rooms than the provision of acoustic absorption within the corridors. In particular, Approved Document E does not strictly require that threshold acoustic seals are provided to apartment entrance doors. However, the provision of threshold acoustic seals to a door can improve the sound insulation of the door by approximately 7 dB.

Therefore, the provision of threshold acoustic seals to the apartment doors and solid plasterboard ceilings to the corridors would lead to noise levels in apartments from the corridors that are 5 dB lower than if acoustically absorptive ceilings were provided but acoustic threshold seals were omitted from apartment entrance doors (as is allowed under the Building Regulations).

It is therefore suggested that the effective requirement E3 of the Building Regulations can be satisfied by the provision of solid plasterboard ceilings to corridors and perimeter acoustic seals, including the threshold, to apartment entrance doors.

This alternative approach to requirement E3 of the Building Regulations has been approved by the Building Inspector.

Appraisal Methods and assessment – Stairwells

The proposed stairwells do not provide direct access to the habitable rooms. There is therefore no requirement under Section 7 of Approved Document E to provide acoustically absorptive finishes within the proposed stairwells.

9.0 EXTERNAL NOISE INTRUSION

Fisher Acoustics report 'Whitworth Street West, Manchester, Environmental Noise & Vibration Study', report reference PR0668-REP01B-MPF provides an assessment of the external noise climate at the development site and includes recommendations on the achievement of the relevant internal noise criteria. The findings and recommendations of the report are summarised below.

Internal noise criteria – road and rail noise sources

In order to comply with the requirements of Manchester City Council, the design and installation of all façade elements must be such that noise levels within the residential dwellings due to typical noise sources such as road and rail traffic comply with the values given in Table 10 with purge vents closed.

Room Type	Spatially averaged equivalent continuous noise level
Bedrooms (23.00-07.00)	30 dB L _{Aeq} , 8 hours
Living Room & other living areas (07.00-23.00)	35 dB L _{Aeq} , 16 hours

Table 10: Maximum allowable intrusive noise levels in dwellings

In addition, typical individual noise events within bedrooms due to external noise sources must not exceed 45 dB L_{Amax} more than fifteen times between 23.00 and 07.00 hours.

Internal noise criteria – entertainment noise

Intrusive noise due to non-typical noise sources such as entertainment venues are subject to more stringent internal noise criteria. Music noise has a specific character and therefore the 'broadband' noise criteria detailed above would not be relevant where music noise was a principal feature of the external noise climate. As the Development is close to entertainment venues along Deansgate Locks, music noise ingress to the proposed living accommodation must be considered.

At the time of writing, condition 21 of the planning approval for the development (planning reference 111003/FO/2016/C1, as amended by 129701/NMC/2021) requires that entertainment noise within apartments due to noise egress from the nearby licensed premises (when measured as an 'LAeq' noise level) must be 10dB below the background noise level in apartments in the absence of entertainment noise (measured as an LA90 noise level).

However, it has been confirmed by Manchester City Council (email dated 12 April 2022 from Laura Miller of Manchester City Council to Matt Fisher of Fisher Acoustics Ltd) that compliance with the octave band noise levels identified in Section 3.6.1.2 'Entertainment Venues' of 'Planning & Noise, Technical Guidance', published by Manchester City Council would be acceptable in lieu of the compliance with the entertainment noise criterion of extant planning condition 21.

In particular, Section 3.6.1.2 of 'Planning & Noise, Technical Guidance', states that 'a criterion that may be applicable for new residential developments that are structurally separate from an existing entertainment venue in order for music noise to be 'inaudible/virtually inaudible' in apartments is as follows:

- 'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq), respectively'.

It should be noted that the measurement tolerance of 'Type 1' precision sound level meters of the type used to carry out sound level surveys, is +/- 1.5 dB at 63 Hz and 125 Hz and typically 1.4 dB to 1.6 dB between 250 Hz and 4000 Hz (ref. BS EN 61672-1:2013). These measurement tolerances must be taken into account when assessing any pre-completion commissioning measurements within the building. For instance, it could not be stated with certainty that a measured internal music level of 48.5 dB in the 63 Hz octave band would demonstrate a failure to comply with the recommendations of the above music noise criterion.

Measured external noise levels

Environmental noise measurements at the proposed site have identified the pre-existing environmental noise levels during the day and night at all elevations of the development.

The measurements included a weekend night time noise survey to determine the prevailing noise levels at the site due to the bars and venues within Deansgate Locks. The measurements were carried out by Fisher Acoustics over the following periods:

- 14:20 Wednesday 15 December 2021 to 11:20 Thursday 16 December 2021
- 16:00 Saturday 18 December 2021 to 10:40 Sunday 19 December 2021

The measurement locations used for the surveys are identified in **Error! Reference source not found.** and are representative of the positions of the façades of the proposed residential building. The measured noise levels can therefore be used to assess the expected internal noise levels within the proposed building.

The noise measurement locations were as follows:

- Location 1: 4.2 metres from the train viaduct and 21 metres from the site fence at the City Road Inn overlooking the railway line at a microphone height of 13.5 metres above site ground level,
- Location 2: 4.2 metres from the viaduct and 2.5 metres from the site fence at the City Road Inn, overlooking the railway line at a microphone height of 12 metres above site ground level
- Location 3: 5.2 metres from the kerb of Whitworth Street West, at a microphone height of 9 metres above site ground level, midway along the proposed site boundary.
- Location 4: 7.4 metres from the kerb of Whitworth Street West, at a microphone height of 12 metres above ground level, at the north-west corner of the proposed site boundary

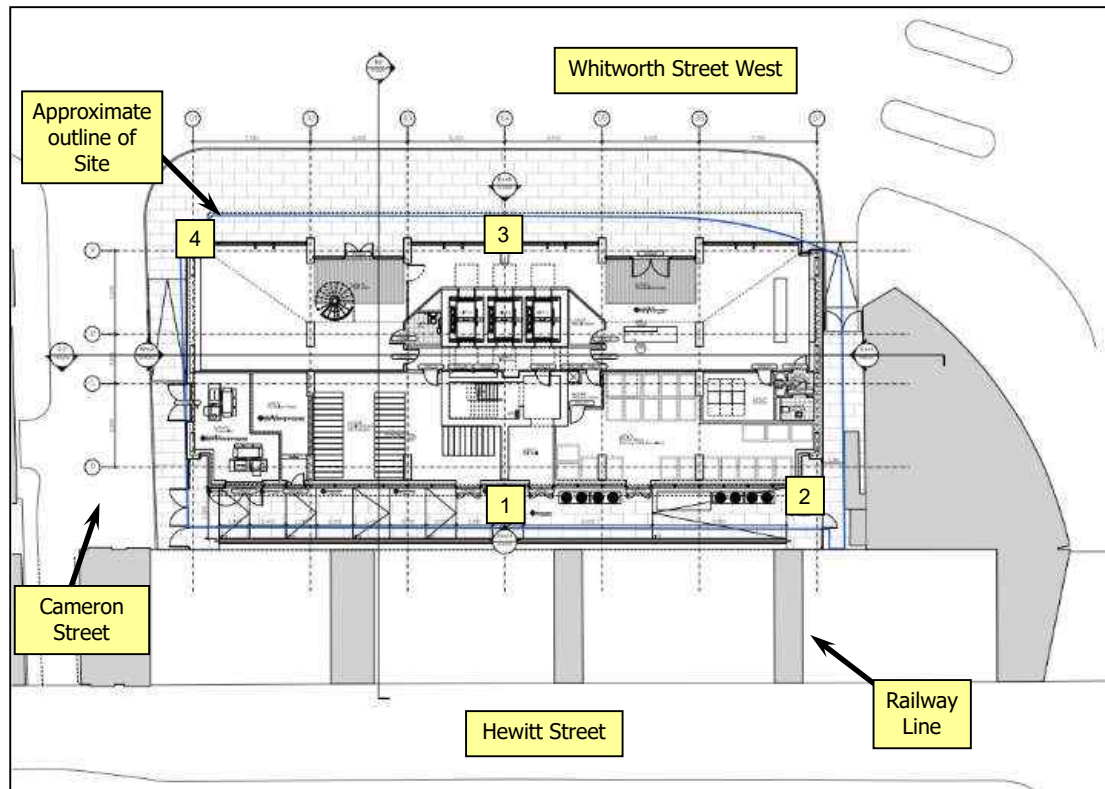


Figure 3: Noise survey measurement locations

The existing daytime and night time noise environment at the site is principally determined by vehicles on Whitworth Street West and by train movements on the adjacent rail viaduct. In addition, music noise egress from bars at Deansgate Locks caused elevated low-frequency noise levels at the site. During the night time noise survey on Saturday 18 December 2021, the entrance doors to the bars were generally only opened to allow the access and egress of patrons. This short-term, intermittent opening of doors for access and egress is in accordance with the premises licences for the bars at Deansgate Locks.

Typical maximum night time noise levels were generated by rail traffic on the viaduct and by road traffic on Whitworth Street West.

The broadband noise levels measured during the noise surveys are summarised in Table 11.

Measurement Location	Measured Noise Levels					
	Daytime (Defined as 7 am to 11 pm)			Night time (Defined as 11 pm to 7 am)		
	dB, LAeq	dB, LAmax	dB LA90	dB, LAeq	dB, LAmax	dB LA90
1 (15 Dec 2021)	71	62 to 97	55 to 74	69	53 to 111	49 to 72
1 (16 Dec 2021)	70	57 to 93	55 to 67	-	-	-
2 (15 Dec 2021)	69	62 to 96	54 to 74	67	51 to 107	49 to 73
2 (16 Dec 2021)	69	62 to 89	55 to 68	-	-	-
3 (18 Dec 2021)	68	63 to 102	56 to 69	67	58 to 101	51 to 67
3 (19 Dec 2021)	61	58 to 67	51 to 61	-	-	-
4 (18 Dec 2021)	68	65 to 103	56 to 67	66	57 to 101	51 to 67
4 (19 Dec 2021)	61	58 to 83	52 to 62	-	-	-

Table 11: Summary of measured environmental noise levels

The statistical noise levels ('LA_{max}' and 'LA₉₀') given in Table 11 show the range of noise levels measured over the sample periods. The quoted average (LA_{eq}) noise levels are the average noise levels measured over the full measurement periods in question at each measurement position.

Figure 4 shows the measured low frequency external noise levels measured at location 4. It can be seen that the 'Leq' average levels at 63 Hz and 125 Hz increased by approximately 5dB after approximately 22.00 hrs. This increase was as a consequence of low frequency music noise egress from the bars at Deansgate Locks.

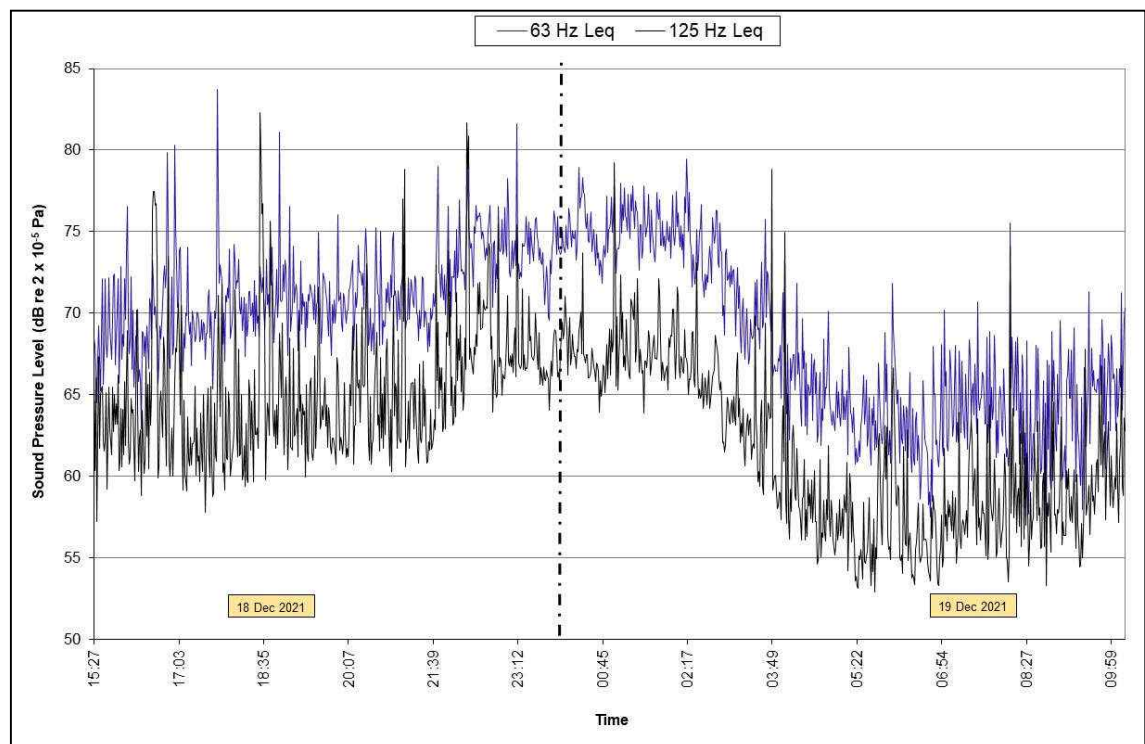


Figure 4: Measured low frequency 'Leq' noise levels at Position 4, Sat 18 Dec 2022 to Sun 19 Dec 2022

The results of the noise survey have been used to develop a 3D model of the site, from which the external noise levels across the facades of the proposed residential building have been calculated. The 3D model includes the buildings and structures around the proposed development site, including the train viaduct and the arches at Deansgate Locks.

Error! Reference source not found. shows the calculated free-field noise levels incident upon the facades, viewed from the north west.

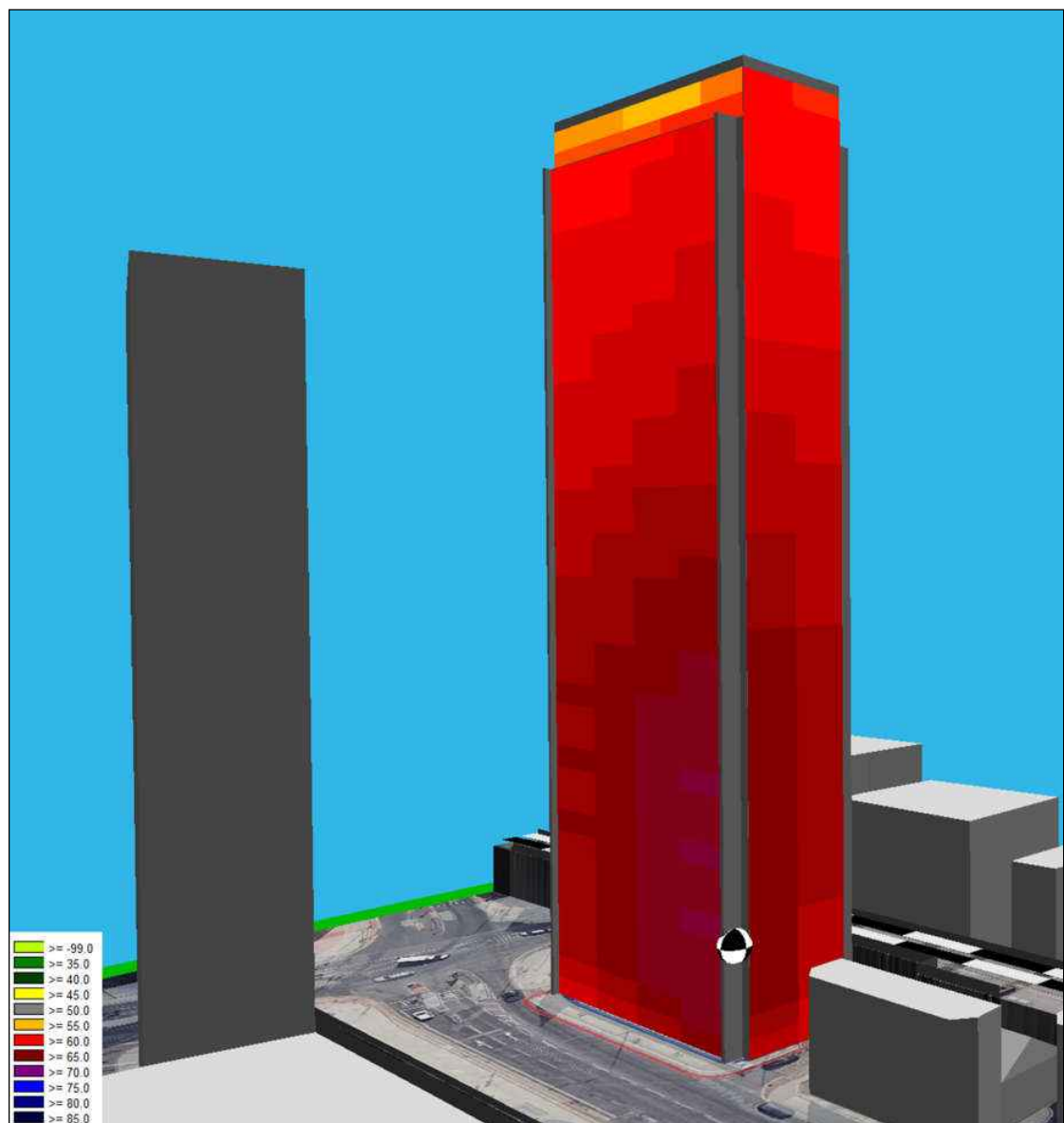


Figure 5: 3D model of development proposals & predicted incident noise levels – north & west facades

Error! Reference source not found. shows the calculated free-field noise levels incident upon the facades, viewed from the south west.

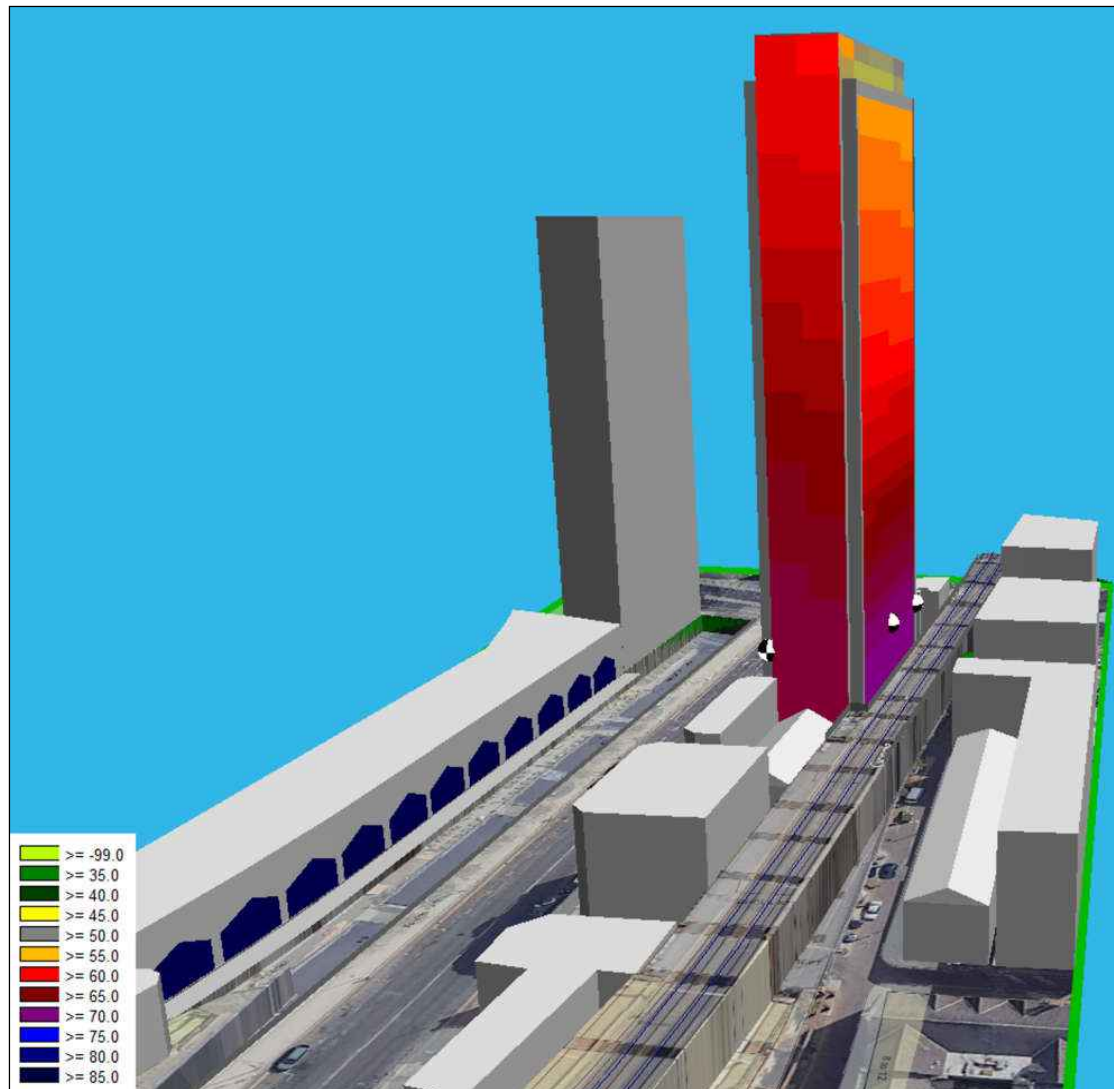


Figure 6: 3D model of development proposals & predicted incident noise levels – south & west facades

Error! Reference source not found. shows the calculated daytime free-field LAeq train noise levels incident upon the facades, viewed from the south west.

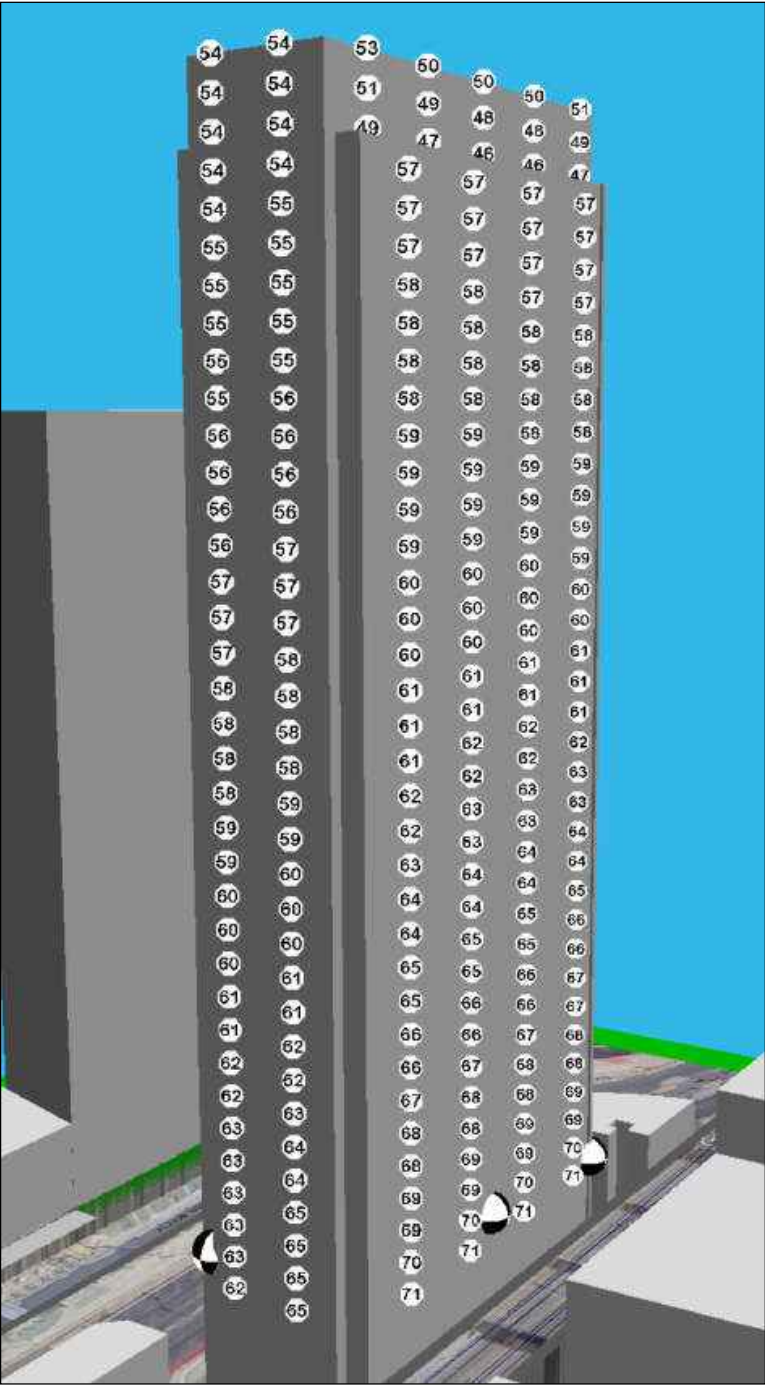


Figure 7: Calculated daytime noise level (LAeq) due to trains – south and west façades

Error! Reference source not found. shows the calculated night-time free-field LAeq train noise levels incident upon the facades, viewed from the south west.

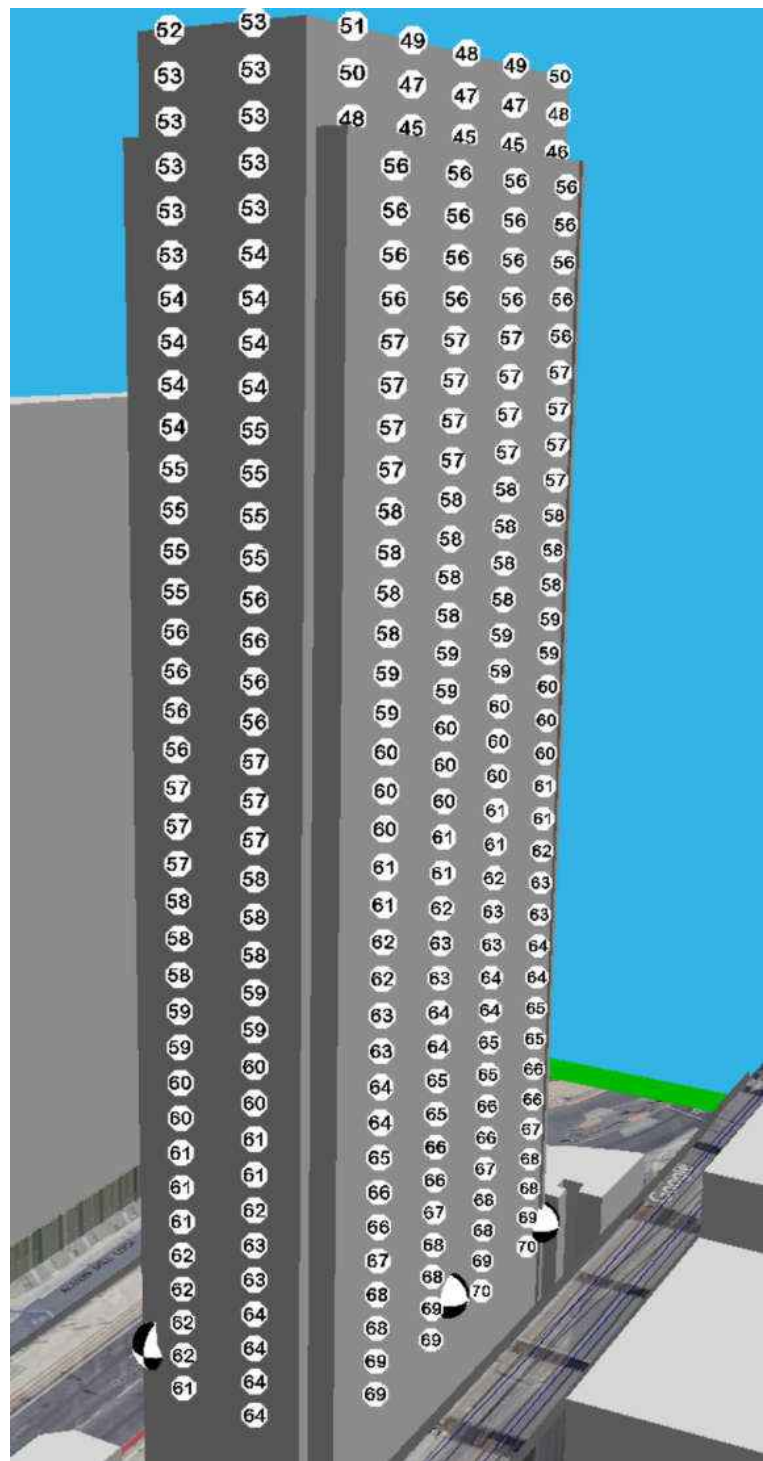


Figure 8: Calculated night time noise level (LAeq) due to trains – south and west façades

Error! Reference source not found. shows the calculated night-time free-field LAeq noise levels incident upon the facades due to music noise breakout from the bars at Deansgate Locks, viewed from the north east.

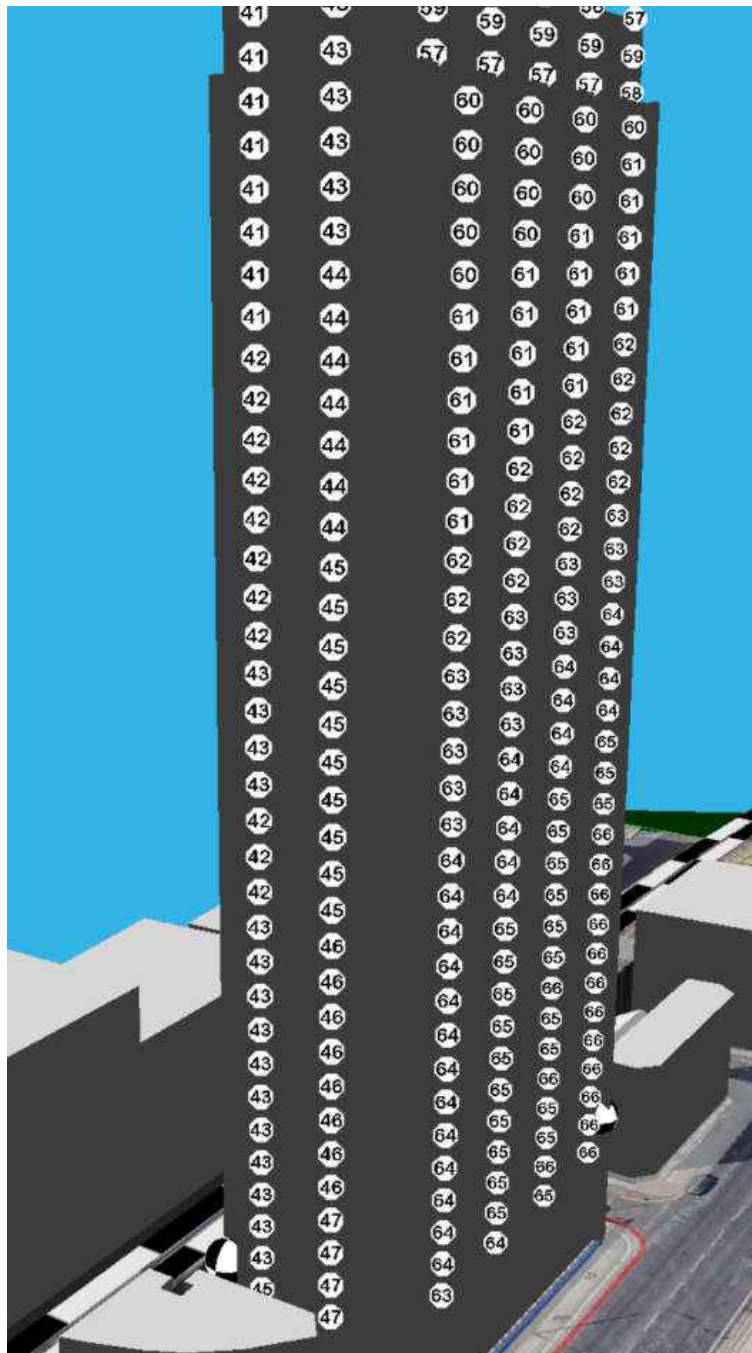


Figure 9: Calculated night time noise level (LAeq) due to bars– north and east façades

Error! Reference source not found. shows the calculated night-time free-field LAeq noise levels incident upon the facades due to music noise breakout from the bars at Deansgate Locks, viewed from the south west.

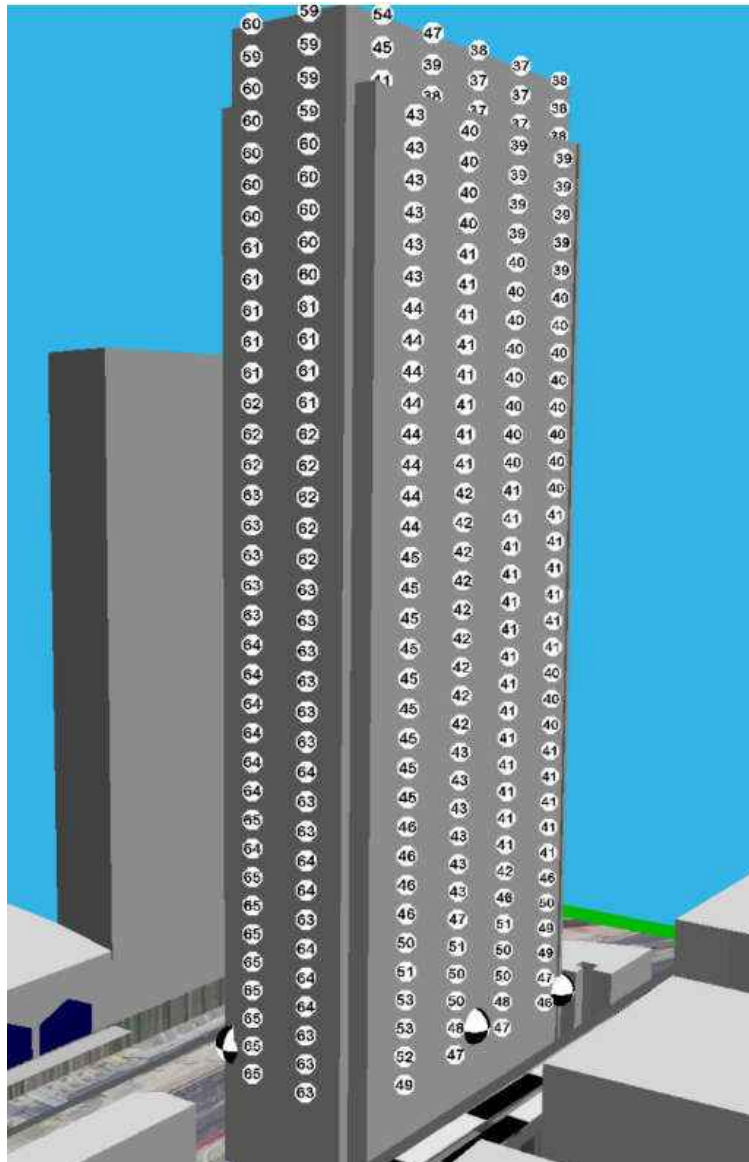


Figure 10: Calculated night time noise level (LAeq) due to bars– south and west façades

Noise Ingress

By taking into account the measured and calculated levels of noise at the façades of the proposed development, the areas of façade elements and the likely reverberation time of the apartment rooms, the required sound insulation performance of the facade elements to achieve the target internal noise criteria can be determined.

Design recommendations

Calculations of noise ingress have been carried out to determine the façade specifications to achieve the applicable internal noise criteria. The calculations are based upon the glazing areas and room sizes and layouts identified on drawings issued to Fisher Acoustics on 13 July 2022.

CURTAIN WALL VISION PANELS

It has been determined that a range of acoustic specifications for the vision panels to the proposed habitable rooms will be required to achieve the recommended internal noise levels. Figures 11 to 14 identify the locations of the various recommended specifications. The vision panel acoustic specifications are detailed below.

Table 12 identifies the minimum recommended sound reduction index of the vision panel specifications referred in Figures 11 to 14. The recommended performance values in Table 12 relate to the composite performance of the glazing and the curtain wall frames and seals.

Vision panel type	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Type A	35	44	48	55	55	58	63
Type B	28	31	40	44	45	48	52
Type C	28	29	36	43	44	46	50
Type D	28	28	36	36	39	45	50

Table 12: Minimum Recommended Sound Reduction Index of vision panels, including frame

Examples of the glass thicknesses and type that are likely to be required to allow compliance with the above acoustic performance values, based on a triple glazed unit to achieve thermal requirements, are as follows:

- Type A: 16.8mm acoustic laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm acoustic laminate / secondary glazing of 14.8mm acoustic laminate spaced a minimum of 200 mm from the primary unit. The secondary glazing frame must be supported independently of the primary vision panel frame.
- Type B: 16.8mm acoustic laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm acoustic laminate
- Type C: 16.8mm acoustic laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm laminate
- Type D: 16.8mm laminate/ 16mm cavity/ 5m float/ 16mm cavity/12.8mm laminate

Other considerations may require that, in complying with the performance values given in Table 12, glazing thickness and cavity sizes differ from the examples given above.

Given the very high performance requirements for the vision panels, it is considered to be imperative that the curtain wall sub-contractor conducts laboratory testing to demonstrate that the proposed glazing and framing configurations achieve the acoustic requirements identified above.

It should be noted that, given the above specifications to Living Rooms, the calculated maximum noise levels due to train pass-bys are expected to lie between 50 dB LA_{max} and 60 dB LA_{max} in Living Rooms at the lower levels of the south elevation. An 'LA_{max}' criterion is not stipulated in published guidelines for living rooms. The above noise levels are therefore provided for information only. As a subjective guide, noise maxima in Living Rooms due to train pass-bys are expected to subjectively sound twice as loud as noise maxima in bedrooms due to train pass-bys.

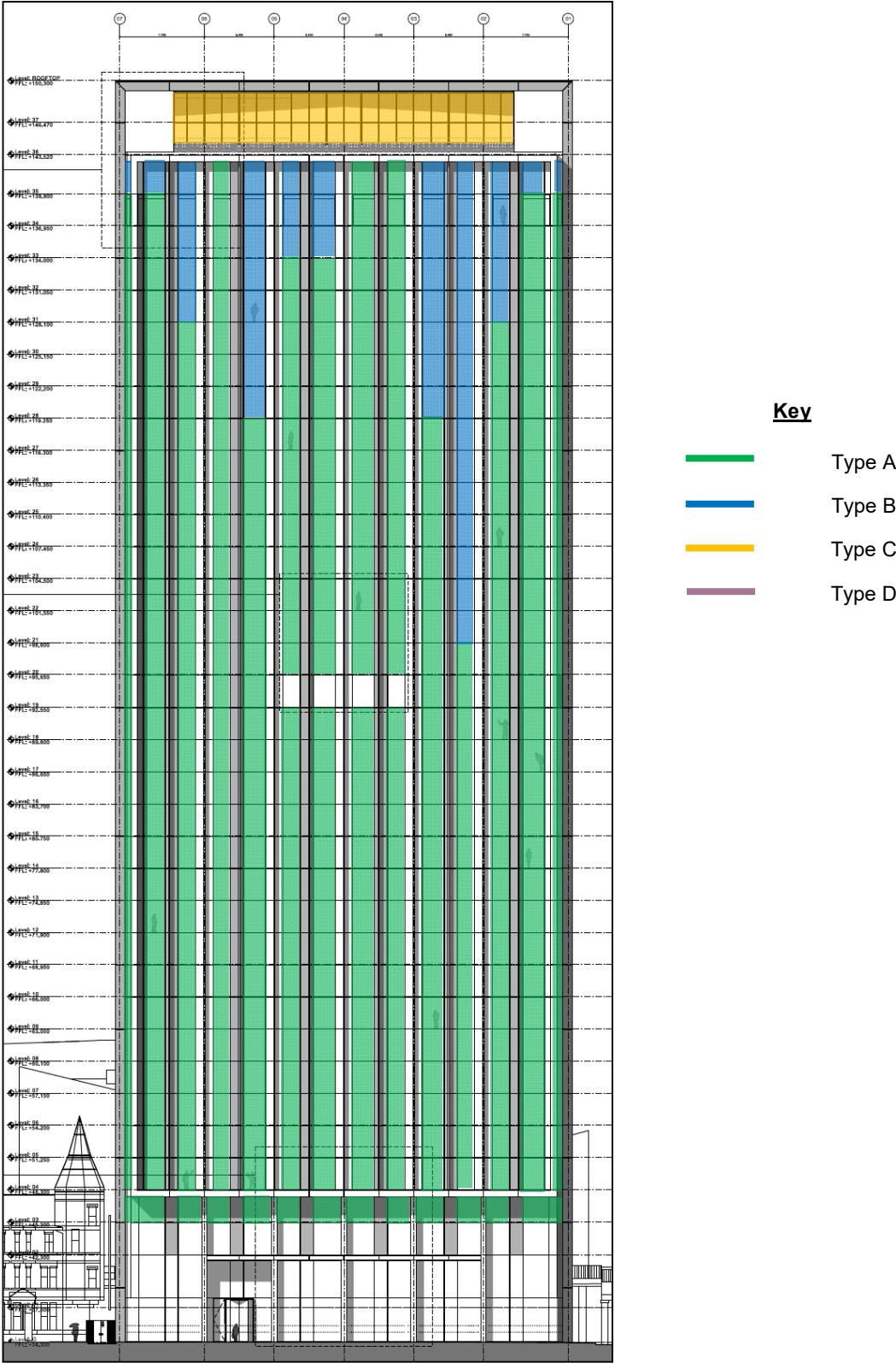


Figure 11: Glass specification location plan, Whitworth Street elevation (North Elevation)

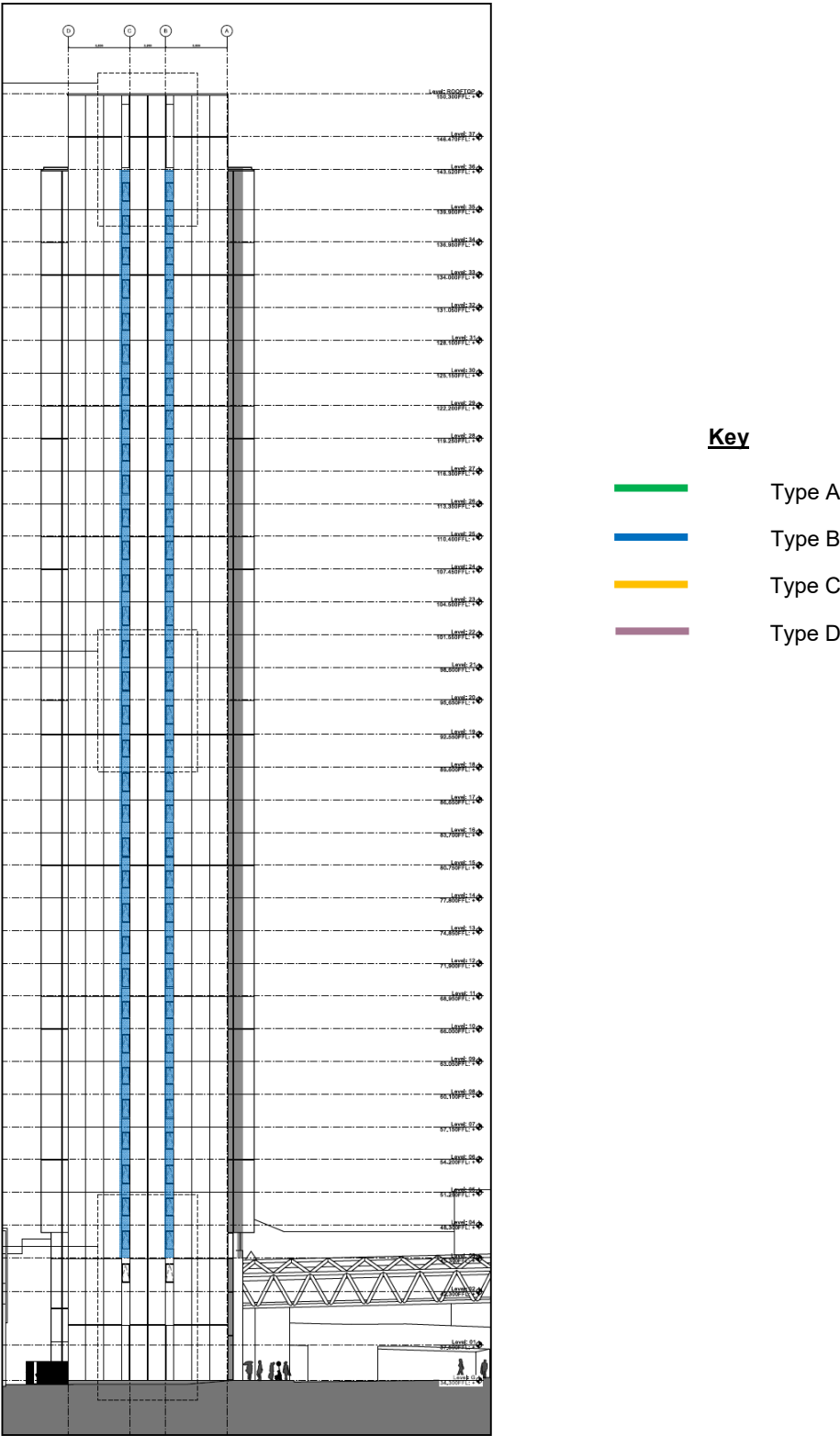


Figure 12: Glass specification location plan, East Elevation

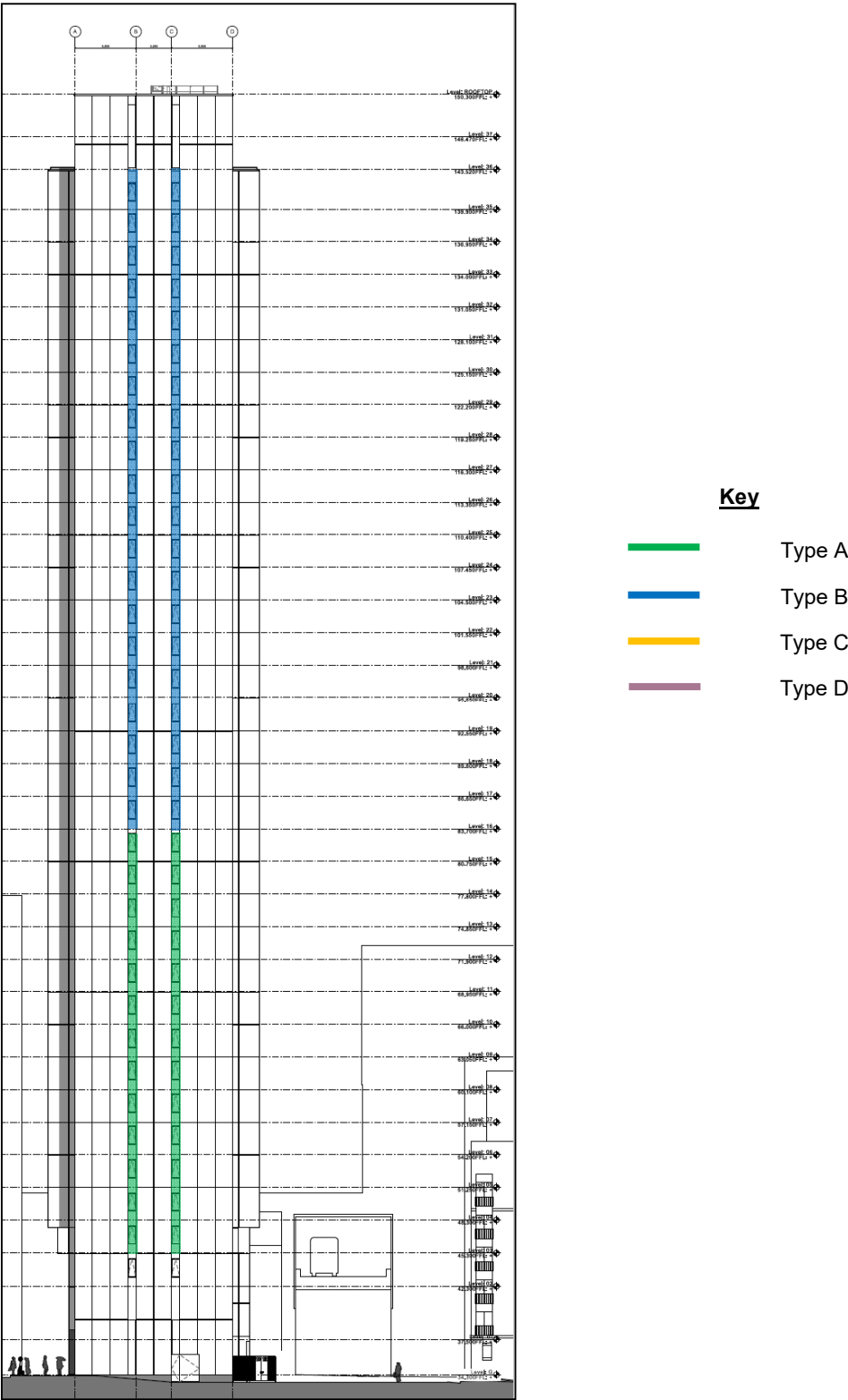


Figure 13: Glass specification location plan, West Elevation

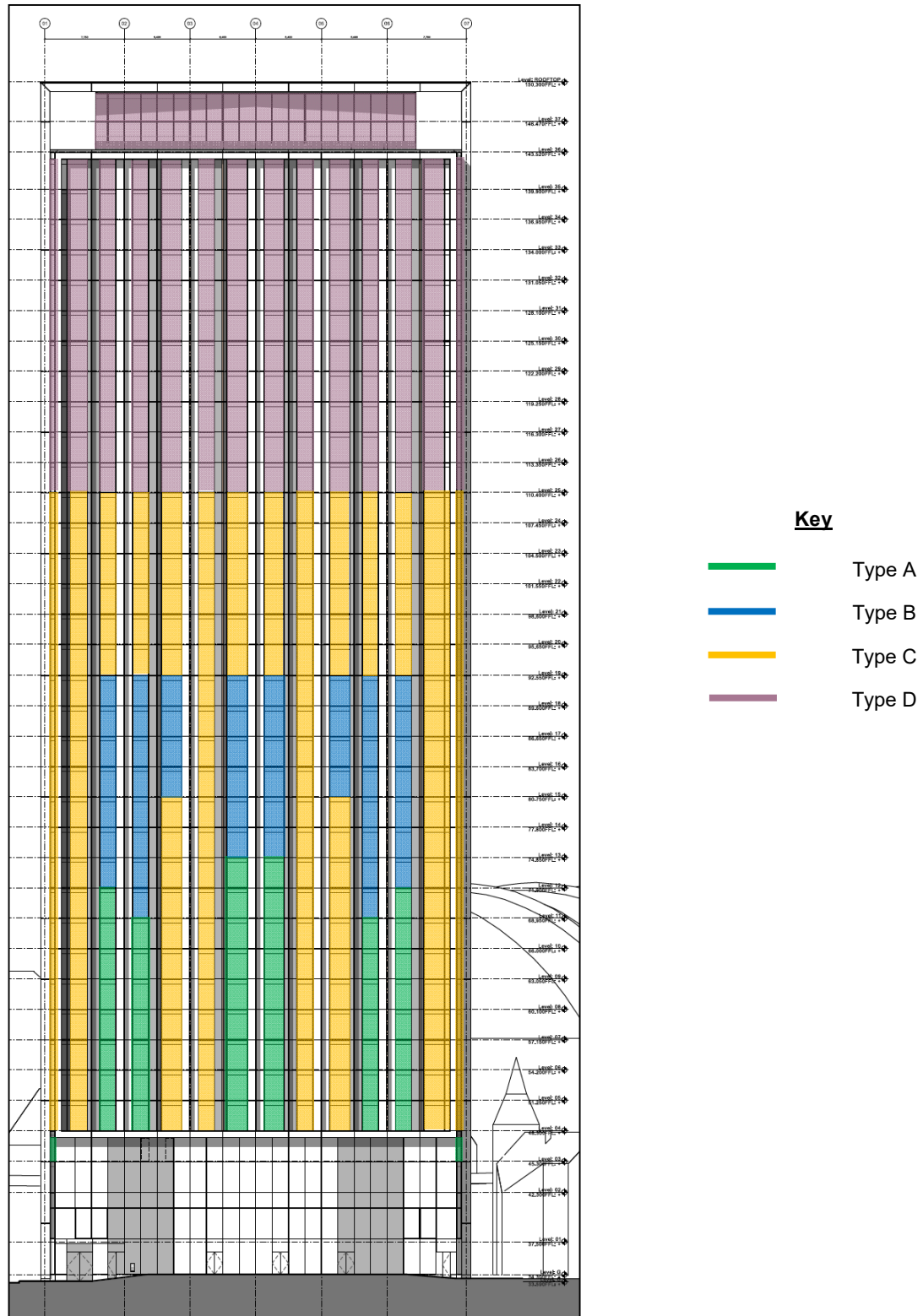


Figure 14: Glass specification location plan, South Elevation

CURTAIN WALL PURGE PANELS

Table 13 identifies the minimum recommended sound reduction index of the purge panels. Figures 15 and 16 identify the recommended locations of the purge panel specifications. The recommended performance values in Table 13 relate to the composite performance of the purge panel and its associated frame and seals.

Purge Panel Type	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Type i	36	44	45	45	45	53	53
Type ii	25	35	43	45	45	53	53

Table 13: Minimum Recommended Sound Reduction Index of purge panels, including frame

Given the very high performance requirements for the purge panels, it is considered to be imperative that the curtain wall sub-contractor conducts laboratory testing to demonstrate that the proposed panel and framing configurations achieve the acoustic requirements identified above.

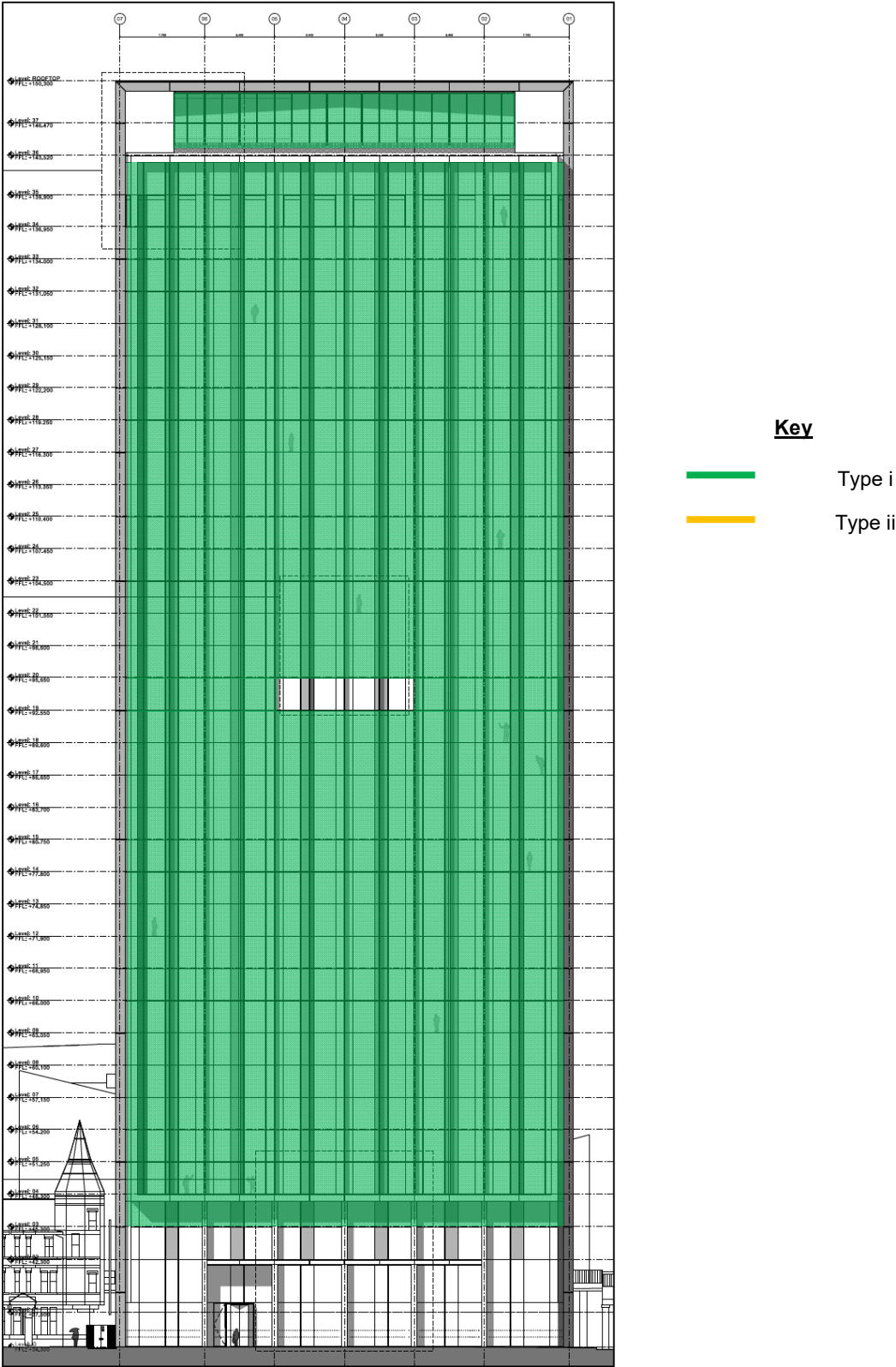


Figure 15: Purge Panel specification location plan, Whitworth Street elevation (North Elevation)

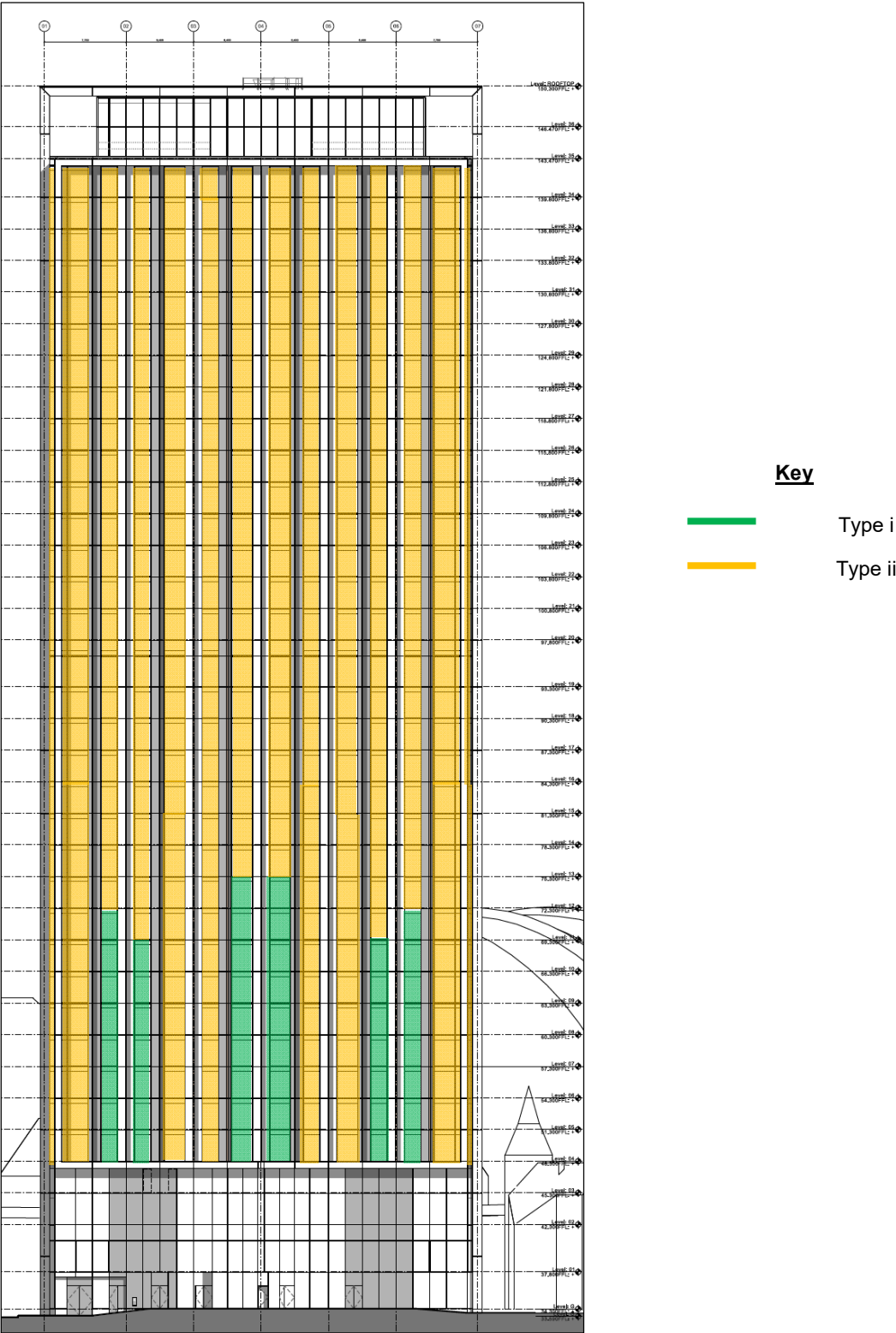


Figure 16: Purge Panel specification location plan, South Elevation

FIXED NON-VISION PANELS

Table 14 identifies the minimum recommended sound reduction index of the fixed non-vision areas of the curtain wall. Figures 17 to 20 identify the recommended locations of the specifications. The recommended performance values in Table 14 relate to the composite performance of the fixed non-vision areas, the associated frame and internal drylining.

ELEMENT	Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Curtain wall non-vision panel - NG1	36	44	45	45	45	53	53
Curtain wall non-vision panel - NG	25	35	43	45	45	53	53
Brick Slip - BS	38	50	60	65	65	65	65

Table 14: Minimum Recommended Sound Reduction Index of external wall construction

Given the very high performance requirements for the fixed non-vision panels, it is considered to be imperative that the curtain wall sub-contractor conducts laboratory testing to demonstrate that the proposed panels, framing and associated drylining achieve the acoustic requirements identified above.

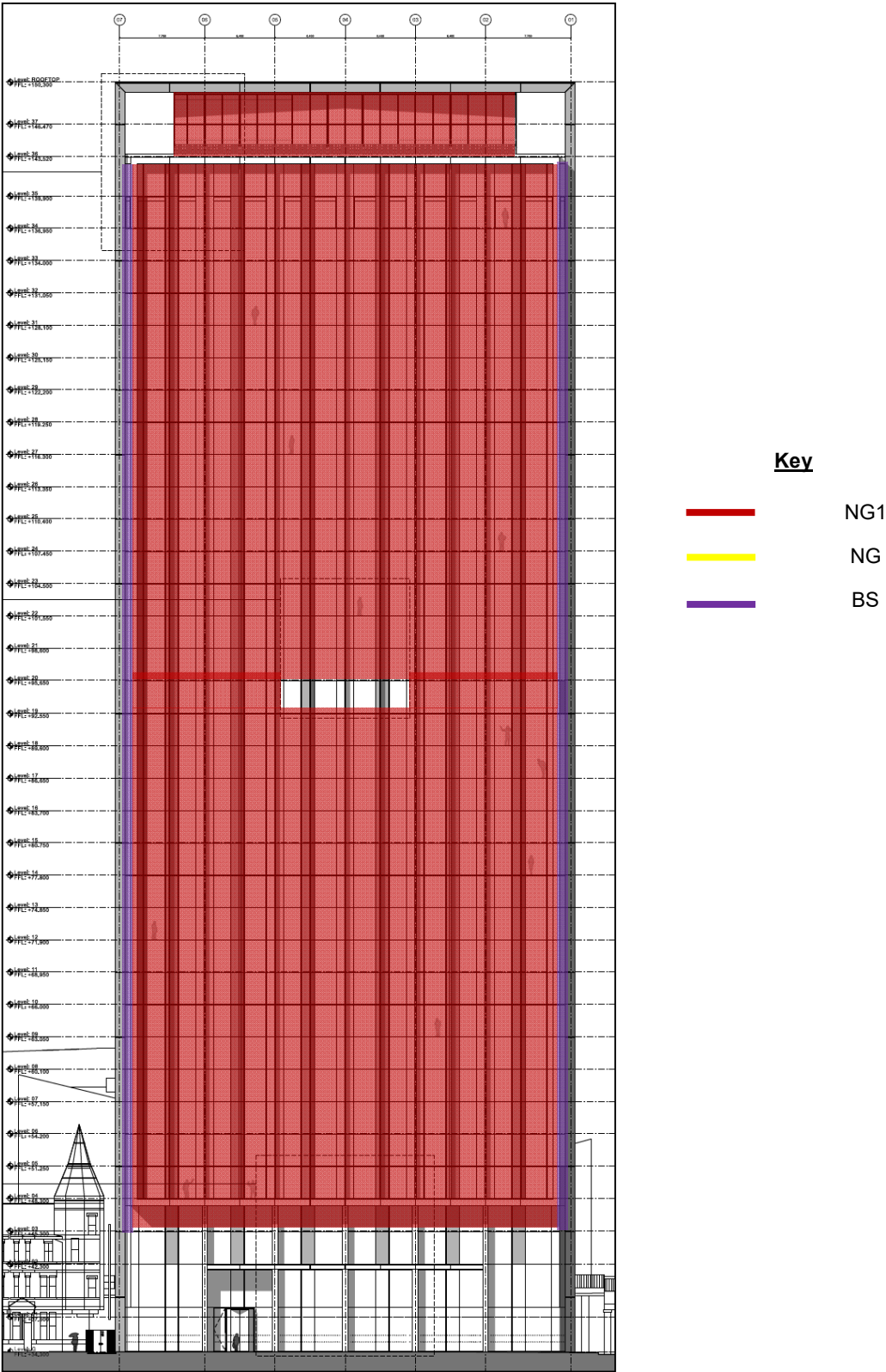


Figure 17: Wall specification location plan, Whitworth Street elevation (North Elevation)

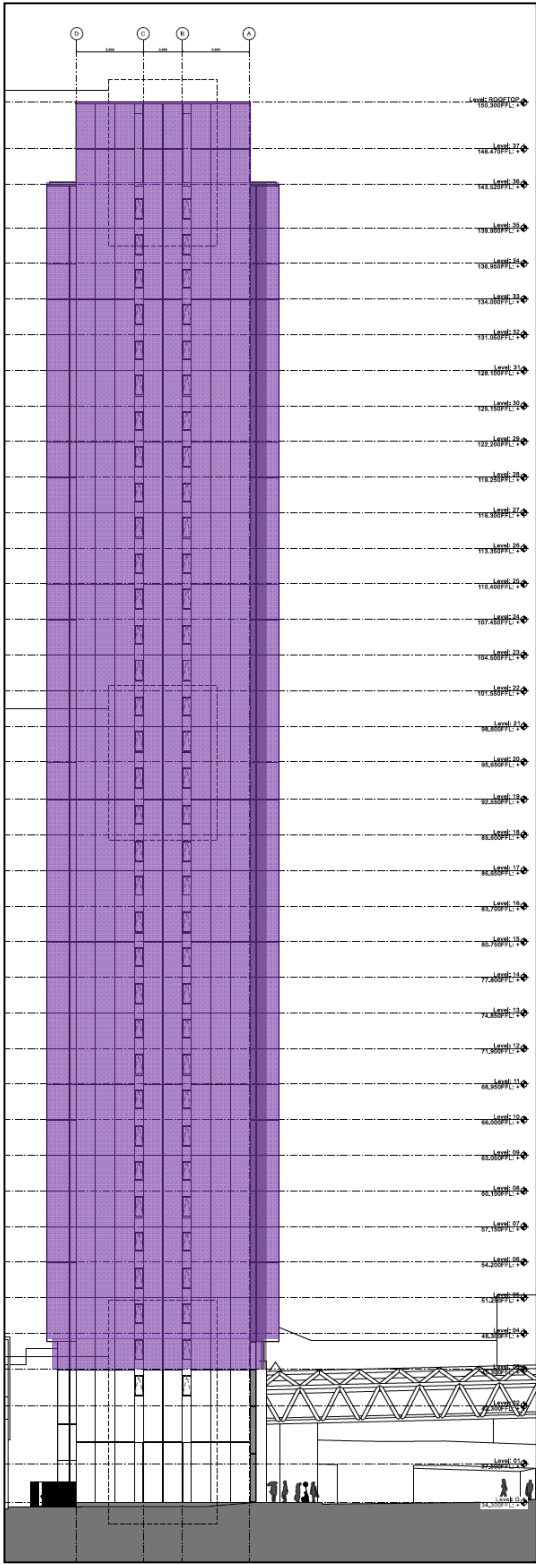


Figure 18: Wall specification location plan, East Elevation

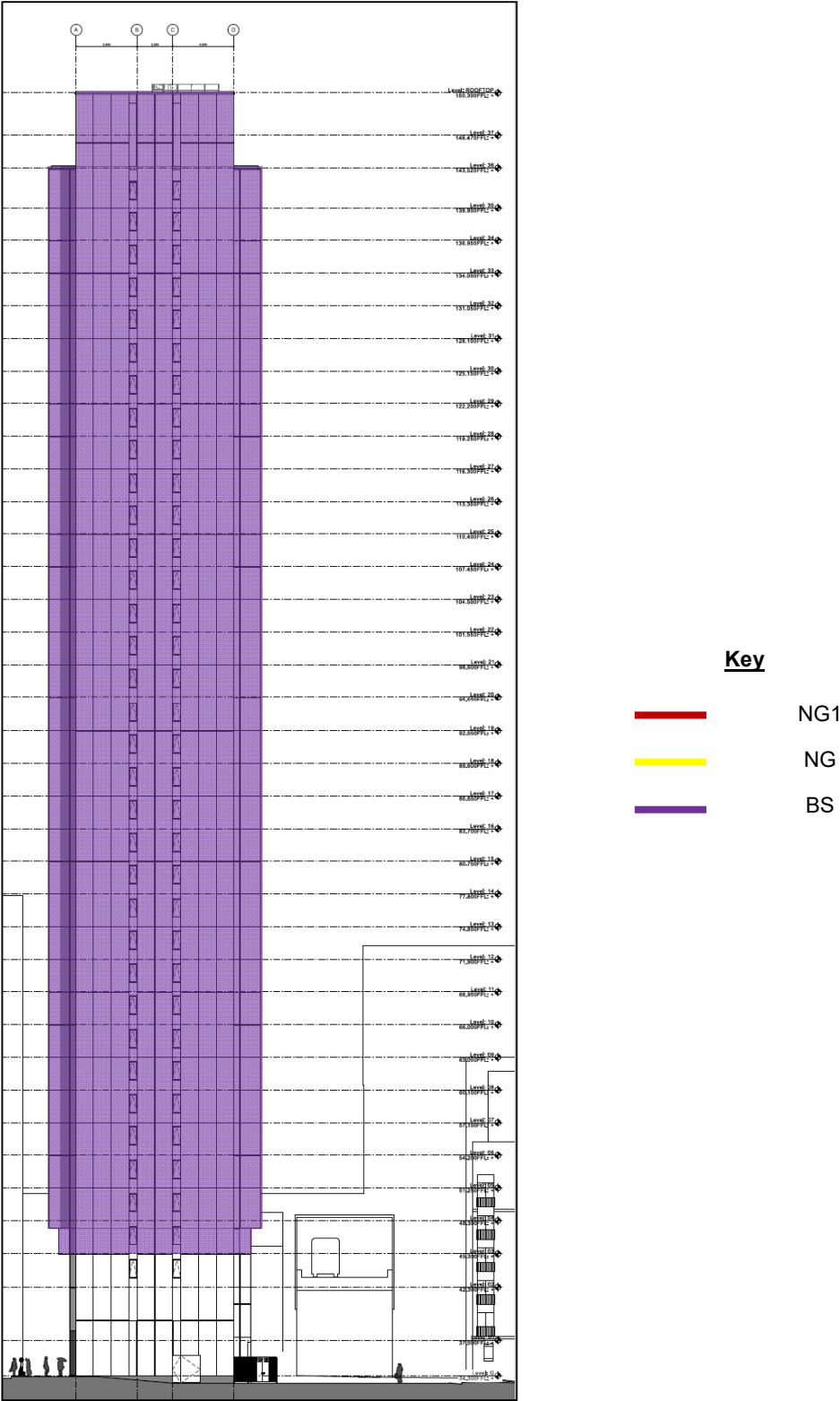


Figure 19: Wall specification location plan, West Elevation

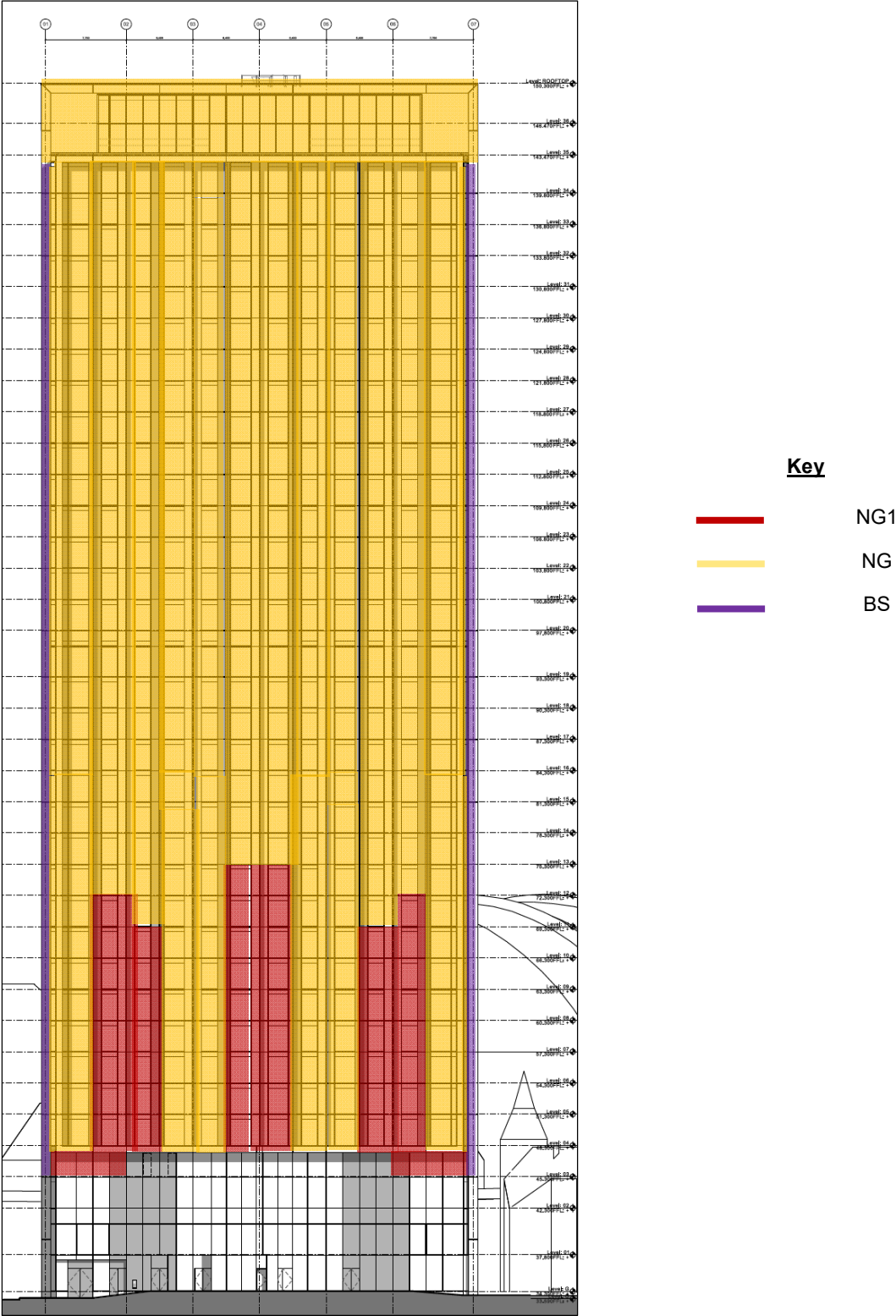


Figure 20: Wall specification location plan, South Elevation

Roof

The principle acoustic elements of the proposed roof of the development are a concrete slab and a ceiling that comprises a single layer of 12.5 mm wallboard fixed to a suspended metal frame. The expected minimum weighted sound reduction index of the roof construction is 60 dB Rw. This performance is fully commensurate with the achievement of the target internal noise levels within the proposed serviced apartments.

Conclusion

Compliance with the recommended sound insulation performances of the façade elements is expected to allow full compliance with the daytime and night time 'average' noise level criteria identified above in relation to noise from the road and rail network.

Given the recommended sound insulation performances given above for the façade, compliance with the recommendations of the World Health Organisation in relation to maximum (L_{Amax}) internal noise events is expected. In particular, if full compliance with the recommended sound insulation performances for the curtain wall elements is achieved, then based on noise survey data gathered in December 2021, there would be fifteen train pass-by events between 11pm and 7am that generated an internal noise level greater than 45dB L_{Amax} in the bedrooms on the lower levels of the south elevation. This is in accordance with the technical guidance of Manchester City Council. These fifteen 'excess' events are predicted to typically generate internal noise levels of up to 50 dB L_{Amax}.

Given full compliance with the recommended sound insulation performances for the façade elements, the expected noise levels in apartments comply with the recommendations of Section 3.6.1.2 'Entertainment Venues' of 'Planning & Noise, Technical Guidance', published by Manchester City Council, in that music noise levels in the 63Hz and 125Hz octave centre frequency bands are not expected to exceed 47dB (+/- 1dB) (L_{eq}) and 41dB (L_{eq}), respectively in habitable rooms. +

It should be noted that if noise levels of 47 dB L_{eq} and 41 dB L_{eq} in the 63Hz and 125Hz octave centre frequency bands respectively are achieved in accordance with the technical guidance of Manchester City Council, low level music noise is expected to be just audible in apartment rooms.

An assessment of groundborne vibration due to train movements on the rail viaduct that lies on the southern perimeter of the site indicates that no mitigation measures are required in order to maintain residential amenity in relation to feelable vibration. Structureborne noise levels in apartments due to train movements are expected to allow compliance with the requirements of the planning approval in relation to average and maximum noise levels in apartments.

10.0 LABORATORY ACOUSTIC TESTING REQUIREMENTS

It is recommended that the Sound Reduction Index of the following elements be tested in a UKAS-accredited laboratory (or European equivalent) in accordance with BS EN ISO 10140-2: 2021 and rated in accordance with BS EN ISO 717-1: 2020:

- Type A Vision panel with frame
- Type B Vision panel with frame
- 'NG1' specification openable purge panel with frame
- 'NG' specification openable purge panel with frame
- 'NG1' fixed non-vision panel with frame
- 'BS' specification external wall, including external cladding

The tested size of the vision panel must be the same or very similar to the proposed dimensions of the largest panel to be installed on the building.

The tested panel size of the purge panels and fixed non-vision panels must be representative of the proposed dimensions of the panels to be installed on the building.

The airborne flanking transmission of the following conditions should be measured in accordance with BS EN ISO 10848-2: 2017 'Acoustics-laboratory measurement of flanking transmission of airborne and impact sound between adjoining rooms' and rated in accordance with BS EN ISO 717-1: 2020:

- Apartment to Apartment (minimum performance requirement of 55dB $D_{n,f,w}$)
- Non-residential to Apartment (minimum requirement of 65dB $D_{n,f,w}$)

The tested curtain wall panel must include the largest vision panel to be installed on levels 4 to 35.

11.0 POTENTIAL WIND NOISE GENERATION DUE TO PERFORATED PANELS

It is intended that perforated metal panels will visually obscure the solid purge vent panels to apartments.

It is known that wind-induced tonal noise can be generated at perforated plates given certain angles of incidence and wind speed. However, studies have shown that perforation diameters that are ten times the thickness of the panel are preferred to avoid pure tones, although broadband turbulence noise due to reasonable high wind speeds can be created at any perforated plate.

The risk of tonal noise generation can be reduced by avoiding a repeating perforation pattern and/or varying the perforation size (whilst maintaining a suitable perforation diameter).

It is recommended that, as a minimum, a desktop assessment is carried to determine the potential risk of wind-induced tonal noise due to the proposed perforation pattern.

12.0 SOIL & VENT PIPES AND RAINWATER PIPES

Approved Document E of the Building Regulations requires that all pipework that passes through party floors must be separated from habitable rooms by 'material' that has a minimum mass of 15 kg/m². This requirement can be achieved by two layers of 12.5 mm wallboard. In addition, the Document requires that the encasement around pipework be lined internally with 25 mm thick unfaced (i.e. not foil-faced) mineral wool (minimum density 10 kg/m³).

If pipes drop from or to habitable rooms in apartments and then run over horizontally within ceiling voids above apartments, where the ceiling comprises only a single layer of plasterboard, the most cost-effective method of complying with Approved Document E may be to lag the pipe with a proprietary pipe lagging that exhibits a minimum mass per unit area of 5 kg/m².

The acoustic encasement or lagging of pipework (SVPs and RWPs) within the non-residential areas would reduce noise breakout from the pipe due to flow within the pipe. With no encasement or lagging, noise from the pipe would be easily audible in the non-residential areas unless there was a reasonably high level of background noise in the space. It is therefore recommended that the encasement specification identified above (i.e. two layers of 12.5 mm wallboard with 25 mm thick unfaced (i.e. not foil-faced) mineral wool within the encasement) is installed around the main vertical runs of pipework within any front-of-house and noise-sensitive non-residential areas.

To reduce noise breakout from horizontal or offset runs of pipework within front-of-house and noise-sensitive non-residential areas, it is recommended that such pipework is acoustically lagged with a proprietary heavy duct lagging with a minimum mass of 10kg/m² as an alternative to plasterboard encasement. A suitable product is 50 mm thick 'Technowrap 2' by CMS Danskin.

In order to maintain compliance with Approved Document E, It is recommended that any access hatch within a plasterboard encasement of pipework achieves a minimum weighted sound reduction index of 30dB Rw.

Pipe penetrations through the slab must be acoustically sealed. This can be achieved with an expanding intumescent/intumescent.

13.0 INTERNAL BUILDING SERVICES NOISE

Residential Rooms

The apartments of the proposed development are to be provided with continuously running supply and extract ventilation in order to achieve the background ventilation requirements of Approved Document F of the Building Regulations.

It is recommended that internal noise levels within residential rooms due to the operation of all building services plant that directly serves the space in question do not at any time exceed the values given in Table 15.

Room Type	Spatially averaged noise level (Leq)
Bedrooms (MVHRs in trickle and 'part F' boost mode)	NR 25
Living Rooms (MVHRs in trickle and 'part F' boost mode)	NR 30
Bathrooms (MVHRs in trickle and 'part F' boost mode)	NR 40

Table 15: Maximum allowable internal noise levels due to building services plant

Upon final selection of the MVHR units, noise breakout from the units must be assessed to confirm that noise transfer to the apartment rooms allows compliance with the values given in Table 15. Similarly, the acoustic requirements of any ductwork silencers to control MVHR fan noise must be determined.

It is also recommended that internal noise levels due to the operation of all non-emergency building services plant that does not directly serve the space in question do not at any time exceed the values given in Table 16.

Room Type	Spatially averaged noise level (Leq)
Bedrooms	NR 20
Living Rooms	NR 20

Table 16: Maximum allowable internal noise levels due to building services plant

It is recommended that vibration within residential rooms due to building services plant is imperceptible. Vibration in all other areas should not exceed the lower bound of 'low probability of adverse comment' defined in BS6472-1: 2008.

Non-Residential Rooms

It is recommended that internal noise levels within non-residential rooms due to the operation of all non-emergency building services plant do not at any time exceed the values given in Table 17. Where required, building services plant should be installed on suitably-specified anti-vibration mounts such that compliance with the internal noise criteria given above is achieved.

Room Type	Spatially averaged noise level (Leq)
Common Corridors	NR 40
Reception	NR 40
F&B Offer	NR 40
WCs	NR 40
Cycle Store	NR 50
Refuse Store	NR 50
Amenity Space – Gym	NR 40
Amenity Space – Lounge	NR 35
Amenity Space – Cinema Room	NR 30
Plant rooms	NR 65

Table 17: Maximum allowable internal noise levels due to building services plant

It is expected that all M&E plant would be provided with appropriately specified anti-vibration mounts to minimise the transmission of structureborne noise to the apartments and to achieve the building services noise limits stated in Tables 15, 16 and 17.

Lift noise

It is recommended that noise levels due to operation of lifts (excluding lift announcement messages and tones) when measured in the lift lobbies at 1 metre from the face of lift door face at a height of 1.5 metres above the finished floor level does not exceed a sound pressure level of 55dB LAeq, 5 secs at any time.

External noise ingress via MVHR ductwork

In order to achieve the internal noise criteria stated detailed above, it is considered that in-line ductwork attenuators would need to be introduced to the intake and exhaust of the proposed apartment MVHR systems to control noise ingress via ductwork to the north and south elevations. The attenuators should be installed as close as possible to the intake and exhaust louvres.

Additionally, in order to reduce the radiation of intrusive noise from the MVHR ductwork, it is expected that it will be necessary to acoustically lag the ducts between the louvre and the attenuator with a product such as 'Technowrap 2' by CMS Danskin. Alternatively, it may be possible to control noise ingress to the apartments by constructing a plasterboard bulkhead to restrict noise transfer to the apartment rooms from the length of untreated duct at the back of the louvre.

Table 18 identifies the minimum recommended insertion loss of the attenuators to the intake and exhaust of the proposed MVHR systems to control noise ingress via ductwork to the north and south elevations.

Elevation, level	Insertion Loss (dB) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
South elevation Levels 3 to 9	4	5	10	19	27	20	6
South elevation Levels 10 to 14	3	4	7	13	20	15	1
South elevation Levels 15 to 29	1	1	2	6	10	10	0
South elevation Levels 3 to 14 (3.07)	0	0	3	11	21	5	0
South elevation Levels 20 to 37 (3.06)	0	0	0	6	15	0	0

Table 18: Minimum Recommended Insertion Loss of intake and exhaust attenuators

Whilst it may be possible to achieve the above figures with appropriate lengths of acoustic flexible ductwork or plastic-walled attenuators, lightweight ductwork may lead to elevated noise levels in the room due to noise breakout through the duct wall. Acoustic flexible ductwork may also cause issues relating to increased static pressure which can lead to increased system noise.

It may therefore be necessary to specify a traditional metal-walled silencer. For instance both Caice and Lindab can supply attenuators that can meet the performances stated above.

As the detailed design of the MVHR system, including potential changes to the layout of ductwork, the acoustic requirements of the in-line ductwork silencers and duct lagging must be confirmed.

14.0 EXTERNAL NOISE LEVELS DUE TO BUILDING SERVICES

Planning Condition 22 of the Planning Approval for the development states that:

- *“Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating noise level of 5dB (LAeq) below the existing background (LA90) at the nearest noise sensitive location.*

The scheme shall be submitted to and approved by the City Council as local planning authority before the use commences; and works approved shall be implemented before the use commences”.

To comply with the Planning Condition, the measured background noise levels around the site must be used to establish the acceptable level of noise from building services plant serving the development.

Non-emergency plant

Table 19 identifies the allowable combined rating noise level at the windows of the nearest residential receptors to the development, due to all simultaneously-operating non-emergency building services plant and equipment.

Location	Rating noise level (dB LAeq)	
	Daytime (07:00 hrs to 23:00 hrs)	Night time (07:00 hrs to 23:00 hrs)
10-12 WSW North elevation	50	46
10-12 WSW South elevation	50	45

Table 19: Environmental noise limits for non-emergency building services plant

Compliance with the noise limits given in Table 19 for the elevations of 10-12 Whitworth Street West will allow compliance with environmental noise limits at the pre-existing residential properties in the area.

Emergency plant

Any emergency plant at the development is expected to only operate during emergencies and during periodical test runs (perhaps test runs of thirty minutes every four weeks). On this basis, it is not considered appropriate to require emergency plant to comply with the noise limits for continuously operating non-emergency plant. It is therefore suggested that the noise limit applicable for any emergency plant is based on the achievement of a noise level at residential properties that is no greater than 10dB above the prevailing background noise level (measured as an LA90).

It is therefore recommended that the noise level at any residential façade during operation of any emergency plant serving the proposed development does not exceed the daytime noise levels given in Table 20.

Location	Daytime noise level (dB LAeq)
10-12 WSW North elevation	65
10-12 WSW South elevation	60

Table 20: Environmental noise limits for emergency building services plant

15.0 COMMON DUCTWORK

Common ductwork that serves adjacent spaces provides a secondary route for noise between the rooms. In order to achieve the required sound insulation targets between the ancillary rooms and amenity spaces it may be necessary to introduce acoustic flexible ductwork or proprietary crosstalk attenuators to each ductwork branch to noise sensitive or noise-producing rooms.

As the building services design progresses, an assessment of the proposed ductwork layouts will be required to determine the specification of any crosstalk attenuation.

16.0 STRUCTURE BORNE NOISE IN APARTMENTS DUE TO TRAIN MOVEMENTS

Groundborne vibration induced by train movements can generate audible structureborne noise within a building, which could cause adverse impact. An assessment of the potential levels of structureborne noise in apartment rooms due to vibration induced by train movements has been carried out by Fisher Acoustics Ltd. The results of the assessment are detailed in 'Whitworth Street West, Manchester, Environmental Noise & Vibration Study', report reference PR0668-REP01B-MPF, dated 17 August 2022

Reference should be made to this document in relation to the potential for disturbance of occupants due to train movements.

In summary, the predicted typical maximum structureborne noise levels within bedrooms during the passage of a train between 11pm and 7am is 46dB LA_{max}. The trains that could potentially generate this level of noise are typically the same trains that could generate airborne noise levels in bedrooms of greater than 45dB LA_{max} (i.e. due to airborne noise ingress through the curtain wall to apartments).

Therefore, the predicted number of night time noise events in bedrooms greater than 45 dB LA_{max} is not expected to increase due to structureborne noise generated by train movements.

Compliance with the requirements of condition 21 of the planning approval is therefore expected with regard to structureborne noise levels due to train movements.

The assessment of groundborne vibration indicates that no mitigation measures would be required at the proposed development to achieve levels of structureborne noise that comply with published guidance, although it should be noted that there is no margin of comfort between the stated requirements and the predicted noise levels in the apartment rooms.

In order to minimise the structureborne noise within the apartments generated by train movements, it is recommended that the stiffness of the concrete slabs is maximised as far as possible.

Appendix C – Daylight / Sunlight Assessment EIA Addendum

Appendix 10.A

Site Plan and 3D Views

Plan View

Existing

NOTES:
No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site, where
discrepancy occurs between specification and
drawings the supervising officer must be notified.

Analysis

Produced using Waldram Tools
MBS Survey Software Ltd (www.mbs-software.co.uk)

Existing & Surrounding Models

Existing and Surrounding massing derived from 3d terrestrial survey pointcloud data, located to OS GPS coordinates & an AccuCities tile
Supported with site photography, Google Maps & Bing Maps.

Consented Schemes derived from 2d data listed below.

Axis Tower - '115351_NMC_2017' PDF Data Set
Viaduct Tower - '133998_JO_2022' PDF Data Set

Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

REV:	DATE:	DESCRIPTION:
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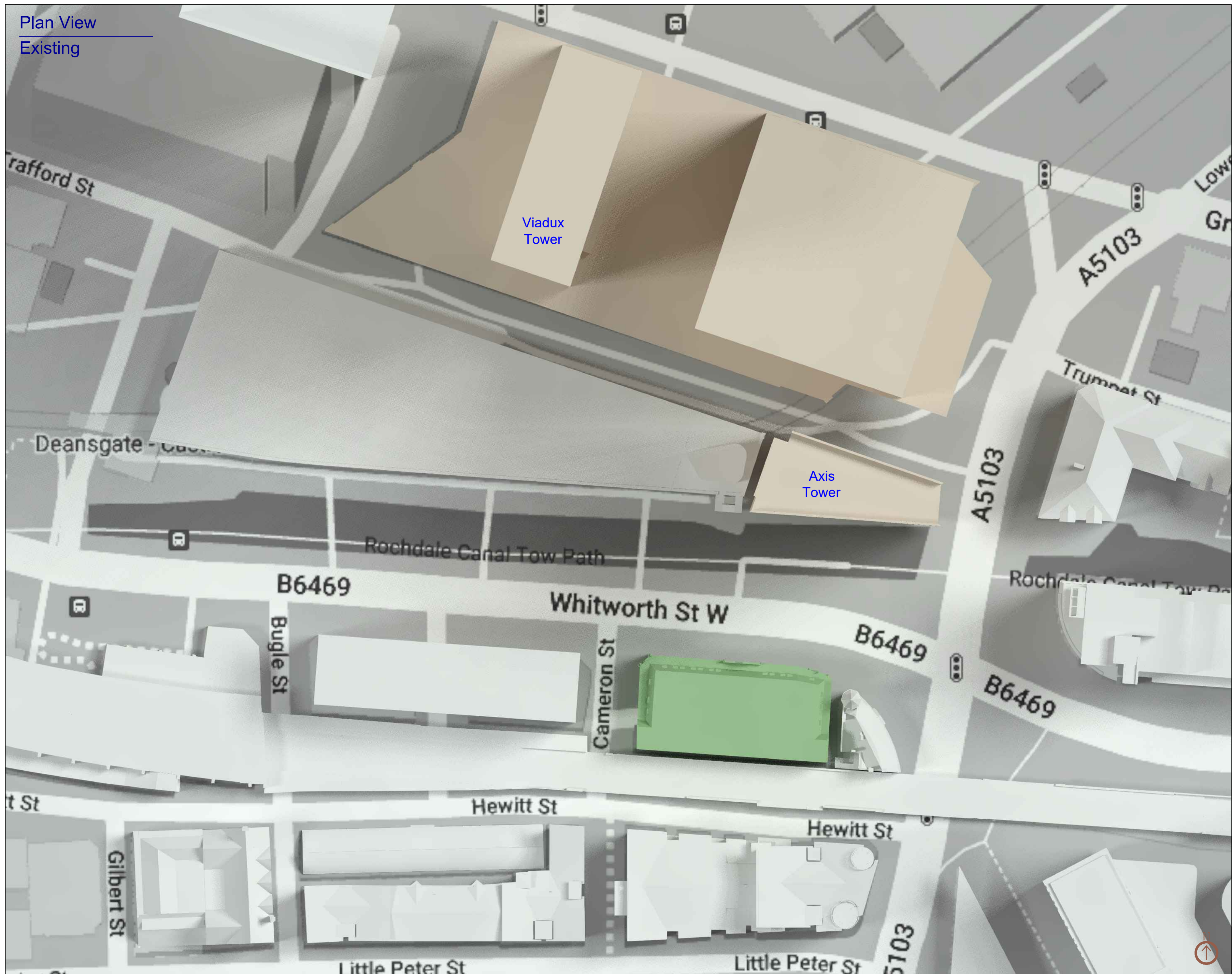
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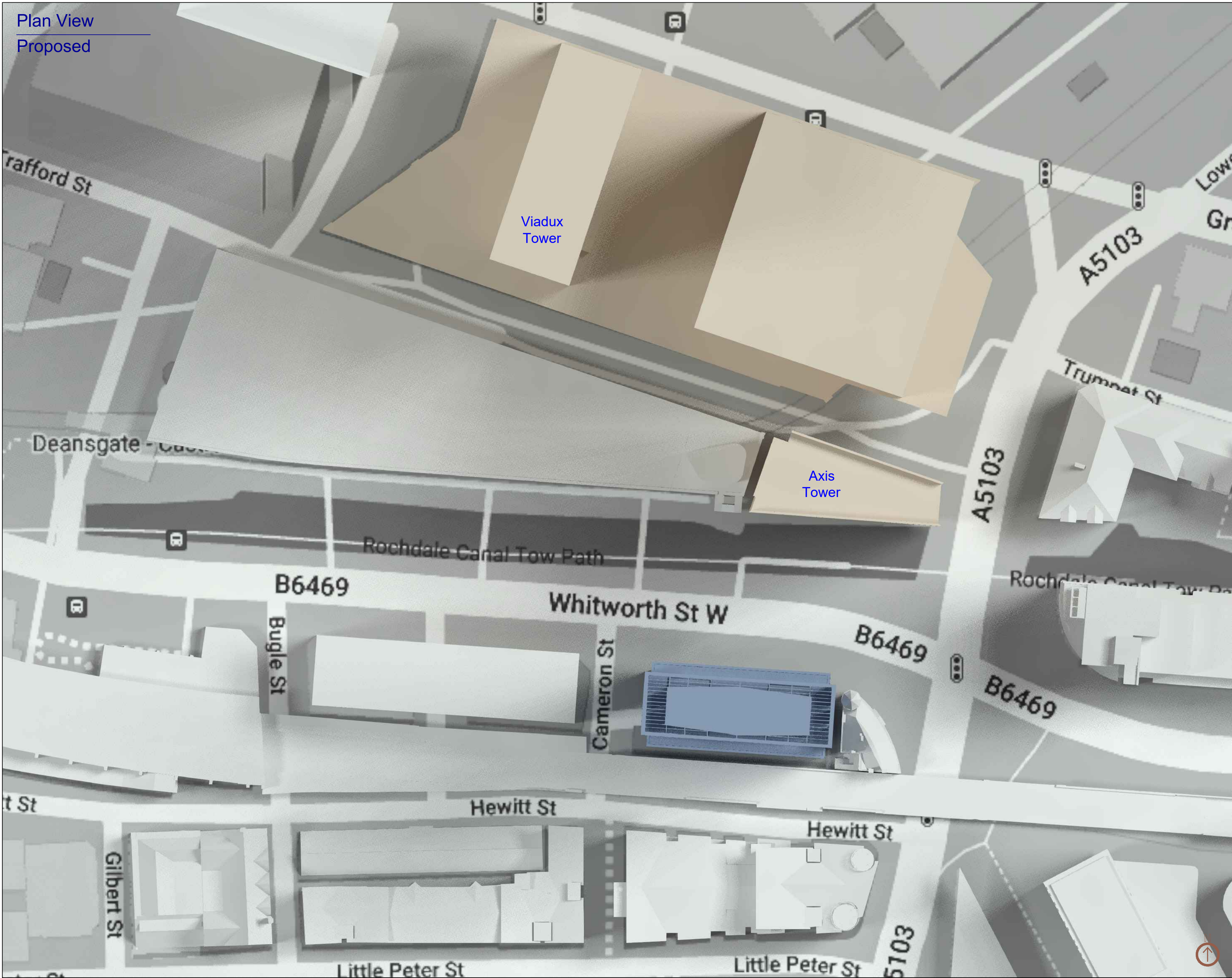
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Existing and Surrounding massing derived from 3d terrestrial survey pointcloud data, located to OS GPS coordinates & an AccuCities file Supported with site photography, Google Maps & Bing Maps. Consented Schemes derived from 2d data listed below.		
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Proposed Model		
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DRAWING TITLE:
Proposed Plan View

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DRAWING NUMBER: 122214-08-02	REV: .
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3d View
Existing



NOTES:
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Analysis		
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Existing and Surrounding massing derived from 3d terrestrial survey pointcloud data, located to OS GPS coordinates & an AccuCities file Supported with site photography, Google Maps & Bing Maps Consented Schemes derived from 2d data listed below.		
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Reference: 05247_Wind Model in Context.dwg Received: 12.08.2022		
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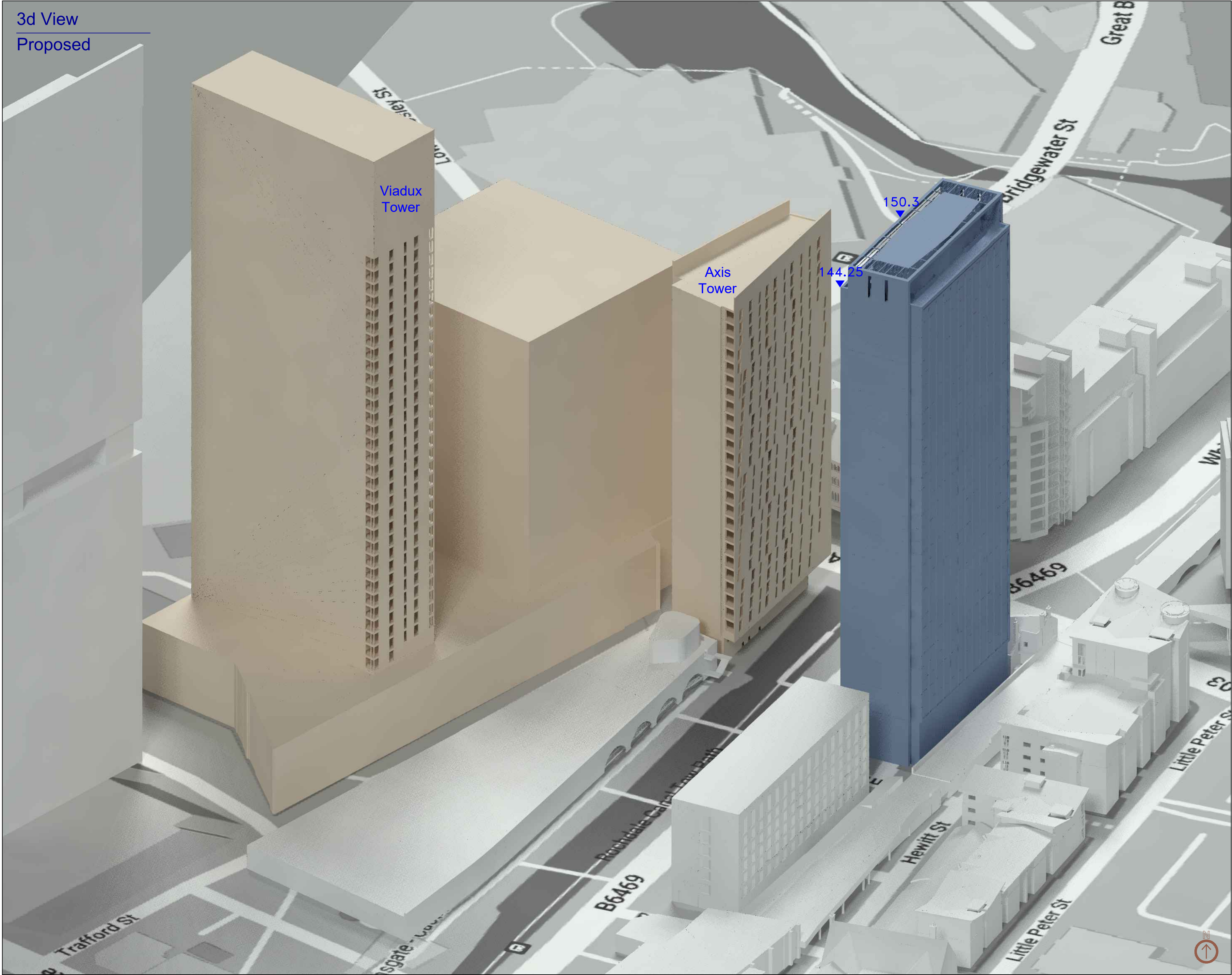
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DRAWING NUMBER: 122214-08-03	REV: .
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3d View
Proposed



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Analysis		
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Reference: 05247_Wind Model in Context.dwg Received: 12.08.2022		
REV:	DATE:	DESCRIPTION:

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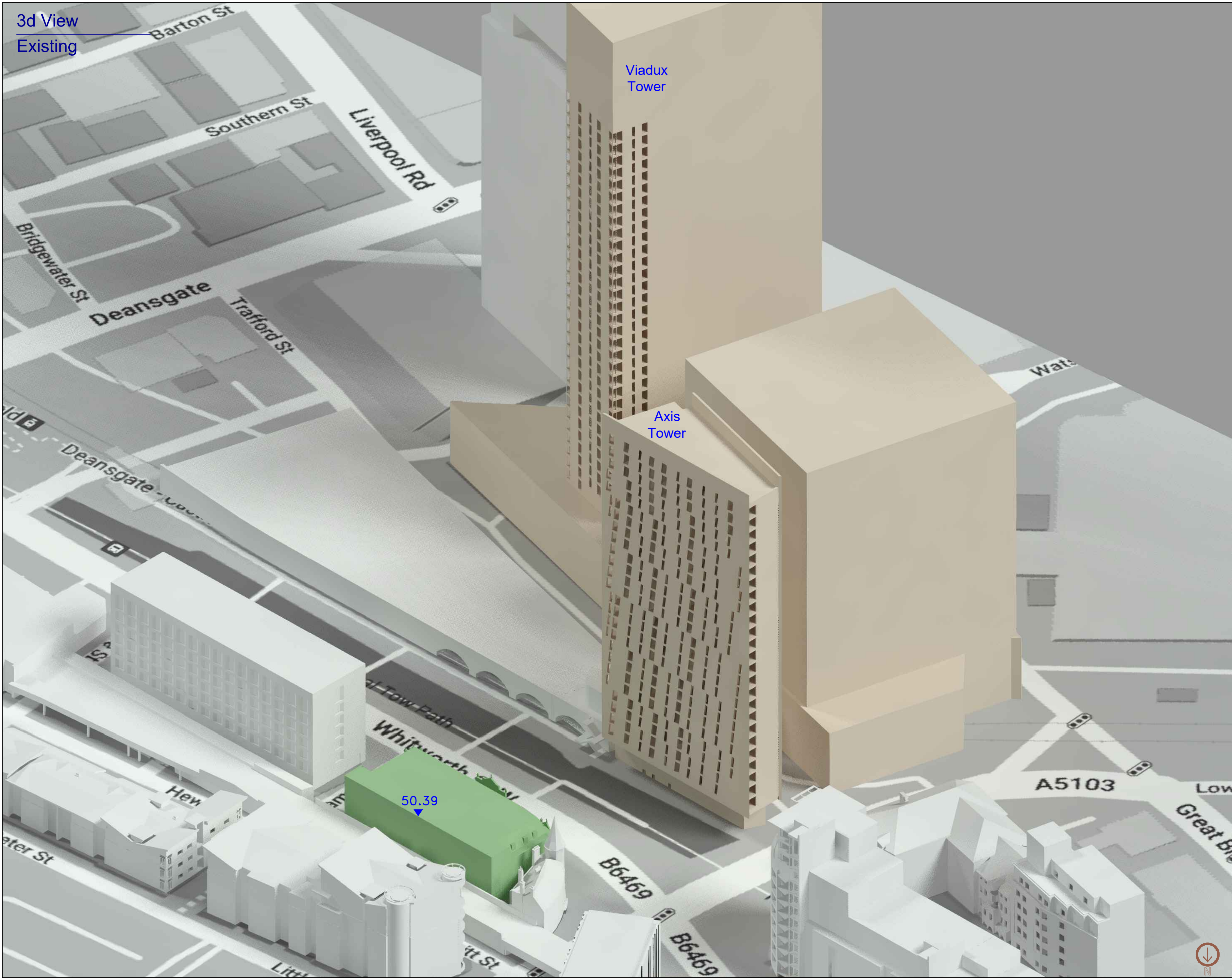
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DRAWING NUMBER: 122214-08-04	REV: .
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3d View
Existing



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Reference: 05247_Wind Model in Context.dwg Received: 12.08.2022		
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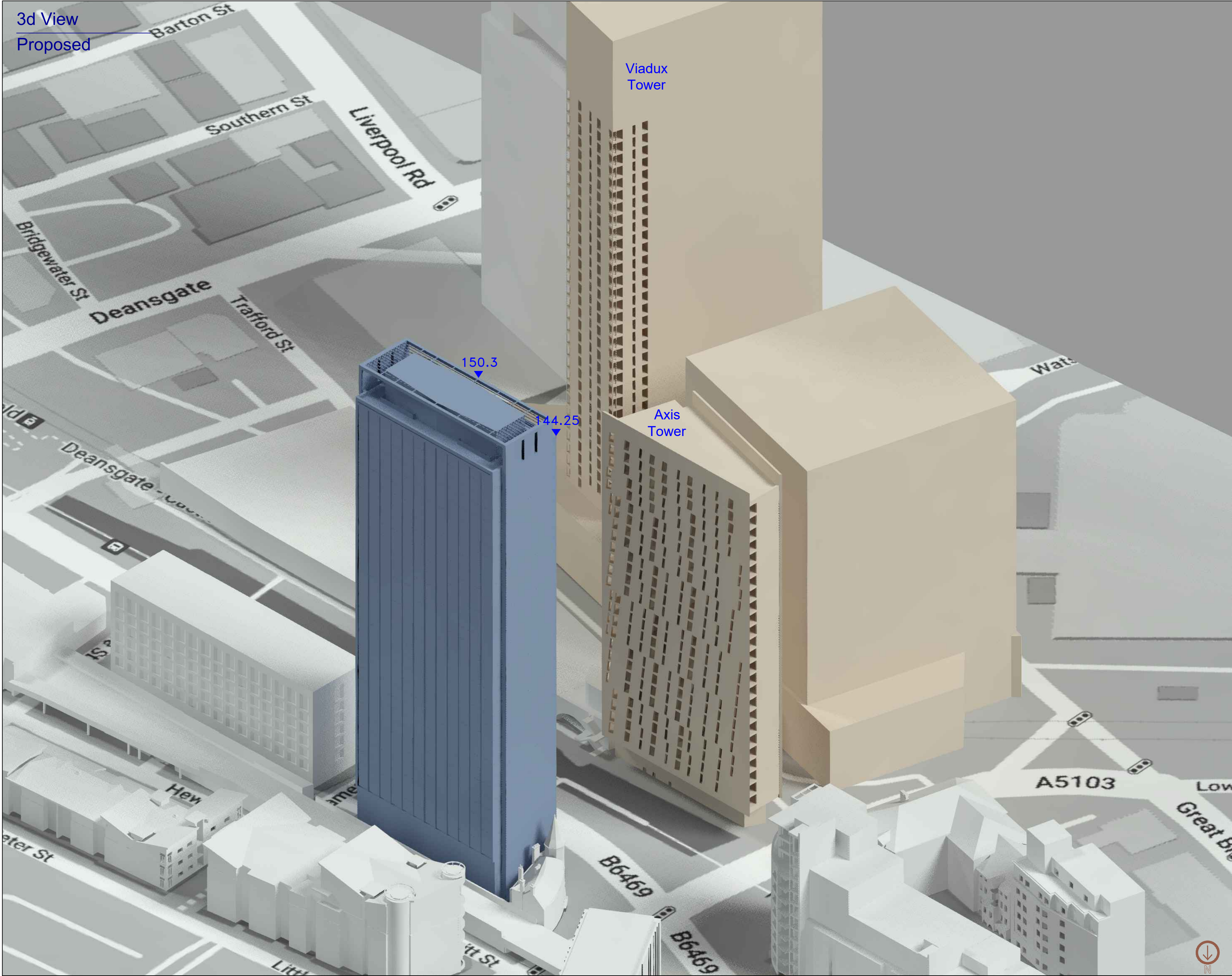
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Looking South

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DRAWING NUMBER: 122214-08-05	REV: .
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3d View
Proposed



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Analysis		
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Proposed Model		
Reference: 05247_Wind Model in Context.dwg Received: 12.08.2022		
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DRAWING TITLE:
Proposed 3d View
Looking South

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	CHECKED:	TK

DRAWING NUMBER: 122214-08-06	REV: •
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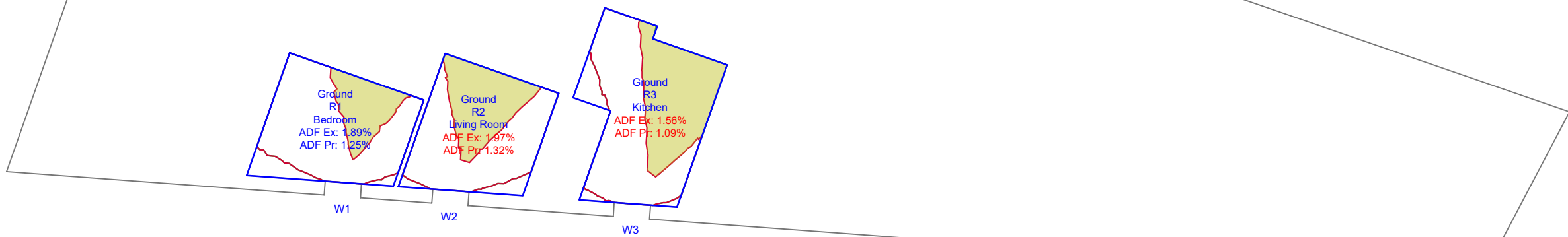


Appendix 10.B

Daylight Distribution Contours

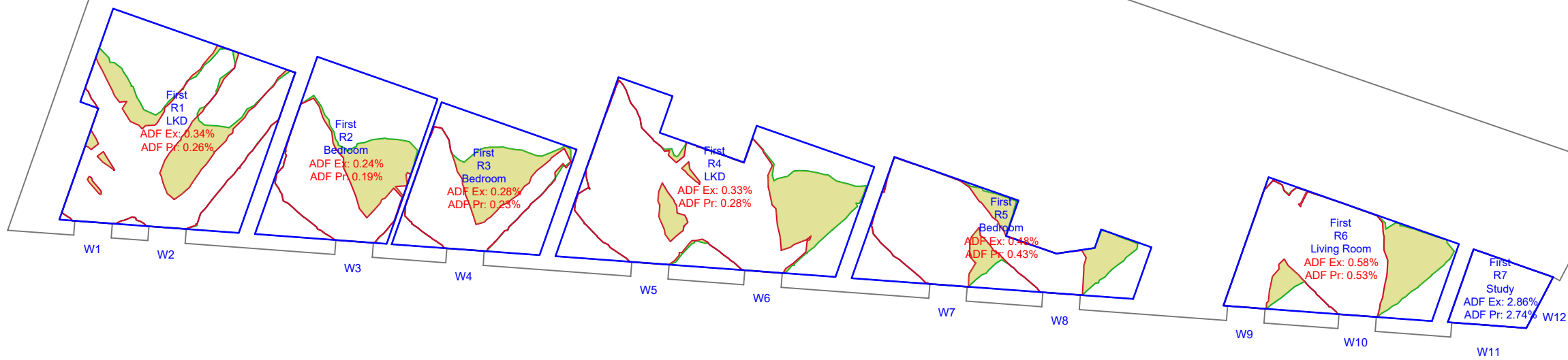
Ground Floor

Axis Tower



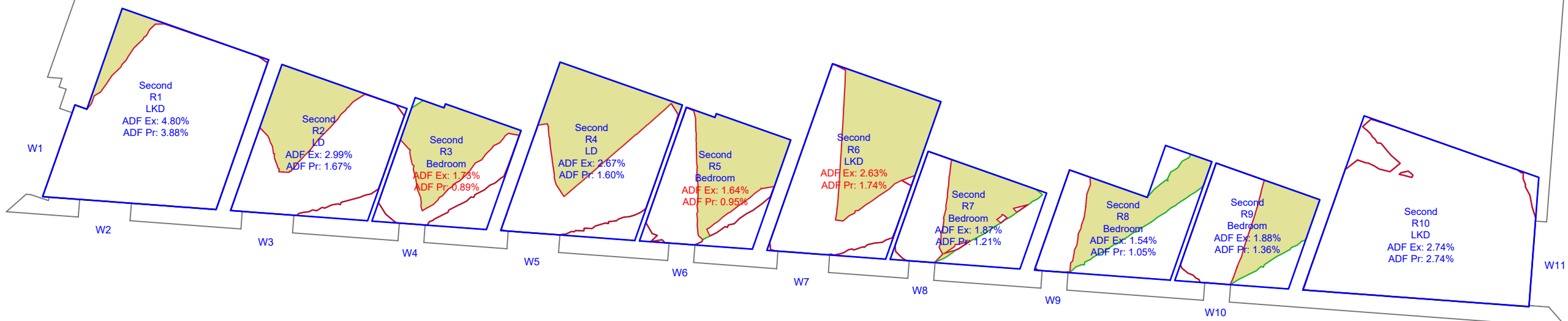
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Axis Tower



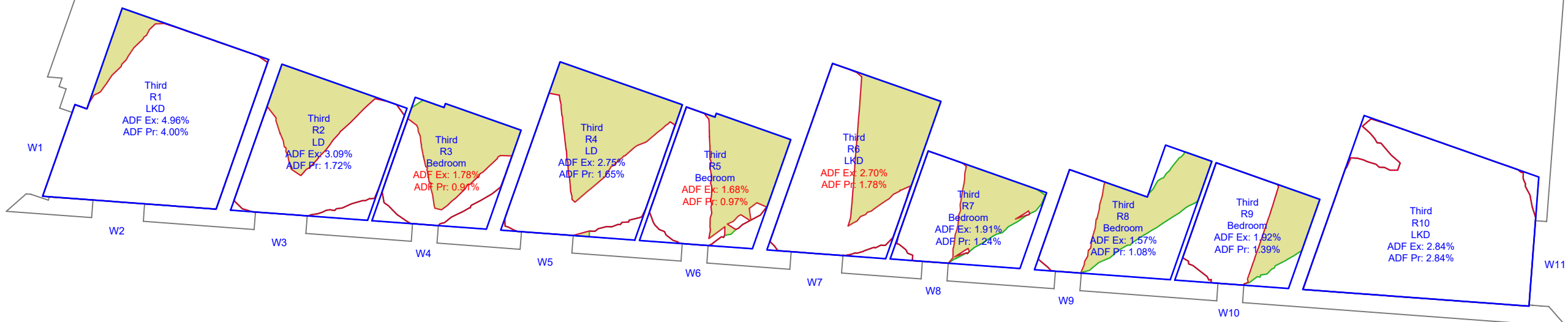
Second Floor

Axis Tower



Third Floor

Axis Tower



NOTES:

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Analysis

Produced using Walktram Tools
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Existing & Surrounding Models

Existing and Surrounding massing derived from 3d terrestrial survey pointcloud data, located to OS GPS coordinates & an AccuCities file
Supported with site photography, Google Maps & Bing Maps
Consented Schemes derived from 2d data listed below.

Axis Tower - "115351_NMC_2017" PDF Data Set
Vadux Tower - "133958_JO_2022" PDF Data Set

Proposed Model

Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY

- Room Area (Measured Layout)
- Room Area (Assumed Layout)
- Existing No Sky Area
- Proposed No Sky Area
- Area of Loss/Gain

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CLIENT:

Brigantes Ltd

PROPERTY:

Whitworth Street West, Manchester

DRAWING TITLE:

Daylight Distribution
Contours

SCALE @ A1:

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DATE:

26.08.22

DRAWN:

MBS

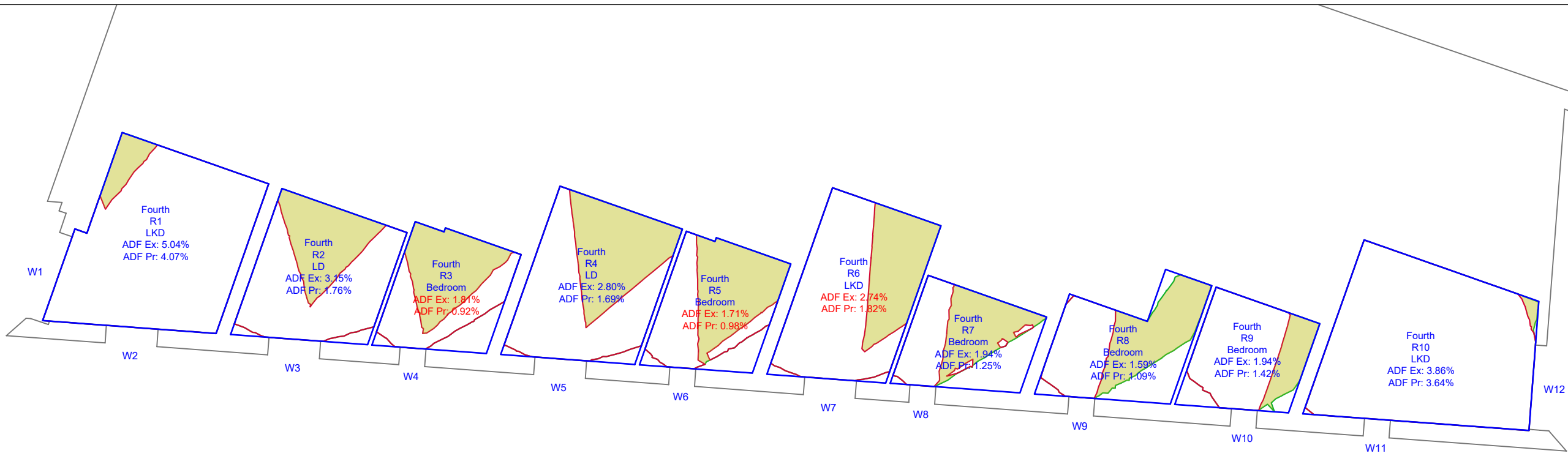
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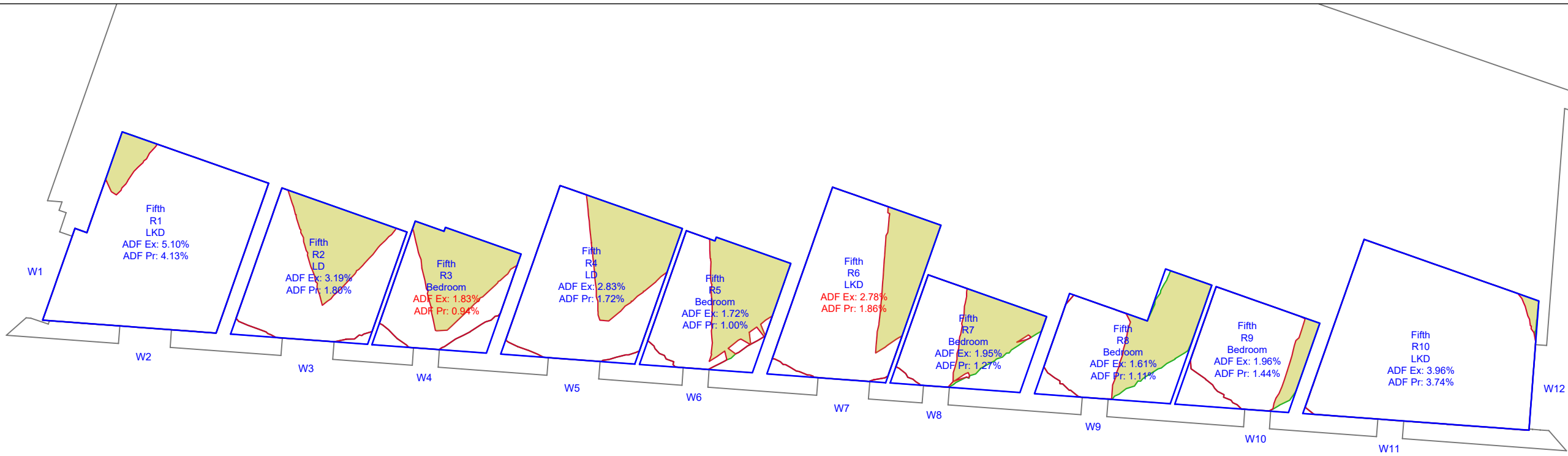
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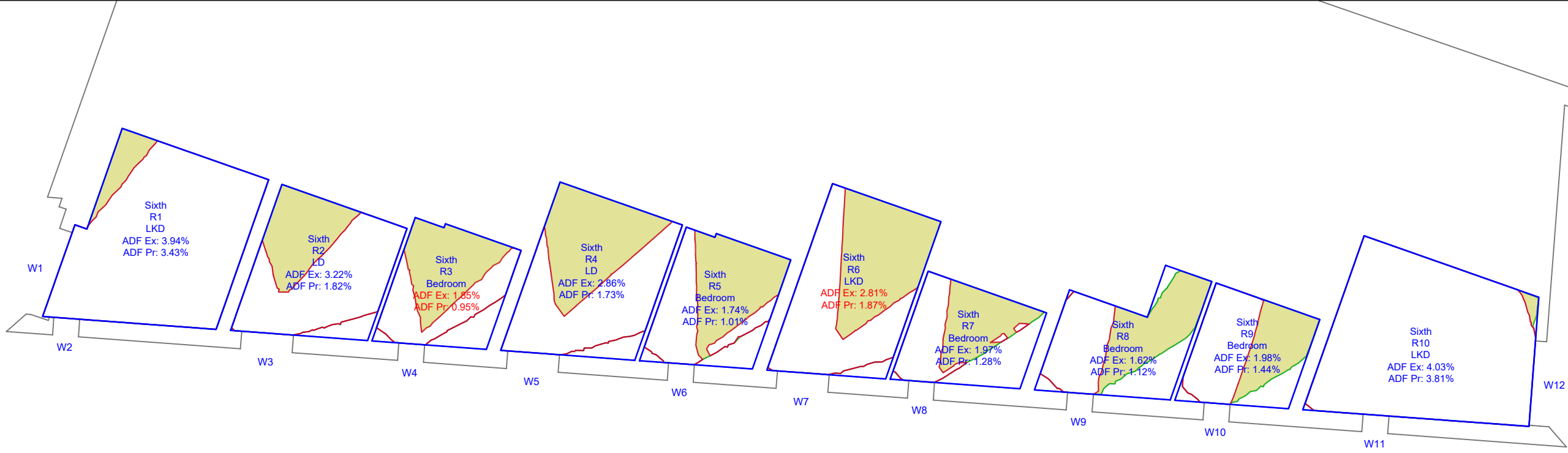
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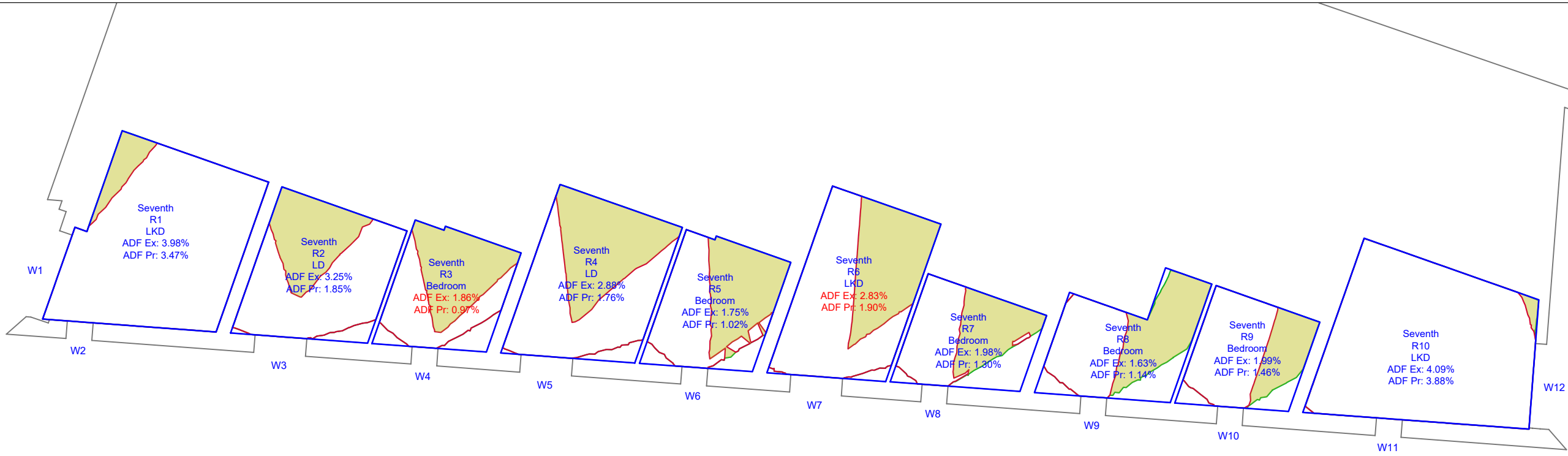
Fifth Floor
Axis Tower



Sixth Floor
Axis Tower



Seventh Floor
Axis Tower



NOTES:
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Analysis
Produced using Walktram Tools
MBS Survey Software Ltd (www.mbs-software.co.uk)
Existing & Surrounding Models
Existing and Surrounding massing derived from 3d
terrestrial survey pointcloud data, located to OS GPS
coordinates & an AccuCities file
Supported with site photography, Google Maps & Bing
Maps
Consented Schemes derived from 2d data listed below.
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Vadux Tower - "133958_JO_2022" PDF Data Set
Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY
Room Area (Measured Layout)
Room Area (Assumed Layout)
Existing No Sky Area
Proposed No Sky Area
Area of Loss/Gain

REV: DATE: DESCRIPTION:

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Brigantes Ltd

PROPERTY:
Whitworth Street West, Manchester

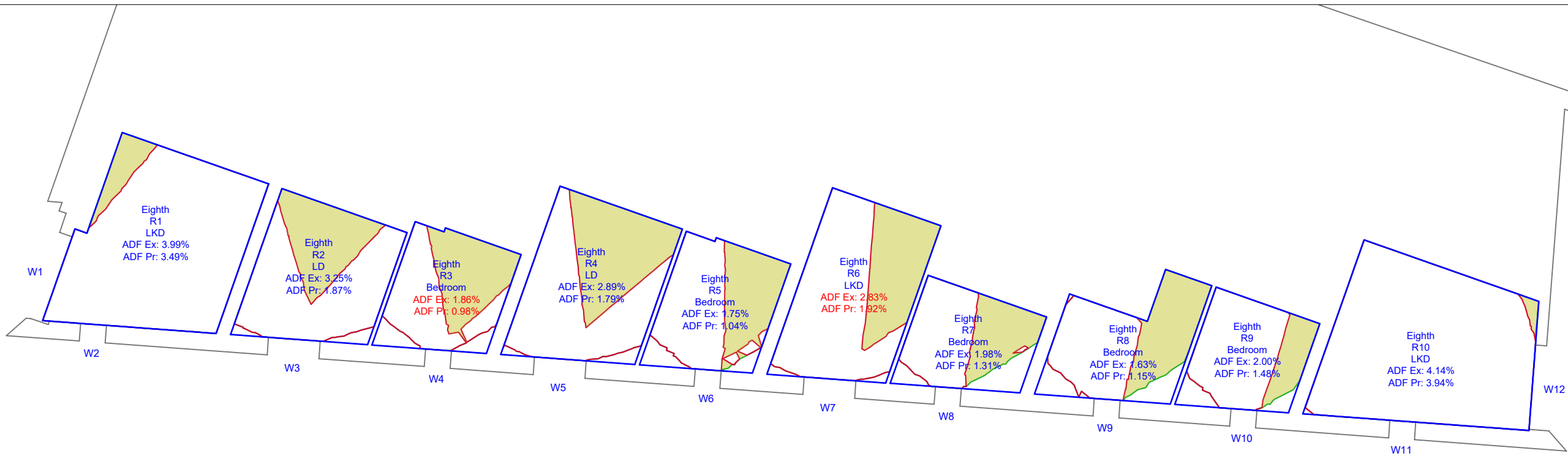
DRAWING TITLE:
Daylight Distribution
Contours

SCALE @ A1: DATE: DRAWN: MBS
NTS 26.08.22
CHECKED: TK

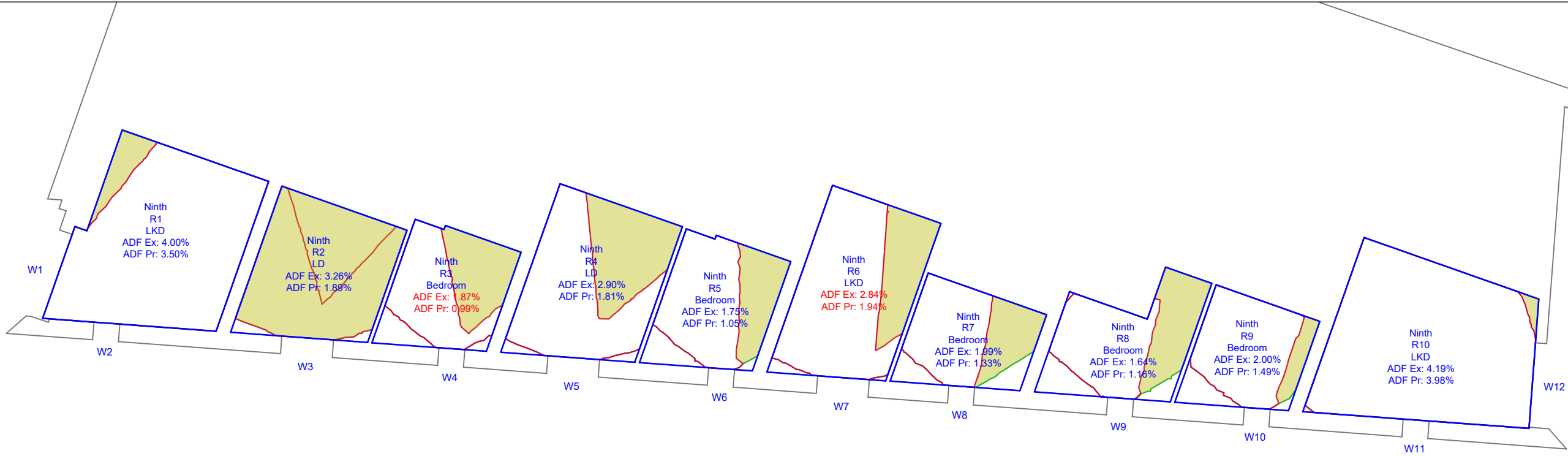
DRAWING NUMBER: REV:
122214-08-08



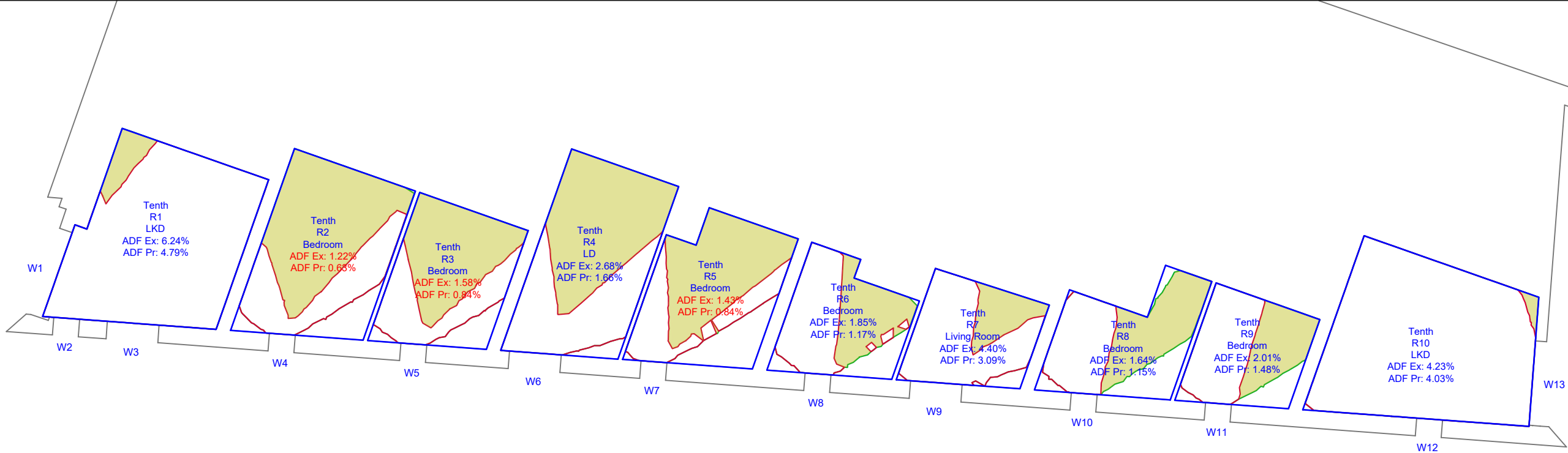
Eighth Floor
Axis Tower



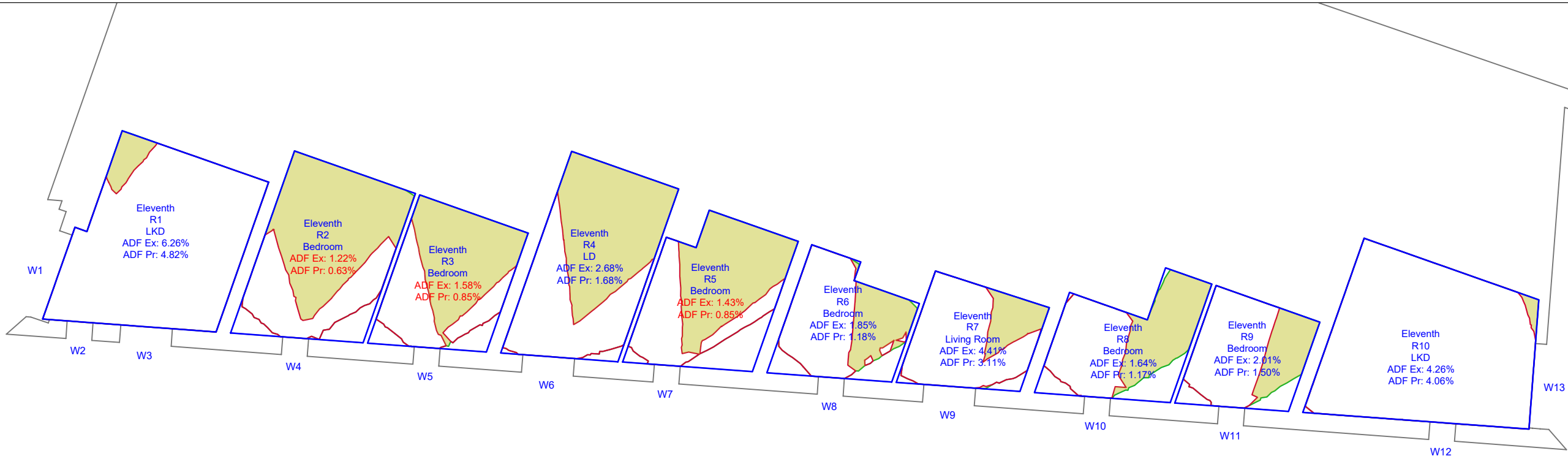
Ninth Floor
Axis Tower



Tenth Floor
Axis Tower



Eleventh Floor
Axis Tower



NOTES:
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Analysis
Produced using Waldram Tools
MBS Survey Software Ltd (www.mbs-software.co.uk)
Existing & Surrounding Models
Existing and Surrounding massing derived from 3d
terrestrial survey pointcloud data, located to OS GPS
coordinates & an AccuCities file
Supported with site photography, Google Maps & Bing
Maps
Consented Schemes derived from 2d data listed below.
Axis Tower - "115351_NMC_2017" PDF Data Set
Vadux Tower - "133958_JO_2022" PDF Data Set
Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY
Room Area (Measured Layout)
Room Area (Assumed Layout)
Existing No Sky Area
Proposed No Sky Area
Area of Loss/Gain

REV:	DATE:	DESCRIPTION:
.	.	.

Watts.

Watts Group Limited
St James's Tower
7 Charlotte Street
Manchester M1 4DZ
T: 0161 831 6180
watts.co.uk

CLIENT:
Brigantes Ltd

PROPERTY:
Whitworth Street West, Manchester

DRAWING TITLE:
Daylight Distribution
Contours

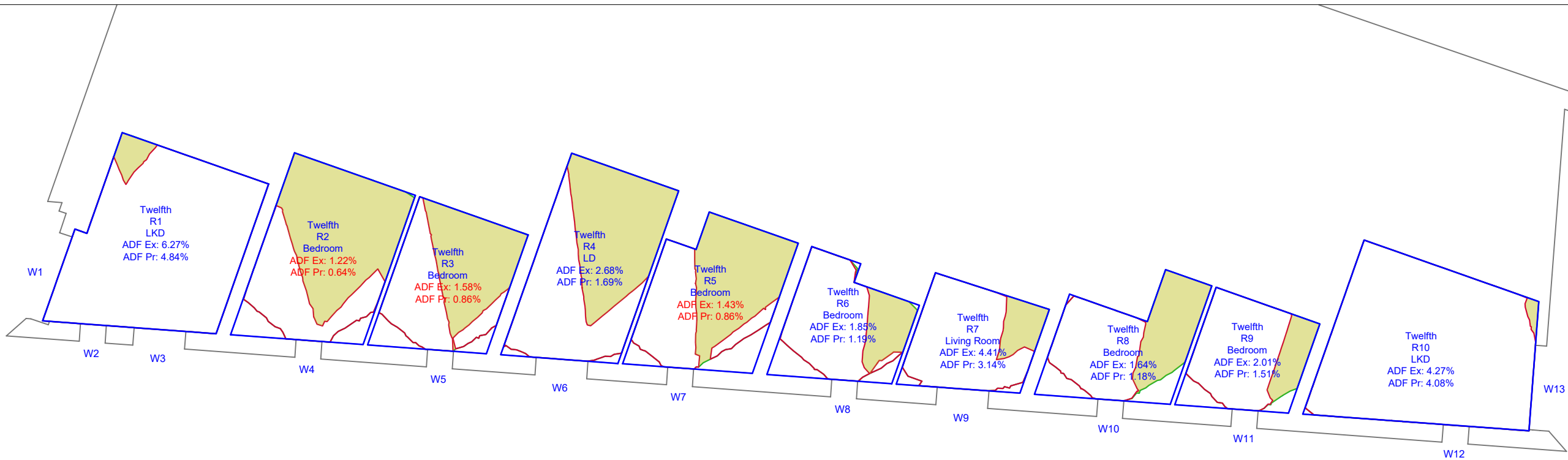
SCALE @ A1: NTS	DATE: 26.08.22	DRAWN: MBS
		CHECKED: TK

DRAWING NUMBER: 122214-08-09	REV: .
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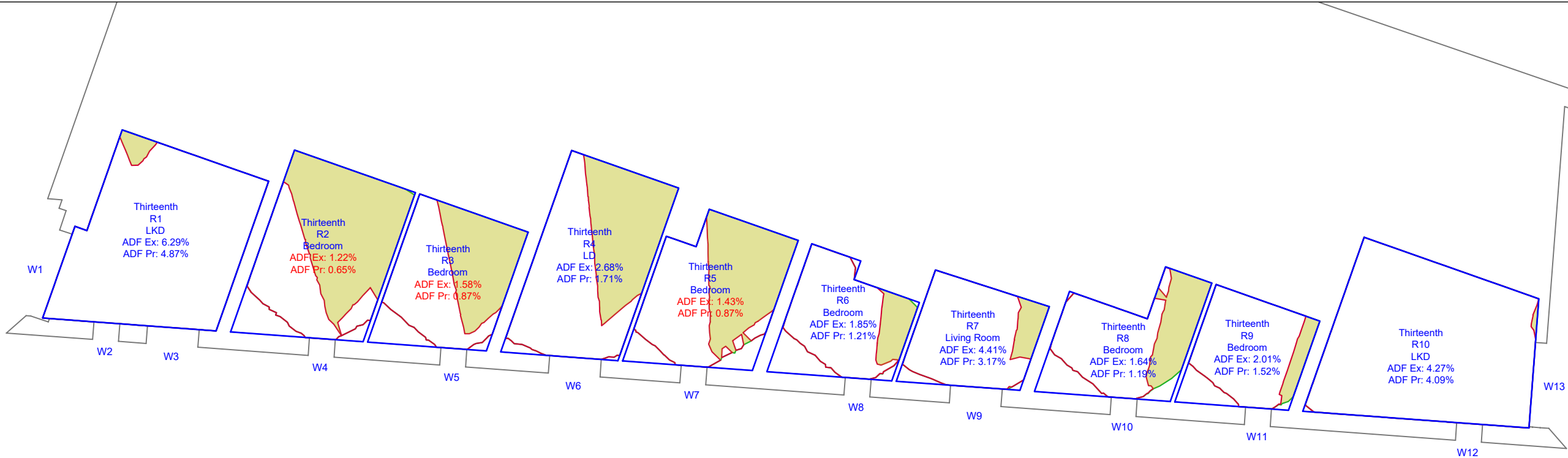
Twelfth Floor

Axis Tower



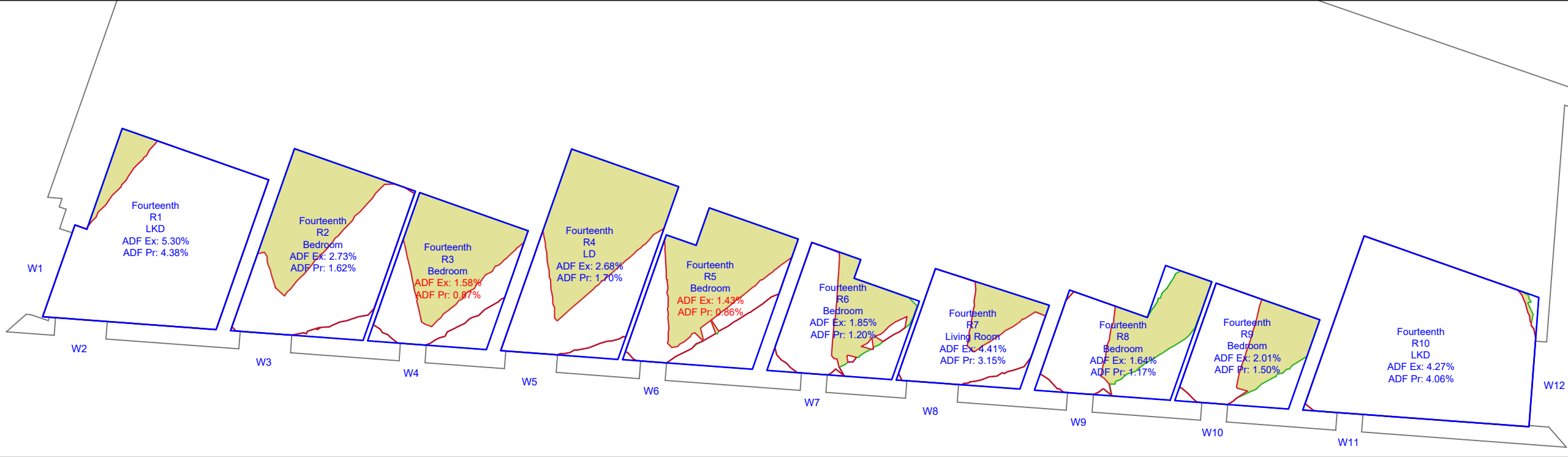
Thirteenth Floor

Axis Tower



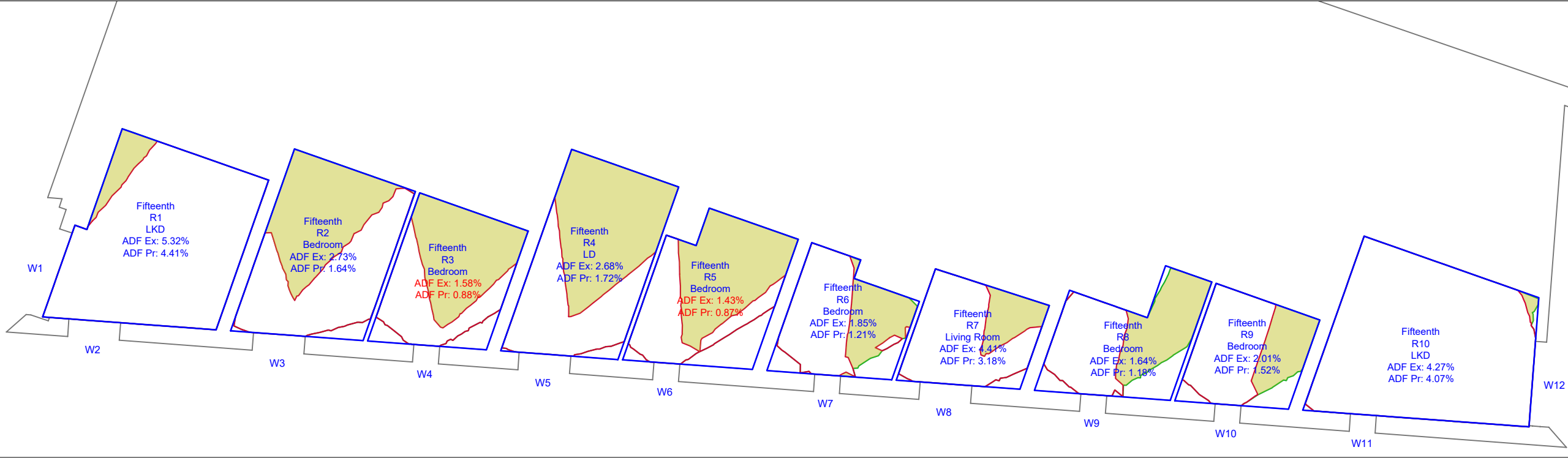
Fourteenth Floor

Axis Tower



Fifteenth Floor

Axis Tower



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Analysis

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MBS Survey Software Ltd (www.mbs-software.co.uk)

Existing & Surrounding Models

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Vadux Tower - "133958_JO_2022" PDF Data Set

Proposed Model

Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY

- Room Area (Measured Layout)
- Room Area (Assumed Layout)
- Existing No Sky Area
- Proposed No Sky Area
- Area of Loss/Gain

REV.	DATE:	DESCRIPTION:

Watts.

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Manchester M1 4DZ

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watts.co.uk

CLIENT:

Brigantes Ltd

PROPERTY:

Whitworth Street West, Manchester

DRAWING TITLE:

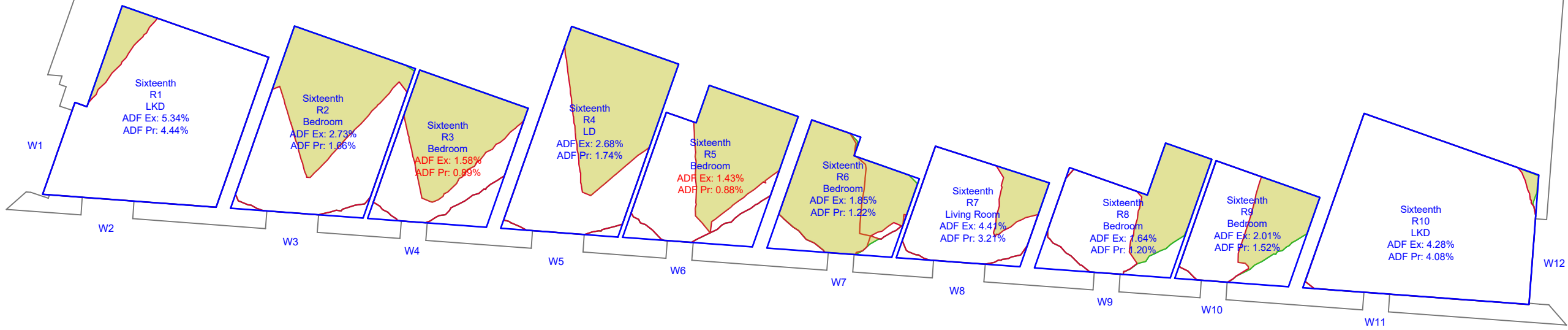
Daylight Distribution
Contours

SCALE @ A1:	DATE:	DRAWN:	MBS
NTS	26.08.22	CHECKED:	TK

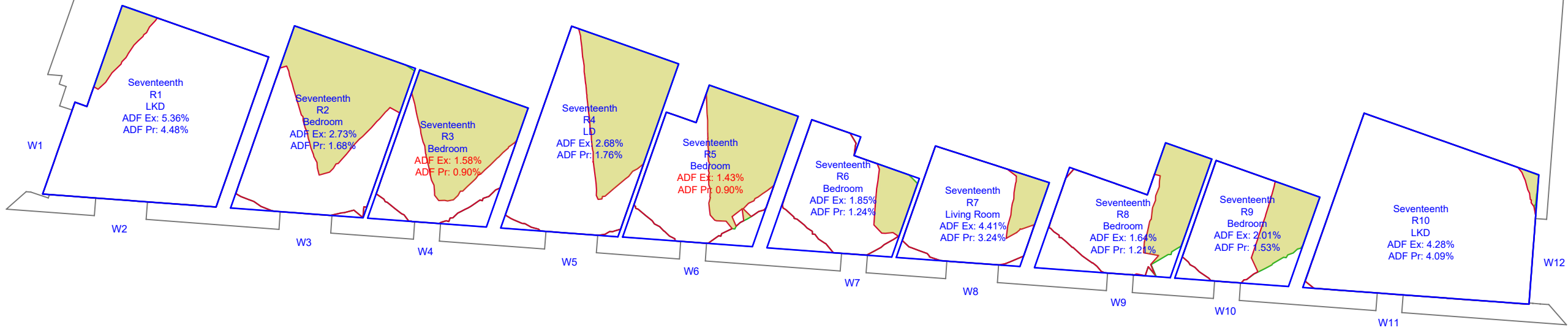
DRAWING NUMBER:	REV:
122214-08-10	



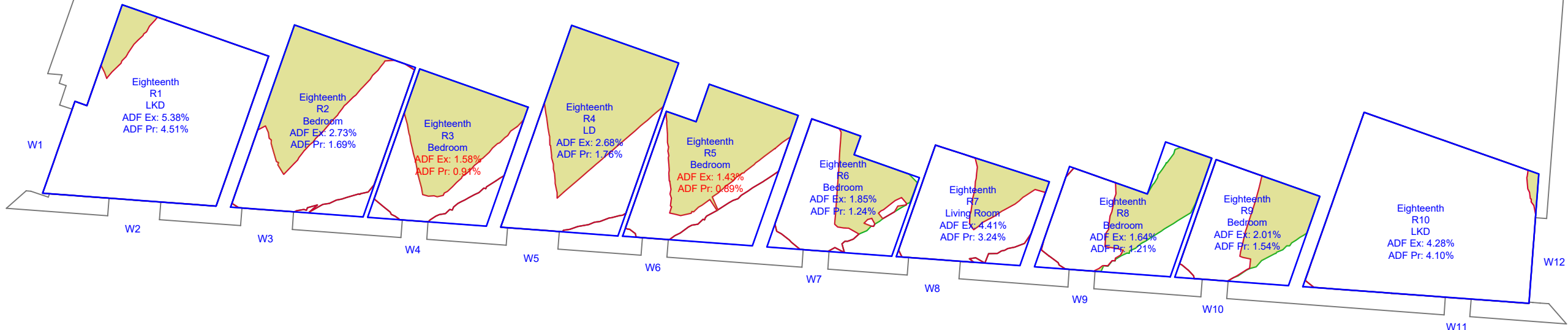
Sixteenth Floor
Axis Tower



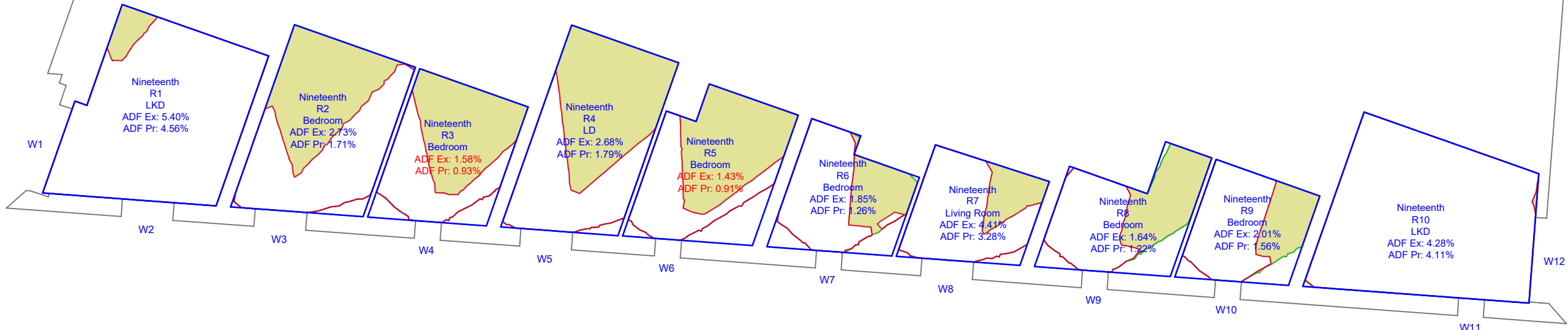
Seventeenth Floor
Axis Tower



Eighteenth Floor
Axis Tower



Nineteenth Floor
Axis Tower



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Analysis
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Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY
Room Area (Measured Layout)
Room Area (Assumed Layout)
Existing No Sky Area
Proposed No Sky Area
Area of Loss/Gain

REV:	DATE:	DESCRIPTION:
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Watts.

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St James's Tower
7 Charlotte Street
Manchester M1 4DZ
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watts.co.uk

CLIENT:
Brigantes Ltd

PROPERTY:
Whitworth Street West, Manchester

DRAWING TITLE:
Daylight Distribution
Contours

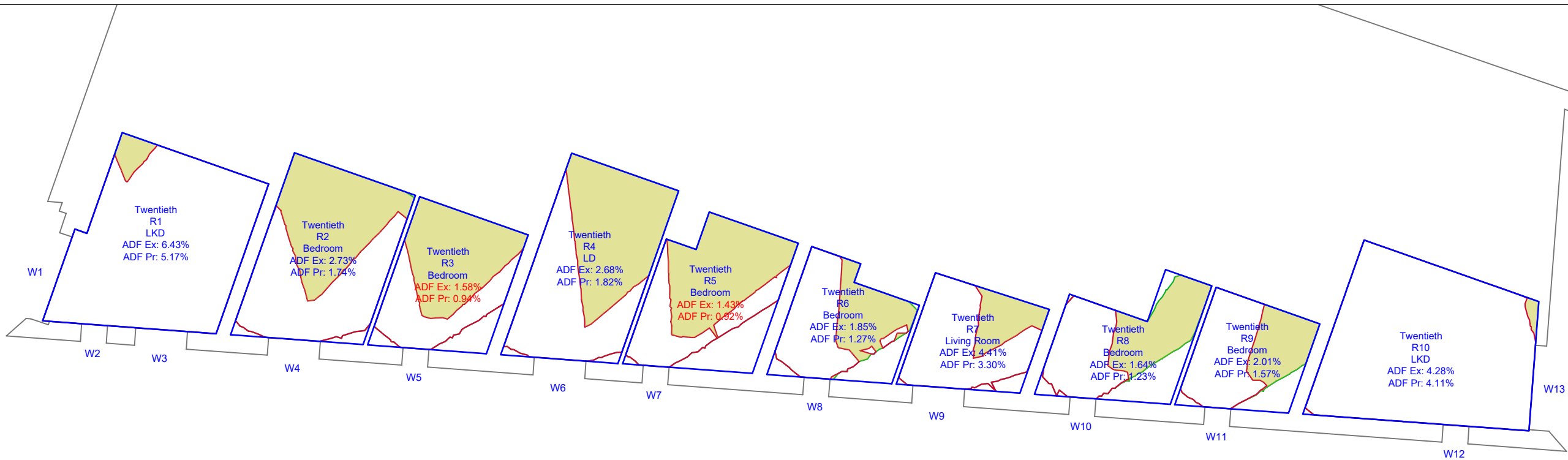
SCALE @ A1: NTS	DATE: 26.08.22	DRAWN: MBS
		CHECKED: TK

DRAWING NUMBER: 122214-08-11	REV: .
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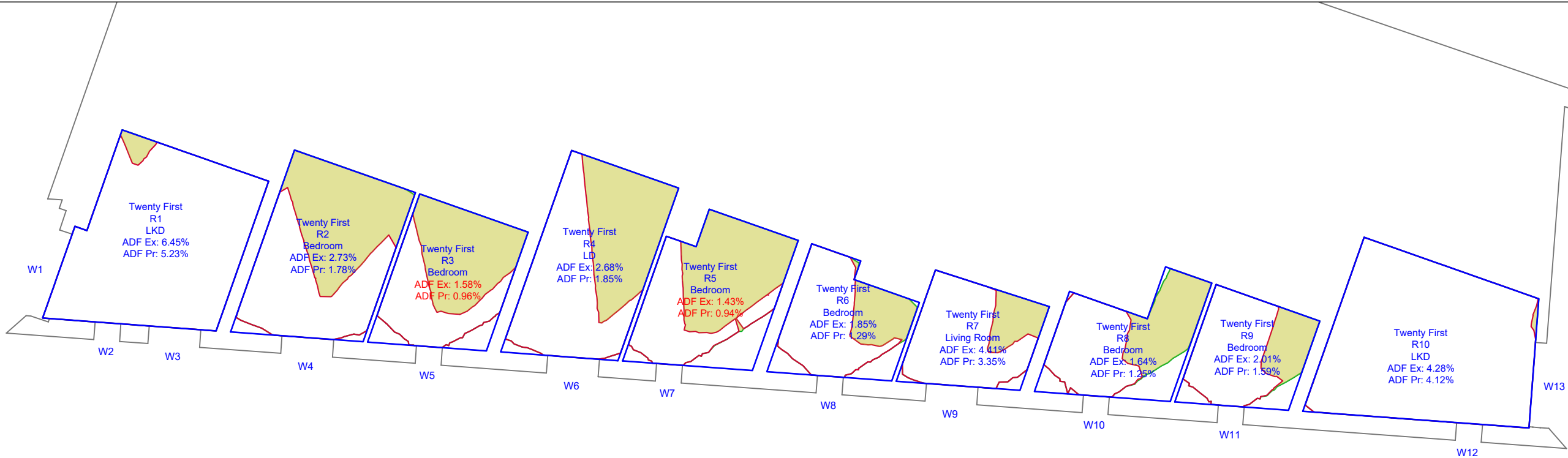
Twentieth Floor

Axis Tower



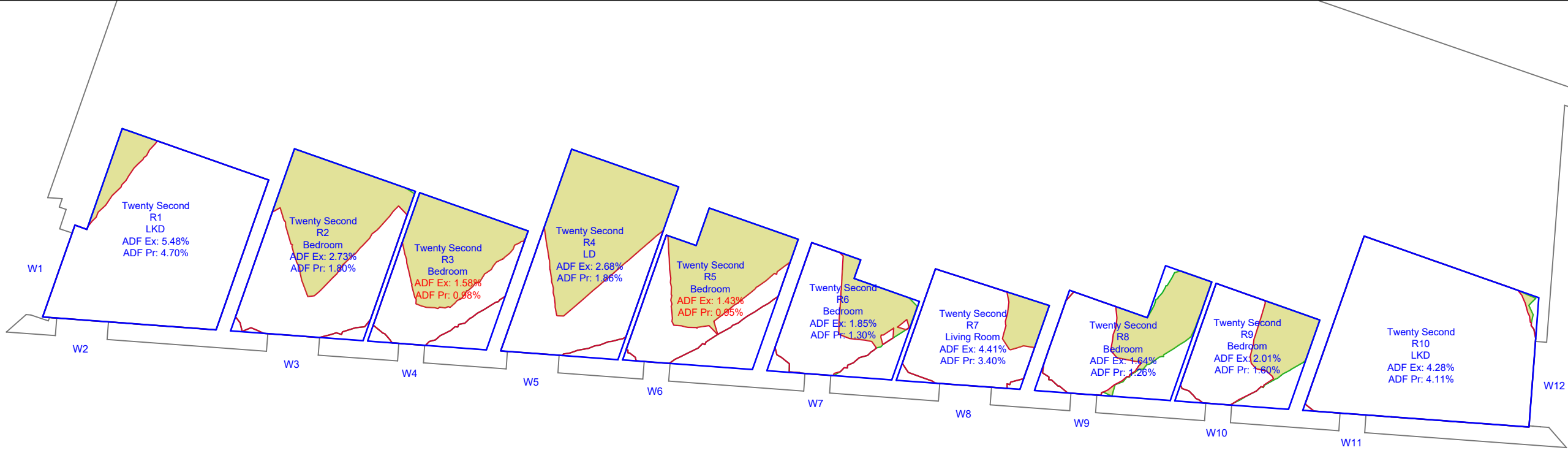
Twenty First Floor

Axis Tower



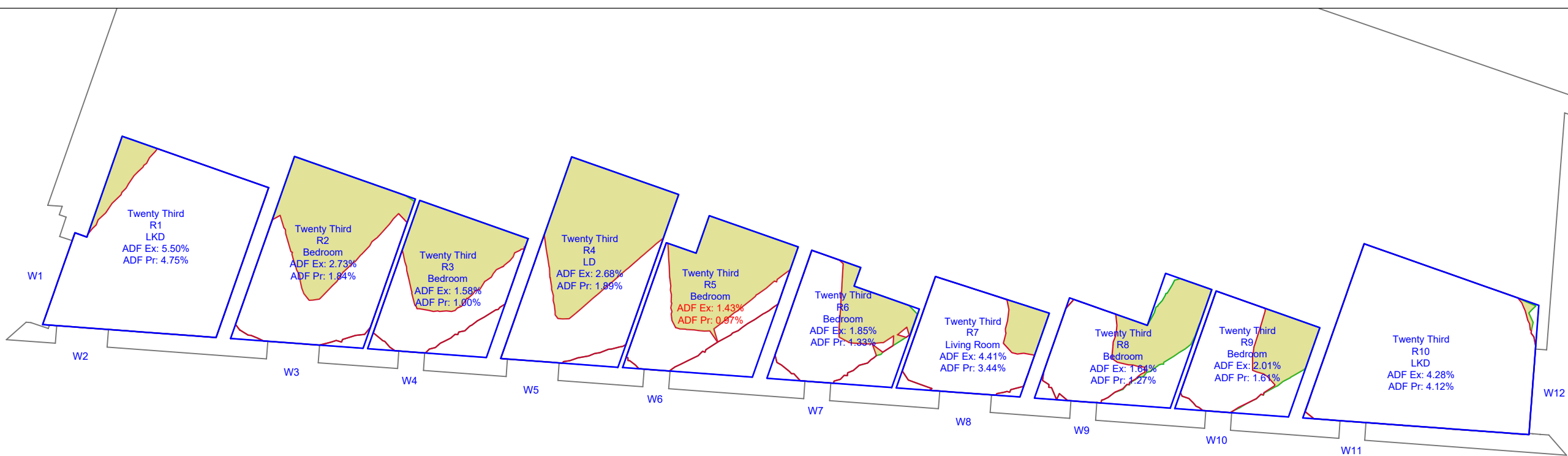
Twenty Second Floor

Axis Tower



Twenty Third Floor

Axis Tower



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Analysis

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Existing & Surrounding Models

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Vadux Tower - "133958_JO_2022" PDF Data Set

Proposed Model

Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY

- Room Area (Measured Layout)
- Room Area (Assumed Layout)
- Existing No Sky Area
- Proposed No Sky Area
- Area of Loss/Gain

REV: DATE: DESCRIPTION:

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watts.co.uk

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PROPERTY:
Whitworth Street West, Manchester

DRAWING TITLE:
Daylight Distribution
Contours

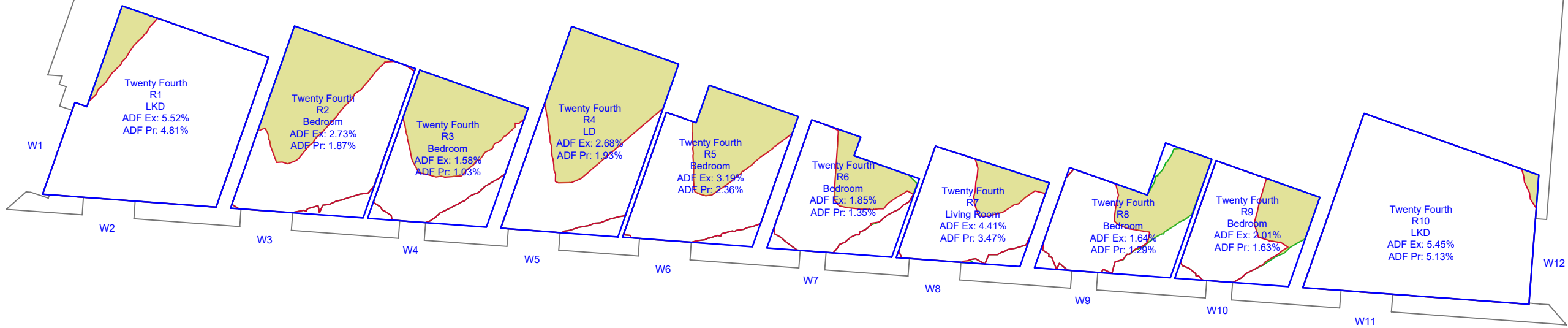
SCALE @ A1: DATE: DRAWN: MBS
NTS 26.08.22
CHECKED: TK

DRAWING NUMBER: REV:
122214-08-12



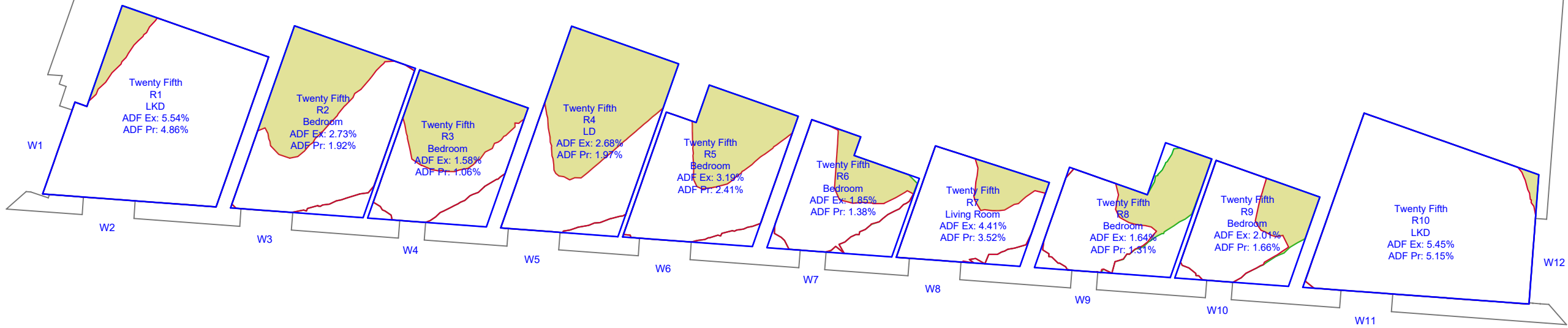
Twenty Fourth Floor

Axis Tower



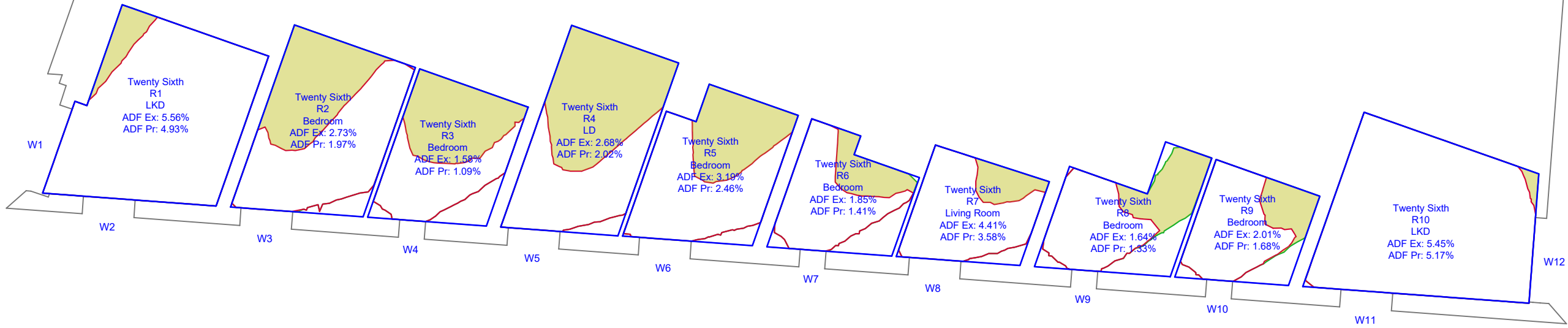
Twenty Fifth Floor

Axis Tower



Twenty Sixth Floor

Axis Tower



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Analysis

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MBS Survey Software Ltd (www.mbs-software.co.uk)

Existing & Surrounding Models

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Vadux Tower - "133958_JO_2022" PDF Data Set

Proposed Model

Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY

- Room Area (Measured Layout)
- Room Area (Assumed Layout)
- Existing No Sky Area
- Proposed No Sky Area
- Area of Loss/Gain

REV:	DATE:	DESCRIPTION:
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Watts.

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watts.co.uk

CLIENT:

Brigantes Ltd

PROPERTY:

Whitworth Street West, Manchester

DRAWING TITLE:

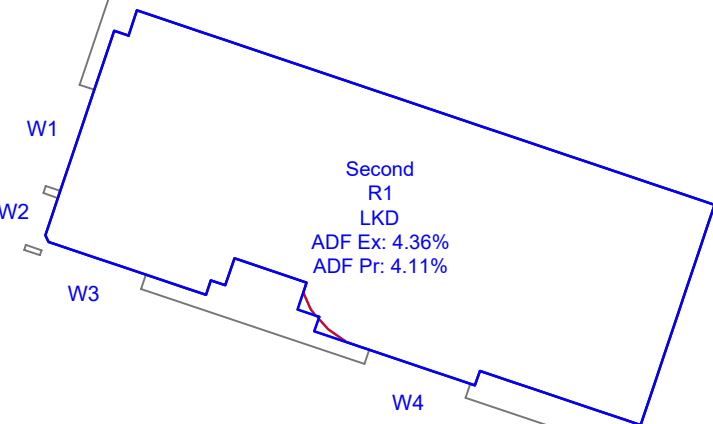
Daylight Distribution
Contours

SCALE @ A1:	DATE:	DRAWN:	MBS
NTS	26.08.22	CHECKED:	TK

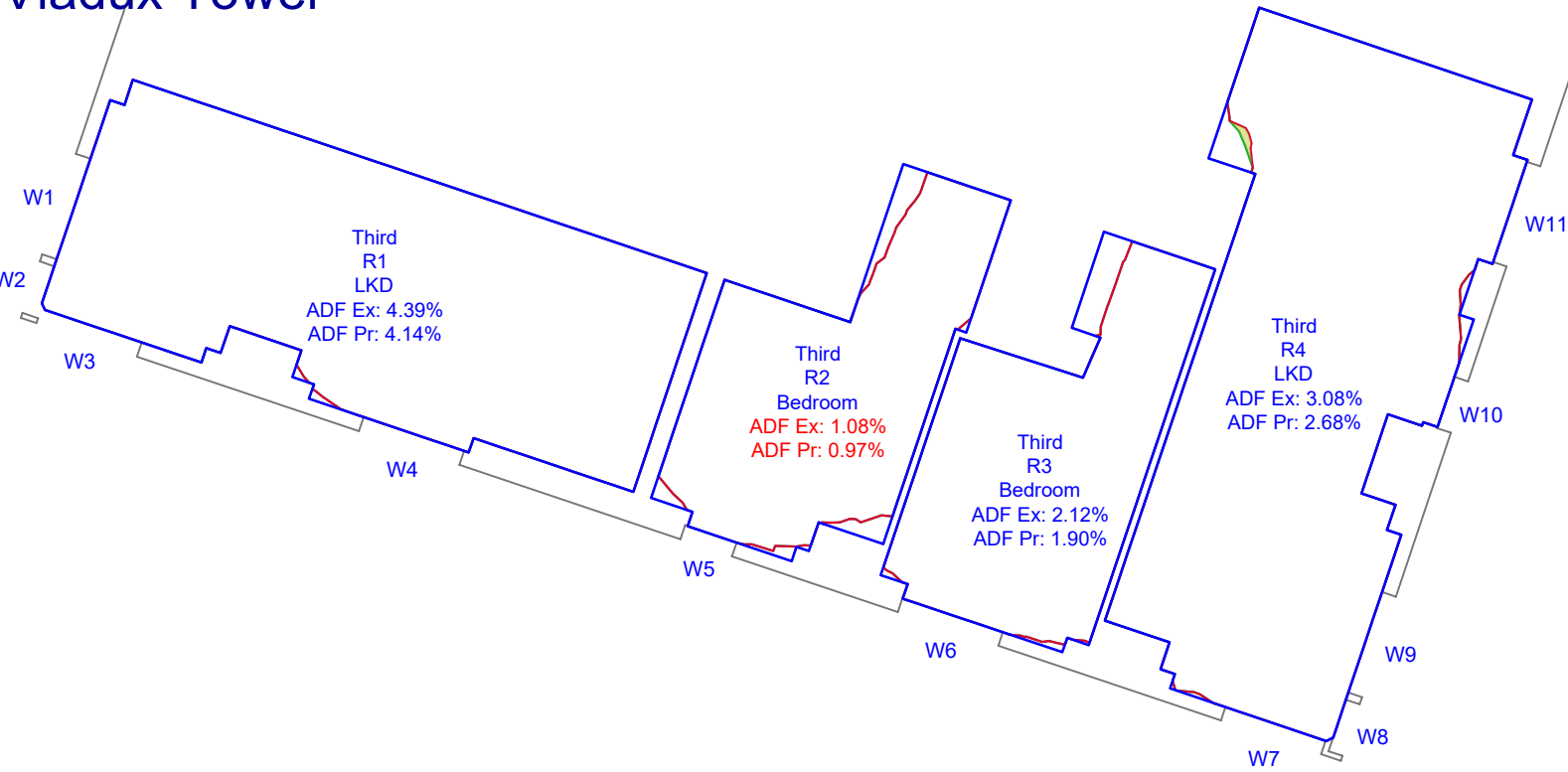
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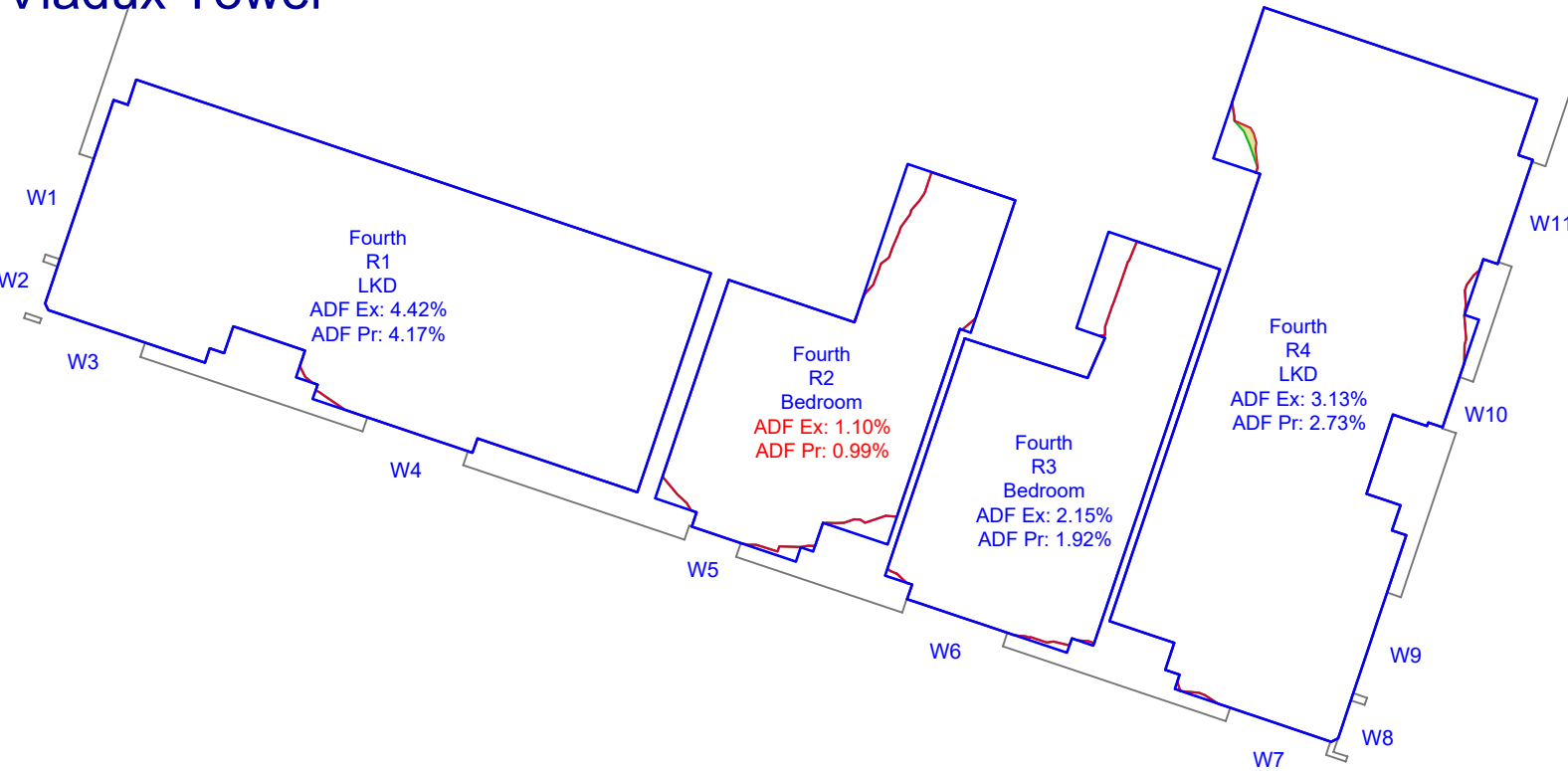
Second Floor
Viadux Tower



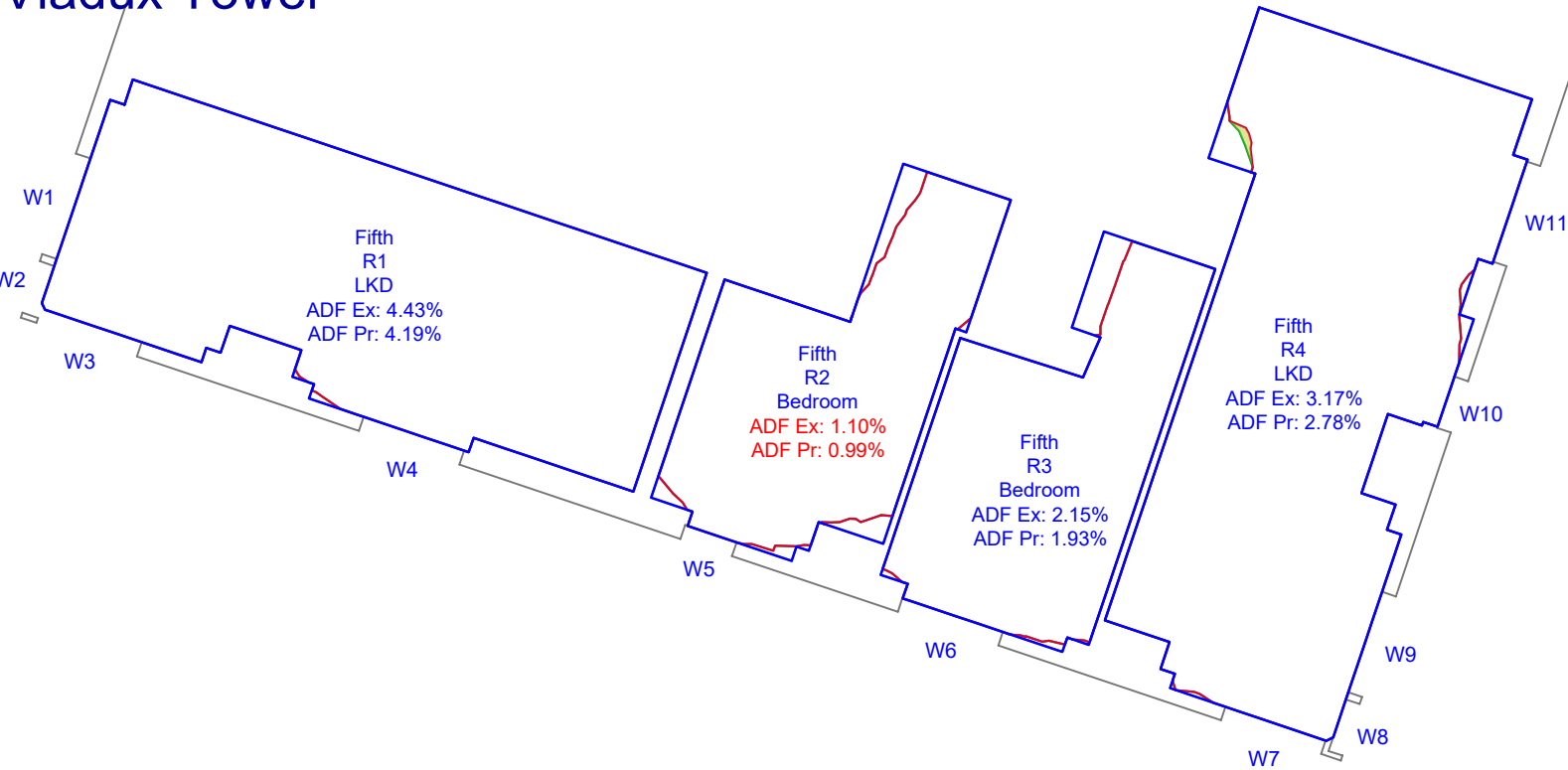
Third Floor
Viadux Tower



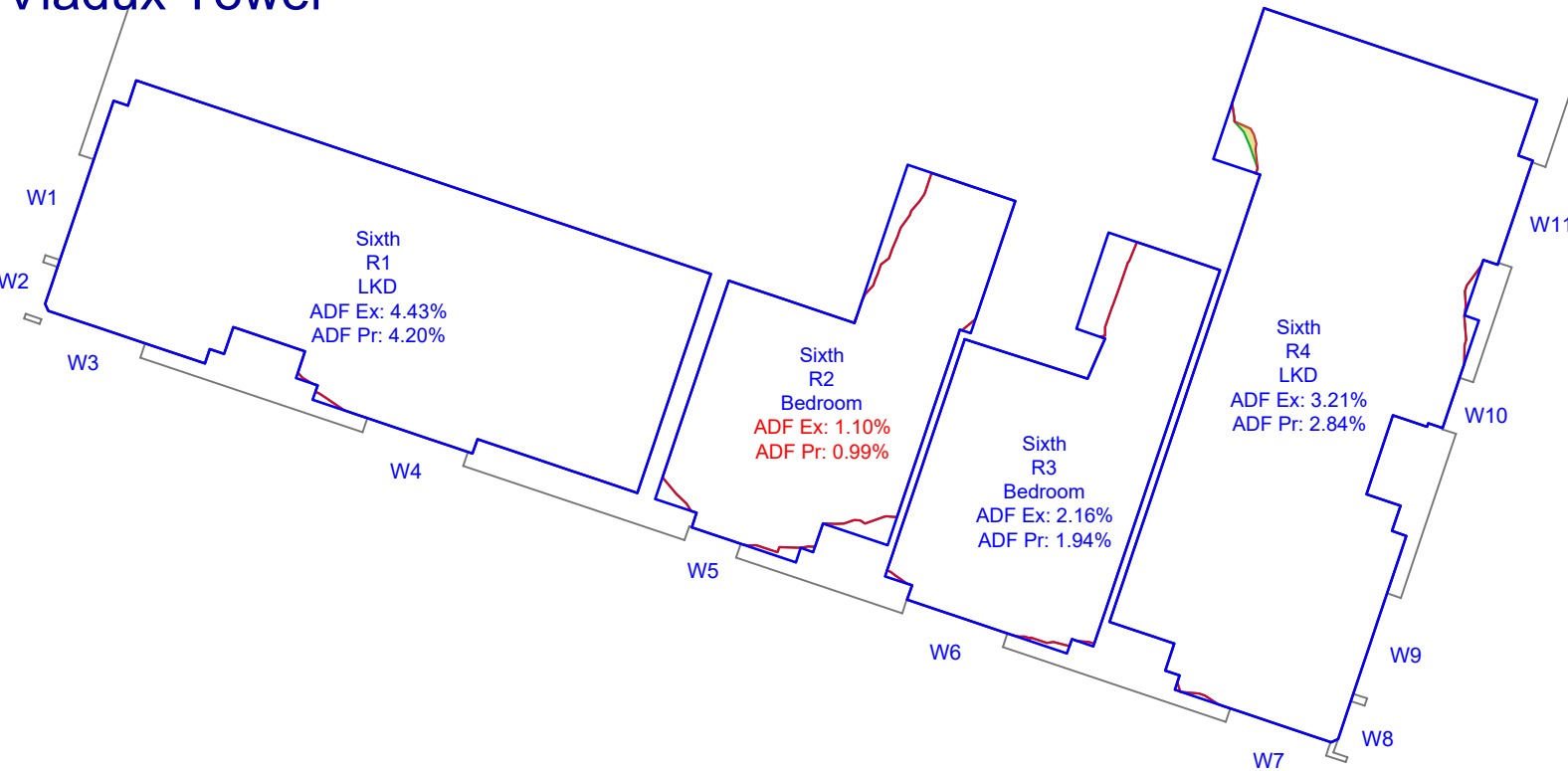
Fourth Floor
Viadux Tower



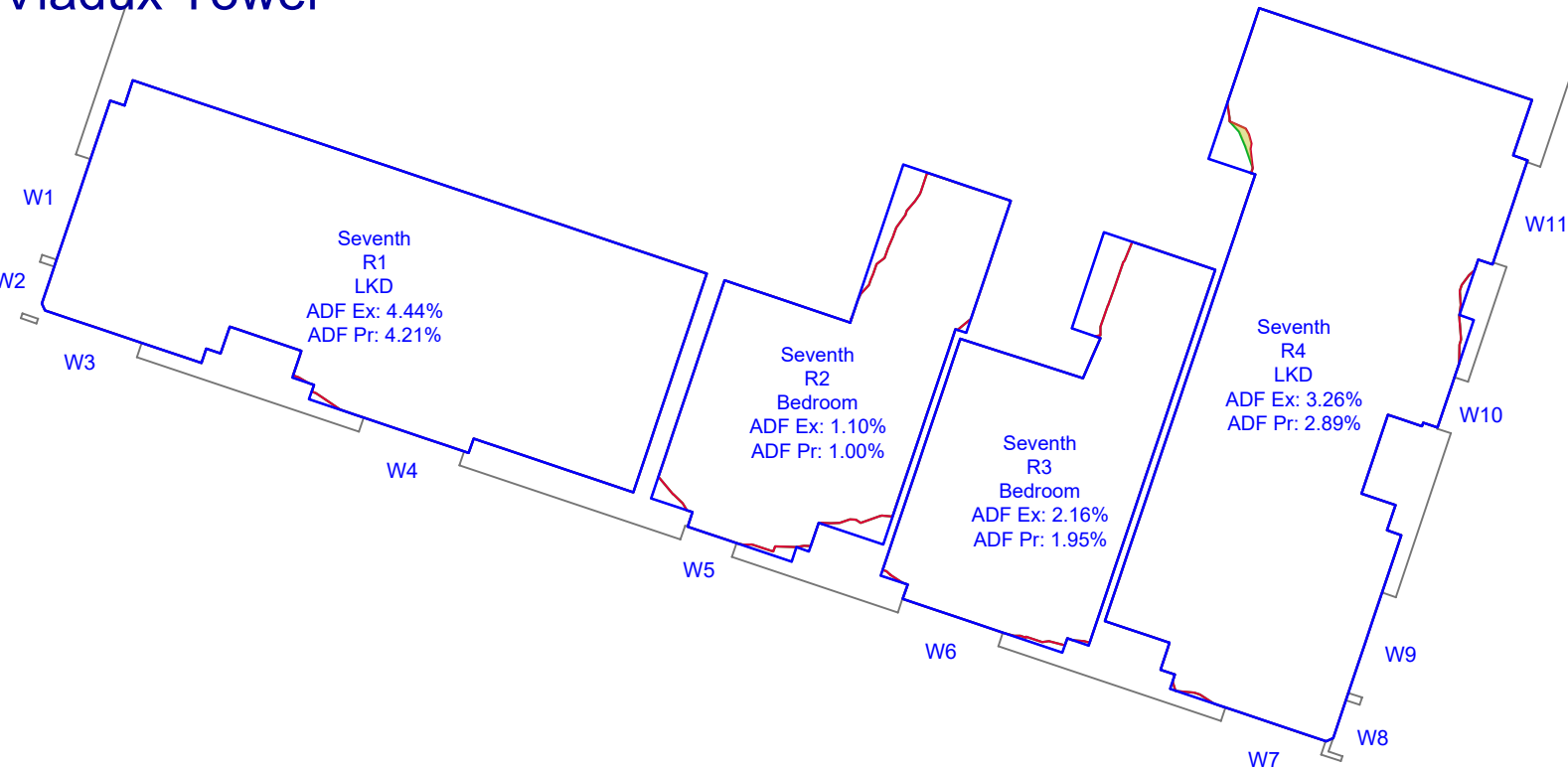
Fifth Floor
Viadux Tower



Sixth Floor
Viadux Tower



Seventh Floor
Viadux Tower



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Analysis
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MBS Survey Software Ltd (www.mbs-software.co.uk)
Existing & Surrounding Models
Existing and Surrounding massing derived from 3d
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Consented Schemes derived from 2d data listed below.
Axis Tower - "115351_NMC_2017" PDF Data Set
Viadux Tower - "133958_JO_2022" PDF Data Set
Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY
Room Area (Measured Layout)
Room Area (Assumed Layout)
Existing No Sky Area
Proposed No Sky Area
Area of Loss/Gain

REV	DATE	DESCRIPTION

Watts.

Watts Group Limited
St James's Tower
7 Charlotte Street
Manchester M1 4DZ
T: 0161 831 6180
watts.co.uk

CLIENT:
Brigantes Ltd

PROPERTY:
Whitworth Street West, Manchester

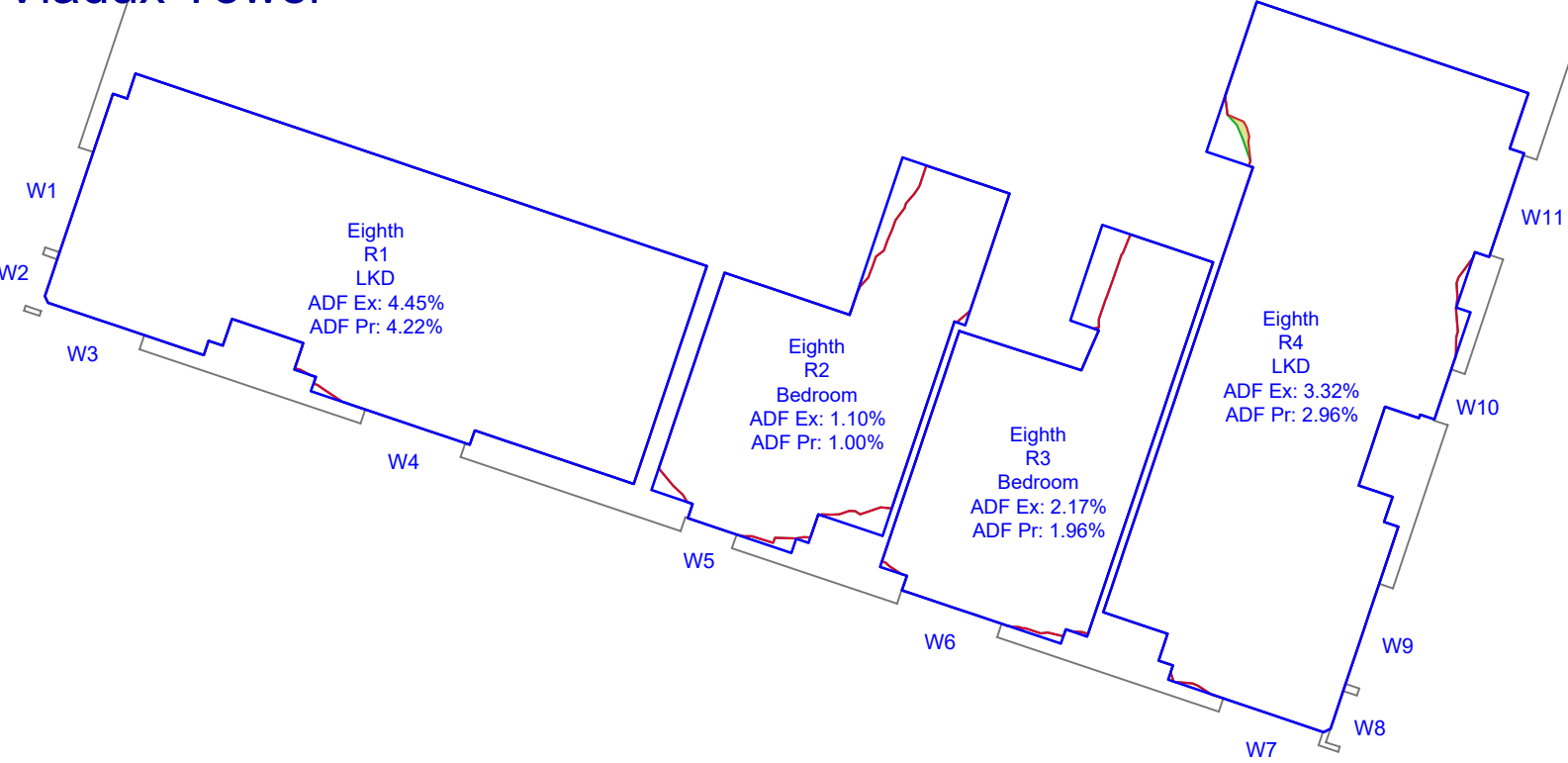
DRAWING TITLE:
Daylight Distribution
Contours

SCALE @ A1: NTS	DATE: 26.08.22	DRAWN: MBS
		CHECKED: TK

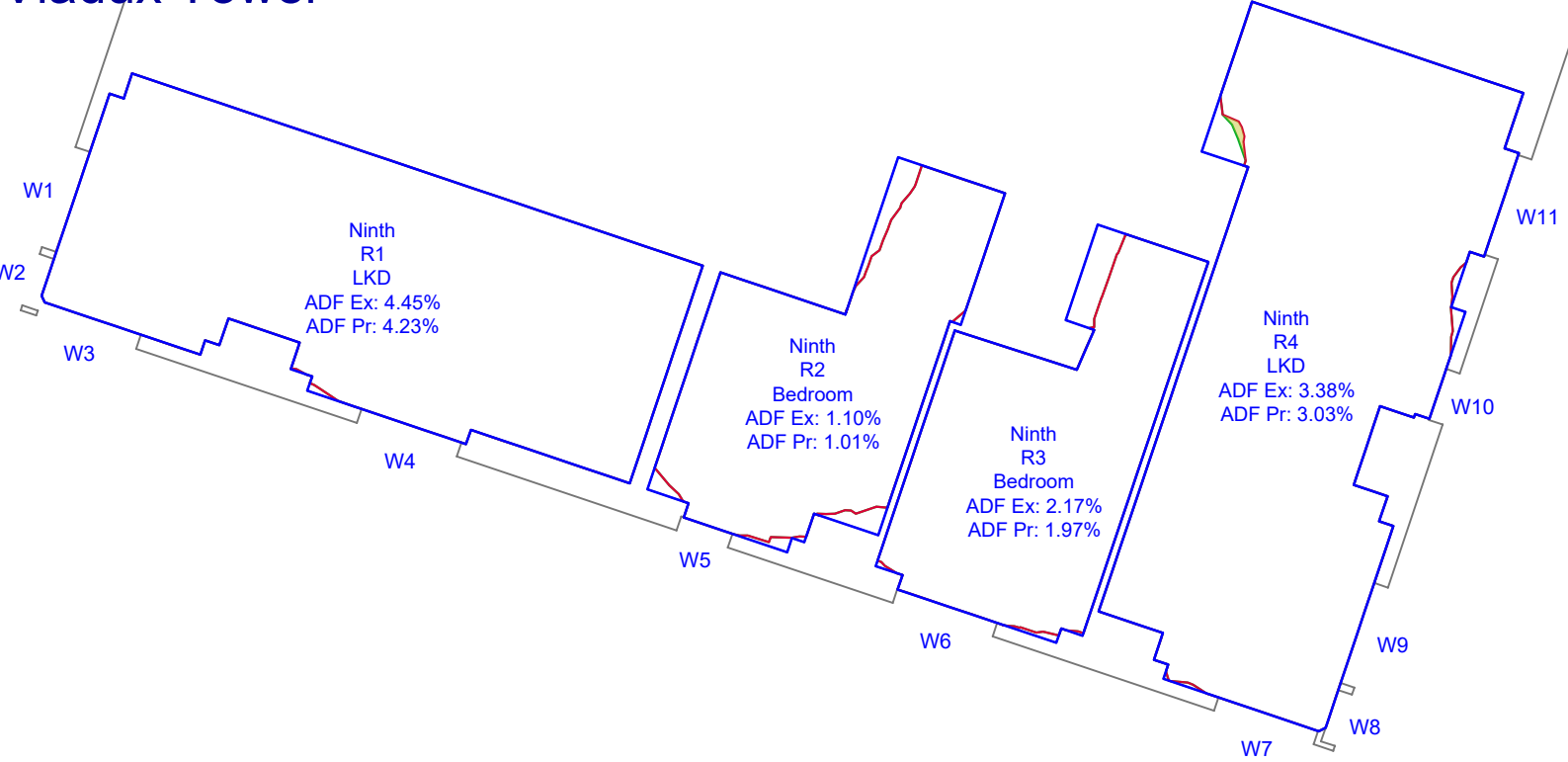
DRAWING NUMBER: 122214-08-14	REV: .
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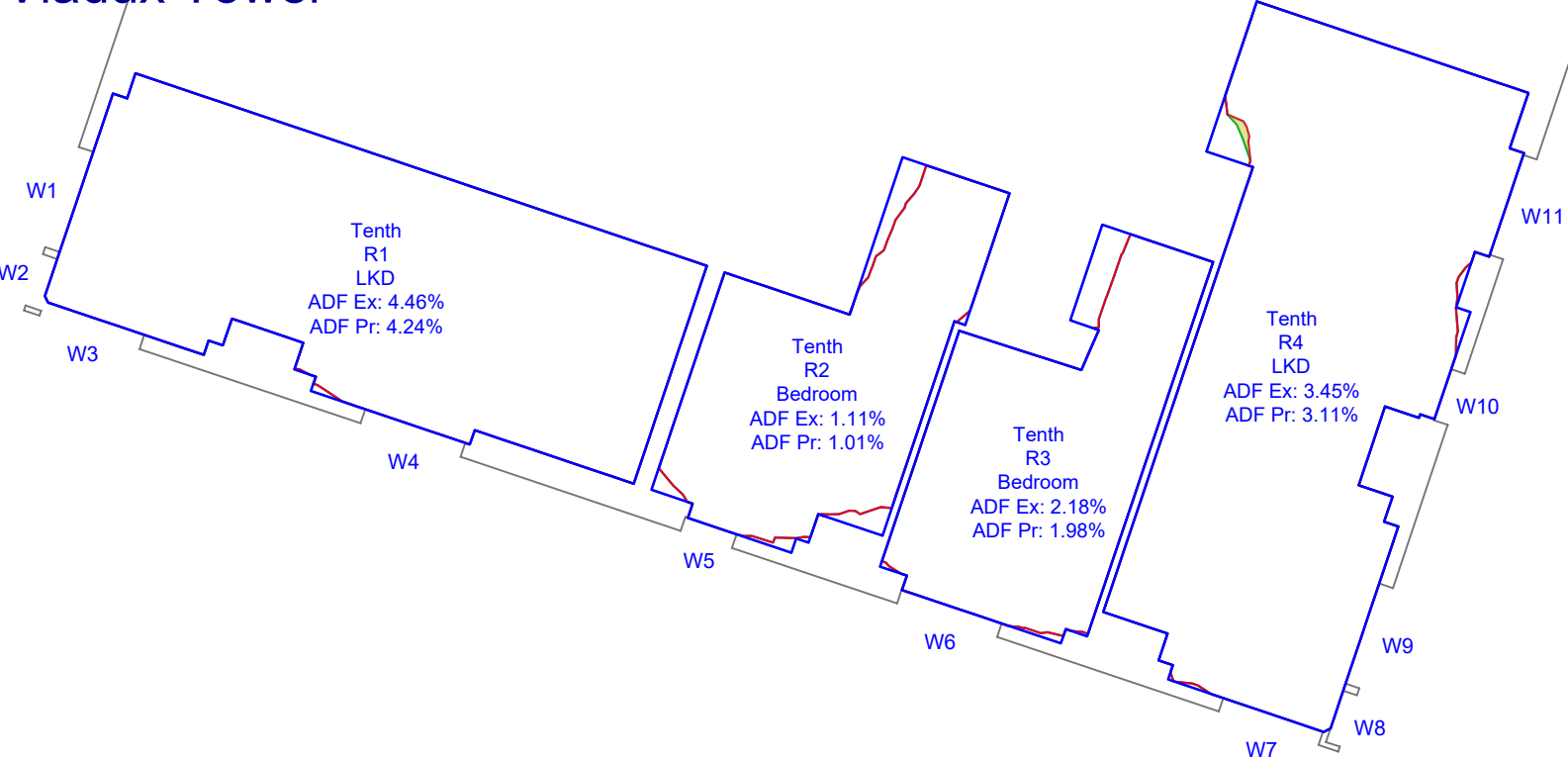
Eighth Floor
Viadux Tower



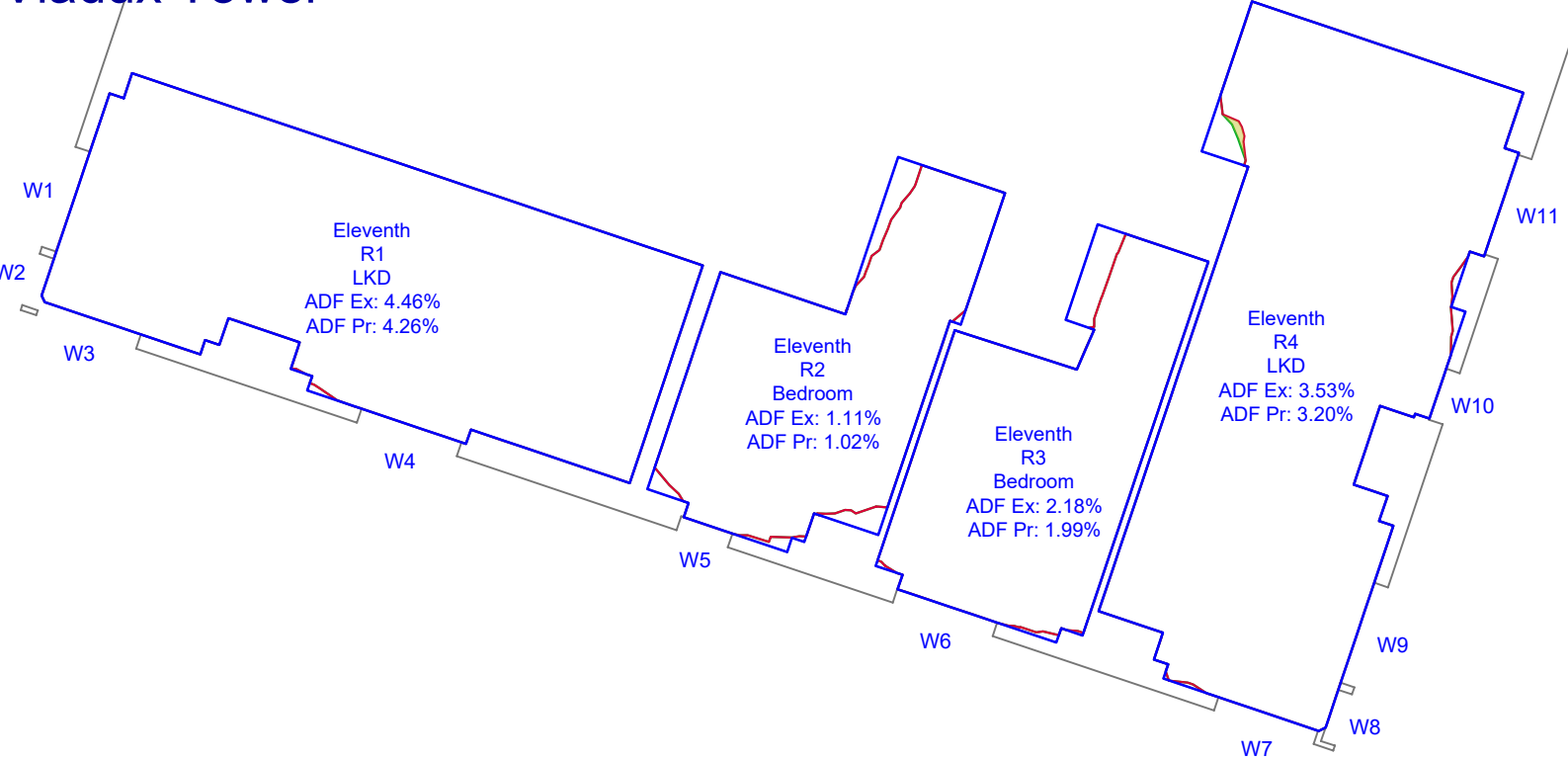
Ninth Floor
Viadux Tower



Tenth Floor
Viadux Tower



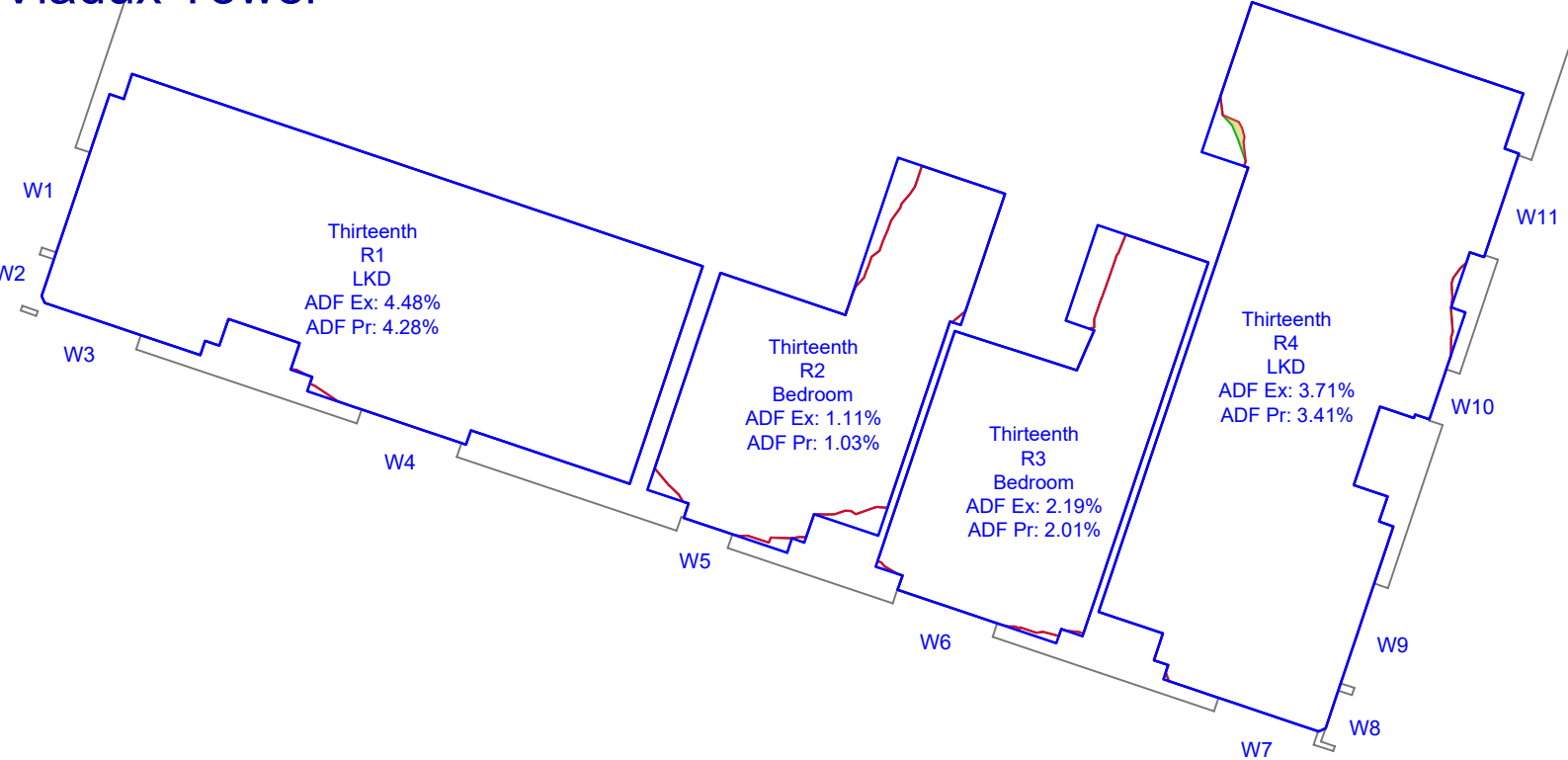
Eleventh Floor
Viadux Tower



Twelfth Floor
Viadux Tower



Thirteenth Floor
Viadux Tower



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Analysis
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Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY
Room Area (Measured Layout)
Room Area (Assumed Layout)
Existing No Sky Area
Proposed No Sky Area
Area of Loss/Gain

REV	DATE	DESCRIPTION

Watts.

Watts Group Limited
St James's Tower
7 Charlotte Street
Manchester M1 4DZ
T: 0161 831 6180
watts.co.uk



CLIENT:

Brigantes Ltd

PROPERTY:

Whitworth Street West, Manchester

DRAWING TITLE:

Daylight Distribution
Contours

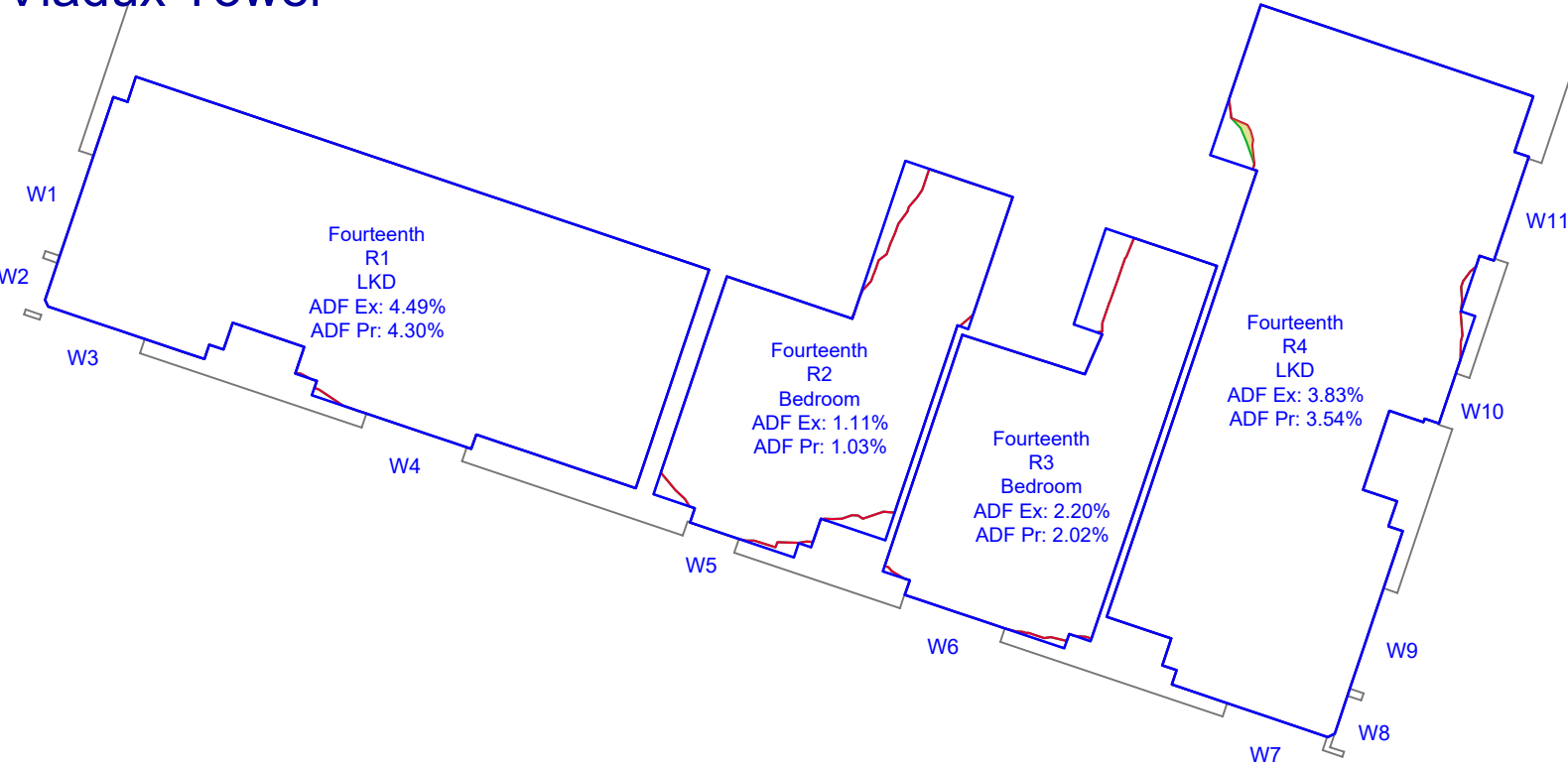
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N	26.08.22	CHECKED:	TK

DRAWING NUMBER:	REV:
122214-08-15	



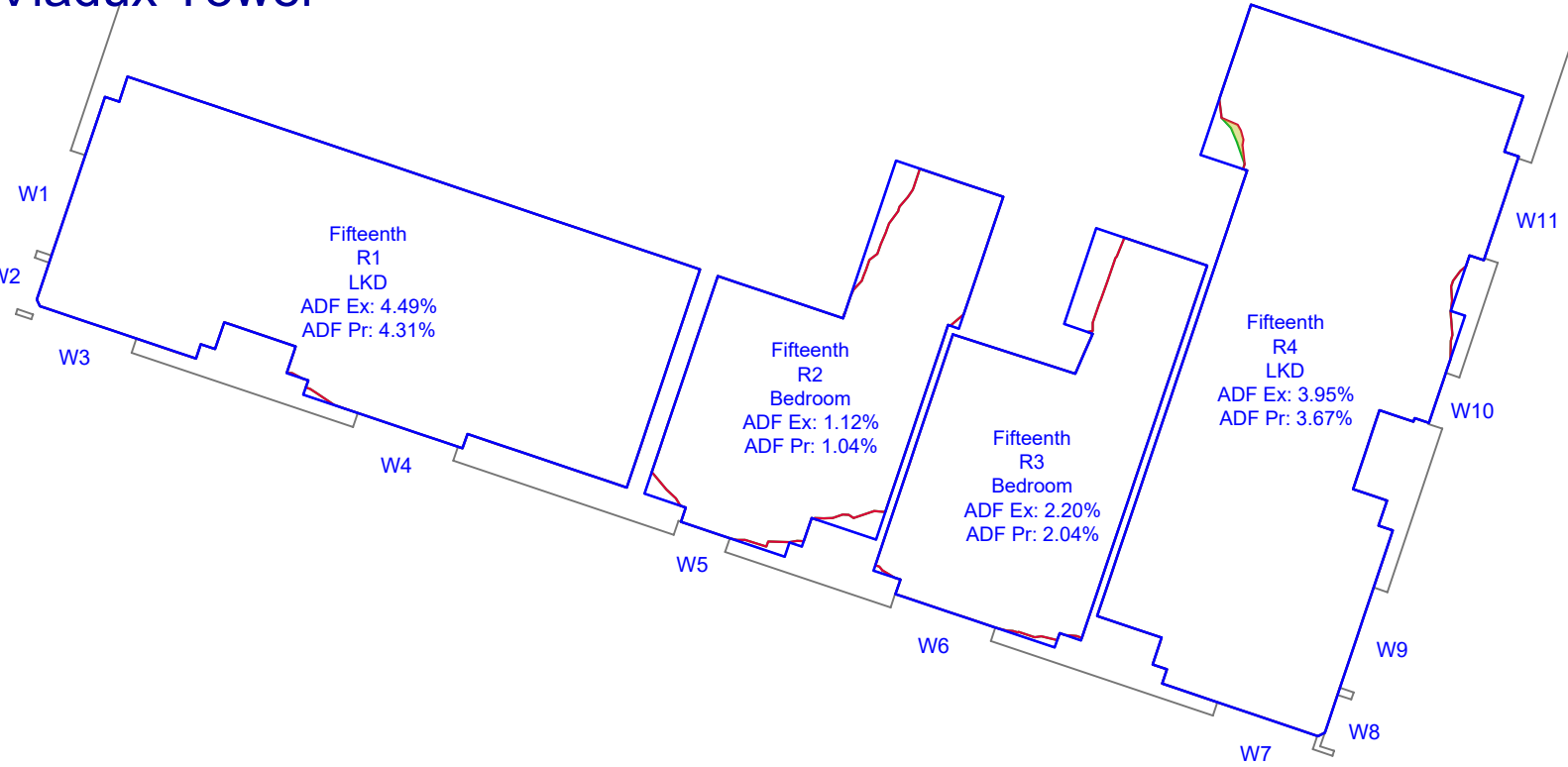
Fourteenth Floor

Viadux Tower



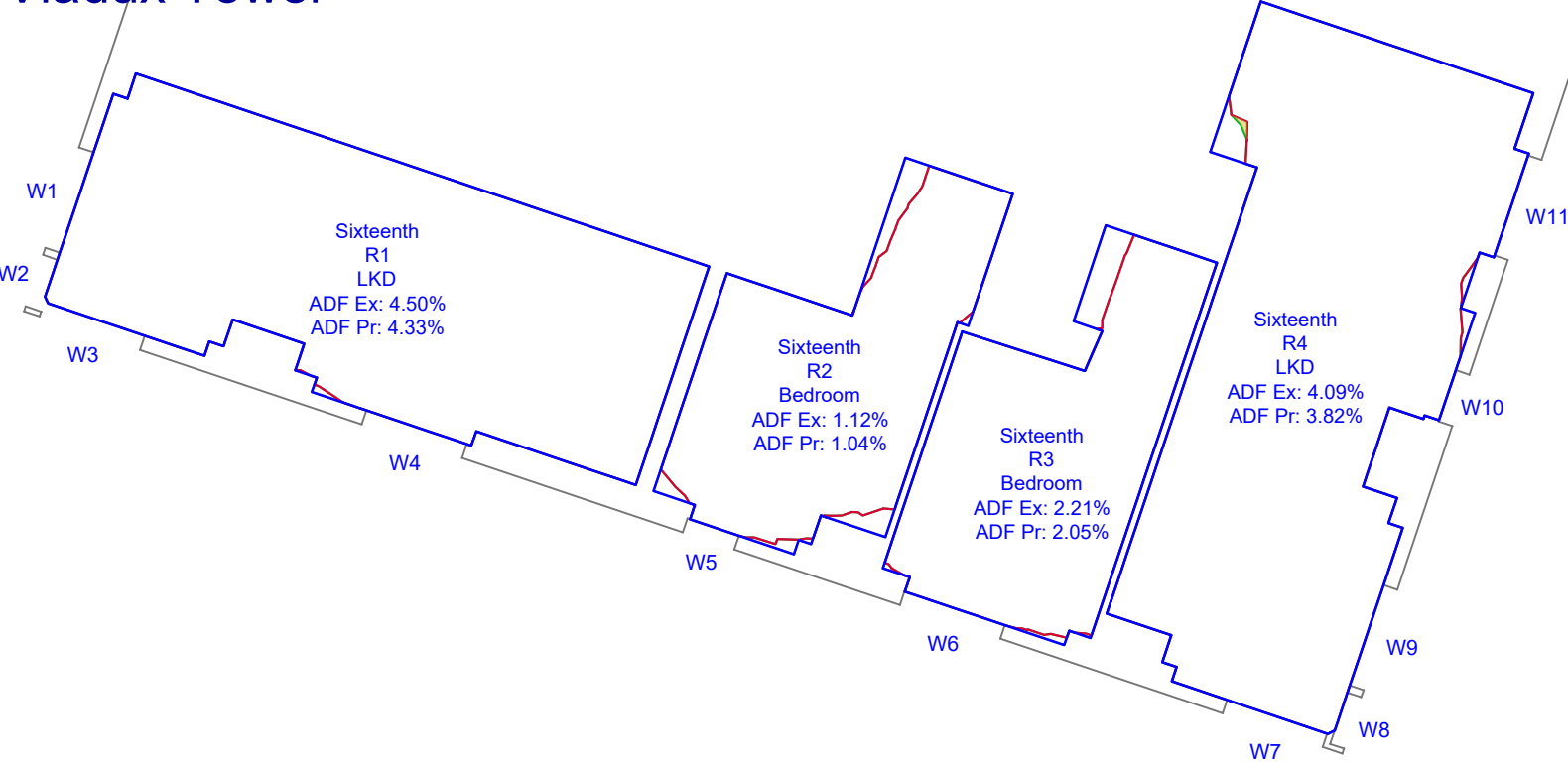
Fifteenth Floor

Viadux Tower



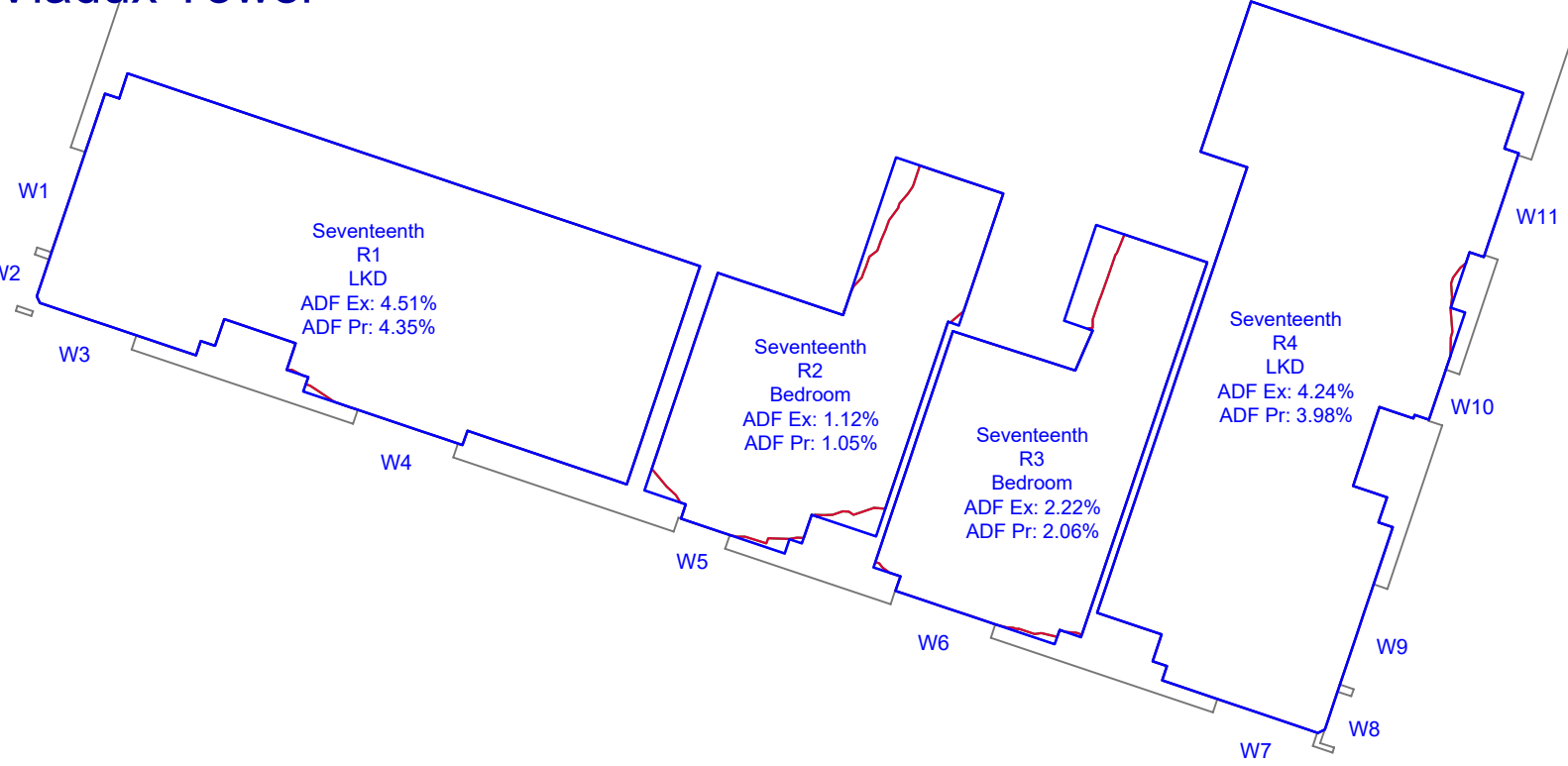
Sixteenth Floor

Viadux Tower



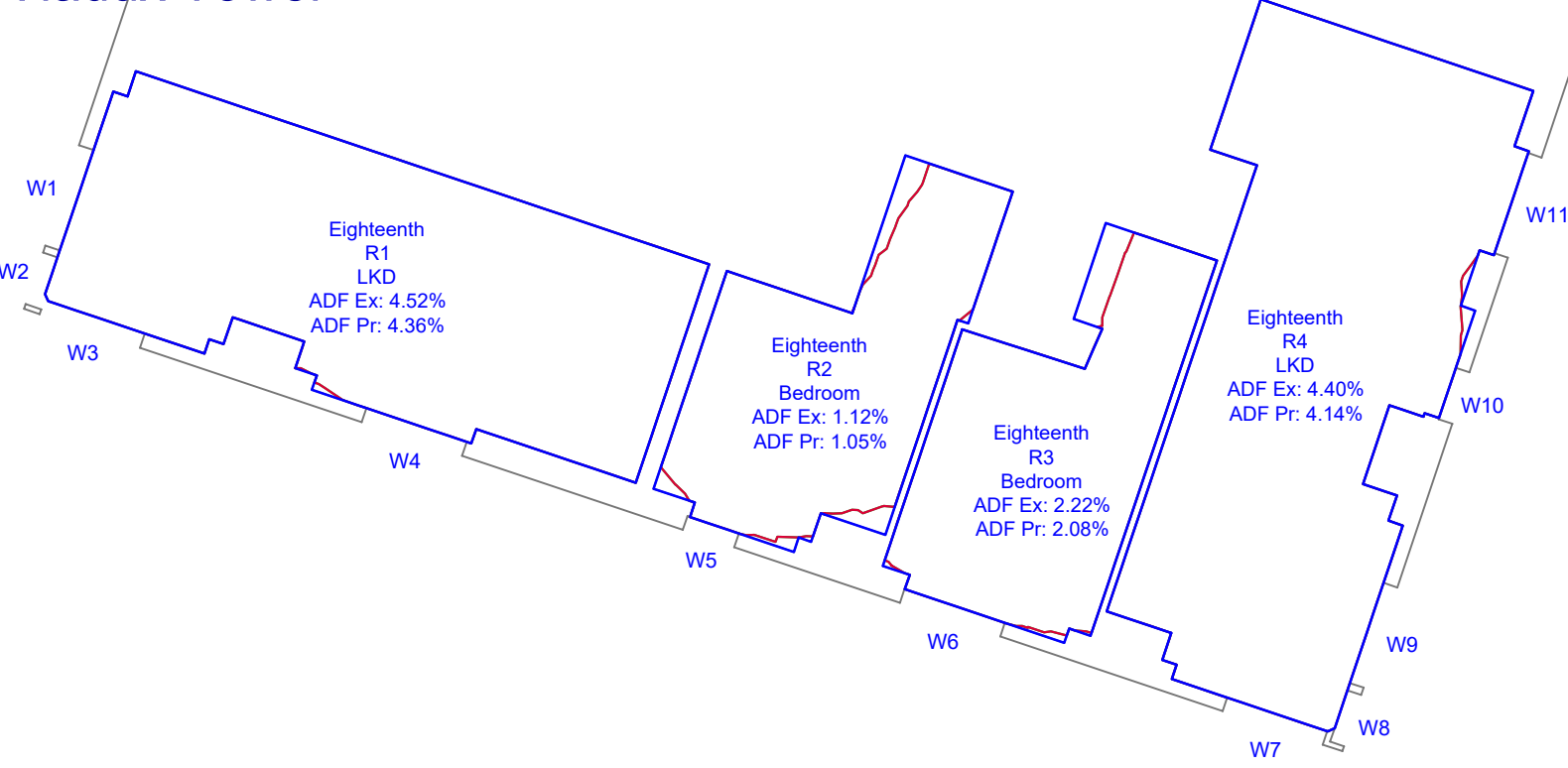
Seventeenth Floor

Viadux Tower



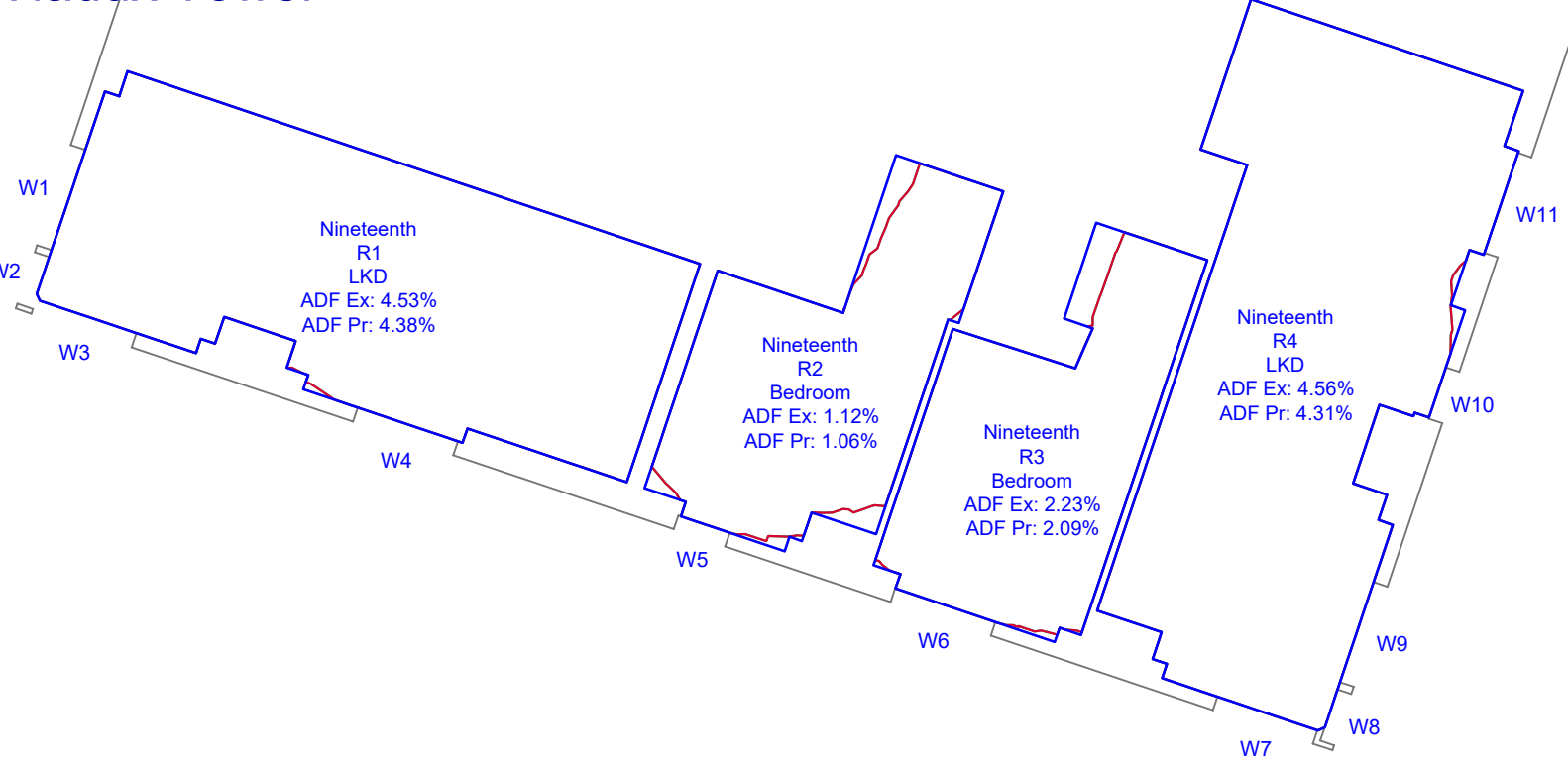
Eighteenth Floor

Viadux Tower



Nineteenth Floor

Viadux Tower



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Analysis

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MBS Survey Software Ltd (www.mbs-software.co.uk)

Existing & Surrounding Models

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Viadux Tower - "133958_JO_2022" PDF Data Set

Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY

- Room Area (Measured Layout)
- Room Area (Assumed Layout)
- Existing No Sky Area
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- Area of Loss/Gain

REV: DATE: DESCRIPTION:

Watts.

Watts Group Limited
St James's Tower
7 Charlotte Street
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T: 0161 831 6180
watts.co.uk

CLIENT:

Brigantes Ltd

PROPERTY:

Whitworth Street West, Manchester

DRAWING TITLE:

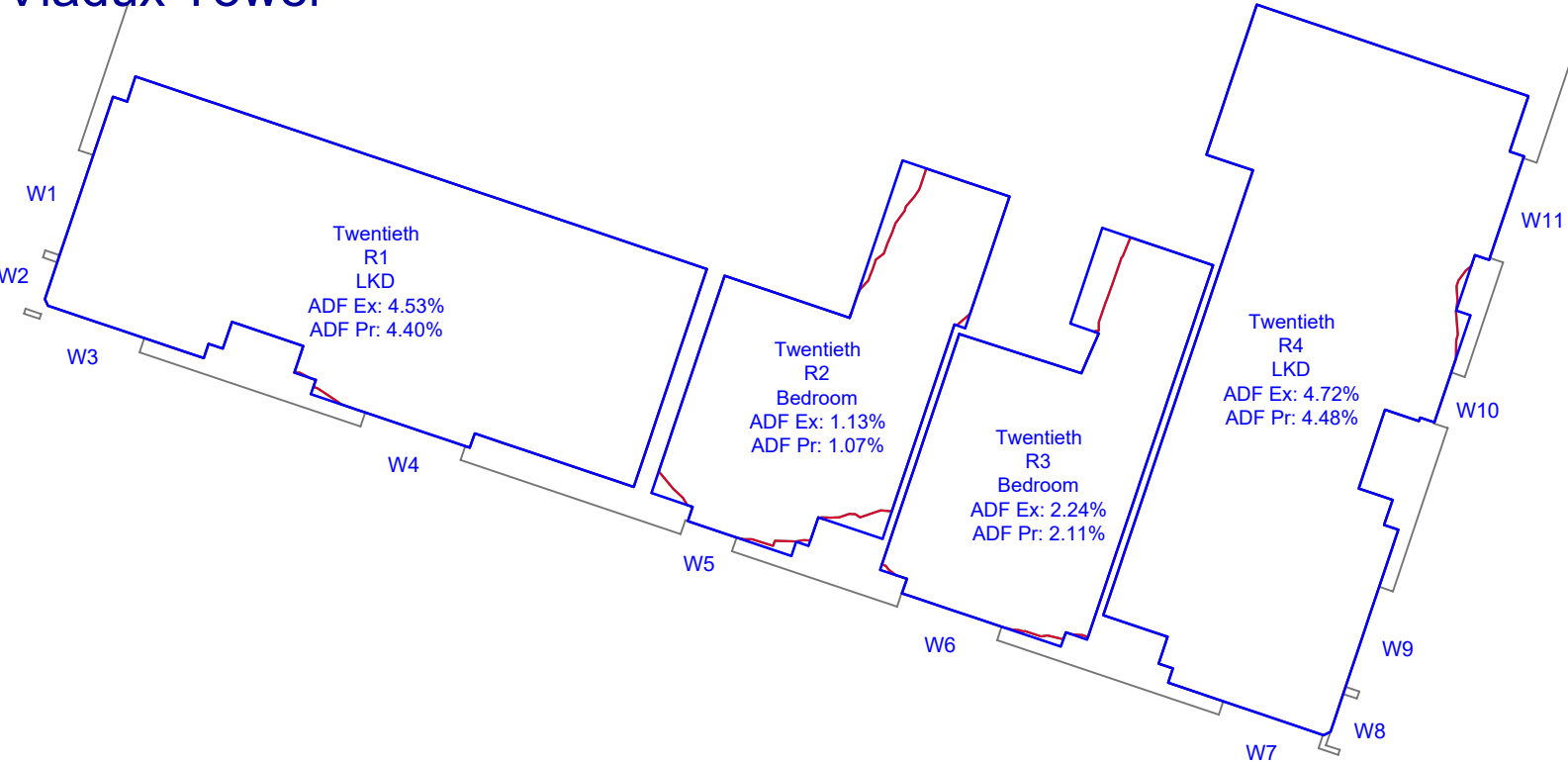
Daylight Distribution
Contours

SCALE @ A1:	DATE:	DRAWN:	MBS
NTS	26.08.22	CHECKED:	TK

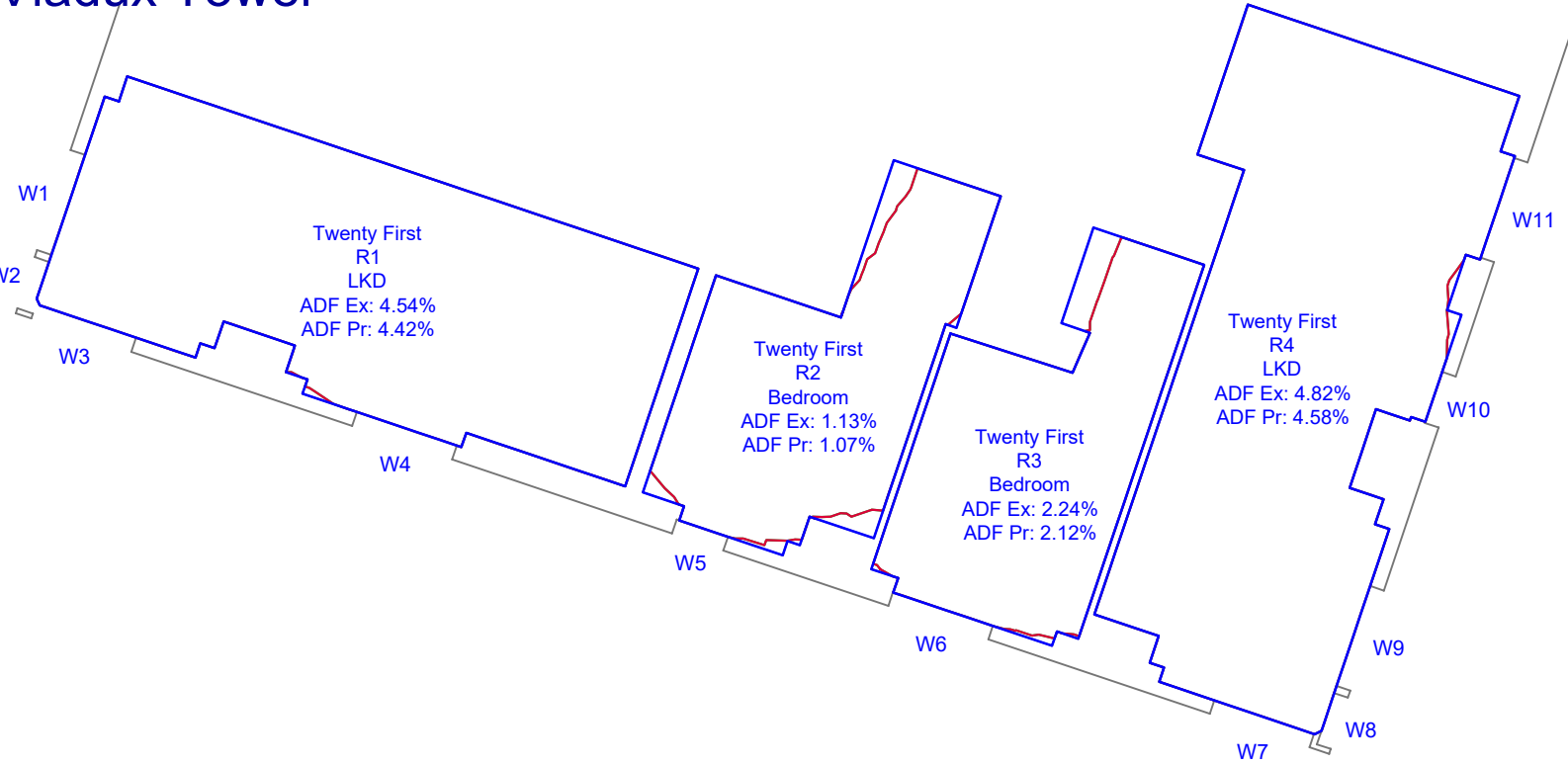
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122214-08-16	.



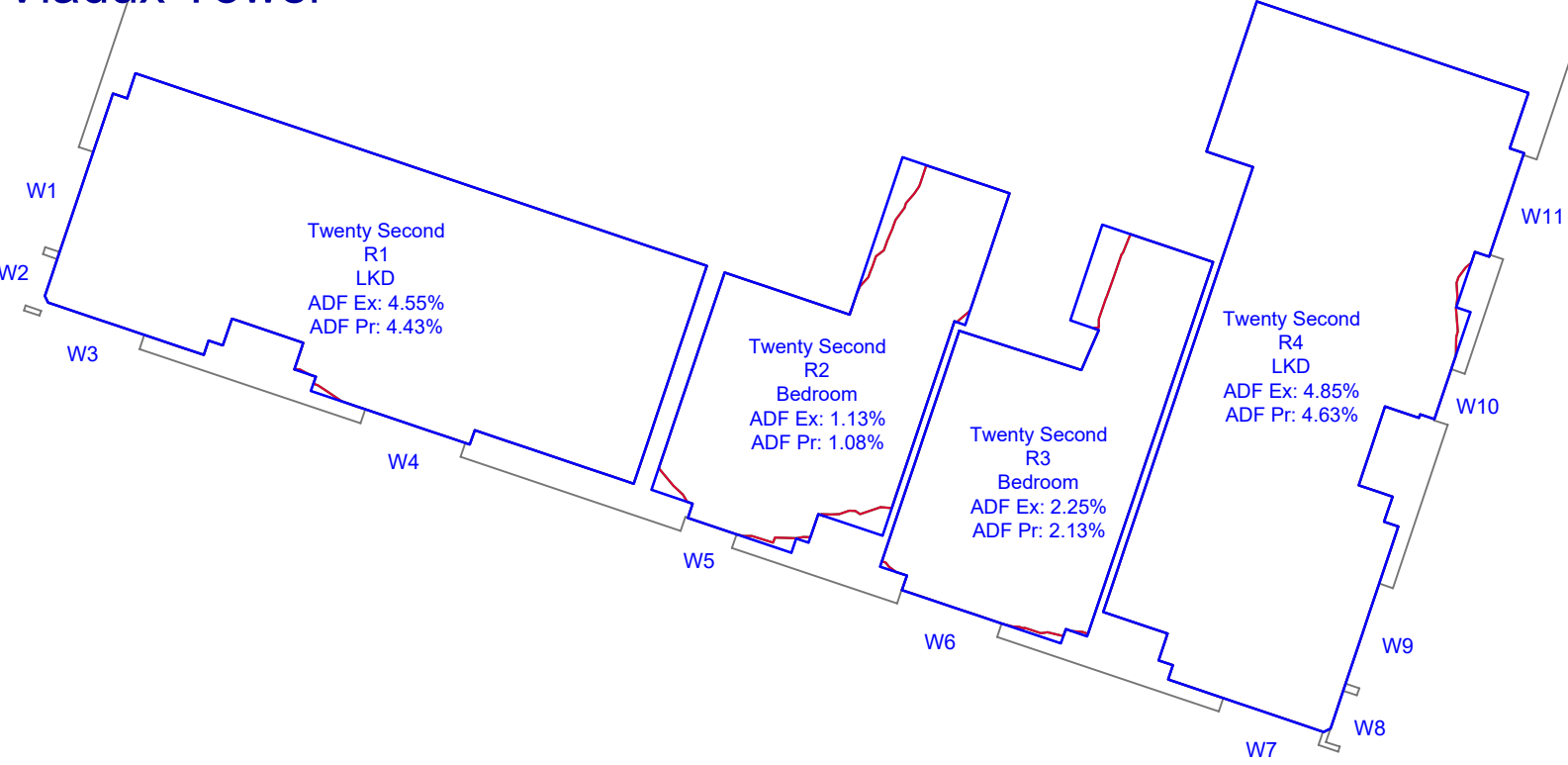
Twentieth Floor
Viadux Tower



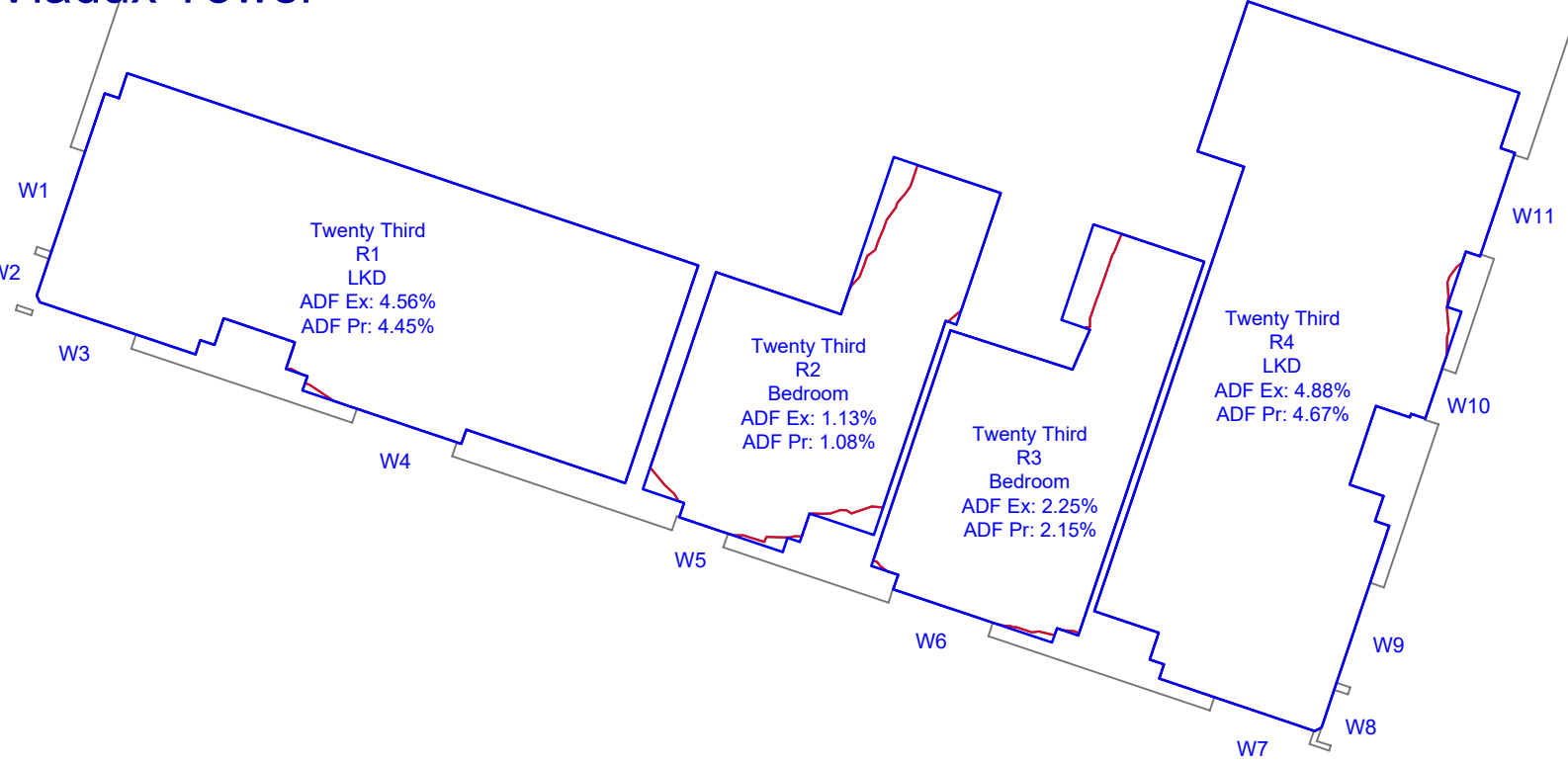
Twenty First Floor
Viadux Tower



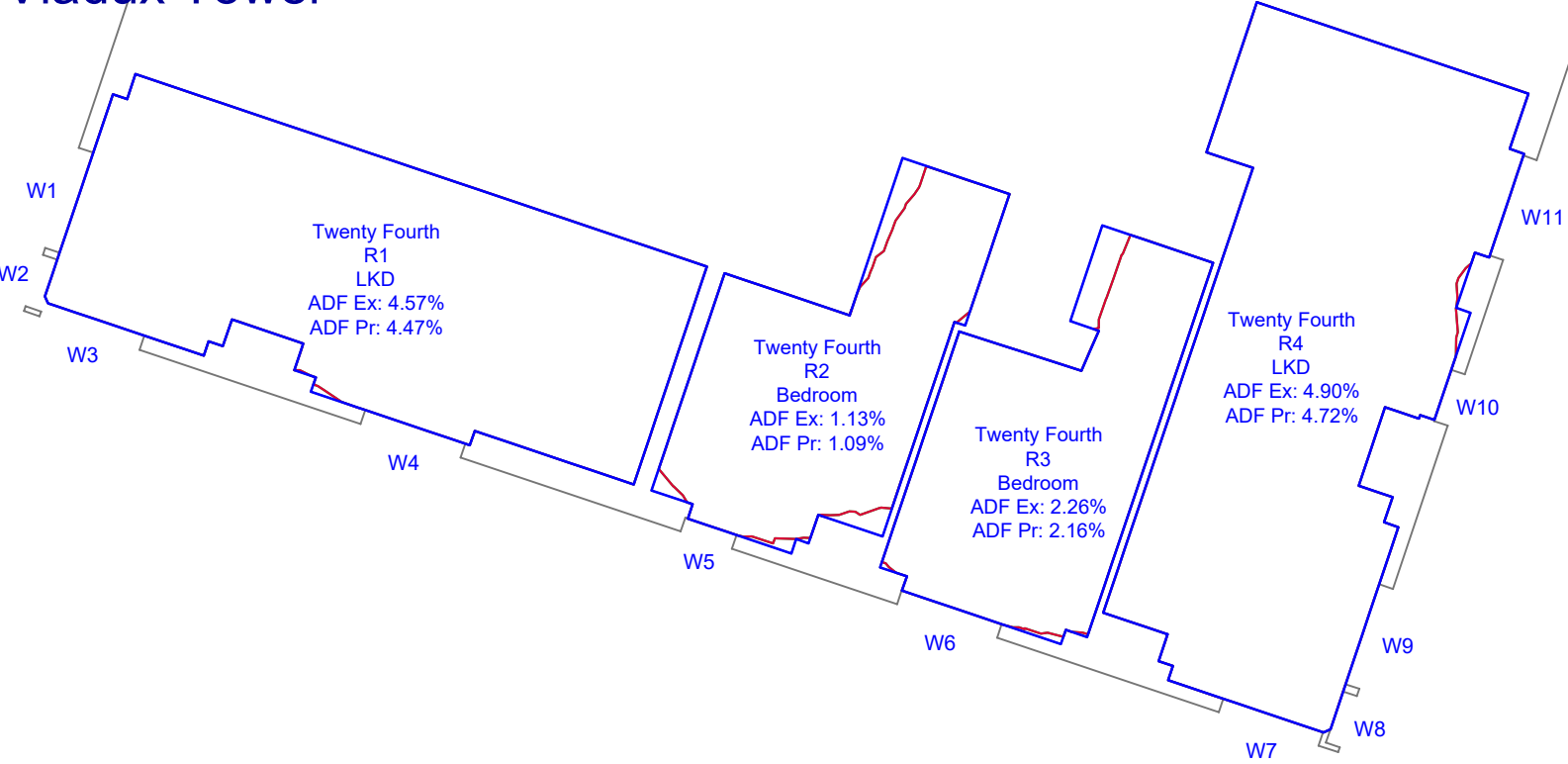
Twenty Second Floor
Viadux Tower



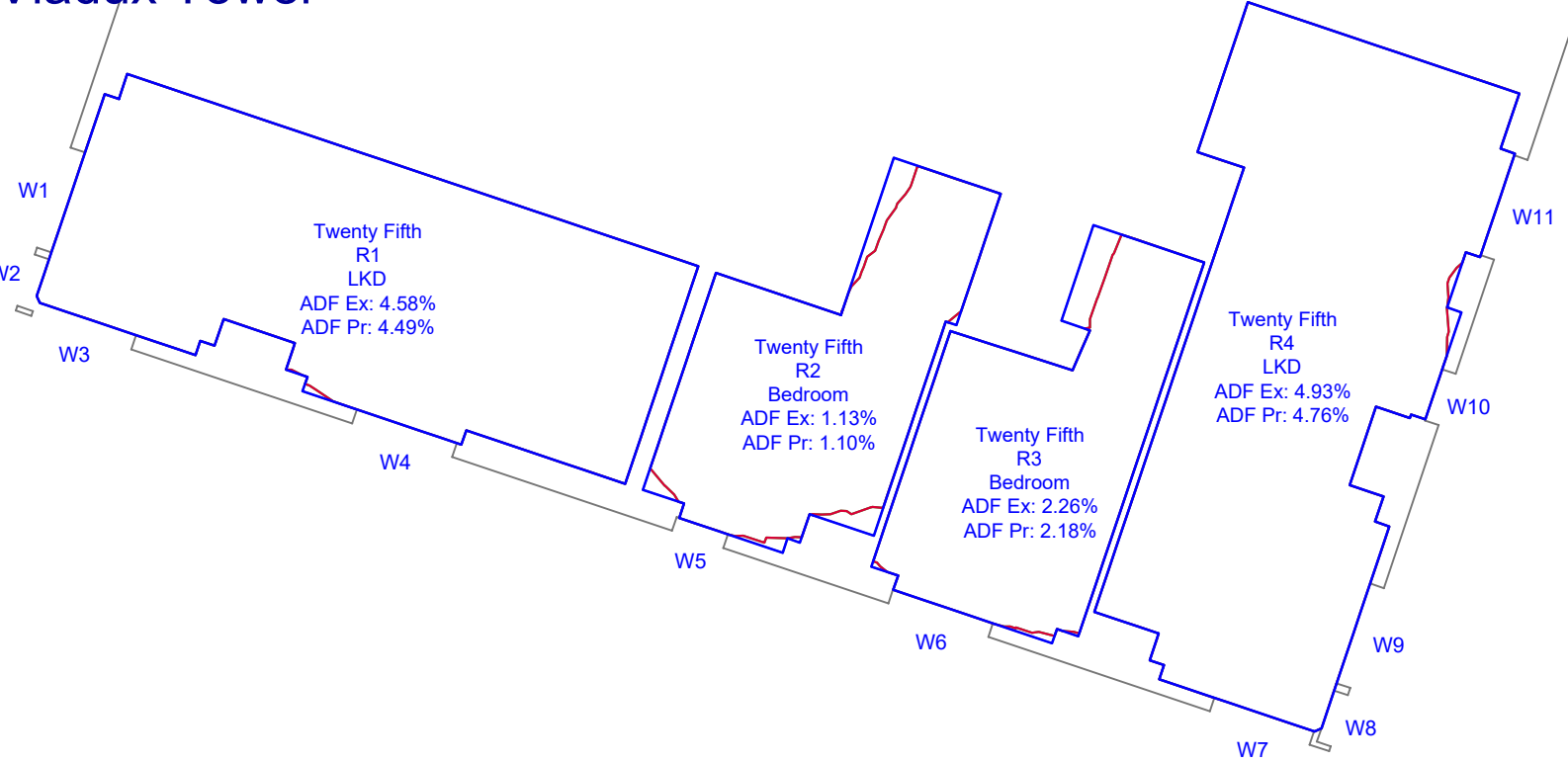
Twenty Third Floor
Viadux Tower



Twenty Fourth Floor
Viadux Tower



Twenty Fifth Floor
Viadux Tower



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Analysis
Produced using Walktram Tools
MBS Survey Software Ltd (www.mbs-software.co.uk)
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Existing and Surrounding massing derived from 3d
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Maps.
Consented Schemes derived from 2d data listed below.
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Viadux Tower - "133958_JO_2022" PDF Data Set

Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

- KEY
- Room Area (Measured Layout)
 - Room Area (Assumed Layout)
 - Existing No Sky Area
 - Proposed No Sky Area
 - Area of Loss/Gain

REV: DATE: DESCRIPTION:

Watts.

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CLIENT:

Brigantes Ltd

PROPERTY:
Whitworth Street West, Manchester

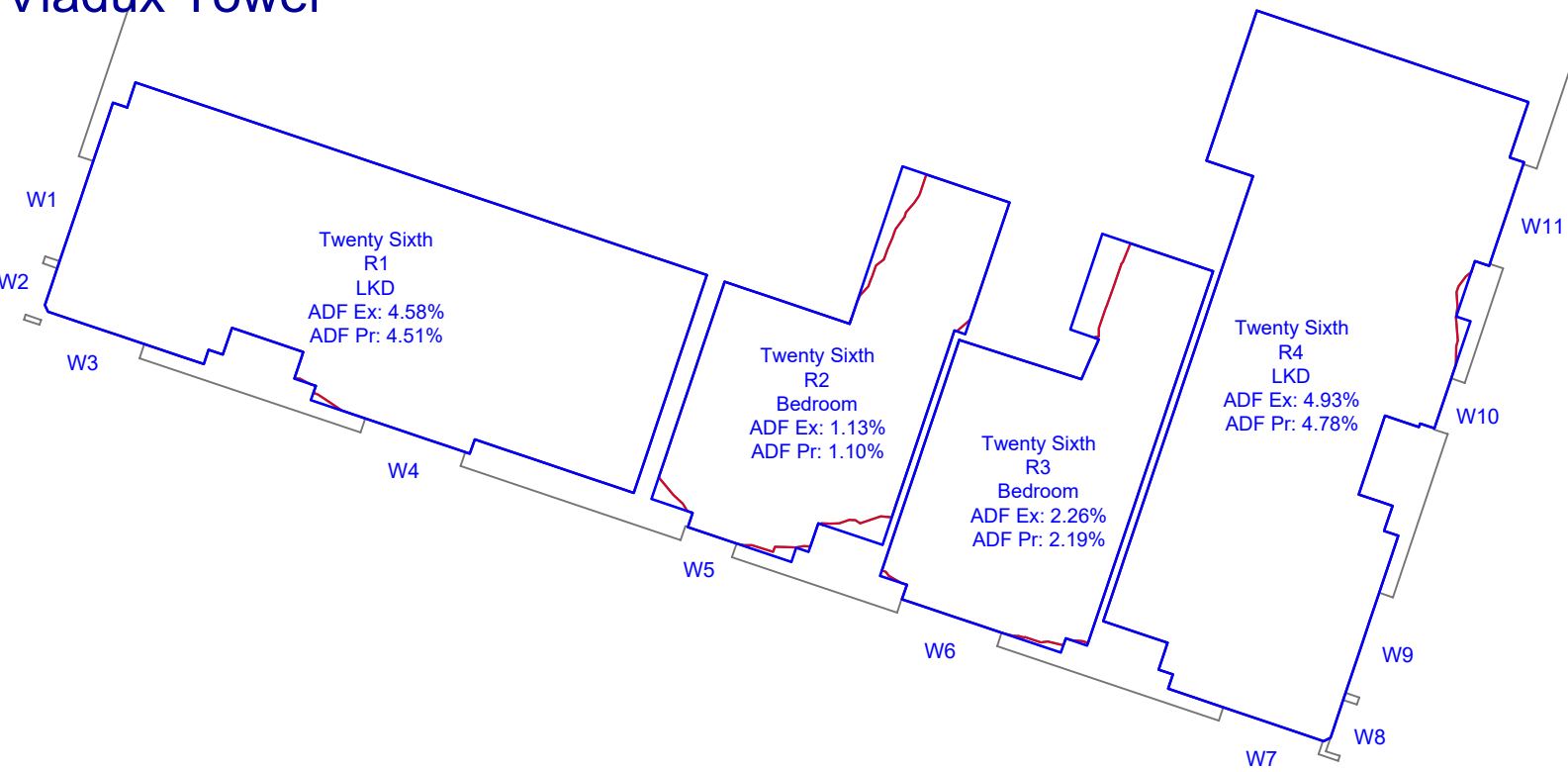
DRAWING TITLE:
Daylight Distribution
Contours

SCALE @ A1: NTS	DATE: 26.08.22	DRAWN: MBS
		CHECKED: TK

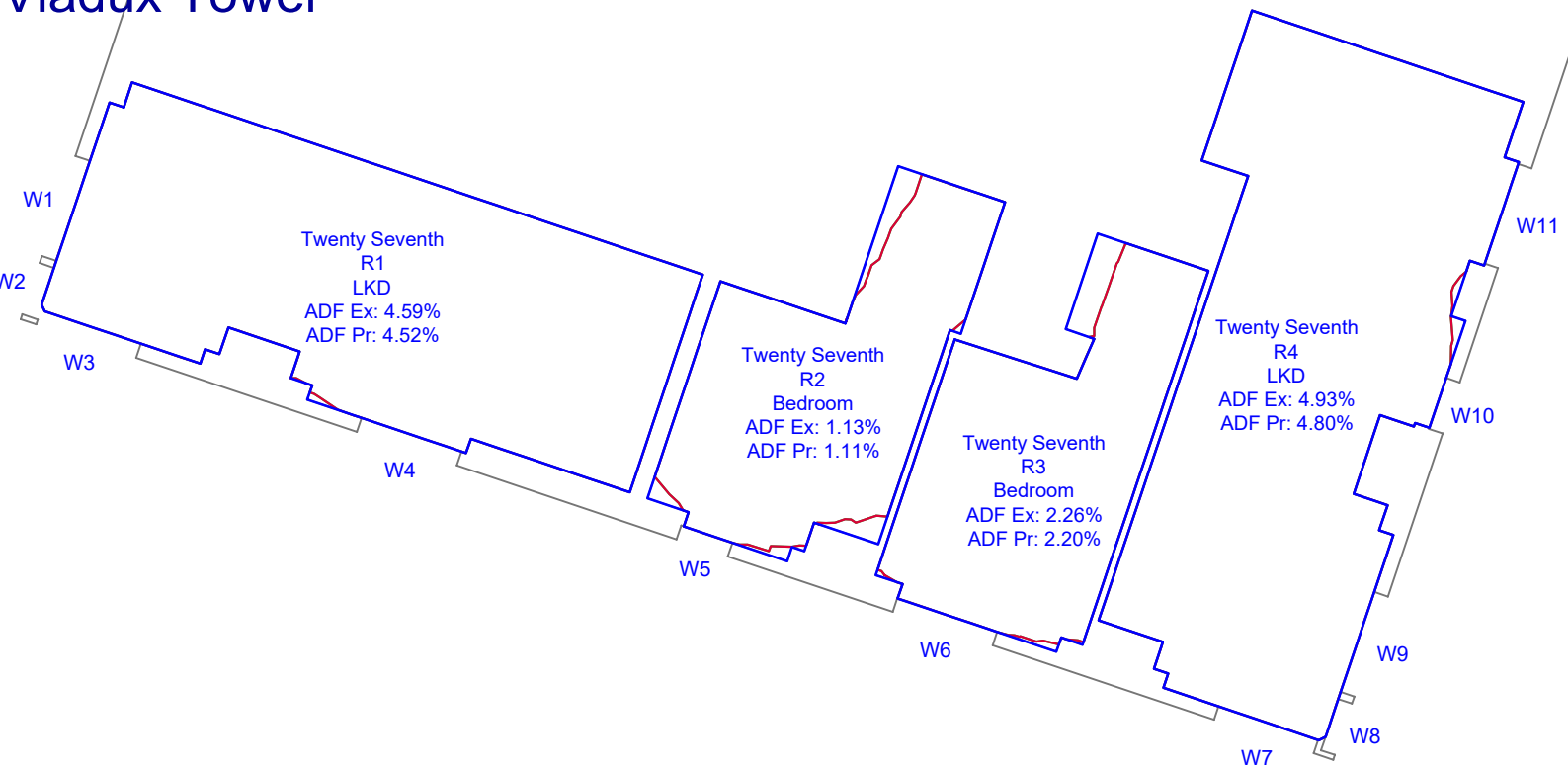
DRAWING NUMBER: 122214-08-17	REV: .
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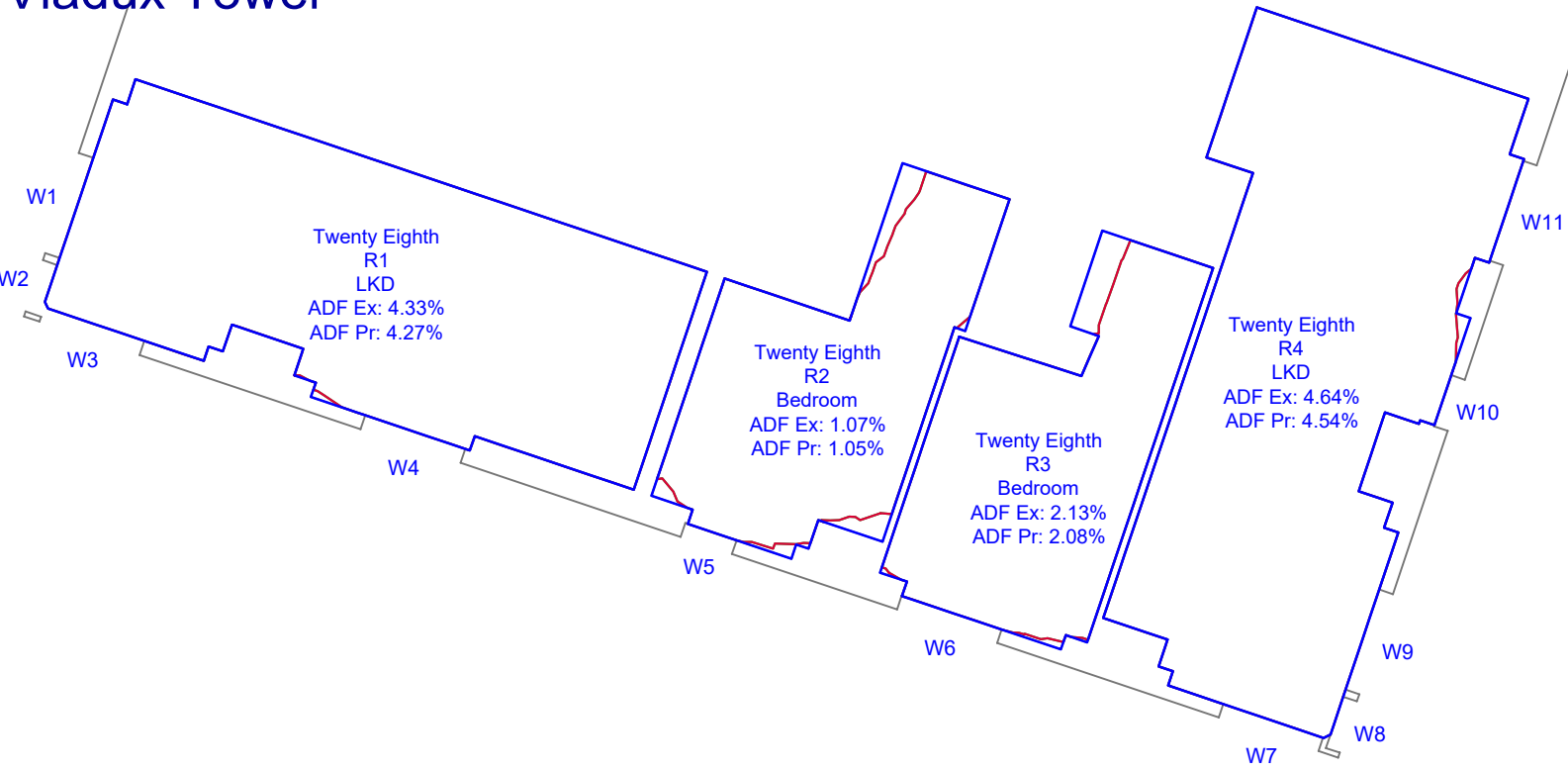
Twenty Sixth Floor
Viadux Tower



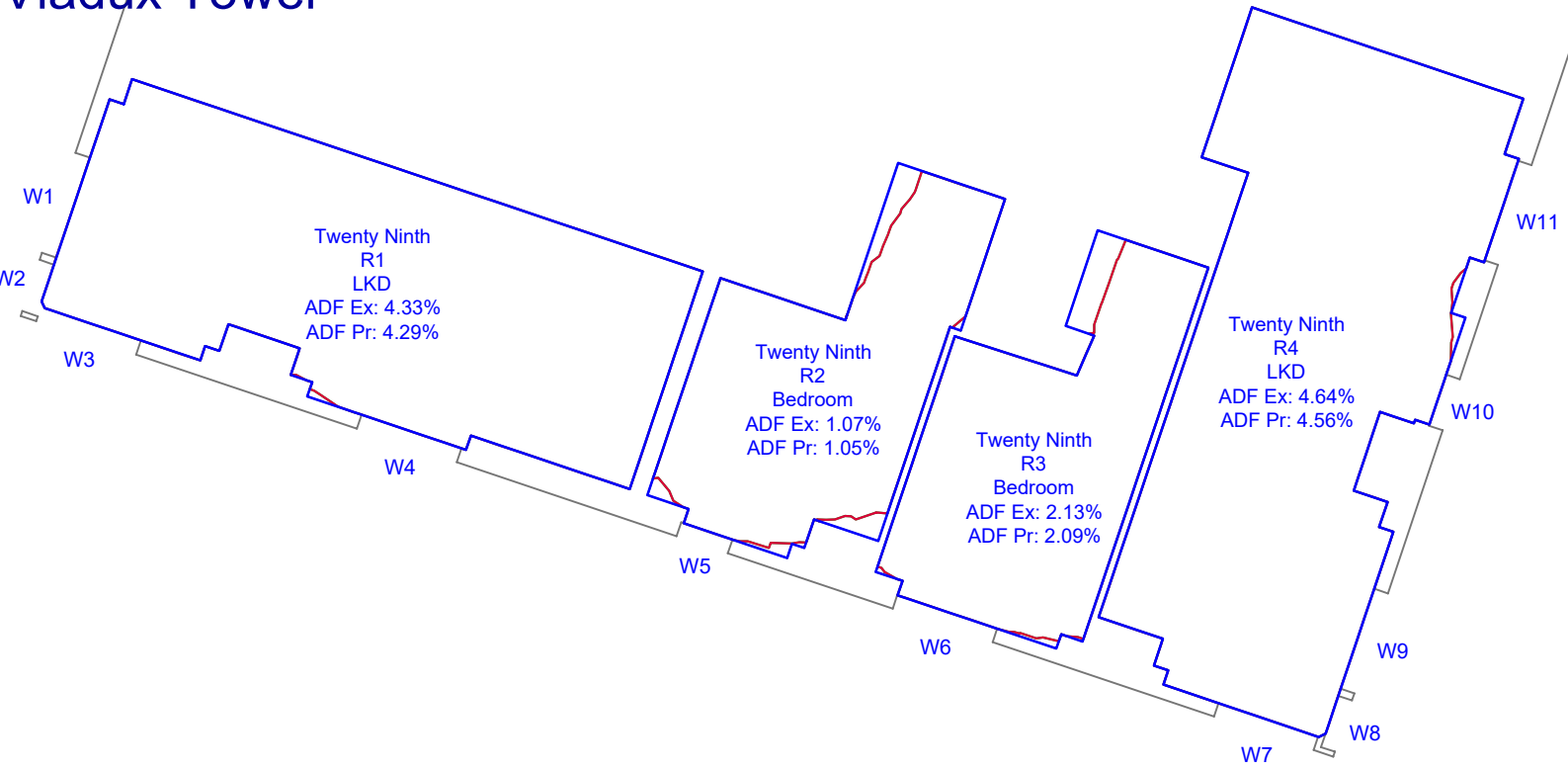
Twenty Seventh Floor
Viadux Tower



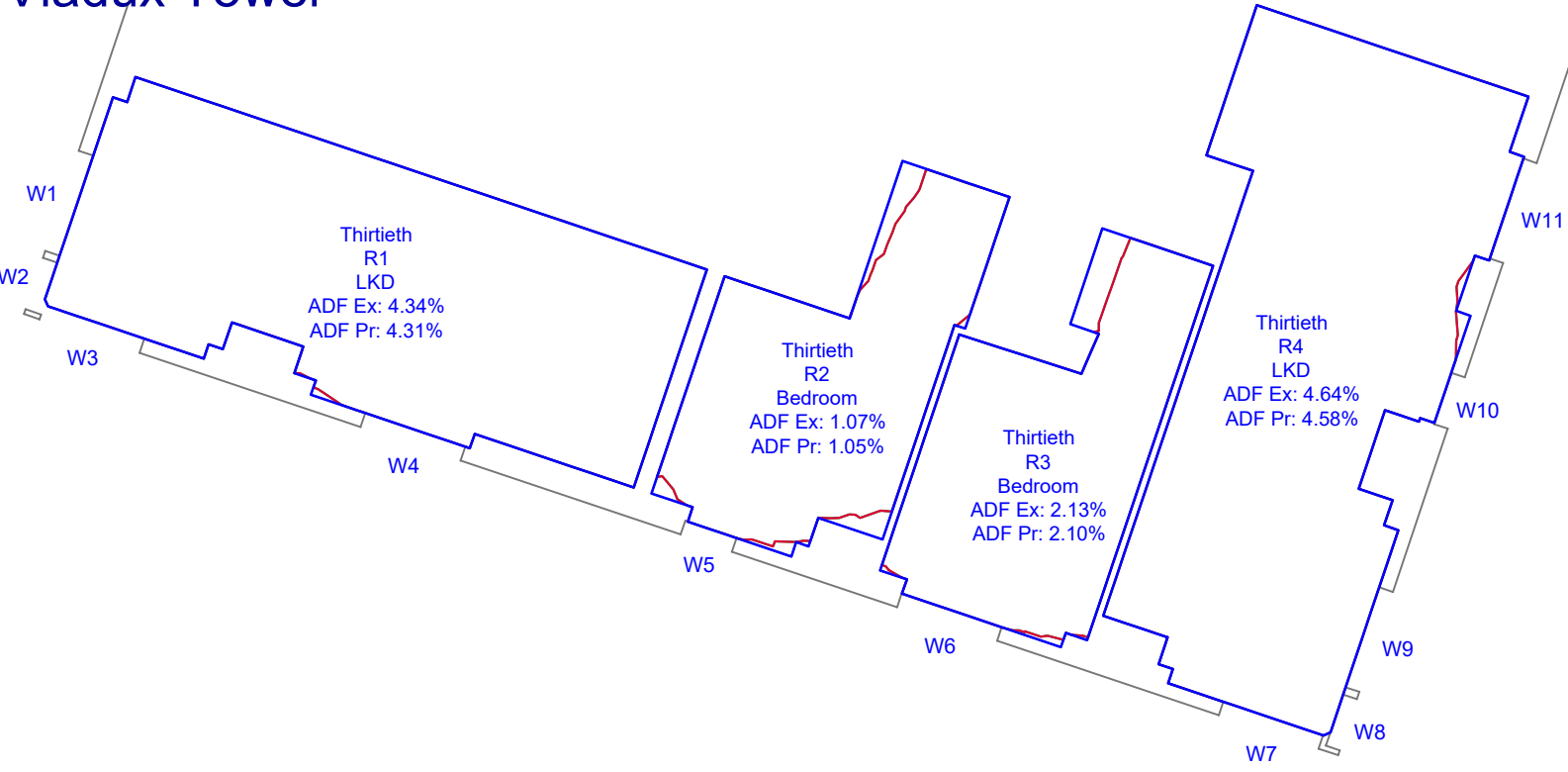
Twenty Eighth Floor
Viadux Tower



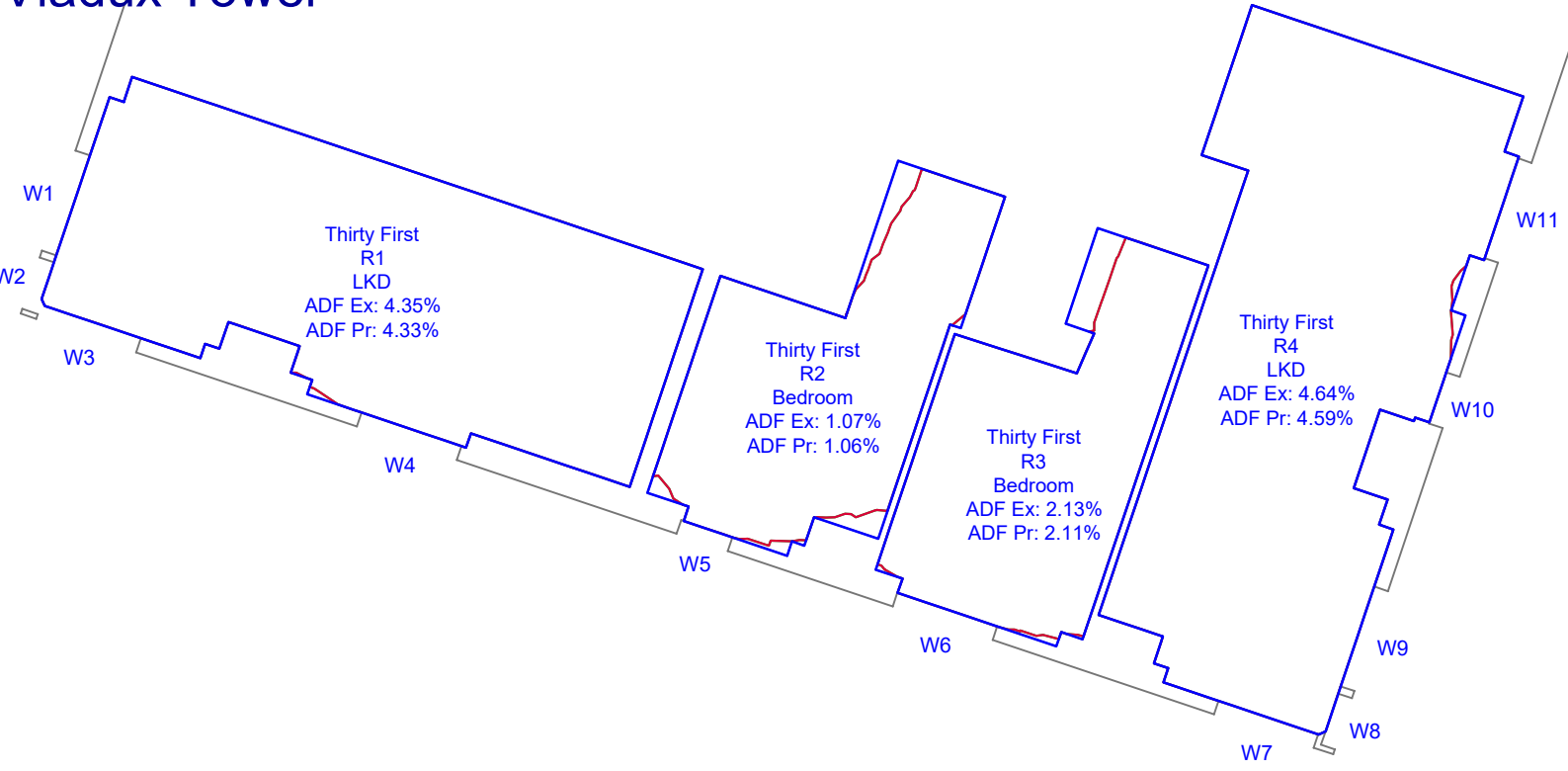
Twenty Ninth Floor
Viadux Tower



Thirtieth Floor
Viadux Tower



Thirty First Floor
Viadux Tower



NOTES:
No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site, where
discrepancy occurs between specification and
drawings the supervising officer must be notified.

Analysis
Produced using Windram Tools
MBS Survey Software Ltd (www.mbs-software.co.uk)
Existing & Surrounding Models
Existing and Surrounding massing derived from 3d
terrestrial survey pointcloud data, located to OS GPS
coordinates & an AccuCities file
Supported with site photography, Google Maps & Bing
Maps.
Consented Schemes derived from 2d data listed below.
Axis Tower - "115351_NMC_2017" PDF Data Set
Viadux Tower - "133958_JO_2022" PDF Data Set
Proposed Model
Reference:
05247_Wind Model in Context.dwg
Received: 12.08.2022

KEY
Room Area (Measured Layout)
Room Area (Assumed Layout)
Existing No Sky Area
Proposed No Sky Area
Area of Loss/Gain

REV: DATE: DESCRIPTION:

Watts.

Watts Group Limited
St James's Tower
7 Charlotte Street
Manchester M1 4DZ
T: 0161 831 6180
watts.co.uk

CLIENT:
Brigantes Ltd

PROPERTY:
Whitworth Street West, Manchester

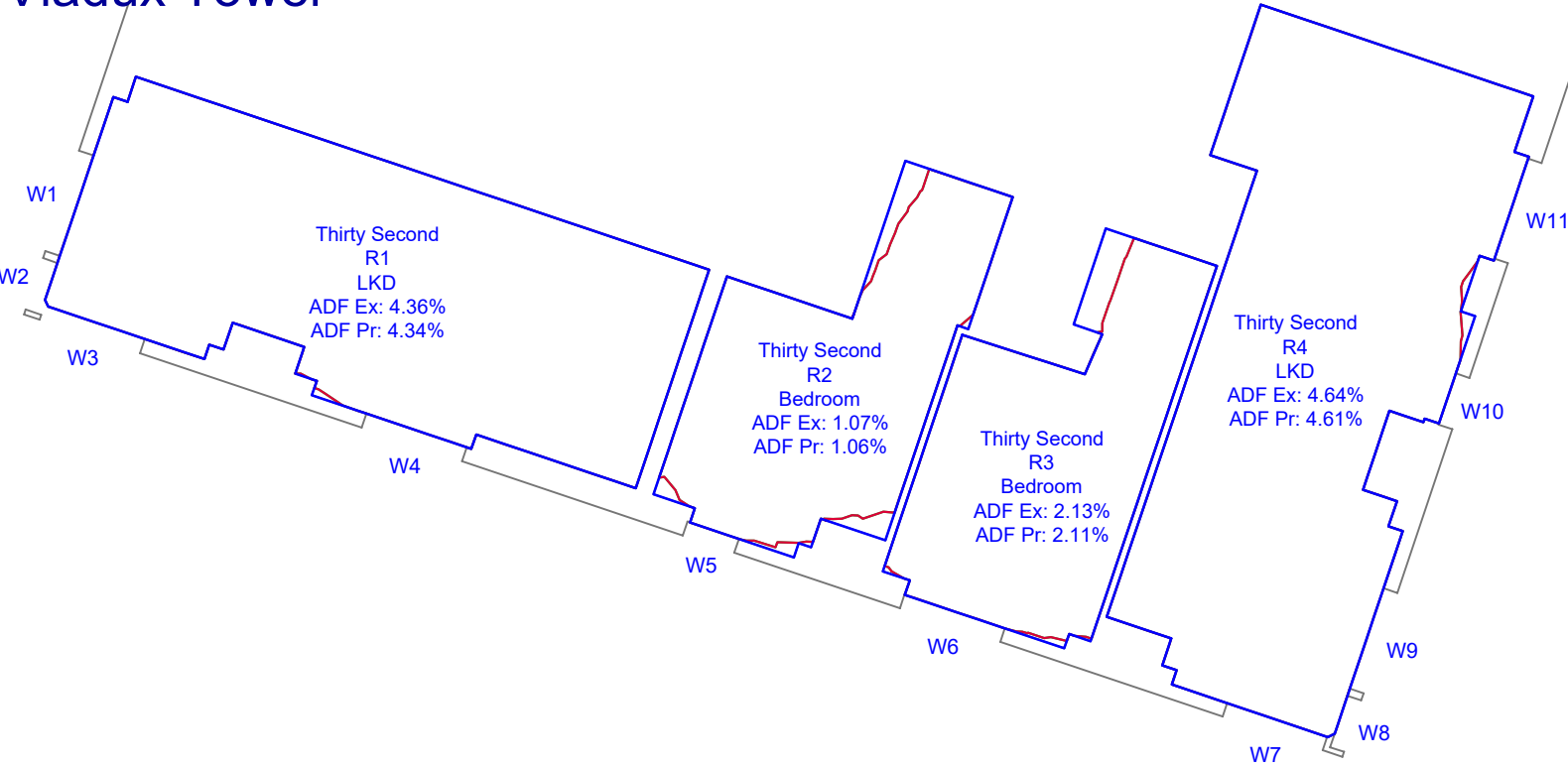
DRAWING TITLE:
Daylight Distribution
Contours

SCALE @ A1: DATE: DRAWN: MBS
NTS 26.08.22
CHECKED: TK

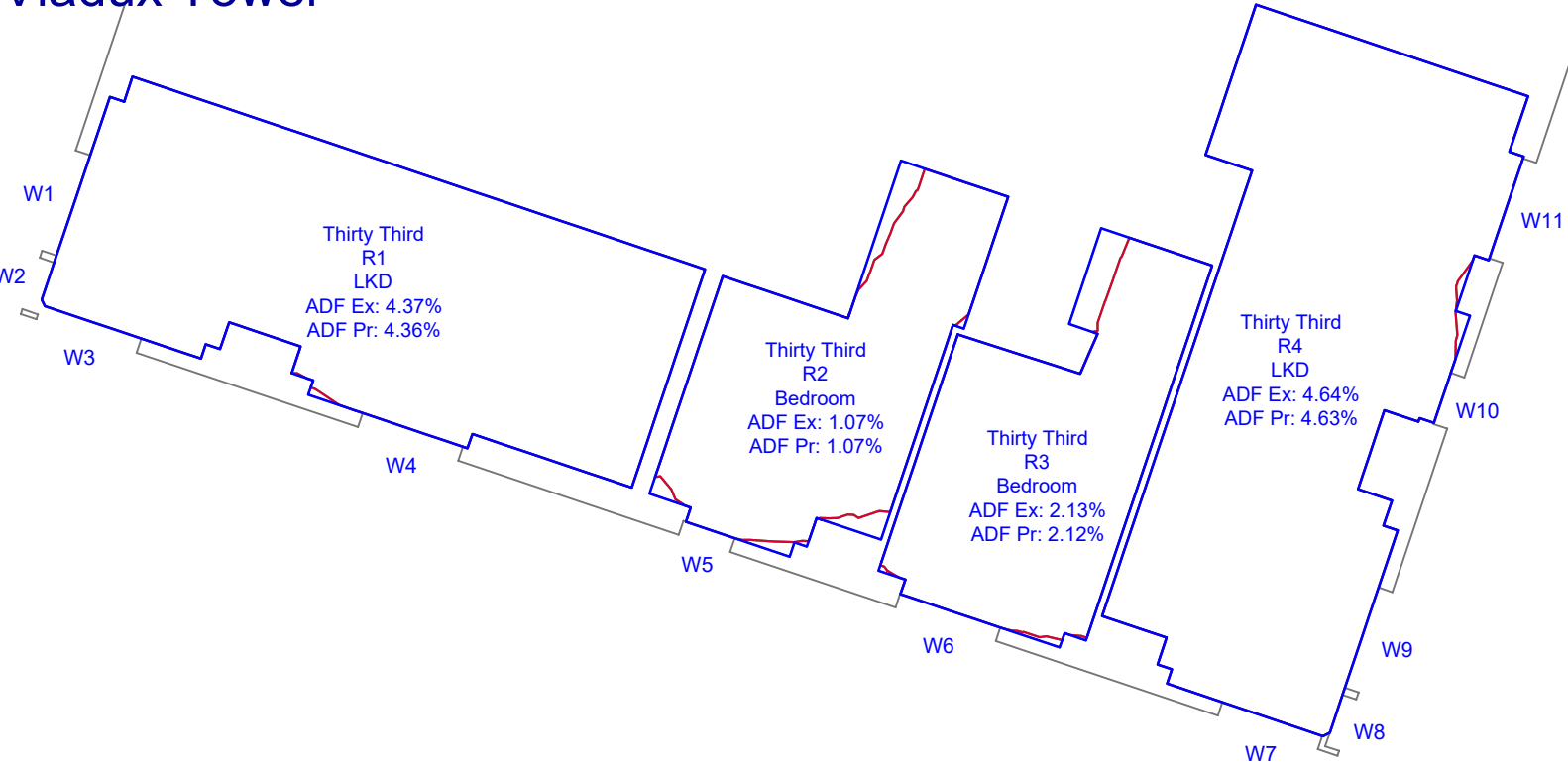
DRAWING NUMBER: REV:
122214-08-18



Twenty Sixth Floor
Viadux Tower



Twenty Seventh Floor
Viadux Tower



NOTES:
No dimensions are to be scaled from this drawing.
All dimensions are to be checked on site, where
discrepancy occurs between specification and
drawings the supervising officer must be notified.

Analysis Produced using Waldram Tools MBS Survey Software Ltd (www.mbs-software.co.uk) Existing & Surrounding Models Existing and Surrounding massing derived from 3d terrestrial survey pointcloud data, located to OS GPS coordinates & an AccuCities tile Supported with site photography, Google Maps & Bing Maps. Consented Schemes derived from 2d data listed below. Axis Tower - "115351_NMC_2017" PDF Data Set Viadux Tower - "133958_JO_2022" PDF Data Set Proposed Model Reference: 05247_Wind Model in Context.dwg Received: 12.08.2022		
KEY Room Area (Measured Layout) Room Area (Assumed Layout) Existing No Sky Area Proposed No Sky Area Area of Loss/Gain		
•	•	•
REV:	DATE:	DESCRIPTION:

Watts.

Watts Group Limited

St James's Tower

7 Charlotte Street

Manchester M1 4DZ

T: 0161 831 6180

watts.co.uk

CLIENT:
Brigantes Ltd

PROPERTY:
Whitworth Street West, Manchester

DRAWING TITLE:
Daylight Distribution
Contours

SCALE @ A1: NTS	DATE: 26.08.22	DRAWN: MBS
		CHECKED: TK

DRAWING NUMBER: 122214-08-19	REV: •
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Appendix 10.C

VSC, APSH and Daylight Distribution Results Table

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight & Sunlight Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria	
Axis Tower																			
Ground	R1	Residential	Bedroom	W1	Existing Proposed	25.16 13.08	0.52	NO	184°	25.16 13.08	0.52	NO	68.00 43.00	0.63	YES	19.00 8.00	0.42	YES	
	R2	Residential	Living Room	W2	Existing Proposed	25.27 13.50	0.53	NO	184°				65.00 41.00	0.63	YES	18.00 9.00	0.50	YES	
	R3	Residential	Kitchen	W3	Existing Proposed	25.51 14.46	0.57	NO	184°	25.27 13.50	0.53	NO	65.00 42.00	0.65	YES	19.00 11.00	0.58	YES	
										25.51 14.46			0.57			NO			
	First	R1	Residential	LKD	W1	Existing Proposed	3.95 1.83	0.46	NO	184°	3.74 1.63	0.44	NO	9.00 4.00	0.44	NO	7.00 2.00	0.29	NO
					W2	Existing Proposed	3.53 1.42	0.40	NO	184°				7.00 1.00	0.14	NO	6.00 0.00	0.00	NO
R2		Residential	Bedroom	W3	Existing Proposed	3.49 1.51	0.43	NO	184°	3.49 1.51	0.43	NO	6.00 1.00	0.17	NO	6.00 1.00	0.17	NO	
													R3	Residential	Bedroom	W4	Existing Proposed	3.56 1.65	0.46
R4		Residential	LKD	W5	Existing Proposed	3.75 1.96	0.52	NO	184°	3.56 1.65	0.46	NO							
				W6	Existing Proposed	3.90 2.22	0.57	NO	184°				6.00 2.00	0.33	YES	6.00 2.00	0.33	YES	
R5		Residential	Bedroom	W7	Existing Proposed	4.03 2.53	0.63	NO	184°	3.82 2.09	0.55	NO	6.00 2.00	0.33	YES	6.00 2.00	0.33	YES	
				W8	Existing Proposed	4.09 2.69	0.66	NO	184°				6.00 3.00	0.50	YES	6.00 3.00	0.50	YES	
R6		Residential	Living Room	W9	Existing Proposed	4.17 2.94	0.71	NO	184°	4.06 2.61	0.64	NO	5.00 4.00	0.80	YES	5.00 4.00	0.80	YES	
				W10	Existing Proposed	4.24 3.09	0.73	NO	184°				5.00 4.00	0.80	YES	5.00 4.00	0.80	YES	
R7		Residential	Study	W11	Existing Proposed	4.33 3.29	0.76	NO	184°	4.21 3.02	0.72	NO	4.00 3.00	0.75	YES	4.00 3.00	0.75	YES	
				W12	Existing Proposed	2.48 2.48	1.00	YES	118°				2.00 2.00	1.00	YES	1.00 1.00	1.00	YES	
													3.45	0.84	YES				

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight & Sunlight Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
Second	R1	Residential	LKD	W1	Existing 25.58 Proposed 25.56	1.00	YES	288°N Inc	2.90			30.00	*North	*North	5.00	*North	*North
				W2	Existing 35.16 Proposed 17.72	0.50	NO	184° Inc				30.00 84.00 53.00	0.63	YES	5.00 26.00 11.00	0.42	YES
	R2	Residential	LD	W3	Existing 35.29 Proposed 18.19	0.52	NO	184° Inc	29.06 22.71	0.78	NO						
												84.00 53.00	0.63	YES	26.00 11.00	0.42	YES
	R3	Residential	Bedroom	W4	Existing 35.34 Proposed 18.96	0.54	NO	184° Inc	35.29 18.19	0.52	NO						
												84.00 53.00	0.63	YES	26.00 12.00	0.46	YES
	R4	Residential	LD	W5	Existing 35.38 Proposed 19.73	0.56	NO	184° Inc	35.34 18.96	0.54	NO						
												84.00 54.00	0.64	YES	26.00 12.00	0.46	YES
	R5	Residential	Bedroom	W6	Existing 35.52 Proposed 21.00	0.59	NO	184° Inc	35.38 19.73	0.56	NO						
												84.00 55.00	0.65	YES	26.00 13.00	0.50	YES
	R6	Residential	LKD	W7	Existing 35.56 Proposed 22.13	0.62	NO	184° Inc	35.52 21.00	0.59	NO						
												84.00 55.00	0.65	YES	26.00 13.00	0.50	YES
Third	R1	Residential	LKD	W1	Existing 26.71 Proposed 26.68	1.00	YES	288°N Inc	35.56 22.13	0.62	NO						
				W2	Existing 36.58 Proposed 18.34	0.50	NO	184° Inc	35.51 22.82	0.64	NO						
	R2	Residential	LD	W3	Existing 36.63 Proposed 18.83	0.51	NO	184° Inc	35.51 22.82	0.64	NO						
												84.00 59.00	0.70	YES	26.00 16.00	0.62	YES
	R9	Residential	Bedroom	W10	Existing 35.21 Proposed 24.44	0.69	NO	184° Inc	35.40 23.57	0.67	NO						
												81.00 58.00	0.72	YES	25.00 17.00	0.68	YES
	R10	Residential	LKD	W11	Existing 29.69 Proposed 29.69	1.00	YES	94°	35.21 24.44	0.69	NO						
												30.00 30.00	1.00	YES	4.00 4.00	1.00	YES
	R1	Residential	LKD	W1	Existing 26.71 Proposed 26.68	1.00	YES	288°N Inc	29.69 29.69	1.00	YES						
				W2	Existing 36.58 Proposed 18.34	0.50	NO	184° Inc	30.30 23.65	0.78	NO						
Third	R2	Residential	LD	W3	Existing 36.63 Proposed 18.83	0.51	NO	184° Inc	36.63	0.51	NO						
												84.00 54.00	0.64	YES	26.00 11.00	0.42	YES

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight & Sunlight Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria	
	R3	Residential	Bedroom	W4	Existing Proposed	36.65 19.61	0.54	NO	184° Inc	18.83 36.65 19.61	0.54	NO	84.00 53.00	0.63	YES	26.00 12.00	0.46	YES	
	R4	Residential	LD	W5	Existing Proposed	36.66 20.41	0.56	NO	184° Inc	36.66 20.41	0.56	NO	84.00 54.00	0.64	YES	26.00 12.00	0.46	YES	
	R5	Residential	Bedroom	W6	Existing Proposed	36.71 21.67	0.59	NO	184° Inc	36.71 21.67	0.59	NO	85.00 56.00	0.66	YES	27.00 14.00	0.52	YES	
	R6	Residential	LKD	W7	Existing Proposed	36.69 22.77	0.62	NO	184° Inc	36.69 22.77	0.62	NO	85.00 56.00	0.66	YES	27.00 14.00	0.52	YES	
	R7	Residential	Bedroom	W8	Existing Proposed	36.61 23.47	0.64	NO	184° Inc	36.61 23.47	0.64	NO	85.00 56.00	0.66	YES	27.00 15.00	0.56	YES	
	R8	Residential	Bedroom	W9	Existing Proposed	36.47 24.25	0.66	NO	184° Inc	36.47 24.25	0.66	NO	85.00 60.00	0.71	YES	27.00 17.00	0.63	YES	
	R9	Residential	Bedroom	W10	Existing Proposed	36.24 25.14	0.69	NO	184° Inc	36.24 25.14	0.69	NO	84.00 61.00	0.73	YES	26.00 18.00	0.69	YES	
	R10	Residential	LKD	W11	Existing Proposed	31.23 31.23	1.00	YES	94°	31.23 31.23	1.00	YES	31.00 31.00	1.00	YES	5.00 5.00	1.00	YES	
	Fourth	R1	Residential	LKD	W1	Existing Proposed	27.15 27.13	1.00	YES	288°N Inc	30.92 24.14	0.78	NO	30.00 30.00	*North	*North	5.00 5.00	*North	*North
				W2	Existing Proposed	37.52 18.90	0.50	NO	184° Inc	85.00 53.00				0.62	YES	26.00 11.00	0.42	YES	
R2		Residential	LD	W3	Existing Proposed	37.55 19.40	0.52	NO	184° Inc	85.00 55.00				0.65	YES	26.00 11.00	0.42	YES	
R3		Residential	Bedroom	W4	Existing Proposed	37.54 20.02	0.53	NO	184° Inc	84.00 53.00				0.63	YES	26.00 12.00	0.46	YES	
R4		Residential	LD	W5	Existing Proposed	37.53 21.01	0.56	NO	184° Inc	84.00 55.00				0.65	YES	26.00 13.00	0.50	YES	
R5		Residential	Bedroom	W6	Existing	37.54	0.59	NO	184° Inc	85.00				0.66	YES	27.00	0.52	YES	

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight & Sunlight Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
	R6	Residential	LKD	W7	Proposed	22.06				37.54	0.59	NO	56.00			14.00		
					Existing	37.48	0.62	NO	22.06			85.00	0.65	YES	27.00	0.52	YES	
	R7	Residential	Bedroom	W8	Proposed	23.38				37.48	0.62	NO	55.00			14.00		
					Existing	37.41	0.64	NO	23.38			85.00	0.66	YES	27.00	0.56	YES	
	R8	Residential	Bedroom	W9	Proposed	23.92				37.41	0.64	NO	56.00			15.00		
					Existing	37.25	0.67	NO	23.92			85.00	0.71	YES	27.00	0.63	YES	
	R9	Residential	Bedroom	W10	Proposed	24.87				37.25	0.67	NO	60.00			17.00		
					Existing	37.00	0.70	NO	24.87			84.00	0.73	YES	26.00	0.69	YES	
	R10	Residential	LKD	W11	Proposed	25.80				37.00	0.70	NO	61.00			18.00		
					Existing	36.75	0.72	NO	25.80			85.00	0.74	YES	26.00	0.69	YES	
				W12	Proposed	32.64	1.00	YES	32.64			63.00	1.00	YES	18.00			
					Existing	32.64			35.00			35.00			5.00	1.00	YES	
										33.60	0.93	YES	31.20					
Fifth	R1	Residential	LKD	W1	Existing	27.53	1.00	YES	288°N Inc				31.00	*North	*North	6.00	*North	*North
					Proposed	27.51						31.00			6.00			
				W2	Existing	38.19	0.51	NO	184° Inc				87.00	0.64	YES	28.00	0.46	YES
					Proposed	19.42						56.00			13.00			
	R2	Residential	LD	W3	Existing	38.19	0.52	NO	184° Inc	31.41	0.78	NO	87.00	0.64	YES	28.00	0.46	YES
					Proposed	19.91				24.57			56.00			13.00		
	R3	Residential	Bedroom	W4	Existing	38.19	0.54	NO	184° Inc	38.19	0.52	NO	87.00	0.63	YES	28.00	0.46	YES
					Proposed	20.56				19.91			55.00			13.00		
	R4	Residential	LD	W5	Existing	38.17	0.57	NO	184° Inc	38.19	0.54	NO	87.00	0.67	YES	28.00	0.54	YES
					Proposed	21.59				20.56			58.00			15.00		
	R5	Residential	Bedroom	W6	Existing	38.13	0.59	NO	184° Inc	38.17	0.57	NO	86.00	0.66	YES	28.00	0.54	YES
					Proposed	22.64				21.59			57.00			15.00		
	R6	Residential	LKD	W7	Existing	38.07	0.63	NO	184° Inc	38.13	0.59	NO	86.00	0.65	YES	28.00	0.54	YES
					Proposed	23.92				22.64			56.00			15.00		
	R7	Residential	Bedroom	W8	Existing	38.00	0.64	NO	184° Inc	38.07	0.63	NO	86.00	0.66	YES	28.00	0.57	YES
					Proposed	23.92				23.92								

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight & Sunlight Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
	R8	Residential	Bedroom	W9	Proposed	24.49				38.00	0.64	NO	57.00			16.00		
					Existing	37.84	0.67	NO	24.49			86.00	0.71	YES	28.00	0.64	YES	
	R9	Residential	Bedroom	W10	Proposed	25.48				37.84	0.67	NO	61.00			18.00		
					Existing	37.61	0.70	NO	25.48			85.00	0.73	YES	27.00	0.70	YES	
	R10	Residential	LKD	W11	Proposed	26.45				37.61	0.70	NO	62.00			19.00		
					Existing	37.40	0.73	YES	26.45			86.00	0.74	YES	27.00	0.70	YES	
				W12	Proposed	27.19					64.00			19.00				
					Existing	33.83	1.00	YES	94°	37.00	1.00	YES	6.00	1.00	YES			
						Proposed	33.83			34.67	0.93	YES	37.00			6.00		
										32.27								
Sixth	R1	Residential	LKD	W1	Existing	27.89	1.00	YES	288°N Inc				32.00	*North	*North	7.00	*North	*North
					Proposed	27.87						32.00			7.00			
				W2	Existing	38.76	0.51	NO	184° Inc				89.00	0.65	YES	30.00	0.50	YES
					Proposed	19.82						58.00			15.00			
	R2	Residential	LD	W3	Existing	38.74	0.52	NO	184° Inc				88.00	0.65	YES	29.00	0.48	YES
					Proposed	20.18						57.00			14.00			
	R3	Residential	Bedroom	W4	Existing	38.72	0.54	NO	184° Inc				88.00	0.65	YES	29.00	0.52	YES
					Proposed	20.88						57.00			15.00			
	R4	Residential	LD	W5	Existing	38.69	0.56	NO	184° Inc				88.00	0.66	YES	29.00	0.52	YES
					Proposed	21.70						58.00			15.00			
	R5	Residential	Bedroom	W6	Existing	38.65	0.59	NO	184° Inc				88.00	0.67	YES	29.00	0.55	YES
					Proposed	22.95						59.00			16.00			
	R6	Residential	LKD	W7	Existing	38.60	0.63	NO	184° Inc				87.00	0.67	YES	28.00	0.54	YES
					Proposed	24.13						58.00			15.00			
	R7	Residential	Bedroom	W8	Existing	38.54	0.65	NO	184° Inc				87.00	0.67	YES	28.00	0.57	YES
Proposed					24.89						58.00			16.00				
R8	Residential	Bedroom	W9	Existing	38.39	0.67	NO	184° Inc				87.00	0.71	YES	28.00	0.64	YES	
				Proposed	25.90						62.00			18.00				
R9	Residential	Bedroom	W10	Existing	38.23	0.70	NO	184° Inc				86.00	0.73	YES	27.00	0.70	YES	

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight & Sunlight Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria	
	R10	Residential	LKD	W11	Proposed	26.76				38.23	0.70	NO	63.00			19.00			
					Existing	38.01	0.73	YES	26.76			86.00	0.74	YES	27.00	0.70	YES		
				W12	Proposed	27.71						64.00			19.00				
					Existing	34.68	1.00	YES				37.00	1.00	YES	6.00	1.00	YES		
					Proposed	34.68			35.46	0.93	YES	37.00			6.00				
									33.04										
Seventh	R1	Residential	LKD	W1	Existing	28.24	1.00	YES	288°N Inc				32.00	*North	*North	7.00	*North	*North	
					Proposed	28.22							32.00			7.00			
	W2	Existing	39.20	0.52	NO	184° Inc			88.00	0.64	YES	29.00	0.45	YES					
		Proposed	20.26						56.00			13.00							
	R2	Residential	LD	W3	Existing	39.16	0.53	NO	184° Inc			30.68	0.86	YES					
					Proposed	20.64						26.45							
	R3	Residential	Bedroom	W4	Existing	39.13	0.55	NO	184° Inc			39.16	0.53	NO	29.00	0.48	YES		
					Proposed	21.36						20.64			58.00			14.00	
	R4	Residential	LD	W5	Existing	39.09	0.57	NO	184° Inc			39.13	0.55	NO	29.00	0.52	YES		
					Proposed	22.21						21.36			57.00			15.00	
	R5	Residential	Bedroom	W6	Existing	39.05	0.60	NO	184° Inc			39.09	0.57	NO	29.00	0.55	YES		
					Proposed	23.50						22.21			58.00			15.00	
	R6	Residential	LKD	W7	Existing	39.00	0.63	NO	184° Inc			39.05	0.60	NO	29.00	0.55	YES		
					Proposed	24.64						23.50			59.00			16.00	
	R7	Residential	Bedroom	W8	Existing	38.94	0.65	NO	184° Inc			39.00	0.63	NO	29.00	0.55	YES		
					Proposed	25.42						24.64			59.00			16.00	
	R8	Residential	Bedroom	W9	Existing	38.81	0.68	NO	184° Inc			38.94	0.65	NO	29.00	0.59	YES		
					Proposed	26.44						25.42			59.00			17.00	
	R9	Residential	Bedroom	W10	Existing	38.67	0.71	YES	184° Inc			38.81	0.68	NO	29.00	0.66	YES		
					Proposed	27.31						26.44			63.00			19.00	
	R10	Residential	LKD	W11	Existing	38.49	0.74	YES	184° Inc			38.67	0.71	YES	28.00	0.71	YES		
					Proposed	28.31						27.31			64.00			20.00	
	W12	Existing	35.44	1.00	YES	94°			87.00	0.74	YES	27.00	0.70	YES					
		Proposed	35.44						64.00			19.00							
														37.00	1.00	YES	6.00	1.00	YES
														37.00			6.00		

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
Eighth	R1	Residential	LKD	W1	Existing 28.36 Proposed 28.33	1.00	YES	288°N Inc	33.77			32.00 32.00 89.00 58.00	*North 0.65	*North YES	7.00 7.00 30.00 15.00	*North 0.50	*North YES
				W2	Existing 39.32 Proposed 20.46	0.52	NO	184° Inc	30.80 26.58	0.86	YES						
	R2	Residential	LD	W3	Existing 39.29 Proposed 20.90	0.53	NO	184° Inc	39.29 20.90	0.53	NO	89.00 59.00	0.66	YES	30.00 15.00	0.50	YES
				W4	Existing 39.27 Proposed 21.66	0.55	NO	184° Inc	39.27 21.66	0.55	NO	89.00 57.00	0.64	YES	30.00 15.00	0.50	YES
	R4	Residential	LD	W5	Existing 39.24 Proposed 22.55	0.57	NO	184° Inc	39.24 22.55	0.57	NO	88.00 59.00	0.67	YES	29.00 16.00	0.55	YES
				W6	Existing 39.21 Proposed 23.87	0.61	NO	184° Inc	39.21 23.87	0.61	NO	88.00 59.00	0.67	YES	29.00 16.00	0.55	YES
	R6	Residential	LKD	W7	Existing 39.17 Proposed 25.00	0.64	NO	184° Inc	39.17 25.00	0.64	NO	88.00 58.00	0.66	YES	29.00 16.00	0.55	YES
				W8	Existing 39.13 Proposed 25.76	0.66	NO	184° Inc	39.13 25.76	0.66	NO	88.00 60.00	0.68	YES	29.00 17.00	0.59	YES
	R8	Residential	Bedroom	W9	Existing 39.03 Proposed 26.84	0.69	NO	184° Inc	39.03 26.84	0.69	NO	88.00 63.00	0.72	YES	29.00 19.00	0.66	YES
				W10	Existing 38.93 Proposed 27.75	0.71	YES	184° Inc	38.93 27.75	0.71	YES	87.00 64.00	0.74	YES	28.00 20.00	0.71	YES
	R10	Residential	LKD	W11	Existing 38.78 Proposed 28.75	0.74	YES	184° Inc	38.78 28.75			87.00 65.00	0.75	YES	28.00 20.00	0.71	YES
				W12	Existing 36.09 Proposed 36.09	1.00	YES	94°	36.72 34.37	0.94	YES	38.00 38.00	1.00	YES	7.00 7.00	1.00	YES
Ninth	R1	Residential	LKD	W1	Existing 28.49 Proposed 28.47	1.00	YES	288°N Inc				32.00 32.00 89.00 58.00	*North 0.65	*North YES	7.00 7.00 30.00 15.00	*North 0.50	*North YES
				W2	Existing 39.43 Proposed 20.66	0.52	NO	184° Inc	30.92 26.73	0.86	YES						
	R2	Residential	LD	W3	Existing 39.41	0.54	NO	184° Inc				89.00	0.65	YES	30.00	0.50	YES

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
					Proposed 21.16				39.41 21.16	0.54	NO	58.00			15.00		
	R3	Residential	Bedroom	W4	Existing 39.39 Proposed 21.96	0.56	NO	184° Inc				89.00 59.00	0.66	YES	30.00 16.00	0.53	YES
	R4	Residential	LD	W5	Existing 39.37 Proposed 22.88	0.58	NO	184° Inc	39.39 21.96	0.56	NO	89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
	R5	Residential	Bedroom	W6	Existing 39.35 Proposed 24.22	0.62	NO	184° Inc	39.37 22.88	0.58	NO	89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
	R6	Residential	LKD	W7	Existing 39.32 Proposed 25.30	0.64	NO	184° Inc	39.35 24.22	0.62	NO	89.00 59.00	0.66	YES	30.00 17.00	0.57	YES
	R7	Residential	Bedroom	W8	Existing 39.29 Proposed 26.11	0.66	NO	184° Inc	39.32 25.30	0.64	NO	89.00 63.00	0.71	YES	30.00 20.00	0.67	YES
	R8	Residential	Bedroom	W9	Existing 39.23 Proposed 27.22	0.69	YES	184° Inc	39.29 26.11	0.66	NO	88.00 63.00	0.72	YES	29.00 19.00	0.66	YES
	R9	Residential	Bedroom	W10	Existing 39.15 Proposed 28.15	0.72	YES	184° Inc	39.23 27.22	0.69	YES	88.00 65.00	0.74	YES	29.00 21.00	0.72	YES
	R10	Residential	LKD	W11	Existing 39.06 Proposed 29.22	0.75	YES	184° Inc	39.15 28.15	0.72	YES	88.00 67.00	0.76	YES	29.00 22.00	0.76	YES
				W12	Existing 36.62 Proposed 36.62	1.00	YES	94°				39.00 39.00	1.00	YES	8.00 8.00	1.00	YES
									37.19 34.88	0.94	YES						
Tenth	R1	Residential	LKD	W1	Existing 28.64 Proposed 28.62	1.00	YES	288°N Inc				32.00 32.00	*North	*North	7.00 7.00	*North	*North
				W2	Existing 39.51 Proposed 20.82	0.53	NO	184° Inc				89.00 58.00	0.65	YES	30.00 15.00	0.50	YES
				W3	Existing 39.50 Proposed 20.86	0.53	NO	184° Inc				89.00 57.00	0.64	YES	30.00 15.00	0.50	YES
	R2	Residential	Bedroom	W4	Existing 39.50 Proposed 21.25	0.54	NO	184° Inc	33.65 25.03	0.74	NO	89.00 59.00	0.66	YES	30.00 15.00	0.50	YES
	R3	Residential	Bedroom	W5	Existing 39.49 Proposed 21.91	0.55	NO	184° Inc	39.50 21.25	0.54	NO	89.00 58.00	0.65	YES	30.00 16.00	0.53	YES
									39.49	0.55	NO						

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
	R4	Residential	LD	W6	Existing Proposed	39.48 22.77	0.58	NO	184° Inc	21.91 39.48 22.77	0.58 NO	89.00 59.00	0.66	YES	30.00 16.00	0.53	YES
	R5	Residential	Bedroom	W7	Existing Proposed	39.47 23.79	0.60	NO	184° Inc	39.47 23.79	0.60 NO	89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
	R6	Residential	Bedroom	W8	Existing Proposed	39.45 25.35	0.64	NO	184° Inc	39.45 25.35	0.64 NO	89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
	R7	Residential	Living Room	W9	Existing Proposed	39.44 26.16	0.66	NO	184° Inc	39.44 26.16	0.66 NO	89.00 60.00	0.67	YES	30.00 18.00	0.60	YES
	R8	Residential	Bedroom	W10	Existing Proposed	39.41 27.22	0.69	YES	184° Inc	39.41 27.22	0.69 YES	89.00 64.00	0.72	YES	30.00 20.00	0.67	YES
	R9	Residential	Bedroom	W11	Existing Proposed	39.37 28.17	0.72	YES	184° Inc	39.37 28.17	0.72 YES	89.00 66.00	0.74	YES	30.00 22.00	0.73	YES
	R10	Residential	LKD	W12	Existing Proposed	39.31 29.64	0.75	YES	184° Inc	37.62 35.35	0.94 YES	88.00 68.00	0.77	YES	29.00 22.00	0.76	YES
				W13	Existing Proposed	37.10 37.10	1.00	YES	94°			39.00 39.00	1.00	YES	8.00 8.00	1.00	YES
Eleventh	R1	Residential	LKD	W1	Existing Proposed	28.79 28.77	1.00	YES	288°N Inc			32.00 32.00	*North	*North	7.00 7.00	*North	*North
				W2	Existing Proposed	39.57 21.00	0.53	NO	184° Inc			89.00 57.00	0.64	YES	30.00 14.00	0.47	YES
				W3	Existing Proposed	39.57 21.05	0.53	NO	184° Inc	33.76 25.20	0.75 NO	89.00 58.00	0.65	YES	30.00 15.00	0.50	YES
	R2	Residential	Bedroom	W4	Existing Proposed	39.56 21.47	0.54	NO	184° Inc	39.56 21.47	0.54 NO	89.00 59.00	0.66	YES	30.00 15.00	0.50	YES
	R3	Residential	Bedroom	W5	Existing Proposed	39.56 22.17	0.56	NO	184° Inc	39.56 22.17	0.56 NO	89.00 57.00	0.64	YES	30.00 15.00	0.50	YES
	R4	Residential	LD	W6	Existing Proposed	39.56 23.06	0.58	NO	184° Inc	39.56 23.06	0.58 NO	89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
	R5	Residential	Bedroom	W7	Existing	39.55	0.61	NO	184° Inc			89.00	0.67	YES	30.00	0.57	YES

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	R6	Residential	Bedroom	W8	Proposed	24.10				39.55	0.61	NO	60.00			17.00		
					Existing	39.55	0.65	NO	24.10			89.00	0.66	YES	30.00	0.57	YES	
	R7	Residential	Living Room	W9	Proposed	25.65				39.55	0.65	NO	59.00			17.00		
					Existing	39.54	0.67	NO	25.65			89.00	0.69	YES	30.00	0.60	YES	
	R8	Residential	Bedroom	W10	Proposed	26.46				39.54	0.67	NO	61.00			18.00		
					Existing	39.53	0.70	YES	26.46			89.00	0.72	YES	30.00	0.67	YES	
	R9	Residential	Bedroom	W11	Proposed	27.54				39.53	0.70	YES	64.00			20.00		
					Existing	39.52	0.72	YES	27.54			89.00	0.74	YES	30.00	0.73	YES	
	R10	Residential	LKD	W12	Proposed	28.53				39.52	0.72	YES	66.00			22.00		
					Existing	39.51	0.76	YES	28.53			89.00	0.78	YES	30.00	0.77	YES	
				W13	Proposed	30.04	1.00	YES			69.00			23.00				
Existing					37.47			40.00	1.00	YES	40.00			9.00	1.00	YES		
Twelfth	R1	Residential	LKD	W1	Existing	28.95	1.00	YES	288°N Inc				32.00	*North	*North	7.00	*North	*North
				Proposed	28.93	0.53	NO	184° Inc			32.00			7.00				
				Existing	39.59	0.54	NO	184° Inc			89.00	0.65	YES	30.00	0.50	YES		
	R2	Residential	Bedroom	W4	Proposed	21.14							58.00			15.00		
					Existing	39.59	0.55	NO				89.00	0.66	YES	30.00	0.50	YES	
					Proposed	21.22						59.00			15.00			
	R3	Residential	Bedroom	W5	Existing	39.58	0.57	NO	184° Inc	33.86	0.75	NO						
					Proposed	21.68				25.36								
					Existing	39.59	0.55	NO				89.00	0.65	YES	30.00	0.50	YES	
	R4	Residential	LD	W6	Proposed	22.41							58.00			15.00		
					Existing	39.58	0.59	NO				89.00	0.64	YES	30.00	0.50	YES	
					Proposed	23.32						57.00			15.00			
	R5	Residential	Bedroom	W7	Existing	39.58	0.62	NO	184° Inc	39.58	0.57	NO						
					Proposed	24.37				22.41								
					Existing	39.58	0.59	NO				89.00	0.67	YES	30.00	0.57	YES	
	R6	Residential	Bedroom	W8	Proposed	25.88							60.00			17.00		
					Existing	39.58	0.65	NO				89.00	0.66	YES	30.00	0.57	YES	
					Proposed	25.88						59.00			17.00			
									Existing	39.58	0.65	NO						

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	R7	Residential	Living Room	W9	Existing Proposed	39.58 26.71	0.67	NO	184° Inc	25.88 39.58 26.71	 0.67	 NO	89.00 64.00	0.72	YES	30.00 20.00	0.67	YES	
	R8	Residential	Bedroom	W10	Existing Proposed	39.58 27.80	0.70	YES	184° Inc	 39.58 27.80	 0.70	 YES	89.00 64.00	0.72	YES	30.00 20.00	0.67	YES	
	R9	Residential	Bedroom	W11	Existing Proposed	39.58 28.79	0.73	YES	184° Inc	 39.58 28.79	 0.73	 YES	89.00 66.00	0.74	YES	30.00 22.00	0.73	YES	
	R10	Residential	LKD	W12	Existing Proposed	39.58 30.31	0.77	YES	184° Inc	 39.58 28.79	 0.78	 YES	89.00 69.00	0.78	YES	30.00 23.00	0.77	YES	
				W13	Existing Proposed	37.60 37.60	1.00	YES	94°	 40.00 40.00	 1.00	 YES	9.00 9.00	1.00	YES				
										38.06 35.89	0.94	YES							
	Thirteenth	R1	Residential	LKD	W1	Existing Proposed	29.15 29.13	1.00	YES	288°N Inc				32.00 32.00	*North	*North	7.00 7.00	*North	*North
					W2	Existing Proposed	39.59 21.30	0.54	NO	184° Inc				89.00 58.00	0.65	YES	30.00 15.00	0.50	YES
					W3	Existing Proposed	39.59 21.39	0.54	NO	184° Inc				89.00 59.00	0.66	YES	30.00 15.00	0.50	YES
R2		Residential	Bedroom	W4	Existing Proposed	39.59 21.89	0.55	NO	184° Inc	33.97 25.54	0.75	NO	89.00 58.00	0.65	YES	30.00 15.00	0.50	YES	
R3		Residential	Bedroom	W5	Existing Proposed	39.59 22.64	0.57	NO	184° Inc	39.59 21.89	0.55	NO	89.00 59.00	0.66	YES	30.00 16.00	0.53	YES	
R4		Residential	LD	W6	Existing Proposed	39.59 23.57	0.60	NO	184° Inc	39.59 22.64	0.57	NO	89.00 60.00	0.67	YES	30.00 17.00	0.57	YES	
R5		Residential	Bedroom	W7	Existing Proposed	39.59 24.64	0.62	NO	184° Inc	39.59 23.57	0.60	NO	89.00 60.00	0.67	YES	30.00 17.00	0.57	YES	
R6		Residential	Bedroom	W8	Existing Proposed	39.59 26.10	0.66	NO	184° Inc	39.59 24.64	0.62	NO	89.00 59.00	0.66	YES	30.00 17.00	0.57	YES	
R7		Residential	Living Room	W9	Existing Proposed	39.59 26.95	0.68	NO	184° Inc	39.59 26.10	0.66	NO	89.00 65.00	0.73	YES	30.00 20.00	0.67	YES	
R8	Residential	Bedroom	W10	Existing	39.59	0.71	YES	184° Inc	39.59 26.95	0.68	NO								

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					Proposed 28.03				39.59 28.03	0.71	YES	65.00			21.00		
	R9	Residential	Bedroom	W11	Existing 39.59 Proposed 29.01	0.73	YES	184° Inc				89.00 67.00	0.75	YES	30.00 22.00	0.73	YES
	R10	Residential	LKD	W12	Existing 39.59 Proposed 30.52	0.77	YES	184° Inc	39.59 29.01	0.73	YES	89.00 69.00	0.78	YES	30.00 23.00	0.77	YES
				W13	Existing 37.62 Proposed 37.62	1.00	YES	94°				40.00 40.00	1.00	YES	9.00 9.00	1.00	YES
									38.08 35.95	0.94	YES						
Fourteenth	R1	Residential	LKD	W1	Existing 29.36 Proposed 29.35	1.00	YES	288°N Inc				32.00 32.00	*North	*North	7.00 7.00	*North	*North
				W2	Existing 39.60 Proposed 21.45	0.54	NO	184° Inc				89.00 57.00	0.64	YES	30.00 14.00	0.47	YES
									33.08 26.48	0.80	YES						
	R2	Residential	Bedroom	W3	Existing 39.60 Proposed 21.82	0.55	NO	184° Inc				89.00 58.00	0.65	YES	30.00 15.00	0.50	YES
									39.60 21.82	0.55	NO						
	R3	Residential	Bedroom	W4	Existing 39.60 Proposed 22.54	0.57	NO	184° Inc				89.00 58.00	0.65	YES	30.00 16.00	0.53	YES
									39.60 22.54	0.57	NO						
	R4	Residential	LD	W5	Existing 39.60 Proposed 23.37	0.59	NO	184° Inc				89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
									39.60 23.37	0.59	NO						
	R5	Residential	Bedroom	W6	Existing 39.59 Proposed 24.41	0.62	NO	184° Inc				89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
									39.59 24.41	0.62	NO						
	R6	Residential	Bedroom	W7	Existing 39.60 Proposed 25.97	0.66	NO	184° Inc				89.00 60.00	0.67	YES	30.00 17.00	0.57	YES
									39.60 25.97	0.66	NO						
	R7	Residential	Living Room	W8	Existing 39.59 Proposed 26.78	0.68	NO	184° Inc				89.00 61.00	0.69	YES	30.00 18.00	0.60	YES
									39.59 26.78	0.68	NO						
	R8	Residential	Bedroom	W9	Existing 39.59 Proposed 27.85	0.70	YES	184° Inc				89.00 64.00	0.72	YES	30.00 20.00	0.67	YES
									39.59 27.85	0.70	YES						
	R9	Residential	Bedroom	W10	Existing 39.59 Proposed 28.84	0.73	YES	184° Inc				89.00 66.00	0.74	YES	30.00 22.00	0.73	YES
									39.59 28.84	0.73	YES						
	R10	Residential	LKD	W11	Existing 39.59	0.75	YES	184° Inc				89.00	0.76	YES	30.00	0.73	YES

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				W12	Proposed 29.83 Existing 37.64 Proposed 37.64	1.00	YES	94°	38.10 35.81	0.94	YES	68.00 40.00 40.00	1.00	YES	22.00 9.00 9.00	1.00	YES
Fifteenth	R1	Residential	LKD	W1	Existing 29.59 Proposed 29.57 Existing 39.60 Proposed 21.65	1.00	YES	288°N Inc	33.23 26.69	0.80	YES	32.00 32.00 89.00 58.00	*North	*North	7.00 7.00 30.00 15.00	*North	*North
				W2		0.55	NO	184° Inc					0.65	YES		0.50	YES
	R2	Residential	Bedroom	W3	Existing 39.60 Proposed 22.05	0.56	NO	184° Inc	39.60 22.05	0.56	NO	89.00 58.00	0.65	YES	30.00 15.00	0.50	YES
				W4	Existing 39.60 Proposed 22.81	0.58	NO	184° Inc				89.00 57.00	0.64	YES	30.00 15.00	0.50	YES
	R4	Residential	LD	W5	Existing 39.60 Proposed 23.66	0.60	NO	184° Inc	39.60 22.81	0.58	NO	89.00 59.00	0.66	YES	30.00 16.00	0.53	YES
				W6	Existing 39.60 Proposed 24.71	0.62	NO	184° Inc				89.00 61.00	0.69	YES	30.00 17.00	0.57	YES
	R6	Residential	Bedroom	W7	Existing 39.60 Proposed 26.23	0.66	NO	184° Inc	39.60 24.71	0.62	NO	89.00 61.00	0.69	YES	30.00 17.00	0.57	YES
				W8	Existing 39.60 Proposed 27.04	0.68	YES	184° Inc				89.00 62.00	0.70	YES	30.00 18.00	0.60	YES
	R8	Residential	Bedroom	W9	Existing 39.60 Proposed 28.11	0.71	YES	184° Inc	39.60 27.04	0.68	YES	89.00 65.00	0.73	YES	30.00 20.00	0.67	YES
				W10	Existing 39.60 Proposed 29.10	0.73	YES	184° Inc				89.00 68.00	0.76	YES	30.00 22.00	0.73	YES
	R10	Residential	LKD	W11	Existing 39.60 Proposed 30.08 Existing 37.64 Proposed 37.64	0.76	YES	184° Inc	39.60 28.11	0.71	YES	89.00 69.00	0.78	YES	30.00 22.00	0.73	YES
				W12		1.00	YES	94°	38.10 35.87	0.94	YES	40.00 40.00	1.00	YES	9.00 9.00	1.00	YES
Sixteenth	R1	Residential	LKD	W1	Existing 29.86 Proposed 29.84 Existing 39.60	1.00	YES	288°N Inc				32.00 32.00 89.00	*North	*North	7.00 7.00 30.00	*North	*North
				W2		0.55	NO	184° Inc					0.67	YES		0.50	YES

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
	R2	Residential	Bedroom	W3	Proposed	21.88				33.40	0.81	YES	60.00			15.00		
					Existing	39.60	0.56	NO	26.95			89.00	0.69	YES	30.00	0.50	YES	
	R3	Residential	Bedroom	W4	Proposed	22.34				39.60	0.56	NO	61.00			15.00		
					Existing	39.60	0.58	NO	22.34			89.00	0.69	YES	30.00	0.53	YES	
	R4	Residential	LD	W5	Proposed	22.96				39.60	0.58	NO	61.00			16.00		
					Existing	39.60	0.61	NO	22.96			89.00	0.69	YES	30.00	0.57	YES	
	R5	Residential	Bedroom	W6	Proposed	23.99				39.60	0.61	NO	61.00			17.00		
					Existing	39.60	0.63	NO	23.99			89.00	0.70	YES	30.00	0.57	YES	
	R6	Residential	Bedroom	W7	Proposed	25.05				39.60	0.63	NO	62.00			17.00		
					Existing	39.60	0.67	NO	25.05			89.00	0.70	YES	30.00	0.57	YES	
	R7	Residential	Living Room	W8	Proposed	26.51				39.60	0.67	NO	62.00			17.00		
					Existing	39.60	0.69	YES	26.51			89.00	0.74	YES	30.00	0.67	YES	
	R8	Residential	Bedroom	W9	Proposed	27.33				39.60	0.69	YES	66.00			20.00		
					Existing	39.60	0.72	YES	27.33			89.00	0.75	YES	30.00	0.67	YES	
R9	Residential	Bedroom	W10	Proposed	28.40				39.60	0.72	YES	67.00			20.00			
				Existing	39.60	0.74	YES	28.40			89.00	0.78	YES	30.00	0.73	YES		
R10	Residential	LKD	W11	Proposed	29.18				39.60	0.74	YES	69.00			22.00			
				Existing	39.60	0.77	YES	29.18			89.00	0.78	YES	30.00	0.73	YES		
				Existing	30.35	1.00	YES	37.65			69.00	1.00	YES	22.00	0.73	YES		
Seventeenth	R1	Residential	LKD	W1	Proposed	30.12	1.00	YES	288°N Inc				32.00	*North	*North	7.00	*North	*North
					Existing	30.10						32.00			7.00			
				W2	Proposed	39.61	0.56	NO	184° Inc				89.00	0.67	YES	30.00	0.50	YES
					Existing	22.16						60.00			15.00			
	R2	Residential	Bedroom	W3	Proposed	39.61	0.57	NO	184° Inc	33.57	0.81	YES						
					Existing	22.65				27.21			89.00	0.69	YES	30.00	0.50	YES
				W4	Existing	39.61	0.59	NO	184° Inc	39.61	0.57	NO	61.00			15.00		
										22.65			89.00	0.67	YES	30.00	0.50	YES
	R3	Residential	Bedroom	W4	Existing	39.61	0.59	NO	184° Inc				89.00	0.67	YES	30.00	0.50	YES

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
	R4	Residential	LD	W5	Proposed	23.30				39.61	0.59	NO	60.00			15.00		
					Existing	39.60	0.61	NO	23.30			89.00	0.71	YES	30.00	0.57	YES	
	R5	Residential	Bedroom	W6	Proposed	24.34				39.60	0.61	NO	63.00			17.00		
					Existing	39.60	0.64	NO	24.34			89.00	0.71	YES	30.00	0.57	YES	
	R6	Residential	Bedroom	W7	Proposed	25.41				39.60	0.64	NO	63.00			17.00		
					Existing	39.60	0.68	NO	25.41			89.00	0.71	YES	30.00	0.57	YES	
	R7	Residential	Living Room	W8	Proposed	26.82				39.60	0.68	NO	63.00			17.00		
					Existing	39.60	0.70	YES	26.82			89.00	0.75	YES	30.00	0.67	YES	
	R8	Residential	Bedroom	W9	Proposed	27.65				39.60	0.70	YES	67.00			20.00		
					Existing	39.60	0.73	YES	27.65			89.00	0.75	YES	30.00	0.67	YES	
	R9	Residential	Bedroom	W10	Proposed	28.72				39.60	0.73	YES	67.00			20.00		
					Existing	39.60	0.74	YES	28.72			89.00	0.78	YES	30.00	0.73	YES	
	R10	Residential	LKD	W11	Proposed	29.49				39.60	0.74	YES	69.00			22.00		
					Existing	39.60	0.77	YES	29.49			89.00	0.79	YES	30.00	0.73	YES	
W12					Proposed	30.64	1.00	YES	40.00	1.00	YES	22.00						
					Proposed	37.66			40.00			9.00	1.00	YES				
Eighteenth	R1	Residential	LKD	W1	Existing	30.42	1.00	YES	288°N Inc				32.00	*North	*North	7.00	*North	*North
					Proposed	30.40	0.57	NO	184° Inc			32.00			7.00			
				W2	Existing	39.61						89.00	0.69	YES	30.00	0.50	YES	
					Proposed	22.46						61.00			15.00			
	R2	Residential	Bedroom	W3	Existing	39.61	0.58	NO	184° Inc	33.76	0.81	YES						
					Proposed	22.79				27.51			89.00	0.70	YES	30.00	0.50	YES
	R3	Residential	Bedroom	W4	Existing	39.61	0.59	NO	184° Inc	39.61	0.58	NO	62.00			15.00		
					Proposed	23.50				22.79			89.00	0.70	YES	30.00	0.53	YES
	R4	Residential	LD	W5	Existing	39.61	0.61	NO	184° Inc	39.61	0.59	NO	62.00			16.00		
					Proposed	24.30				23.50			89.00	0.71	YES	30.00	0.53	YES
	R5	Residential	Bedroom	W6	Existing	39.61	0.64	NO	184° Inc	39.61	0.61	NO	63.00			16.00		
										24.30			89.00	0.71	YES	30.00	0.57	YES

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
					Proposed 25.32				39.61 25.32	0.64	NO	63.00			17.00		
	R6	Residential	Bedroom	W7	Existing 39.60 Proposed 26.82	0.68	NO	184° Inc				89.00 63.00	0.71	YES	30.00 17.00	0.57	YES
	R7	Residential	Living Room	W8	Existing 39.60 Proposed 27.62	0.70	YES	184° Inc	39.60 26.82	0.68	NO	89.00 64.00	0.72	YES	30.00 18.00	0.60	YES
	R8	Residential	Bedroom	W9	Existing 39.60 Proposed 28.67	0.72	YES	184° Inc	39.60 27.62	0.70	YES	89.00 67.00	0.75	YES	30.00 20.00	0.67	YES
	R9	Residential	Bedroom	W10	Existing 39.60 Proposed 29.63	0.75	YES	184° Inc	39.60 28.67	0.72	YES	89.00 69.00	0.78	YES	30.00 22.00	0.73	YES
	R10	Residential	LKD	W11	Existing 39.60 Proposed 31.32	0.79	YES	184° Inc	39.60 29.63	0.75	YES	89.00 72.00	0.81	YES	30.00 23.00	0.77	YES
				W12	Existing 37.67 Proposed 37.67	1.00	YES	94°				40.00 40.00	1.00	YES	9.00 9.00	1.00	YES
									38.12 36.18	0.95	YES						
Nineteenth	R1	Residential	LKD	W1	Existing 30.75 Proposed 30.73	1.00	YES	288°N Inc				32.00 32.00	*North	*North	7.00 7.00	*North	*North
				W2	Existing 39.61 Proposed 22.82	0.58	NO	184° Inc				89.00 63.00	0.71	YES	30.00 15.00	0.50	YES
	R2	Residential	Bedroom	W3	Existing 39.61 Proposed 23.17	0.58	NO	184° Inc	33.97 27.85	0.82	YES	89.00 62.00	0.70	YES	30.00 15.00	0.50	YES
	R3	Residential	Bedroom	W4	Existing 39.61 Proposed 23.91	0.60	NO	184° Inc	39.61 23.17	0.58	NO	89.00 61.00	0.69	YES	30.00 15.00	0.50	YES
	R4	Residential	LD	W5	Existing 39.61 Proposed 24.73	0.62	NO	184° Inc	39.61 23.91	0.60	NO	89.00 63.00	0.71	YES	30.00 16.00	0.53	YES
	R5	Residential	Bedroom	W6	Existing 39.61 Proposed 25.74	0.65	NO	184° Inc	39.61 24.73	0.62	NO	89.00 63.00	0.71	YES	30.00 17.00	0.57	YES
	R6	Residential	Bedroom	W7	Existing 39.61 Proposed 27.19	0.69	YES	184° Inc	39.61 25.74	0.65	NO	89.00 63.00	0.71	YES	30.00 17.00	0.57	YES
	R7	Residential	Living Room	W8	Existing 39.61	0.71	YES	184° Inc	39.61 27.19	0.69	YES	89.00	0.72	YES	30.00	0.60	YES

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	R8	Residential	Bedroom	W9	Proposed	28.00				39.61	0.71	YES	64.00			18.00		
					Existing	39.61	0.73	YES	28.00			89.00	0.75	YES	30.00	0.67	YES	
	R9	Residential	Bedroom	W10	Proposed	29.03				39.61	0.73	YES	67.00			20.00		
					Existing	39.61	0.76	YES	29.03			89.00	0.79	YES	30.00	0.73	YES	
	R10	Residential	LKD	W11	Proposed	29.99				39.61	0.76	YES	70.00			22.00		
					Existing	39.61	0.80	YES	29.99			89.00	0.81	YES	30.00	0.77	YES	
				W12	Proposed	31.63	1.00	YES			72.00			23.00				
					Existing	37.68					40.00	1.00	YES	9.00	1.00	YES		
					Proposed	37.68			38.13	0.95	YES	40.00			9.00			
									36.26									
Twentieth	R1	Residential	LKD	W1	Existing	31.08	1.00	YES	288°N Inc				32.00	*North	*North	7.00	*North	*North
				Proposed	31.06	0.58	NO	184° Inc			32.00			7.00				
				W2	Existing	39.61					89.00	0.72	YES	30.00	0.50	YES		
	R2	Residential	Bedroom	W3	Proposed	23.17	0.59	NO	184° Inc				64.00			15.00		
					Existing	39.61					89.00	0.72	YES	30.00	0.50	YES		
				Proposed	23.23					64.00			15.00					
	W4	Existing	39.61	0.60	NO	184° Inc	35.02	0.78	YES	64.00								
		Proposed	23.61	0.60	NO	184° Inc	27.44			89.00	0.71	YES	30.00	0.50	YES			
	R3	Residential	Bedroom	W5	Existing	39.61	0.61	NO	184° Inc	39.61	0.60	NO	63.00			15.00		
					Proposed	24.22	0.61	NO	184° Inc	23.61			89.00	0.72	YES	30.00	0.53	YES
	R4	Residential	LD	W6	Existing	39.61	0.64	NO	184° Inc	39.61	0.61	NO	64.00			16.00		
					Proposed	25.20	0.64	NO	184° Inc	24.22			89.00	0.73	YES	30.00	0.57	YES
	R5	Residential	Bedroom	W7	Existing	39.61	0.66	NO	184° Inc	39.61	0.64	NO	65.00			17.00		
					Proposed	25.99	0.66	NO	184° Inc	25.20			89.00	0.73	YES	30.00	0.57	YES
	R6	Residential	Bedroom	W8	Existing	39.61	0.69	YES	184° Inc	39.61	0.66	NO	65.00			17.00		
					Proposed	27.43	0.69	YES	184° Inc	25.99			89.00	0.72	YES	30.00	0.57	YES
	R7	Residential	Living Room	W9	Existing	39.61	0.71	YES	184° Inc	39.61	0.69	YES	64.00			17.00		
					Proposed	28.26	0.71	YES	184° Inc	27.43			89.00	0.73	YES	30.00	0.60	YES
	R8	Residential	Bedroom	W10	Existing	39.61	0.74	YES	184° Inc	39.61	0.71	YES	65.00			18.00		
					Proposed	29.25	0.74	YES	184° Inc	28.26			89.00	0.76	YES	30.00	0.67	YES
									39.61	0.74	YES	68.00			20.00			

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	R9	Residential	Bedroom	W11	Existing Proposed	39.61 30.20	0.76	YES	184° Inc	29.25 39.61 30.20	 0.76	 YES	89.00 71.00	0.80	YES	30.00 22.00	0.73	YES
	R10	Residential	LKD	W12	Existing Proposed	39.61 31.81	0.80	YES	184° Inc				89.00 73.00	0.82	YES	30.00 23.00	0.77	YES
				W13	Existing Proposed	37.69 37.69	1.00	YES	94°				40.00 40.00	1.00	YES	9.00 9.00	1.00	YES
									38.14 36.31				0.95	YES				
Twenty First	R1	Residential	LKD	W1	Existing Proposed	31.42 31.40	1.00	YES	288°N Inc				32.00 32.00	*North	*North	7.00 7.00	*North	*North
				W2	Existing Proposed	39.61 23.59	0.60	NO	184° Inc				89.00 65.00	0.73	YES	30.00 15.00	0.50	YES
				W3	Existing Proposed	39.61 23.68	0.60	NO	184° Inc				89.00 66.00	0.74	YES	30.00 15.00	0.50	YES
	R2	Residential	Bedroom	W4	Existing Proposed	39.61 24.08	0.61	NO	184° Inc				89.00 65.00	0.73	YES	30.00 15.00	0.50	YES
	R3	Residential	Bedroom	W5	Existing Proposed	39.61 24.70	0.62	NO	184° Inc				89.00 65.00	0.73	YES	30.00 15.00	0.50	YES
	R4	Residential	LD	W6	Existing Proposed	39.61 25.69	0.65	NO	184° Inc				89.00 67.00	0.75	YES	30.00 17.00	0.57	YES
	R5	Residential	Bedroom	W7	Existing Proposed	39.61 26.47	0.67	NO	184° Inc				89.00 67.00	0.75	YES	30.00 17.00	0.57	YES
	R6	Residential	Bedroom	W8	Existing Proposed	39.61 27.88	0.70	YES	184° Inc				89.00 67.00	0.75	YES	30.00 17.00	0.57	YES
	R7	Residential	Living Room	W9	Existing Proposed	39.61 28.68	0.72	YES	184° Inc				89.00 69.00	0.78	YES	30.00 18.00	0.60	YES
	R8	Residential	Bedroom	W10	Existing Proposed	39.61 29.68	0.75	YES	184° Inc				89.00 72.00	0.81	YES	30.00 20.00	0.67	YES
	R9	Residential	Bedroom	W11	Existing Proposed	39.61 30.60	0.77	YES	184° Inc				89.00 73.00	0.82	YES	30.00 22.00	0.73	YES
	R10	Residential	LKD	W12	Existing	39.61	0.81	YES	184° Inc				89.00	0.85	YES	30.00	0.77	YES

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				W13	Proposed 32.16 Existing 37.69 Proposed 37.69	1.00	YES	94°	38.14 36.39	0.95	YES	76.00 40.00 40.00	1.00	YES	23.00 9.00 9.00	1.00	YES
Twenty Second	R1	Residential	LKD	W1	Existing 31.76 Proposed 31.75	1.00	YES	288°N Inc	34.61 28.96	0.84	YES	32.00 32.00	*North	*North	7.00 7.00	*North	*North
				W2	Existing 39.61 Proposed 24.07	0.61	NO	184° Inc				89.00 64.00	0.72	YES	30.00 14.00	0.47	YES
	R2	Residential	Bedroom	W3	Existing 39.61 Proposed 24.50	0.62	NO	184° Inc	39.61 24.50	0.62	NO	89.00 65.00	0.73	YES	30.00 15.00	0.50	YES
				W4	Existing 39.61 Proposed 25.07	0.63	NO	184° Inc				89.00 68.00	0.76	YES	30.00 16.00	0.53	YES
	R4	Residential	LD	W5	Existing 39.61 Proposed 25.84	0.65	NO	184° Inc	39.61 25.07	0.63	NO	89.00 71.00	0.80	YES	30.00 17.00	0.57	YES
				W6	Existing 39.61 Proposed 26.81	0.68	NO	184° Inc				89.00 70.00	0.79	YES	30.00 17.00	0.57	YES
	R6	Residential	Bedroom	W7	Existing 39.61 Proposed 28.19	0.71	YES	184° Inc	39.61 26.81	0.68	NO	89.00 69.00	0.78	YES	30.00 17.00	0.57	YES
				W8	Existing 39.61 Proposed 29.17	0.74	YES	184° Inc				89.00 74.00	0.83	YES	30.00 20.00	0.67	YES
	R8	Residential	Bedroom	W9	Existing 39.61 Proposed 29.95	0.76	YES	184° Inc	39.61 29.17	0.74	YES	89.00 74.00	0.83	YES	30.00 20.00	0.67	YES
				W10	Existing 39.61 Proposed 30.86	0.78	YES	184° Inc				89.00 75.00	0.84	YES	30.00 22.00	0.73	YES
	R10	Residential	LKD	W11	Existing 39.61 Proposed 31.74	0.80	YES	184° Inc	39.61 30.86	0.78	YES	89.00 76.00	0.85	YES	30.00 22.00	0.73	YES
				W12	Existing 37.70 Proposed 37.70	1.00	YES	94°				40.00 40.00	1.00	YES	9.00 9.00	1.00	YES
									38.15 36.30	0.95	YES						
Twenty Third	R1	Residential	LKD	W1	Existing 32.11 Proposed 32.09	1.00	YES	288°N Inc				32.00 32.00	*North	*North	7.00 7.00	*North	*North
				W2	Existing 39.61	0.62	NO	184° Inc				89.00	0.75	YES	30.00	0.47	YES

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	R2	Residential	Bedroom	W3	Proposed	24.61			34.84	0.84	YES	67.00			14.00		
					Existing	39.61	0.63	NO	29.37			89.00	0.76	YES	30.00	0.50	YES
	R3	Residential	Bedroom	W4	Proposed	25.04			39.61	0.63	NO	68.00			15.00		
					Existing	39.61	0.65	NO	25.04			89.00	0.78	YES	30.00	0.53	YES
	R4	Residential	LD	W5	Proposed	25.59			39.61	0.65	NO	69.00			16.00		
					Existing	39.61	0.66	NO	25.59			89.00	0.80	YES	30.00	0.57	YES
	R5	Residential	Bedroom	W6	Proposed	26.34			39.61	0.66	NO	71.00			17.00		
					Existing	39.61	0.69	YES	26.34			89.00	0.79	YES	30.00	0.57	YES
	R6	Residential	Bedroom	W7	Proposed	27.28			39.61	0.69	YES	70.00			17.00		
					Existing	39.61	0.72	YES	27.28			89.00	0.79	YES	30.00	0.57	YES
	R7	Residential	Living Room	W8	Proposed	28.64			39.61	0.72	YES	70.00			17.00		
					Existing	39.61	0.75	YES	28.64			89.00	0.83	YES	30.00	0.67	YES
	R8	Residential	Bedroom	W9	Proposed	29.59			39.61	0.75	YES	74.00			20.00		
					Existing	39.61	0.77	YES	29.59			89.00	0.83	YES	30.00	0.67	YES
Twenty Fourth	R9	Residential	Bedroom	W10	Proposed	30.36			39.61	0.77	YES	74.00			20.00		
					Existing	39.61	0.79	YES	30.36			89.00	0.83	YES	30.00	0.67	YES
	R10	Residential	Bedroom	W11	Proposed	31.23			39.61	0.79	YES	76.00			22.00		
					Existing	39.61	0.81	YES	31.23			89.00	0.85	YES	30.00	0.73	YES
	R10	Residential	LKD	W12	Proposed	32.09			39.61	0.87	YES	77.00			22.00		
					Existing	39.61	1.00	YES	32.09			40.00	1.00	YES	9.00	1.00	YES
	R10	Residential	LKD	W12	Proposed	37.71			38.16	0.95	YES	40.00			9.00		
					Existing	39.61			36.39								
	R1	Residential	LKD	W1	Proposed	32.34						32.00	*North	*North	7.00	*North	*North
					Existing	39.61	1.00	YES				32.00			7.00		
Twenty Fourth	R1	Residential	LKD	W2	Proposed	25.25						89.00	0.78	YES	30.00	0.50	YES
					Existing	39.61	0.64	NO				69.00			15.00		
	R2	Residential	Bedroom	W3	Proposed	25.56			35.00	0.85	YES						
					Existing	39.61	0.65	NO	29.76			89.00	0.76	YES	30.00	0.50	YES
	R3	Residential	Bedroom	W4	Proposed	25.56			39.61	0.65	NO	68.00			15.00		
					Existing	39.61	0.66	NO	25.56			89.00	0.78	YES	30.00	0.53	YES

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
	R4	Residential	LD	W5	Proposed	26.19			39.61	0.66	NO	69.00			16.00		
					Existing	39.61	0.68	NO	26.19			89.00	0.79	YES	30.00	0.53	YES
	R5	Residential	Bedroom	W6	Proposed	26.92			39.61	0.68	NO	70.00			16.00		
					Existing	39.61	0.70	YES	26.92			89.00	0.80	YES	30.00	0.57	YES
	R6	Residential	Bedroom	W7	Proposed	27.89			39.61	0.70	YES	71.00			17.00		
					Existing	39.61	0.74	YES	27.89			89.00	0.79	YES	30.00	0.57	YES
	R7	Residential	Living Room	W8	Proposed	29.12			39.61	0.74	YES	70.00			17.00		
					Existing	39.61	0.75	YES	29.12			89.00	0.80	YES	30.00	0.60	YES
	R8	Residential	Bedroom	W9	Proposed	30.80			39.61	0.75	YES	71.00			18.00		
					Existing	39.61	0.78	YES	29.86			89.00	0.83	YES	30.00	0.67	YES
	R9	Residential	Bedroom	W10	Proposed	31.66			39.61	0.78	YES	74.00			20.00		
					Existing	39.61	0.80	YES	30.80			89.00	0.85	YES	30.00	0.73	YES
	R10	Residential	LKD	W11	Proposed	32.56			39.61	0.80	YES	76.00			22.00		
					Existing	39.61	0.82	YES	31.66			89.00	0.85	YES	30.00	0.73	YES
				W12	Proposed	37.72			39.61	0.80	YES	40.00	1.00	YES	9.00	1.00	YES
					Proposed	37.72	1.00	YES	38.44	0.93	YES	40.00			9.00		
	Twenty Fifth	R1	Residential	LKD	Existing	32.58	1.00	YES	35.76			32.00	*North	*North	7.00	*North	*North
					Proposed	32.57	0.66	NO				32.00			7.00		
				W2	Existing	39.61				0.86	YES	89.00	0.79	YES	30.00	0.50	YES
					Proposed	25.96			35.14			70.00			15.00		
	R2	Residential	Bedroom	W3	Existing	39.61	0.66	NO	30.17			89.00	0.79	YES	30.00	0.50	YES
					Proposed	26.26			39.61	0.66	NO	70.00			15.00		
	R3	Residential	Bedroom	W4	Existing	39.61	0.68	NO	26.26			89.00	0.79	YES	30.00	0.53	YES
					Proposed	26.86			39.61	0.68	NO	70.00			16.00		
	R4	Residential	LD	W5	Existing	39.61	0.70	YES	26.86			89.00	0.80	YES	30.00	0.53	YES
					Proposed	27.57			39.61	0.70	YES	71.00			16.00		
	R5	Residential	Bedroom	W6	Existing	39.61	0.72	YES	27.57			89.00	0.81	YES	30.00	0.57	YES

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	R6	Residential	Bedroom	W7	Proposed	28.50				39.61	0.72	YES	72.00			17.00		
					Existing	39.61	0.75	YES	184° Inc	28.50			89.00	0.81	YES	30.00	0.57	YES
	R7	Residential	Living Room	W8	Proposed	29.68				39.61	0.75	YES	72.00			17.00		
					Existing	39.61	0.77	YES	184° Inc	29.68			89.00	0.82	YES	30.00	0.60	YES
	R8	Residential	Bedroom	W9	Proposed	30.39				39.61	0.77	YES	73.00			18.00		
					Existing	39.61	0.79	YES	184° Inc	30.39			89.00	0.85	YES	30.00	0.67	YES
	R9	Residential	Bedroom	W10	Proposed	31.30				39.61	0.79	YES	76.00			20.00		
					Existing	39.61	0.81	YES	184° Inc	31.30			89.00	0.88	YES	30.00	0.73	YES
	R10	Residential	LKD	W11	Proposed	32.12				39.61	0.81	YES	78.00			22.00		
					Existing	39.61	0.83	YES	184° Inc	32.99			89.00	0.88	YES	30.00	0.73	YES
				W12	Proposed	32.99				39.61	0.81	YES	40.00	1.00	YES	9.00	1.00	YES
					Existing	37.73	1.00	YES	94°	37.73			40.00			9.00		
													38.44	0.93	YES	35.93		
Twenty Sixth	R1	Residential	LKD	W1	Existing	32.87	1.00	YES	288°N Inc				32.00	*North	*North	7.00	*North	*North
					Proposed	32.86						32.00			7.00			
				W2	Existing	39.61	0.68	NO	184° Inc				89.00	0.81	YES	30.00	0.50	YES
					Proposed	26.75						72.00			15.00			
	R2	Residential	Bedroom	W3	Existing	39.61	0.68	YES	184° Inc	35.32	0.87	YES	89.00	0.79	YES	30.00	0.50	YES
					Proposed	27.04				30.64		70.00			15.00			
	R3	Residential	Bedroom	W4	Existing	39.61	0.70	YES	184° Inc	39.61	0.68	YES	70.00			30.00	0.53	YES
					Proposed	27.62				27.04		72.00			16.00			
	R4	Residential	LD	W5	Existing	39.61	0.71	YES	184° Inc	39.61	0.70	YES	89.00	0.81	YES	30.00	0.53	YES
					Proposed	28.29				27.62		73.00			16.00			
	R5	Residential	Bedroom	W6	Existing	39.61	0.74	YES	184° Inc	39.61	0.71	YES	89.00	0.82	YES	30.00	0.53	YES
					Proposed	29.18				28.29		74.00			17.00			
	R6	Residential	Bedroom	W7	Existing	39.61	0.76	YES	184° Inc	39.61	0.74	YES	89.00	0.83	YES	30.00	0.57	YES
					Proposed	30.30				29.18		74.00			17.00			
	R7	Residential	Living Room	W8	Existing	39.61	0.78	YES	184° Inc	39.61	0.76	YES	89.00	0.82	YES	30.00	0.57	YES
					Proposed	30.30				30.30		73.00			17.00			

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	R8	Residential	Bedroom	W9	Proposed 30.98 Existing 39.61 Proposed 31.85	0.80	YES	184° Inc	39.61 30.98	0.78	YES	75.00			18.00		
	R9	Residential	Bedroom	W10	Existing 39.61 Proposed 32.62	0.82	YES	184° Inc	39.61 31.85	0.80	YES	89.00 76.00	0.85	YES	30.00 20.00	0.67	YES
	R10	Residential	LKD	W11	Existing 39.61 Proposed 33.44	0.84	YES	184° Inc	39.61 32.62	0.82	YES	89.00 79.00	0.89	YES	30.00 22.00	0.73	YES
				W12	Existing 37.76 Proposed 37.76	1.00	YES	94°				40.00 40.00	1.00	YES	9.00 9.00	1.00	YES
									38.46 36.12	0.94	YES						
Viadux Tower																	
Second	R1	Residential	LKD	W1	Existing 30.70 Proposed 30.70	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 30.80 Proposed 30.80	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 37.47 Proposed 33.98	0.91	YES	199°				80.00 73.00	0.91	YES	28.00 23.00	0.82	YES
				W4	Existing 37.27 Proposed 33.46	0.90	YES	199°				79.00 72.00	0.91	YES	28.00 23.00	0.82	YES
									34.51 32.43	0.94	YES						
Third	R1	Residential	LKD	W1	Existing 30.72 Proposed 30.72	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 30.83 Proposed 30.83	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 37.89 Proposed 34.43	0.91	YES	199°				80.00 74.00	0.93	YES	28.00 23.00	0.82	YES
				W4	Existing 37.70 Proposed 33.93	0.90	YES	199°				79.00 73.00	0.92	YES	28.00 23.00	0.82	YES
									34.76 32.71	0.94	YES						
	R2	Residential	Bedroom	W5	Existing 37.46 Proposed 33.36	0.89	YES	199°				77.00 71.00	0.92	YES	27.00 23.00	0.85	YES
									37.46 33.36	0.89	YES						
	R3	Residential	Bedroom	W6	Existing 37.30 Proposed 32.97	0.88	YES	199°				76.00 70.00	0.92	YES	27.00 22.00	0.81	YES
									37.30 32.97	0.88	YES						
	R4	Residential	LKD	W7	Existing 36.95 Proposed 32.26	0.87	YES	199°				75.00 66.00	0.88	YES	27.00 21.00	0.78	YES
				W8	Existing 18.44 Proposed 14.53	0.79	NO	109°				37.00 27.00	0.73	YES	17.00 10.00	0.59	YES

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				W9	Existing 17.76 Proposed 13.91	0.78	NO	109°				36.00 26.00	0.72	YES	16.00 9.00	0.56	YES
				W10	Existing 16.11 Proposed 12.52	0.78	NO	109°				32.00 23.00	0.72	NO	14.00 7.00	0.50	YES
				W11	Existing 15.12 Proposed 11.71	0.77	NO	109°	21.75 17.82	0.82	YES	31.00 22.00	0.71	NO	14.00 7.00	0.50	YES
Fourth	R1	Residential	LKD	W1	Existing 30.75 Proposed 30.75	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 30.85 Proposed 30.85	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 38.30 Proposed 34.88	0.91	YES	199°				80.00 74.00	0.93	YES	28.00 23.00	0.82	YES
				W4	Existing 38.12 Proposed 34.40	0.90	YES	199°				80.00 74.00	0.93	YES	28.00 23.00	0.82	YES
	R2	Residential	Bedroom	W5	Existing 37.88 Proposed 33.84	0.89	YES	199°	35.01 32.98	0.94	YES	77.00 72.00	0.94	YES	27.00 23.00	0.85	YES
	R3	Residential	Bedroom	W6	Existing 37.73 Proposed 33.45	0.89	YES	199°	37.88 33.84	0.89	YES	77.00 71.00	0.92	YES	27.00 22.00	0.81	YES
	R4	Residential	LKD	W7	Existing 37.38 Proposed 32.75	0.88	YES	199°	37.73 33.45	0.89	YES	76.00 68.00	0.89	YES	27.00 21.00	0.78	YES
				W8	Existing 18.95 Proposed 15.08	0.80	YES	109°				37.00 28.00	0.76	YES	17.00 10.00	0.59	YES
				W9	Existing 18.28 Proposed 14.47	0.79	NO	109°				37.00 28.00	0.76	YES	16.00 9.00	0.56	YES
				W10	Existing 16.63 Proposed 13.08	0.79	NO	109°				32.00 23.00	0.72	NO	14.00 7.00	0.50	YES
				W11	Existing 15.62 Proposed 12.26	0.78	NO	109°	22.24 18.36	0.83	YES	31.00 22.00	0.71	NO	14.00 7.00	0.50	YES
Fifth	R1	Residential	LKD	W1	Existing 30.77 Proposed 30.77	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 30.88 Proposed 30.88	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 38.41 Proposed 35.07	0.91	YES	199°				81.00 75.00	0.93	YES	28.00 23.00	0.82	YES
				W4	Existing 38.25 Proposed 34.60	0.90	YES	199°				80.00 74.00	0.93	YES	28.00 23.00	0.82	YES
	R2	Residential	Bedroom	W5	Existing 38.01 Proposed 34.05	0.90	YES	199°	35.09 33.10	0.94	YES	77.00 72.00	0.94	YES	27.00 23.00	0.85	YES
									38.01 34.05	0.90	YES						

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	R3	Residential	Bedroom	W6	Existing Proposed	37.85 33.67	0.89	YES	199°	37.85 33.67	0.89	YES	77.00 71.00	0.92	YES	27.00 22.00	0.81	YES	
	R4	Residential	LKD	W7	Existing Proposed	37.52 32.98	0.88	YES	199°				76.00 68.00	0.89	YES	27.00 21.00	0.78	YES	
				W8	Existing Proposed	19.45 15.66	0.81	YES	109°				39.00 30.00	0.77	YES	17.00 10.00	0.59	YES	
				W9	Existing Proposed	18.78 15.05	0.80	YES	109°				37.00 28.00	0.76	YES	16.00 9.00	0.56	YES	
				W10	Existing Proposed	17.14 13.67	0.80	YES	109°				32.00 23.00	0.72	NO	14.00 7.00	0.50	YES	
				W11	Existing Proposed	16.14 12.85	0.80	YES	109°				32.00 23.00	0.72	NO	14.00 7.00	0.50	YES	
									22.66 18.86										
	Sixth	R1	Residential	LKD	W1	Existing Proposed	30.80 30.80	1.00	YES	289°N	35.14 33.20	0.94	YES	40.00 40.00	*North	*North	10.00 10.00	*North	*North
					W2	Existing Proposed	30.90 30.90	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
					W3	Existing Proposed	38.48 35.22	0.92	YES	199°				81.00 75.00	0.93	YES	28.00 23.00	0.82	YES
					W4	Existing Proposed	38.31 34.76	0.91	YES	199°				81.00 75.00	0.93	YES	28.00 23.00	0.82	YES
		R2	Residential	Bedroom	W5	Existing Proposed	38.07 34.21	0.90	YES	199°				78.00 73.00	0.94	YES	27.00 23.00	0.85	YES
										38.07 34.21									
R3		Residential	Bedroom	W6	Existing Proposed	37.92 33.84	0.89	YES	199°	78.00 72.00				0.92	YES	27.00 22.00	0.81	YES	
R4		Residential	LKD	W7	Existing Proposed	37.59 33.15	0.88	YES	199°	78.00 70.00				0.90	YES	27.00 21.00	0.78	YES	
				W8	Existing Proposed	19.99 16.29	0.81	YES	109°	40.00 31.00				0.78	YES	17.00 10.00	0.59	YES	
				W9	Existing Proposed	19.33 15.68	0.81	YES	109°	38.00 29.00				0.76	YES	16.00 9.00	0.56	YES	
				W10	Existing Proposed	17.72 14.33	0.81	YES	109°	33.00 24.00				0.73	NO	14.00 7.00	0.50	YES	
				W11	Existing Proposed	16.71 13.50	0.81	YES	109°	32.00 23.00				0.72	NO	14.00 7.00	0.50	YES	
									23.09 19.38										
Seventh	R1	Residential	LKD	W1	Existing Proposed	30.82 30.82	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North	
				W2	Existing Proposed	30.93 30.93	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North	
				W3	Existing Proposed	38.54 35.37	0.92	YES	199°				82.00 76.00	0.93	YES	28.00 23.00	0.82	YES	

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	R2	Residential	Bedroom	W4	Existing Proposed	38.38 34.91	0.91	YES	199°	35.19 33.30	0.95	YES	82.00 76.00	0.93	YES	28.00 23.00	0.82	YES
				W5	Existing Proposed	38.15 34.38	0.90	YES	199°	80.00 75.00	0.94	YES	27.00 23.00	0.85	YES			
	R3	Residential	Bedroom	W6	Existing Proposed	38.00 34.01	0.90	YES	199°	38.15 34.38	0.90	YES	78.00 72.00	0.92	YES	27.00 22.00	0.81	YES
				W7	Existing Proposed	37.67 33.33	0.88	YES	199°	38.00 34.01	0.90	YES	78.00 70.00	0.90	YES	27.00 21.00	0.78	YES
	R4	Residential	LKD	W8	Existing Proposed	20.60 16.98	0.82	YES	109°	40.00 31.00	0.78	YES	17.00 10.00	0.59	YES			
				W9	Existing Proposed	19.95 16.39	0.82	YES	109°	38.00 29.00	0.76	YES	16.00 9.00	0.56	YES			
				W10	Existing Proposed	18.37 15.07	0.82	YES	109°	33.00 25.00	0.76	YES	14.00 7.00	0.50	YES			
				W11	Existing Proposed	17.38 14.25	0.82	YES	109°	32.00 24.00	0.75	NO	14.00 7.00	0.50	YES			
										23.60 19.97	0.85	YES						
	Eighth	R1	Residential	LKD	W1	Existing Proposed	30.85 30.85	1.00	YES	289°N	35.24 33.40 38.22 34.56 38.07 34.19 79.00 71.00 40.00 31.00 38.00 29.00 33.00 24.00 33.00 26.00	0.95	YES	40.00 40.00 40.00 40.00	*North	*North	10.00 10.00 10.00 10.00	*North
W2					Existing Proposed	30.96 30.96	1.00	YES	289°N	40.00 40.00				*North	*North	10.00 10.00	*North	*North
W3					Existing Proposed	38.60 35.52	0.92	YES	199°	82.00 76.00				0.93	YES	28.00 23.00	0.82	YES
W4					Existing Proposed	38.45 35.08	0.91	YES	199°	82.00 76.00				0.93	YES	28.00 23.00	0.82	YES
R2		Residential	Bedroom	W5	Existing Proposed	38.22 34.56	0.90	YES	199°	80.00 75.00				0.94	YES	27.00 23.00	0.85	YES
				W6	Existing Proposed	38.07 34.19	0.90	YES	199°	80.00 74.00				0.93	YES	27.00 22.00	0.81	YES
R3		Residential	Bedroom	W7	Existing Proposed	37.75 33.53	0.89	YES	199°	79.00 71.00				0.90	YES	27.00 21.00	0.78	YES
				W8	Existing Proposed	21.29 17.77	0.83	YES	109°	40.00 31.00				0.78	YES	17.00 10.00	0.59	YES
R4		Residential	LKD	W9	Existing Proposed	20.65 17.19	0.83	YES	109°	38.00 29.00				0.76	YES	16.00 9.00	0.56	YES
				W10	Existing Proposed	19.12 15.90	0.83	YES	109°	33.00 24.00				0.73	NO	14.00 7.00	0.50	YES
				W11	Existing Proposed	18.14 15.09	0.83	YES	109°	33.00 26.00				0.79	YES	14.00 7.00	0.50	YES

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										24.16 20.64	0.85	YES							
Ninth	R1	Residential	LKD	W1	Existing	30.88	1.00	YES	289°N				40.00	*North	*North	10.00	*North	*North	
					Proposed	30.88	1.00	YES	289°N				40.00	*North	*North	10.00	*North	*North	
				W2	Existing	30.99						40.00			10.00				
					Proposed	30.99						40.00			10.00				
		R2	Residential	Bedroom	W3	Existing	38.66	0.92	YES	199°				82.00	0.94	YES	28.00	0.82	YES
					Proposed	35.67						77.00			23.00				
	W4				Existing	38.51	0.92	YES	199°				82.00	0.94	YES	28.00	0.82	YES	
					Proposed	35.24						77.00			23.00				
										35.28 33.50	0.95	YES							
		R3	Residential	Bedroom	W5	Existing	38.30	0.91	YES	199°				80.00	0.95	YES	27.00	0.85	YES
					Proposed	34.74						76.00			23.00				
		R4	Residential	Bedroom	W6	Existing	38.15	0.90	YES	199°				80.00	0.93	YES	27.00	0.81	YES
					Proposed	34.38						74.00			22.00				
		R4	Residential	LKD	W7	Existing	37.84	0.89	YES	199°				79.00	0.91	YES	27.00	0.78	YES
					Proposed	33.73						72.00			21.00				
					W8	Existing	22.06	0.84	YES	109°			41.00	0.80	YES	17.00	0.59	YES	
						Proposed	18.64						33.00			10.00			
	W9				Existing	21.45	0.84	YES	109°			39.00	0.77	YES	16.00	0.56	YES		
					Proposed	18.08						30.00			9.00				
	W10				Existing	19.96	0.84	YES	109°			34.00	0.79	YES	14.00	0.50	YES		

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				W8	Existing	22.95	0.86	YES	109°				42.00	0.83	YES	17.00	0.59	YES
				W9	Proposed	19.63	0.85	YES	109°				35.00	0.83	YES	10.00	0.56	YES
					Existing	22.35							40.00			16.00		
				Proposed	19.09	33.00	9.00											
				W10	Existing	20.92	0.86	YES	109°				35.00	0.80	YES	14.00	0.50	YES
W11	Proposed	17.89	0.86	YES	109°	28.00	0.79	YES	7.00	0.50	YES							
	Existing	20.00				34.00			14.00									
						Proposed	17.14				27.00			7.00				
								25.53	0.87	YES								
Eleventh	R1	Residential	LKD	W1	Existing	30.96	1.00	YES	289°N				40.00	*North	*North	10.00	*North	*North
				W2	Proposed	30.96	1.00	YES	289°N				40.00	*North	*North	10.00	*North	*North
					Existing	31.07							40.00			10.00		
				Proposed	31.07	40.00	10.00											
	W3	Existing	38.78	0.93	YES	199°	84.00	0.94	YES	28.00	0.82	YES						
		Proposed	35.99	79.00	23.00													
	W4	Existing	38.65	0.92	YES	199°	82.00	0.94	YES	28.00	0.82	YES						
		Proposed	35.59	77.00	23.00													
							35.39	0.95	YES									
	R2	Residential	Bedroom	W5	Existing	38.45	0.91	YES	199°				81.00	0.95	YES	27.00	0.85	YES
					Proposed	35.12	77.00	23.00										
							38.45	0.91	YES									
	R3	Residential	Bedroom	W6	Existing	38.32	0.91	YES	199°				81.00	0.94	YES	27.00	0.81	YES
					Proposed	34.79	76.00	22.00										
							38.32	0.91	YES									
R4	Residential	LKD	W7	Existing	38.03	0.90	YES	199°				81.00	0.93	YES	27.00	0.78	YES	
				Proposed	34.18	75.00	21.00											
				Existing	23.95	0.87	YES	109°				42.00	0.83	YES	17.00	0.59	YES	
				Proposed	20.74	35.00	10.00											
				Existing	23.38	0.87	YES	109°				40.00	0.83	YES	16.00	0.56	YES	
				Proposed	20.23	33.00	9.00											
				Existing	22.02	0.87	YES	109°				35.00	0.80	YES	14.00	0.50	YES	
W10	Proposed	19.09	0.87	YES	109°	28.00	0.82	YES	7.00	0.57	YES							
	Existing	21.14				34.00			14.00									
	Proposed	18.38				28.00			8.00									
						26.36	0.88	YES										
						23.16												
Twelfth	R1	Residential	LKD	W1	Existing	30.99	1.00	YES	289°N				40.00	*North	*North	10.00	*North	*North
				W2	Proposed	30.99	1.00	YES	289°N				40.00	*North	*North	10.00	*North	*North
					Existing	31.10							40.00			10.00		
				Proposed	31.10	40.00	10.00											
	W3	Existing	38.85	0.93	YES	199°	84.00	0.94	YES	28.00	0.82	YES						
		Proposed	36.16	79.00	23.00													
	W4	Existing	38.72	0.92	YES	199°	84.00	0.94	YES	28.00	0.82	YES						
		Proposed	35.78	79.00	23.00													
						35.44	0.95	YES										
R2	Residential	Bedroom	W5	Existing	38.54	0.92	YES	199°				82.00	0.95	YES	27.00	0.85	YES	
				Proposed	35.33	78.00	23.00											

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	R3	Residential	Bedroom	W6	Existing Proposed	38.41 35.00	0.91	YES	199°	38.54 35.33	0.92	YES						
	R4	Residential	LKD	W7	Existing Proposed	38.14 34.42	0.90	YES	199°	38.41 35.00	0.91	YES						
				W8	Existing Proposed	25.08 21.98	0.88	YES	109°									
				W9	Existing Proposed	24.54 21.50	0.88	YES	109°									
				W10	Existing Proposed	23.26 20.44	0.88	YES	109°									
				W11	Existing Proposed	22.44 19.78	0.88	YES	109°									
										27.30 24.21	0.89	YES						
Thirteenth	R1	Residential	LKD	W1	Existing Proposed	31.04 31.04	1.00	YES	289°N									
				W2	Existing Proposed	31.15 31.15	1.00	YES	289°N									
				W3	Existing Proposed	38.91 36.33	0.93	YES	199°									
				W4	Existing Proposed	38.79 35.97	0.93	YES	199°									
										35.50 33.97	0.96	YES						
	R2	Residential	Bedroom	W5	Existing Proposed	38.62 35.54	0.92	YES	199°									
										38.62 35.54	0.92	YES						
	R3	Residential	Bedroom	W6	Existing Proposed	38.51 35.23	0.91	YES	199°									
										38.51 35.23	0.91	YES						
	R4	Residential	LKD	W7	Existing Proposed	38.25 34.68	0.91	YES	199°									
				W8	Existing Proposed	26.34 23.36	0.89	YES	109°									
				W9	Existing Proposed	25.85 22.92	0.89	YES	109°									
				W10	Existing Proposed	24.67 21.96	0.89	YES	109°									
				W11	Existing Proposed	23.91 21.36	0.89	YES	109°									
										28.36 25.39	0.90	YES						
Fourteenth	R1	Residential	LKD	W1	Existing Proposed	31.08 31.08	1.00	YES	289°N									
				W2	Existing Proposed	31.19 31.19	1.00	YES	289°N									

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	R2	Residential	Bedroom	W3	Existing	38.98	0.94	YES	199*	35.56 34.09	0.96	YES	85.00	0.95	YES	29.00	0.86	YES
				W4	Proposed	36.51	0.93	YES	199*				81.00	0.95	YES	25.00	0.86	YES
					Existing	38.87							85.00			29.00		
				Proposed	36.16	81.00	25.00											
				W5	Existing	38.71	0.92	YES	199*				84.00	0.96	YES	28.00	0.89	YES
					Proposed	35.76							81.00			25.00		
				W6	Existing	38.61	0.92	YES	199*				83.00	0.95	YES	27.00	0.85	YES
					Proposed	35.47							79.00			23.00		
				W7	Existing	38.37	0.91	YES	199*				82.00	0.94	YES	27.00	0.81	YES
					Proposed	34.94							77.00			22.00		
				W8	Existing	27.74	0.90	YES	109*				45.00	0.89	YES	17.00	0.71	YES
Proposed	24.89	40.00	12.00															
W9	Existing	27.30	0.90	YES	109*	44.00	0.89	YES	16.00	0.69	YES							
	Proposed	24.50				39.00			11.00									
W10	Existing	26.24	0.90	YES	109*	40.00	0.88	YES	14.00	0.64	YES							
	Proposed	23.65				35.00			9.00									
W11	Existing	25.57	0.90	YES	109*	39.00	0.87	YES	14.00	0.64	YES							
	Proposed	23.12				34.00			9.00									
Fifteenth	R1	Residential	LKD	W1	Existing	31.13	1.00	YES	289*N	35.63 34.22	0.96	YES	40.00	*North	*North	10.00	*North	*North
				W2	Proposed	31.13	1.00	YES	289*N				40.00	*North	*North	10.00	*North	*North
					Existing	31.24							40.00			10.00		
				Proposed	31.24	40.00	10.00											
				W3	Existing	39.05	0.94	YES	199*				85.00	0.95	YES	29.00	0.86	YES
					Proposed	36.69							81.00			25.00		
				W4	Existing	38.95	0.93	YES	199*				85.00	0.95	YES	29.00	0.86	YES
					Proposed	36.37							81.00			25.00		
				W5	Existing	38.81	0.93	YES	199*				84.00	0.96	YES	28.00	0.89	YES
					Proposed	35.99							81.00			25.00		
				W6	Existing	38.71	0.92	YES	199*				84.00	0.95	YES	28.00	0.86	YES
Proposed	35.71	80.00	24.00															
W7	Existing	38.49	0.92	YES	199*	84.00	0.94	YES	28.00	0.82	YES							
	Proposed	35.22				79.00			23.00									
W8	Existing	29.28	0.91	YES	109*	48.00	0.90	YES	17.00	0.71	YES							
	Proposed	26.55				43.00			12.00									
W9	Existing	28.89	0.91	YES	109*	47.00	0.89	YES	16.00	0.69	YES							
	Proposed	26.21				42.00			11.00									
W10	Existing	27.97	0.91	YES	109*	45.00	0.91	YES	15.00	0.73	YES							
	Proposed	25.50				41.00			11.00									

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				W11	Existing Proposed	27.39 25.06	0.91	YES	109°				44.00 40.00	0.91	YES	15.00 11.00	0.73	YES	
Sixteenth	R1	Residential	LKD	W1	Existing Proposed	31.18 31.18	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North	
				W2	Existing Proposed	31.30 31.30	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North	
				W3	Existing Proposed	39.11 36.88	0.94	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES	
				W4	Existing Proposed	39.03 36.58	0.94	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES	
										35.69 34.36	0.96	YES							
	R2	Residential	Bedroom	W5	Existing Proposed	38.90 36.22	0.93	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES	
										38.90 36.22	0.93	YES							
	R3	Residential	Bedroom	W6	Existing Proposed	38.81 35.97	0.93	YES	199°				84.00 80.00	0.95	YES	28.00 24.00	0.86	YES	
										38.81 35.97	0.93	YES							
	R4	Residential	LKD	W7	Existing Proposed	38.62 35.50	0.92	YES	199°				84.00 79.00	0.94	YES	28.00 23.00	0.82	YES	
				W8	Existing Proposed	30.92 28.33	0.92	YES	109°				50.00 45.00	0.90	YES	18.00 13.00	0.72	YES	
				W9	Existing Proposed	30.60 28.06	0.92	YES	109°				49.00 44.00	0.90	YES	17.00 12.00	0.71	YES	
				W10	Existing Proposed	29.85 27.50	0.92	YES	109°				47.00 43.00	0.91	YES	15.00 11.00	0.73	YES	
				W11	Existing Proposed	29.37 27.16	0.92	YES	109°				47.00 43.00	0.91	YES	15.00 11.00	0.73	YES	
													32.23 29.65	0.92	YES				
Seventeenth	R1	Residential	LKD	W1	Existing Proposed	31.24 31.24	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North	
				W2	Existing Proposed	31.36 31.36	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North	
				W3	Existing Proposed	39.18 37.07	0.95	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES	
				W4	Existing Proposed	39.10 36.79	0.94	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES	
										35.76 34.50	0.96	YES							
	R2	Residential	Bedroom	W5	Existing Proposed	38.99 36.46	0.94	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES	
										38.99 36.46	0.94	YES							
	R3	Residential	Bedroom	W6	Existing Proposed	38.92 36.22	0.93	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES	
										38.92 36.22	0.93	YES							

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	R4	Residential	LKD	W7	Existing 38.75 Proposed 35.80	0.92	YES	199°				85.00 81.00	0.95	YES	29.00 25.00	0.86	YES
				W8	Existing 32.65 Proposed 30.19	0.92	YES	109°				53.00 49.00	0.92	YES	19.00 15.00	0.79	YES
				W9	Existing 32.40 Proposed 29.99	0.93	YES	109°				52.00 48.00	0.92	YES	18.00 14.00	0.78	YES
				W10	Existing 31.82 Proposed 29.59	0.93	YES	109°				50.00 46.00	0.92	YES	16.00 12.00	0.75	YES
				W11	Existing 31.46 Proposed 29.37	0.93	YES	109°				50.00 46.00	0.92	YES	16.00 12.00	0.75	YES
									33.70 31.25	0.93	YES						
Eighteenth	R1	Residential	LKD	W1	Existing 31.30 Proposed 31.30	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 31.42 Proposed 31.42	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.25 Proposed 37.26	0.95	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
				W4	Existing 39.18 Proposed 37.00	0.94	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
	R2	Residential	Bedroom	W5	Existing 39.09 Proposed 36.70	0.94	YES	199°	35.82 34.64	0.97	YES	85.00 83.00	0.98	YES	29.00 27.00	0.93	YES
									39.09 36.70	0.94	YES						
	R3	Residential	Bedroom	W6	Existing 39.02 Proposed 36.48	0.93	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
									39.02 36.48	0.93	YES						
	R4	Residential	LKD	W7	Existing 38.88 Proposed 36.10	0.93	YES	199°				85.00 81.00	0.95	YES	29.00 25.00	0.86	YES
				W8	Existing 34.39 Proposed 32.07	0.93	YES	109°				57.00 53.00	0.93	YES	19.00 15.00	0.79	YES
				W9	Existing 34.21 Proposed 31.94	0.93	YES	109°				56.00 52.00	0.93	YES	18.00 14.00	0.78	YES
				W10	Existing 33.82 Proposed 31.72	0.94	YES	109°				55.00 51.00	0.93	YES	17.00 13.00	0.76	YES
				W11	Existing 33.59 Proposed 31.61	0.94	YES	109°				55.00 51.00	0.93	YES	17.00 13.00	0.76	YES
									35.19 32.88	0.93	YES						
Nineteenth	R1	Residential	LKD	W1	Existing 31.37 Proposed 31.37	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 31.49 Proposed 31.49	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.31 Proposed 37.45	0.95	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
				W4	Existing 39.26 Proposed 37.22	0.95	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES

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	R2	Residential	Bedroom	W5	Existing Proposed	39.18 36.94	0.94	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES
	R3	Residential	Bedroom	W6	Existing Proposed	39.13 36.75	0.94	YES	199°	39.18 36.94	0.94	YES	85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
	R4	Residential	LKD	W7	Existing Proposed	39.01 36.40	0.93	YES	199°	39.13 36.75	0.94	YES	85.00 81.00	0.95	YES	29.00 25.00	0.86	YES
				W8	Existing Proposed	36.09 33.92	0.94	YES	109°				58.00 54.00	0.93	YES	19.00 15.00	0.79	YES
				W9	Existing Proposed	35.99 33.86	0.94	YES	109°				58.00 54.00	0.93	YES	19.00 15.00	0.79	YES
				W10	Existing Proposed	35.77 33.80	0.94	YES	109°				57.00 53.00	0.93	YES	18.00 14.00	0.78	YES
				W11	Existing Proposed	35.65 33.80	0.95	YES	109°				57.00 53.00	0.93	YES	18.00 14.00	0.78	YES
										36.64 34.48	0.94	YES						
Twentieth	R1	Residential	LKD	W1	Existing Proposed	31.45 31.45	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing Proposed	31.56 31.56	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing Proposed	39.37 37.64	0.96	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
				W4	Existing Proposed	39.33 37.43	0.95	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
										35.96 34.93	0.97	YES						
	R2	Residential	Bedroom	W5	Existing Proposed	39.27 37.19	0.95	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES
										39.27 37.19	0.95	YES						
	R3	Residential	Bedroom	W6	Existing Proposed	39.23 37.01	0.94	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES
										39.23 37.01	0.94	YES						
	R4	Residential	LKD	W7	Existing Proposed	39.13 36.70	0.94	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
				W8	Existing Proposed	37.67 35.65	0.95	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W9	Existing Proposed	37.64 35.65	0.95	YES	109°				59.00 55.00	0.93	YES	19.00 15.00	0.79	YES
				W10	Existing Proposed	37.58 35.75	0.95	YES	109°				59.00 55.00	0.93	YES	19.00 15.00	0.79	YES
				W11	Existing Proposed	37.56 35.84	0.95	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
										37.99 35.97	0.95	YES						
Twenty First	R1	Residential	LKD	W1	Existing Proposed	31.52 31.52	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North

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Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
	R2	Residential	Bedroom	W2	Existing 31.63 Proposed 31.63	1.00	YES	289°N	36.03 35.07	0.97	YES	40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.43 Proposed 37.83	0.96	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
				W4	Existing 39.40 Proposed 37.64	0.96	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES
				W5	Existing 39.35 Proposed 37.43	0.95	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES
				W6	Existing 39.32 Proposed 37.27	0.95	YES	199°				85.00 83.00	0.98	YES	29.00 27.00	0.93	YES
				W7	Existing 39.25 Proposed 36.99	0.94	YES	199°				85.00 82.00	0.96	YES	29.00 26.00	0.90	YES
				W8	Existing 38.63 Proposed 36.75	0.95	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W9	Existing 38.62 Proposed 36.78	0.95	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W10	Existing 38.64 Proposed 36.95	0.96	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W11	Existing 38.66 Proposed 37.07	0.96	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W12	Existing 38.68 Proposed 37.09	0.96	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W13	Existing 38.70 Proposed 37.11	0.96	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W14	Existing 38.72 Proposed 37.13	0.96	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W15	Existing 38.74 Proposed 37.15	0.96	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
Twenty Second	R1	Residential	LKD	W1	Existing 31.60 Proposed 31.60	1.00	YES	289°N	36.10 35.22	0.98	YES	40.00 40.00	*North	*North	10.00 10.00	*North	*North
			W2	Existing 31.71 Proposed 31.71	1.00	YES	289°N	40.00 40.00				*North	*North	10.00 10.00	*North	*North	
			W3	Existing 39.48 Proposed 38.02	0.96	YES	199°	86.00 84.00				0.98	YES	30.00 28.00	0.93	YES	
			W4	Existing 39.46 Proposed 37.85	0.96	YES	199°	86.00 84.00				0.98	YES	30.00 28.00	0.93	YES	
			W5	Existing 39.43 Proposed 37.66	0.96	YES	199°	86.00 84.00				0.98	YES	30.00 28.00	0.93	YES	
			W6	Existing 39.41 Proposed 37.52	0.95	YES	199°	86.00 84.00				0.98	YES	30.00 28.00	0.93	YES	
			W7	Existing 39.36 Proposed 37.28	0.95	YES	199°	86.00 83.00				0.97	YES	30.00 27.00	0.90	YES	
			W8	Existing 38.91 Proposed 37.19	0.96	YES	109°	60.00 57.00				0.95	YES	20.00 17.00	0.85	YES	
			W9	Existing 38.90 Proposed 37.22	0.96	YES	109°	60.00 57.00				0.95	YES	20.00 17.00	0.85	YES	
			W10	Existing 38.88 Proposed 37.20	0.96	YES	109°	60.00 57.00				0.95	YES	20.00 17.00	0.85	YES	

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				W10	Existing 38.91 Proposed 37.36	0.96	YES	109°				59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
				W11	Existing 38.92 Proposed 37.47	0.96	YES	109°	39.02 37.31	0.96	YES	59.00 56.00	0.95	YES	19.00 16.00	0.84	YES
Twenty Third	R1	Residential	LKD	W1	Existing 31.69 Proposed 31.69	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 31.80 Proposed 31.80	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.53 Proposed 38.20	0.97	YES	199°				86.00 84.00	0.98	YES	30.00 28.00	0.93	YES
				W4	Existing 39.52 Proposed 38.06	0.96	YES	199°				86.00 84.00	0.98	YES	30.00 28.00	0.93	YES
	R2	Residential	Bedroom	W5	Existing 39.50 Proposed 37.89	0.96	YES	199°	36.17 35.37	0.98	YES						
												86.00 84.00	0.98	YES	30.00 28.00	0.93	YES
	R3	Residential	Bedroom	W6	Existing 39.48 Proposed 37.77	0.96	YES	199°	39.50 37.89	0.96	YES						
												86.00 84.00	0.98	YES	30.00 28.00	0.93	YES
	R4	Residential	LKD	W7	Existing 39.45 Proposed 37.57	0.95	YES	199°	39.48 37.77	0.96	YES						
				W8	Existing 39.16 Proposed 37.60	0.96	YES	109°				86.00 83.00	0.97	YES	30.00 27.00	0.90	YES
				W9	Existing 39.16 Proposed 37.63	0.96	YES	109°				60.00 57.00	0.95	YES	20.00 17.00	0.85	YES
				W10	Existing 39.17 Proposed 37.76	0.96	YES	109°				60.00 57.00	0.95	YES	20.00 17.00	0.85	YES
				W11	Existing 39.17 Proposed 37.85	0.97	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
Twenty Fourth	R1	Residential	LKD	W1	Existing 31.79 Proposed 31.79	1.00	YES	289°N	39.24 37.68	0.96	YES						
				W2	Existing 31.91 Proposed 31.91	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.58 Proposed 38.38	0.97	YES	199°				86.00 85.00	0.99	YES	30.00 29.00	0.97	YES
				W4	Existing 39.57 Proposed 38.26	0.97	YES	199°				86.00 85.00	0.99	YES	30.00 29.00	0.97	YES
	R2	Residential	Bedroom	W5	Existing 39.56 Proposed 38.12	0.96	YES	199°	36.24 35.53	0.98	YES						
												86.00 85.00	0.99	YES	30.00 29.00	0.97	YES
	R3	Residential	Bedroom	W6	Existing 39.56 Proposed 38.02	0.96	YES	199°	39.56 38.12	0.96	YES						
												86.00 85.00	0.99	YES	30.00 29.00	0.97	YES

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	R4	Residential	LKD	W7	Existing 39.54 Proposed 37.85	0.96	YES	199°	39.56 38.02	0.96	YES	86.00 84.00	0.98	YES	30.00 28.00	0.93	YES
				W8	Existing 39.40 Proposed 38.00	0.96	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
				W9	Existing 39.40 Proposed 38.02	0.96	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
				W10	Existing 39.40 Proposed 38.13	0.97	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
				W11	Existing 39.41 Proposed 38.22	0.97	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
									39.44 38.04	0.96	YES						
Twenty Fifth	R1	Residential	LKD	W1	Existing 31.91 Proposed 31.91	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 32.03 Proposed 32.03	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.62 Proposed 38.56	0.97	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W4	Existing 39.62 Proposed 38.45	0.97	YES	199°				86.00 85.00	0.99	YES	30.00 29.00	0.97	YES
									36.32 35.68	0.98	YES						
	R2	Residential	Bedroom	W5	Existing 39.62 Proposed 38.34	0.97	YES	199°				86.00 85.00	0.99	YES	30.00 29.00	0.97	YES
									39.62 38.34	0.97	YES						
	R3	Residential	Bedroom	W6	Existing 39.62 Proposed 38.25	0.97	YES	199°				86.00 85.00	0.99	YES	30.00 29.00	0.97	YES
									39.62 38.25	0.97	YES						
	R4	Residential	LKD	W7	Existing 39.62 Proposed 38.11	0.96	YES	199°				86.00 84.00	0.98	YES	30.00 28.00	0.93	YES
				W8	Existing 39.61 Proposed 38.36	0.97	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
				W9	Existing 39.61 Proposed 38.39	0.97	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
				W10	Existing 39.61 Proposed 38.48	0.97	YES	109°				60.00 58.00	0.97	YES	20.00 18.00	0.90	YES
				W11	Existing 39.61 Proposed 38.55	0.97	YES	109°				60.00 59.00	0.98	YES	20.00 19.00	0.95	YES
									39.61 38.37	0.97	YES						
Twenty Sixth	R1	Residential	LKD	W1	Existing 32.04 Proposed 32.04	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 32.16 Proposed 32.16	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.62 Proposed 38.69	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W4	Existing 39.62 Proposed 38.60	0.97	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES

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	R2	Residential	Bedroom	W5	Existing Proposed	39.62 38.50	0.97	YES	199°	36.37 35.82	0.98	YES						
													86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R3	Residential	Bedroom	W6	Existing Proposed	39.62 38.42	0.97	YES	199°	39.62 38.50	0.97	YES						
													86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R4	Residential	LKD	W7	Existing Proposed	39.62 38.30	0.97	YES	199°	39.62 38.42	0.97	YES						
				W8	Existing Proposed	39.62 38.52	0.97	YES	109°				86.00 60.00	1.00 0.98	YES	30.00 20.00	1.00 0.95	YES
				W9	Existing Proposed	39.62 38.55	0.97	YES	109°				59.00 60.00	0.98	YES	19.00 20.00	0.95	YES
				W10	Existing Proposed	39.61 38.63	0.98	YES	109°				59.00 60.00	0.98	YES	19.00 20.00	0.95	YES
				W11	Existing Proposed	39.61 38.69	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
										39.62 38.53	0.97	YES						
Twenty Seventh	R1	Residential	LKD	W1	Existing Proposed	32.18 32.18	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing Proposed	32.30 32.30	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing Proposed	39.62 38.82	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W4	Existing Proposed	39.62 38.74	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
										36.43 35.96	0.99	YES						
	R2	Residential	Bedroom	W5	Existing Proposed	39.62 38.66	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
										39.62 38.66	0.98	YES						
	R3	Residential	Bedroom	W6	Existing Proposed	39.62 38.59	0.97	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
										39.62 38.59	0.97	YES						
	R4	Residential	LKD	W7	Existing Proposed	39.62 38.49	0.97	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W8	Existing Proposed	39.62 38.68	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W9	Existing Proposed	39.62 38.70	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W10	Existing Proposed	39.62 38.77	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W11	Existing Proposed	39.62 38.82	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
										39.62 38.68	0.98	YES						

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Twenty Eighth	R1	Residential	LKD	W1	Existing 32.33 Proposed 32.33	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 32.45 Proposed 32.45	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.62 Proposed 38.95	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W4	Existing 39.62 Proposed 38.89	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R2	Residential	Bedroom	W5	Existing 39.62 Proposed 38.81	0.98	YES	199°	36.50 36.10	0.99	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
					39.62 38.81	0.98	YES										
	R3	Residential	Bedroom	W6	Existing 39.62 Proposed 38.76	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
					39.62 38.76	0.98	YES										
	R4	Residential	LKD	W7	Existing 39.62 Proposed 38.67	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W8	Existing 39.62 Proposed 38.83	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W9	Existing 39.62 Proposed 38.85	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W10	Existing 39.62 Proposed 38.91	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W11	Existing 39.62 Proposed 38.96	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
									39.62 38.84	0.98	YES						
Twenty Ninth	R1	Residential	LKD	W1	Existing 32.50 Proposed 32.50	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 32.62 Proposed 32.62	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.62 Proposed 39.08	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W4	Existing 39.62 Proposed 39.03	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R2	Residential	Bedroom	W5	Existing 39.62 Proposed 38.97	0.98	YES	199°	36.57 36.25	0.99	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
					39.62 38.97	0.98	YES										
	R3	Residential	Bedroom	W6	Existing 39.62 Proposed 38.93	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
					39.62 38.93	0.98	YES										
R4	Residential	LKD	W7	Existing 39.62 Proposed 38.86	0.98	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES	
			W8	Existing 39.62 Proposed 38.99	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES	

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				W9	Existing 39.62 Proposed 39.00	0.98	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W10	Existing 39.62 Proposed 39.05	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W11	Existing 39.62 Proposed 39.08	0.99	YES	109°	39.62 38.99	0.98	YES	60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
Thirtieth	R1	Residential	LKD	W1	Existing 32.69 Proposed 32.69	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 32.80 Proposed 32.80	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.62 Proposed 39.20	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W4	Existing 39.62 Proposed 39.16	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R2	Residential	Bedroom	W5	Existing 39.62 Proposed 39.12	0.99	YES	199°	36.65 36.40	0.99	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R3	Residential	Bedroom	W6	Existing 39.62 Proposed 39.09	0.99	YES	199°	39.62 39.12	0.99	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R4	Residential	LKD	W7	Existing 39.62 Proposed 39.03	0.99	YES	199°	39.62 39.09	0.99	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W8	Existing 39.62 Proposed 39.13	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W9	Existing 39.62 Proposed 39.15	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W10	Existing 39.62 Proposed 39.18	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W11	Existing 39.62 Proposed 39.21	0.99	YES	109°	39.62 39.14	0.99	YES	60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
Thirty First	R1	Residential	LKD	W1	Existing 32.89 Proposed 32.89	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W2	Existing 33.00 Proposed 33.00	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North
				W3	Existing 39.62 Proposed 39.32	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W4	Existing 39.62 Proposed 39.30	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R2	Residential	Bedroom	W5	Existing 39.62 Proposed 39.26	0.99	YES	199°	36.74 36.56	1.00	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
									39.62 39.26	0.99	YES						

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight & Sunlight Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.		VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria			
	R3	Residential	Bedroom	W6	Existing Proposed	39.62 39.24	0.99	YES	199°	39.62 39.24	0.99	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES			
	R4	Residential	LKD	W7	Existing Proposed	39.62 39.20	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES			
				W8	Existing Proposed	39.62 39.27	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
				W9	Existing Proposed	39.62 39.28	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
				W10	Existing Proposed	39.62 39.31	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
				W11	Existing Proposed	39.62 39.33	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
Thirty Second	R1	Residential	LKD	W1	Existing Proposed	33.11 33.11	1.00	YES	289°N	36.83 36.72	1.00	YES	40.00 40.00	*North	*North	10.00 10.00	*North	*North			
				W2	Existing Proposed	33.22 33.22	1.00	YES	289°N				40.00 40.00	*North	*North	10.00 10.00	*North	*North			
				W3	Existing Proposed	39.62 39.44	1.00	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES			
				W4	Existing Proposed	39.62 39.42	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES			
	R2	Residential	Bedroom	W5	Existing Proposed	39.62 39.40	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES			
	R3	Residential	Bedroom	W6	Existing Proposed	39.62 39.39	0.99	YES	199°				39.62 39.40	0.99	YES	86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R4	Residential	LKD	W7	Existing Proposed	39.62 39.36	0.99	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES			
				W8	Existing Proposed	39.62 39.41	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
				W9	Existing Proposed	39.62 39.41	0.99	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
				W10	Existing Proposed	39.62 39.43	1.00	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
				W11	Existing Proposed	39.62 39.44	1.00	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES			
	Thirty Third	R1	Residential	LKD	W1	Existing Proposed	33.35 33.35	1.00	YES				289°N				40.00 40.00	*North	*North	10.00 10.00	*North
W2					Existing Proposed	33.46 33.46	1.00	YES	289°N	40.00 40.00	*North	*North	10.00 10.00				*North	*North			
W3					Existing Proposed	39.62 39.55	1.00	YES	199°	86.00 86.00	1.00	YES	30.00 30.00				1.00	YES			

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Date of Analysis: 26/08/2022

Floor Ref.	Room Ref.	Property Type	Room Use	Window Ref.	VSC	Pr/Ex	Meets BRE Criteria	Window Orientation	Room VSC	Pr/Ex	Meets BRE Criteria	Annual	Pr/Ex	Meets BRE Criteria	Winter	Pr/Ex	Meets BRE Criteria
				W4	Existing 39.62 Proposed 39.54	1.00	YES	199°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R2	Residential	Bedroom	W5	Existing 39.62 Proposed 39.53	1.00	YES	199°	36.94 36.89	1.00	YES						
												86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R3	Residential	Bedroom	W6	Existing 39.62 Proposed 39.53	1.00	YES	199°	39.62 39.53	1.00	YES						
												86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
	R4	Residential	LKD	W7	Existing 39.62 Proposed 39.51	1.00	YES	199°									
				W8	Existing 39.62 Proposed 39.53	1.00	YES	109°				86.00 86.00	1.00	YES	30.00 30.00	1.00	YES
				W9	Existing 39.62 Proposed 39.54	1.00	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W10	Existing 39.62 Proposed 39.54	1.00	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
				W11	Existing 39.62 Proposed 39.55	1.00	YES	109°				60.00 60.00	1.00	YES	20.00 20.00	1.00	YES
									39.62 39.53	1.00	YES						

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight Distribution Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
Axis Tower									
Ground	R1	Residential	Bedroom	Area m2	9.84	9.04	6.88		
				% of room		91.93%	69.91%	0.76	NO
	R2	Residential	Living Room	Area m2	9.41	8.93	5.53		
				% of room		94.92%	58.83%	0.62	NO
	R3	Residential	Kitchen	Area m2	12.19	11.42	6.54		
				% of room		93.63%	53.66%	0.57	NO
First	R1	Residential	LKD	Area m2	20.92	13.14	10.53		
				% of room		62.81%	50.31%	0.80	YES
	R2	Residential	Bedroom	Area m2	12.82	7.24	4.93		
				% of room		56.47%	38.45%	0.68	NO
	R3	Residential	Bedroom	Area m2	11.06	6.97	4.51		
				% of room		63.01%	40.75%	0.65	NO
	R4	Residential	LKD	Area m2	22.44	16.48	12.79		
				% of room		73.45%	56.99%	0.78	NO
	R5	Residential	Bedroom	Area m2	12.98	10.11	8.01		
				% of room		77.85%	61.69%	0.79	NO
	R6	Residential	Living Room	Area m2	12.96	11.04	8.38		
				% of room		85.21%	64.64%	0.76	NO
	R7	Residential	Study	Area m2	3.15	3.15	3.15		
				% of room		100.00%	100.00%	1.00	YES
Second	R1	Residential	LKD	Area m2	21.19	21.16	19.73		
				% of room		99.86%	93.11%	0.93	YES
	R2	Residential	LD	Area m2	13.23	12.40	8.21		
				% of room		93.72%	62.07%	0.66	NO
	R3	Residential	Bedroom	Area m2	9.58	8.18	3.46		
				% of room		85.39%	36.07%	0.42	NO
	R4	Residential	LD	Area m2	15.22	14.43	7.81		
				% of room		94.78%	51.32%	0.54	NO
	R5	Residential	Bedroom	Area m2	10.32	9.12	3.86		
				% of room		88.36%	37.40%	0.42	NO
	R6	Residential	LKD	Area m2	15.25	14.82	7.77		
				% of room		97.12%	50.92%	0.52	NO
	R7	Residential	Bedroom	Area m2	8.93	6.50	2.91		
				% of room		72.76%	32.65%	0.45	NO
	R8	Residential	Bedroom	Area m2	10.43	6.44	2.16		
				% of room		61.79%	20.67%	0.33	NO
	R9	Residential	Bedroom	Area m2	8.76	7.56	4.44		
				% of room		86.30%	50.64%	0.59	NO
	R10	Residential	LKD	Area m2	23.16	21.97	21.97		
				% of room		94.85%	94.85%	1.00	YES
Third	R1	Residential	LKD	Area m2	21.19	21.17	19.76		
				% of room		99.88%	93.23%	0.93	YES
	R2	Residential	LD	Area m2	13.23	12.62	8.11		
				% of room		95.41%	61.32%	0.64	NO
	R3	Residential	Bedroom	Area m2	9.58	8.49	3.71		
				% of room		88.59%	38.74%	0.44	NO
	R4	Residential	LD	Area m2	15.22	14.68	8.03		
				% of room		96.45%	52.74%	0.55	NO
	R5	Residential	Bedroom	Area m2	10.32	9.37	4.66		
				% of room		90.72%	45.13%	0.50	NO
	R6	Residential	LKD	Area m2	15.25	14.97	9.10		
				% of room		98.11%	59.66%	0.61	NO

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Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R7	Residential	Bedroom	Area m2	8.93	7.09	3.80		
				% of room		79.39%	42.56%	0.54	NO
	R8	Residential	Bedroom	Area m2	10.43	7.40	3.05		
				% of room		71.00%	29.22%	0.41	NO
	R9	Residential	Bedroom	Area m2	8.76	7.81	5.36		
				% of room		89.19%	61.19%	0.69	NO
	R10	Residential	LKD	Area m2	23.16	22.06	22.06		
				% of room		95.24%	95.24%	1.00	YES
Fourth	R1	Residential	LKD	Area m2	21.19	21.19	19.92		
				% of room		100.00%	93.98%	0.94	YES
	R2	Residential	LD	Area m2	13.23	12.78	8.40		
				% of room		96.64%	63.52%	0.66	NO
	R3	Residential	Bedroom	Area m2	9.58	8.29	3.61		
				% of room		86.50%	37.68%	0.44	NO
	R4	Residential	LD	Area m2	15.22	14.81	8.78		
				% of room		97.29%	57.70%	0.59	NO
	R5	Residential	Bedroom	Area m2	10.32	9.15	4.00		
				% of room		88.65%	38.71%	0.44	NO
	R6	Residential	LKD	Area m2	15.25	15.01	10.17		
				% of room		98.39%	66.68%	0.68	NO
	R7	Residential	Bedroom	Area m2	8.93	6.58	3.07		
				% of room		73.76%	34.36%	0.47	NO
	R8	Residential	Bedroom	Area m2	10.43	8.10	3.77		
				% of room		77.67%	36.14%	0.47	NO
	R9	Residential	Bedroom	Area m2	8.76	7.90	6.14		
				% of room		90.14%	70.12%	0.78	NO
	R10	Residential	LKD	Area m2	23.16	23.08	22.85		
				% of room		99.64%	98.67%	0.99	YES
Fifth	R1	Residential	LKD	Area m2	21.19	21.19	20.07		
				% of room		100.00%	94.70%	0.95	YES
	R2	Residential	LD	Area m2	13.23	12.84	8.72		
				% of room		97.02%	65.92%	0.68	NO
	R3	Residential	Bedroom	Area m2	9.58	8.58	3.94		
				% of room		89.57%	41.13%	0.46	NO
	R4	Residential	LD	Area m2	15.22	14.84	9.65		
				% of room		97.52%	63.37%	0.65	NO
	R5	Residential	Bedroom	Area m2	10.32	9.41	4.82		
				% of room		91.16%	46.67%	0.51	NO
	R6	Residential	LKD	Area m2	15.25	14.96	11.34		
				% of room		98.05%	74.33%	0.76	NO
	R7	Residential	Bedroom	Area m2	8.93	7.15	3.85		
				% of room		80.09%	43.11%	0.54	NO
	R8	Residential	Bedroom	Area m2	10.43	8.67	4.46		
				% of room		83.13%	42.78%	0.51	NO
	R9	Residential	Bedroom	Area m2	8.76	7.69	6.72		
				% of room		87.79%	76.69%	0.87	YES
	R10	Residential	LKD	Area m2	23.16	23.10	22.85		
				% of room		99.74%	98.68%	0.99	YES
Sixth	R1	Residential	LKD	Area m2	21.19	21.19	19.79		
				% of room		100.00%	93.40%	0.93	YES
	R2	Residential	LD	Area m2	13.23	12.45	8.34		
				% of room		94.11%	63.06%	0.67	NO
	R3	Residential	Bedroom	Area m2	9.58	8.25	3.63		
				% of room		86.09%	37.85%	0.44	NO
	R4	Residential	LD	Area m2	15.22	14.45	7.97		

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Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R5	Residential	Bedroom	% of room	10.32	94.91%	52.37%	0.55	NO
				Area m2		9.13	3.93		
	R6	Residential	LKD	% of room	15.25	88.47%	38.09%	0.43	NO
				Area m2		14.81	7.84		
	R7	Residential	Bedroom	% of room	8.93	97.11%	51.40%	0.53	NO
				Area m2		6.51	3.00		
	R8	Residential	Bedroom	% of room	10.43	72.96%	33.62%	0.46	NO
				Area m2		8.06	3.74		
	R9	Residential	Bedroom	% of room	8.76	77.32%	35.84%	0.46	NO
				Area m2		7.52	4.40		
	R10	Residential	LKD	% of room	23.16	85.79%	50.24%	0.59	NO
				Area m2		23.08	22.86		
				% of room		99.64%	98.68%	0.99	YES
Seventh	R1	Residential	LKD	Area m2	21.19	21.19	19.80		
				% of room		100.00%	93.41%	0.93	YES
	R2	Residential	LD	Area m2	13.23	12.68	8.25		
				% of room		95.84%	62.36%	0.65	NO
	R3	Residential	Bedroom	Area m2	9.58	8.55	3.85		
				% of room		89.25%	40.21%	0.45	NO
	R4	Residential	LD	Area m2	15.22	14.67	8.22		
				% of room		96.35%	54.00%	0.56	NO
	R5	Residential	Bedroom	Area m2	10.32	9.40	4.78		
				% of room		91.08%	46.25%	0.51	NO
	R6	Residential	LKD	Area m2	15.25	14.97	9.12		
				% of room		98.11%	59.81%	0.61	NO
	R7	Residential	Bedroom	Area m2	8.93	7.09	3.83		
				% of room		79.44%	42.92%	0.54	NO
	R8	Residential	Bedroom	Area m2	10.43	8.58	4.40		
				% of room		82.32%	42.17%	0.51	NO
	R9	Residential	Bedroom	Area m2	8.76	7.80	5.36		
				% of room		88.98%	61.19%	0.69	NO
	R10	Residential	LKD	Area m2	23.16	23.10	22.86		
				% of room		99.74%	98.68%	0.99	YES
Eighth	R1	Residential	LKD	Area m2	21.19	21.19	19.80		
				% of room		100.00%	93.41%	0.93	YES
	R2	Residential	LD	Area m2	13.23	12.79	8.43		
				% of room		96.66%	63.70%	0.66	NO
	R3	Residential	Bedroom	Area m2	9.58	8.67	4.50		
				% of room		90.47%	46.93%	0.52	NO
	R4	Residential	LD	Area m2	15.22	14.80	8.76		
				% of room		97.24%	57.52%	0.59	NO
	R5	Residential	Bedroom	Area m2	10.32	9.46	5.72		
				% of room		91.66%	55.43%	0.60	NO
	R6	Residential	LKD	Area m2	15.25	15.01	10.16		
				% of room		98.41%	66.59%	0.68	NO
	R7	Residential	Bedroom	Area m2	8.93	7.47	4.53		
				% of room		83.63%	50.72%	0.61	NO
	R8	Residential	Bedroom	Area m2	10.43	8.97	4.98		
				% of room		85.99%	47.74%	0.56	NO
	R9	Residential	Bedroom	Area m2	8.76	7.88	6.12		
				% of room		89.97%	69.90%	0.78	NO
	R10	Residential	LKD	Area m2	23.16	23.11	22.86		
				% of room		99.79%	98.68%	0.99	YES
Ninth	R1	Residential	LKD	Area m2	21.19	21.19	19.79		
				% of room		100.00%	93.40%	0.93	YES

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Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R2	Residential	LD	Area m2	13.23	12.83	8.71	0.68	NO
			% of room			97.00%	65.83%		
	R3	Residential	Bedroom	Area m2	9.58	8.58	5.00	0.58	NO
			% of room			89.53%	52.13%		
	R4	Residential	LD	Area m2	15.22	14.85	9.62	0.65	NO
			% of room			97.52%	63.22%		
	R5	Residential	Bedroom	Area m2	10.32	9.29	6.46	0.70	NO
			% of room			90.01%	62.62%		
	R6	Residential	LKD	Area m2	15.25	14.97	11.29	0.75	NO
			% of room			98.14%	73.99%		
	R7	Residential	Bedroom	Area m2	8.93	7.65	5.18	0.68	NO
			% of room			85.66%	58.01%		
	R8	Residential	Bedroom	Area m2	10.43	8.94	5.52	0.62	NO
			% of room			85.73%	52.96%		
	R9	Residential	Bedroom	Area m2	8.76	7.72	6.71	0.87	YES
			% of room			88.08%	76.55%		
	R10	Residential	LKD	Area m2	23.16	23.12	22.86	0.99	YES
			% of room			99.81%	98.69%		
Tenth	R1	Residential	LKD	Area m2	21.19	21.19	19.93	0.94	YES
			% of room			100.00%	94.03%		
	R2	Residential	Bedroom	Area m2	16.40	14.61	4.93	0.34	NO
			% of room			89.08%	30.06%		
	R3	Residential	Bedroom	Area m2	11.84	10.54	3.92	0.37	NO
			% of room			89.00%	33.09%		
	R4	Residential	LD	Area m2	16.38	15.93	6.61	0.42	NO
			% of room			97.26%	40.37%		
	R5	Residential	Bedroom	Area m2	13.28	10.88	3.65	0.34	NO
			% of room			81.88%	27.51%		
	R6	Residential	Bedroom	Area m2	9.50	8.06	4.63	0.57	NO
			% of room			84.84%	48.67%		
	R7	Residential	Living Room	Area m2	9.01	8.57	6.54	0.76	NO
			% of room			95.09%	72.57%		
	R8	Residential	Bedroom	Area m2	10.43	8.24	3.89	0.47	NO
			% of room			79.01%	37.33%		
	R9	Residential	Bedroom	Area m2	8.76	7.58	4.56	0.60	NO
			% of room			86.47%	52.06%		
	R10	Residential	LKD	Area m2	23.16	23.12	22.86	0.99	YES
			% of room			99.82%	98.69%		
Eleventh	R1	Residential	LKD	Area m2	21.19	21.19	20.08	0.95	YES
			% of room			100.00%	94.77%		
	R2	Residential	Bedroom	Area m2	16.40	14.95	4.90	0.33	NO
			% of room			91.14%	29.86%		
	R3	Residential	Bedroom	Area m2	11.84	10.80	4.22	0.39	NO
			% of room			91.17%	35.64%		
	R4	Residential	LD	Area m2	16.38	16.10	6.98	0.43	NO
			% of room			98.26%	42.64%		
	R5	Residential	Bedroom	Area m2	13.28	11.44	4.29	0.37	NO
			% of room			86.12%	32.28%		
	R6	Residential	Bedroom	Area m2	9.50	8.25	5.53	0.67	NO
			% of room			86.86%	58.22%		
	R7	Residential	Living Room	Area m2	9.01	8.67	6.85	0.79	NO
			% of room			96.18%	76.05%		
	R8	Residential	Bedroom	Area m2	10.43	8.76	4.62	0.53	NO
			% of room			83.99%	44.27%		
	R9	Residential	Bedroom	Area m2	8.76	7.82	5.46		

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Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R10	Residential	LKD	% of room Area m2 % of room	23.16	89.26% 23.12 99.82%	62.36% 22.86 98.69%	0.70 0.99	NO YES
Twelfth	R1	Residential	LKD	Area m2 % of room	21.19	21.19 100.00%	20.37 96.10%	0.96	YES
	R2	Residential	Bedroom	Area m2 % of room	16.40	15.06 91.80%	5.11 31.16%	0.34	NO
	R3	Residential	Bedroom	Area m2 % of room	11.84	10.85 91.61%	5.06 42.75%	0.47	NO
	R4	Residential	LD	Area m2 % of room	16.38	16.15 98.58%	7.86 47.96%	0.49	NO
	R5	Residential	Bedroom	Area m2 % of room	13.28	11.81 88.93%	5.05 38.00%	0.43	NO
	R6	Residential	Bedroom	Area m2 % of room	9.50	8.25 86.85%	6.16 64.87%	0.75	NO
	R7	Residential	Living Room	Area m2 % of room	9.01	8.73 96.89%	7.27 80.64%	0.83	YES
	R8	Residential	Bedroom	Area m2 % of room	10.43	8.94 85.72%	5.16 49.53%	0.58	NO
	R9	Residential	Bedroom	Area m2 % of room	8.76	7.87 89.78%	6.21 70.88%	0.79	NO
	R10	Residential	LKD	Area m2 % of room	23.16	23.12 99.83%	22.88 98.80%	0.99	YES
Thirteenth	R1	Residential	LKD	Area m2 % of room	21.19	21.19 100.00%	20.67 97.53%	0.98	YES
	R2	Residential	Bedroom	Area m2 % of room	16.40	14.92 90.96%	5.59 34.08%	0.37	NO
	R3	Residential	Bedroom	Area m2 % of room	11.84	10.68 90.16%	5.76 48.64%	0.54	NO
	R4	Residential	LD	Area m2 % of room	16.38	16.11 98.36%	9.34 57.02%	0.58	NO
	R5	Residential	Bedroom	Area m2 % of room	13.28	12.00 90.31%	5.82 43.85%	0.49	NO
	R6	Residential	Bedroom	Area m2 % of room	9.50	8.09 85.15%	6.64 69.92%	0.82	YES
	R7	Residential	Living Room	Area m2 % of room	9.01	8.68 96.31%	7.65 84.89%	0.88	YES
	R8	Residential	Bedroom	Area m2 % of room	10.43	8.90 85.33%	5.97 57.26%	0.67	NO
	R9	Residential	Bedroom	Area m2 % of room	8.76	7.71 88.03%	6.81 77.73%	0.88	YES
	R10	Residential	LKD	Area m2 % of room	23.16	23.12 99.83%	23.03 99.45%	1.00	YES
Fourteenth	R1	Residential	LKD	Area m2 % of room	21.19	21.19 100.00%	19.79 93.40%	0.93	YES
	R2	Residential	Bedroom	Area m2 % of room	16.40	15.66 95.46%	9.03 55.05%	0.58	NO
	R3	Residential	Bedroom	Area m2 % of room	11.84	10.52 88.87%	3.92 33.13%	0.37	NO
	R4	Residential	LD	Area m2 % of room	16.38	15.89 96.98%	6.53 39.86%	0.41	NO
	R5	Residential	Bedroom	Area m2 % of room	13.28	10.84 81.60%	3.62 27.28%	0.33	NO
	R6	Residential	Bedroom	Area m2 % of room	9.50	7.96 83.76%	4.48 47.16%	0.56	NO

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Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R7	Residential	Living Room	Area m2	9.01	8.48	6.47	0.76	NO
				% of room		94.13%	71.80%		
	R8	Residential	Bedroom	Area m2	10.43	8.08	3.84		
				% of room		77.45%	36.79%		
	R9	Residential	Bedroom	Area m2	8.76	7.48	4.34		
				% of room		85.36%	49.50%	0.58	NO
	R10	Residential	LKD	Area m2	23.16	22.95	22.86		
				% of room		99.08%	98.70%		
Fifteenth	R1	Residential	LKD	Area m2	21.19	21.19	19.79	0.93	YES
				% of room		100.00%	93.40%		
	R2	Residential	Bedroom	Area m2	16.40	15.87	8.54		
				% of room		96.73%	52.04%		
	R3	Residential	Bedroom	Area m2	11.84	10.77	4.27		
				% of room		90.97%	36.02%		
	R4	Residential	LD	Area m2	16.38	16.06	6.87		
				% of room		98.04%	41.97%		
	R5	Residential	Bedroom	Area m2	13.28	11.43	4.34		
				% of room		86.07%	32.68%		
	R6	Residential	Bedroom	Area m2	9.50	8.30	5.41		
				% of room		87.30%	56.97%	0.65	NO
	R7	Residential	Living Room	Area m2	9.01	8.67	6.80		
				% of room		96.26%	75.42%		
	R8	Residential	Bedroom	Area m2	10.43	8.62	4.51		
				% of room		82.67%	43.27%		
	R9	Residential	Bedroom	Area m2	8.76	7.77	5.28		
				% of room		88.66%	60.31%		
	R10	Residential	LKD	Area m2	23.16	23.04	22.86		
				% of room		99.48%	98.70%		
Sixteenth	R1	Residential	LKD	Area m2	21.19	21.19	19.80	0.93	YES
				% of room		100.00%	93.41%		
	R2	Residential	Bedroom	Area m2	16.40	15.99	8.19		
				% of room		97.51%	49.95%		
	R3	Residential	Bedroom	Area m2	11.84	10.55	3.94		
				% of room		89.10%	33.29%		
	R4	Residential	LD	Area m2	16.38	16.13	7.61		
				% of room		98.49%	46.47%		
	R5	Residential	Bedroom	Area m2	13.28	11.80	5.13		
				% of room		88.84%	38.64%		
	R6	Residential	Bedroom	Area m2	9.50	8.29	6.08		
				% of room		87.20%	63.96%	0.73	NO
	R7	Residential	Living Room	Area m2	9.01	8.69	7.13		
				% of room		96.46%	79.11%		
	R8	Residential	Bedroom	Area m2	10.43	8.95	5.06		
				% of room		85.79%	48.51%		
	R9	Residential	Bedroom	Area m2	8.76	7.46	4.36		
				% of room		85.14%	49.77%		
	R10	Residential	LKD	Area m2	23.16	23.08	22.86		
				% of room		99.65%	98.70%		
Seventeenth	R1	Residential	LKD	Area m2	21.19	21.19	19.83	0.94	YES
				% of room		100.00%	93.59%		
	R2	Residential	Bedroom	Area m2	16.40	16.06	8.29		
				% of room		97.91%	50.51%		
	R3	Residential	Bedroom	Area m2	11.84	10.80	4.35		
				% of room		91.21%	36.72%	0.40	NO
	R4	Residential	LD	Area m2	16.38	16.14	9.01		

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	R5	Residential	Bedroom	% of room Area m2	13.28	98.55% 11.99	55.00% 5.91	0.56	NO
	R6	Residential	Bedroom	% of room Area m2	9.50	90.24% 8.16	44.52% 6.63	0.49	NO
	R7	Residential	Living Room	% of room Area m2	9.01	85.89% 8.69	69.75% 7.53	0.81	YES
	R8	Residential	Bedroom	% of room Area m2	10.43	96.44% 8.98	83.52% 5.72	0.87	YES
	R9	Residential	Bedroom	% of room Area m2	8.76	86.16% 7.76	54.84% 5.28	0.64	NO
	R10	Residential	LKD	% of room Area m2	23.16	88.61% 23.10	60.21% 22.86	0.68	NO
				% of room		99.75% 98.69%		0.99	YES
Eighteenth	R1	Residential	LKD	Area m2	21.19	21.19	19.95		
				% of room		100.00% 94.12%		0.94	YES
	R2	Residential	Bedroom	Area m2	16.40	15.69	8.98		
				% of room		95.65% 54.74%		0.57	NO
	R3	Residential	Bedroom	Area m2	11.84	10.55	3.97		
				% of room		89.13% 33.52%		0.38	NO
	R4	Residential	LD	Area m2	16.38	15.91	6.56		
				% of room		97.14% 40.04%		0.41	NO
	R5	Residential	Bedroom	Area m2	13.28	10.95	3.87		
				% of room		82.42% 29.17%		0.35	NO
	R6	Residential	Bedroom	Area m2	9.50	8.01	4.70		
				% of room		84.26% 49.51%		0.59	NO
	R7	Residential	Living Room	Area m2	9.01	8.55	6.55		
				% of room		94.88% 72.71%		0.77	NO
	R8	Residential	Bedroom	Area m2	10.43	8.13	4.02		
				% of room		77.96% 38.57%		0.49	NO
	R9	Residential	Bedroom	Area m2	8.76	7.50	4.48		
				% of room		85.65% 51.10%		0.60	NO
	R10	Residential	LKD	Area m2	23.16	23.12	22.90		
				% of room		99.83% 98.87%		0.99	YES
Nineteenth	R1	Residential	LKD	Area m2	21.19	21.19	20.13		
				% of room		100.00% 95.00%		0.95	YES
	R2	Residential	Bedroom	Area m2	16.40	15.94	8.48		
				% of room		97.16% 51.73%		0.53	NO
	R3	Residential	Bedroom	Area m2	11.84	10.80	4.46		
				% of room		91.16% 37.63%		0.41	NO
	R4	Residential	LD	Area m2	16.38	16.08	6.93		
				% of room		98.16% 42.30%		0.43	NO
	R5	Residential	Bedroom	Area m2	13.28	11.50	4.54		
				% of room		86.57% 34.20%		0.40	NO
	R6	Residential	Bedroom	Area m2	9.50	8.26	5.70		
				% of room		86.89% 59.94%		0.69	NO
	R7	Residential	Living Room	Area m2	9.01	8.65	6.80		
				% of room		95.99% 75.47%		0.79	NO
	R8	Residential	Bedroom	Area m2	10.43	8.68	4.77		
				% of room		83.20% 45.72%		0.55	NO
	R9	Residential	Bedroom	Area m2	8.76	7.78	5.46		
				% of room		88.80% 62.32%		0.70	NO
	R10	Residential	LKD	Area m2	23.16	23.12	23.08		
				% of room		99.83% 99.63%		1.00	YES
Twentieth	R1	Residential	LKD	Area m2	21.19	21.19	20.40		
				% of room		100.00% 96.27%		0.96	YES

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	R2	Residential	Bedroom	Area m2	16.40	15.98	8.20		
				% of room		97.40%	50.01%	0.51	NO
	R3	Residential	Bedroom	Area m2	11.84	10.60	4.09		
				% of room		89.47%	34.50%	0.39	NO
	R4	Residential	LD	Area m2	16.38	16.14	7.70		
				% of room		98.54%	47.01%	0.48	NO
	R5	Residential	Bedroom	Area m2	13.28	10.99	4.02		
				% of room		82.76%	30.25%	0.37	NO
	R6	Residential	Bedroom	Area m2	9.50	8.03	4.84		
				% of room		84.51%	50.91%	0.60	NO
	R7	Residential	Living Room	Area m2	9.01	8.57	6.48		
				% of room		95.06%	71.94%	0.76	NO
	R8	Residential	Bedroom	Area m2	10.43	8.15	4.20		
				% of room		78.17%	40.27%	0.52	NO
	R9	Residential	Bedroom	Area m2	8.76	7.57	4.84		
				% of room		86.34%	55.23%	0.64	NO
	R10	Residential	LKD	Area m2	23.16	23.12	22.88		
				% of room		99.83%	98.79%	0.99	YES
Twenty First	R1	Residential	LKD	Area m2	21.19	21.19	20.71		
				% of room		100.00%	97.71%	0.98	YES
	R2	Residential	Bedroom	Area m2	16.40	16.03	8.25		
				% of room		97.70%	50.30%	0.51	NO
	R3	Residential	Bedroom	Area m2	11.84	10.81	4.60		
				% of room		91.25%	38.88%	0.43	NO
	R4	Residential	LD	Area m2	16.38	16.12	9.16		
				% of room		98.43%	55.91%	0.57	NO
	R5	Residential	Bedroom	Area m2	13.28	11.53	4.67		
				% of room		86.80%	35.13%	0.40	NO
	R6	Residential	Bedroom	Area m2	9.50	8.25	5.97		
				% of room		86.83%	62.78%	0.72	NO
	R7	Residential	Living Room	Area m2	9.01	8.72	7.00		
				% of room		96.77%	77.71%	0.80	YES
	R8	Residential	Bedroom	Area m2	10.43	8.72	4.94		
				% of room		83.65%	47.40%	0.57	NO
	R9	Residential	Bedroom	Area m2	8.76	7.81	5.79		
				% of room		89.19%	66.07%	0.74	NO
	R10	Residential	LKD	Area m2	23.16	23.12	23.03		
				% of room		99.83%	99.44%	1.00	YES
Twenty Second	R1	Residential	LKD	Area m2	21.19	21.19	19.79		
				% of room		100.00%	93.40%	0.93	YES
	R2	Residential	Bedroom	Area m2	16.40	16.01	8.24		
				% of room		97.60%	50.21%	0.51	NO
	R3	Residential	Bedroom	Area m2	11.84	10.48	4.23		
				% of room		88.50%	35.71%	0.40	NO
	R4	Residential	LD	Area m2	16.38	15.91	6.57		
				% of room		97.12%	40.08%	0.41	NO
	R5	Residential	Bedroom	Area m2	13.28	11.03	4.20		
				% of room		83.03%	31.58%	0.38	NO
	R6	Residential	Bedroom	Area m2	9.50	8.10	5.24		
				% of room		85.23%	55.11%	0.65	NO
	R7	Residential	Living Room	Area m2	9.01	8.74	7.43		
				% of room		96.97%	82.50%	0.85	YES
	R8	Residential	Bedroom	Area m2	10.43	8.25	4.46		
				% of room		79.15%	42.74%	0.54	NO
	R9	Residential	Bedroom	Area m2	8.76	7.58	5.04		

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	R10	Residential	LKD	% of room Area m2 % of room	23.16	86.47% 22.97 99.19%	57.55% 22.86 98.70%	0.67 1.00	NO YES
Twenty Third	R1	Residential	LKD	Area m2 % of room	21.19	21.19 100.00%	19.79 93.40%	0.93	YES
	R2	Residential	Bedroom	Area m2 % of room	16.40	15.98 97.44%	8.24 50.25%	0.52	NO
	R3	Residential	Bedroom	Area m2 % of room	11.84	10.48 88.47%	4.34 36.63%	0.41	NO
	R4	Residential	LD	Area m2 % of room	16.38	15.91 97.12%	6.60 40.31%	0.42	NO
	R5	Residential	Bedroom	Area m2 % of room	13.28	11.02 83.00%	4.33 32.58%	0.39	NO
	R6	Residential	Bedroom	Area m2 % of room	9.50	8.06 84.81%	5.34 56.23%	0.66	NO
	R7	Residential	Living Room	Area m2 % of room	9.01	8.72 96.76%	7.47 82.90%	0.86	YES
	R8	Residential	Bedroom	Area m2 % of room	10.43	8.24 78.99%	4.58 43.89%	0.56	NO
	R9	Residential	Bedroom	Area m2 % of room	8.76	7.58 86.46%	5.12 58.42%	0.68	NO
	R10	Residential	LKD	Area m2 % of room	23.16	22.97 99.19%	22.86 98.70%	1.00	YES
Twenty Fourth	R1	Residential	LKD	Area m2 % of room	21.19	21.19 100.00%	19.80 93.41%	0.93	YES
	R2	Residential	Bedroom	Area m2 % of room	16.40	15.68 95.59%	9.11 55.52%	0.58	NO
	R3	Residential	Bedroom	Area m2 % of room	11.84	10.50 88.71%	4.47 37.75%	0.43	NO
	R4	Residential	LD	Area m2 % of room	16.38	15.92 97.17%	6.71 40.94%	0.42	NO
	R5	Residential	Bedroom	Area m2 % of room	13.28	12.76 96.03%	7.75 58.34%	0.61	NO
	R6	Residential	Bedroom	Area m2 % of room	9.50	7.94 83.57%	5.29 55.69%	0.67	NO
	R7	Residential	Living Room	Area m2 % of room	9.01	8.56 95.04%	6.76 75.00%	0.79	NO
	R8	Residential	Bedroom	Area m2 % of room	10.43	8.32 79.81%	4.85 46.55%	0.58	NO
	R9	Residential	Bedroom	Area m2 % of room	8.76	7.61 86.88%	5.39 61.50%	0.71	NO
	R10	Residential	LKD	Area m2 % of room	23.16	23.16 100.00%	22.91 98.92%	0.99	YES
Twenty Fifth	R1	Residential	LKD	Area m2 % of room	21.19	21.19 100.00%	19.80 93.41%	0.93	YES
	R2	Residential	Bedroom	Area m2 % of room	16.40	15.67 95.56%	9.22 56.18%	0.59	NO
	R3	Residential	Bedroom	Area m2 % of room	11.84	10.50 88.71%	4.69 39.63%	0.45	NO
	R4	Residential	LD	Area m2 % of room	16.38	15.92 97.17%	6.79 41.43%	0.43	NO
	R5	Residential	Bedroom	Area m2 % of room	13.28	12.76 96.03%	7.87 59.28%	0.62	NO
	R6	Residential	Bedroom	Area m2 % of room	9.50	7.96 83.78%	5.54 58.35%	0.70	NO

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Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R7	Residential	Living Room	Area m2	9.01	8.58	6.88	0.80	YES
				% of room		95.19%	76.41%		
	R8	Residential	Bedroom	Area m2	10.43	8.30	5.03		
				% of room		79.58%	48.27%		
	R9	Residential	Bedroom	Area m2	8.76	7.61	5.55		
				% of room		86.88%	63.34%	0.73	NO
	R10	Residential	LKD	Area m2	23.16	23.12	22.86		
				% of room		99.84%	98.71%		
Twenty Sixth	R1	Residential	LKD	Area m2	21.19	21.19	19.80	0.93	YES
				% of room		100.00%	93.41%		
	R2	Residential	Bedroom	Area m2	16.40	15.69	9.35		
				% of room		95.65%	56.98%		
	R3	Residential	Bedroom	Area m2	11.84	10.51	4.98		
				% of room		88.71%	42.08%		
	R4	Residential	LD	Area m2	16.38	15.92	6.95		
				% of room		97.17%	42.42%		
	R5	Residential	Bedroom	Area m2	13.28	12.76	8.02		
				% of room		96.03%	60.34%		
	R6	Residential	Bedroom	Area m2	9.50	7.95	5.83	0.73	NO
				% of room		83.65%	61.39%		
	R7	Residential	Living Room	Area m2	9.01	8.52	7.03		
				% of room		94.51%	78.04%		
	R8	Residential	Bedroom	Area m2	10.43	8.26	5.23		
				% of room		79.20%	50.12%		
	R9	Residential	Bedroom	Area m2	8.76	7.61	5.87		
				% of room		86.88%	67.04%		
	R10	Residential	LKD	Area m2	23.16	23.12	22.86		
				% of room		99.84%	98.71%		
Viadux Tower									
Second	R1	Residential	LKD	Area m2	25.50	25.44	25.44	1.00	YES
				% of room		99.76%	99.76%		
Third	R1	Residential	LKD	Area m2	25.50	25.45	25.45	1.00	YES
				% of room		99.81%	99.81%		
	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94		
				% of room		94.63%	94.63%		
	R3	Residential	Bedroom	Area m2	12.84	12.28	12.28		
				% of room		95.65%	95.65%	1.00	YES
	R4	Residential	LKD	Area m2	29.53	29.18	29.14		
				% of room		98.80%	98.66%		
Fourth	R1	Residential	LKD	Area m2	25.50	25.46	25.46	1.00	YES
				% of room		99.83%	99.83%		
	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94		
				% of room		94.63%	94.63%		
	R3	Residential	Bedroom	Area m2	12.84	12.28	12.28		
				% of room		95.66%	95.66%	1.00	YES
	R4	Residential	LKD	Area m2	29.53	29.18	29.14		
				% of room		98.80%	98.66%		
Fifth	R1	Residential	LKD	Area m2	25.50	25.47	25.47	1.00	YES
				% of room		99.86%	99.86%		
	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94		
				% of room		94.64%	94.64%		
	R3	Residential	Bedroom	Area m2	12.84	12.28	12.28	1.00	YES
				% of room		95.67%	95.67%		

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight Distribution Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R4	Residential	LKD	Area m2 % of room	29.53	29.18 98.80%	29.14 98.66%	1.00	YES
Sixth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.87%	25.47 99.87%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.69%	12.29 95.69%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.18 98.79%	29.14 98.65%	1.00	YES
Seventh	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.88%	25.47 99.88%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.69%	12.29 95.69%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.18 98.80%	29.14 98.66%	1.00	YES
Eighth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.88%	25.47 99.88%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.70%	12.29 95.70%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.18 98.79%	29.14 98.65%	1.00	YES
Ninth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.88%	25.47 99.88%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.70%	12.29 95.70%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.18 98.80%	29.14 98.66%	1.00	YES
Tenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.88%	25.47 99.88%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.18 98.80%	29.14 98.66%	1.00	YES
Eleventh	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.70%	12.29 95.70%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.18 98.80%	29.14 98.65%	1.00	YES
Twelfth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2	12.84	12.29	12.29		

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight Distribution Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R4	Residential	LKD	% of room Area m2 % of room	29.53	95.71% 29.18 98.81%	95.71% 29.14 98.67%	1.00 1.00	YES YES
Thirteenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.20 98.86%	29.16 98.71%	1.00	YES
Fourteenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.20 98.87%	29.16 98.73%	1.00	YES
Fifteenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.20 98.87%	29.16 98.73%	1.00	YES
Sixteenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.22 98.94%	29.20 98.87%	1.00	YES
Seventeenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.72%	12.29 95.72%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Eighteenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Nineteenth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight Distribution Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R3	Residential	Bedroom	Area m2	12.84	12.29	12.29	1.00	YES
				% of room		95.72%	95.72%		
	R4	Residential	LKD	Area m2	29.53	29.44	29.44	1.00	YES
				% of room		99.69%	99.69%		
Twentieth	R1	Residential	LKD	Area m2	25.50	25.47	25.47	1.00	YES
				% of room		99.89%	99.89%		
	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94		
				% of room		94.64%	94.64%		
	R3	Residential	Bedroom	Area m2	12.84	12.29	12.29		
Twenty First				% of room		95.72%	95.72%	1.00	YES
	R4	Residential	LKD	Area m2	29.53	29.44	29.44		
				% of room		99.69%	99.69%		
	R1	Residential	LKD	Area m2	25.50	25.47	25.47		
				% of room		99.89%	99.89%		
Twenty Second	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94	1.00	YES
				% of room		94.64%	94.64%		
	R3	Residential	Bedroom	Area m2	12.84	12.29	12.29		
				% of room		95.71%	95.71%		
	R4	Residential	LKD	Area m2	29.53	29.44	29.44		
Twenty Third				% of room		99.69%	99.69%	1.00	YES
	R1	Residential	LKD	Area m2	25.50	25.47	25.47		
				% of room		99.89%	99.89%		
	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94		
				% of room		94.64%	94.64%		
Twenty Fourth	R3	Residential	Bedroom	Area m2	12.84	12.29	12.29	1.00	YES
				% of room		95.72%	95.72%		
	R4	Residential	LKD	Area m2	29.53	29.44	29.44		
				% of room		99.69%	99.69%		
	R1	Residential	LKD	Area m2	25.50	25.47	25.47		
Twenty Fifth				% of room		99.89%	99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94		
				% of room		94.64%	94.64%		
	R3	Residential	Bedroom	Area m2	12.84	12.29	12.29		
				% of room		95.72%	95.72%		
Twenty Sixth	R4	Residential	LKD	Area m2	29.53	29.44	29.44	1.00	YES
				% of room		99.69%	99.69%		
	R1	Residential	LKD	Area m2	25.50	25.47	25.47		
				% of room		99.89%	99.89%		
	R2	Residential	Bedroom	Area m2	12.62	11.94	11.94		

Project Name: Whitworth Street West, Manchester
Project No.: 122214-08
Report Title: Daylight Distribution Analysis - Neighbour
Date of Analysis: 26/08/2022

Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R3	Residential	Bedroom	% of room Area m2	12.84	94.64% 12.29	94.64% 12.29	1.00	YES
	R4	Residential	LKD	% of room Area m2	29.53	95.71% 29.44	95.71% 29.44	1.00	YES
				% of room Area m2		99.69% 29.44	99.69% 29.44	1.00	YES
Twenty Seventh	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.94 94.64%	11.94 94.64%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Twenty Eighth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.96 94.73%	11.96 94.73%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Twenty Ninth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.96 94.73%	11.96 94.73%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Thirtieth	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.96 94.73%	11.96 94.73%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Thirty First	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.96 94.73%	11.96 94.73%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Thirty Second	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES
	R2	Residential	Bedroom	Area m2 % of room	12.62	11.96 94.73%	11.96 94.73%	1.00	YES
	R3	Residential	Bedroom	Area m2 % of room	12.84	12.29 95.71%	12.29 95.71%	1.00	YES
	R4	Residential	LKD	Area m2 % of room	29.53	29.44 99.69%	29.44 99.69%	1.00	YES
Thirty Third	R1	Residential	LKD	Area m2 % of room	25.50	25.47 99.89%	25.47 99.89%	1.00	YES

Project Name: Whitworth Street West, Manchester
 Project No.: 122214-08
 Report Title: Daylight Distribution Analysis - Neighbour
 Date of Analysis: 26/08/2022

Floor Ref.	Room Ref	Property Type	Room Use		Room Area	Lit Area Existing	Lit Area Proposed	Pr/Ex	Meets BRE Criteria
	R2	Residential	Bedroom	Area m2	12.62	11.95	11.95		
				% of room		94.65%	94.65%	1.00	YES
	R3	Residential	Bedroom	Area m2	12.84	12.29	12.29		
				% of room		95.71%	95.71%	1.00	YES
	R4	Residential	LKD	Area m2	29.53	29.44	29.44		
				% of room		99.69%	99.69%	1.00	YES

Legislation, Methodology and Impact

Legislation and Planning Policy Context

- 10.1 This section reviews the existing national, regional and local planning policy or legislation relating to the developments and their potential effects on daylight and sunlight.
- 10.2 There is no current specific national planning policy or legislation relating to developments and their potential effects on daylight and sunlight.

National Planning Policy Framework (2021)

- 10.3 the National Planning Policy Framework (NPPF) states:

“Where there is an existing or anticipated shortage of land for meeting identified housing needs, it is especially important that planning policies 37 and decisions avoid homes being built at low densities and ensure that developments make optimal use of the potential of each site. In these circumstances:

c) local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards).”

National Design Guide (2021)

- 10.4 The National Design Guide forms part of the government's collection of planning practice guidance and sets out the characteristics of well-designed places and demonstrates what good design means in practice.
- 10.5 Paragraph 71 of section B2 (Appropriate Building Type and Forms) highlights that:

“Proposals for tall buildings (and other buildings with a significantly larger scale or bulk than their surroundings) require special consideration. This includes their location and siting; relationship to context; impact on local character, views and sight lines; composition - how they meet the ground and the sky; and environmental impacts, such as sunlight, daylight, overshadowing and wind. These need to be resolved satisfactorily in relation to the context and local character”.

Regional Planning Policy

Manchester's Local Development Framework – Core Strategy Development Plan Document (2012)

- 10.6 The Manchester's Local Development Framework contains policies which are relevant to daylight, sunlight and overshadowing as listed below:
- 10.7 Policy DM1 – Development Management states:

“Effects on amenity, including privacy, light, noise, vibration, air quality and road safety and traffic generation. This could also include proposals which would be sensitive to existing environmental conditions, such as noise”.

10.8 Planning Policy EN2 – Tall Buildings states:

“...By their very size tall buildings can have a significant impact on the local environment and its micro-climate. It is therefore expected that this impact be modelled and that submissions for tall buildings also include appropriate measures to create an attractive, pedestrian friendly local environment”.

Local Planning Policy

Manchester City Council.

10.9 The Manchester’s Guide to Development in Manchester, supplementary Planning Document and Planning Guidance (2007) contains the following policies in respect of daylight and sunlight enjoyed by properties surrounding a development site:

10.10 Paragraph 12.8 states:

” ... consideration be given to “microclimate, including overshadowing and air turbulence effects, created by the relationship of the building to those adjacent; and the quality and usability of the spaces surrounding the building.”

Building Research Establishment Guidelines: Site Layout Planning for Daylight and Sunlight 2022, A Guide to Good Practice, Third Edition

10.11 Whilst not an instrument of planning policy, the BRE Report 209 “*Site Layout Planning for Daylight and Sunlight – a guide to good practice*” (BRE Guidelines) is generally accepted as the industry standard and is used by most local planning authorities in considering the impact on sunlight, daylight and overshadowing that a development may cause.

10.12 The guide is not prescriptive but provides methods of assessing the potential impact of a scheme on the daylight and sunlight to adjacent windows. The BRE guidelines suggests values for parameters to be considered by designers in order to be able to retain good levels of sunlight and daylight to surrounding properties.

10.13 The values within BRE guidelines are based on sub-urban scenarios, and can be considered restrictive in an urban, city centre environment. The significance criteria used in this report have **not** been adjusted to take account of the city centre location of this proposed development. As a result the severity of the impact may be considered dis-proportionate to a city centre window where less daylight and sunlight would be expected by an occupant.

Assessment Methodology and Significance Criteria

Methodology for determining baseline conditions and sensitive receptors

10.14 When assessing any potential effects on surrounding sensitive receptors, the BRE guidelines suggest that only those windows and rooms that have a ‘reasonable expectation’ of daylight and sunlight need to be assessed. In particular, the BRE guidelines state at paragraph 2.2.2:

“The guidelines given here are intended for use for rooms in adjoining dwellings where daylight is required, including living rooms, kitchens, and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be analysed. The guidelines may also be applied to any existing non-domestic building where the occupants have a reasonable expectation of daylight, this would normally include schools, hospitals, hotels and hostels, small workshops, and some offices”.

10.15 In general, the majority of commercial properties are not treated as having reasonable expectation of daylight or sunlight, as they are generally designed to rely on electric lighting to provide sufficient light by which to work, rather than natural daylight or sunlight. Commercial properties have therefore been considered as non-sensitive receptors and excluded from this assessment, which also includes hotel uses.

10.16 The uses of the surrounding properties have been established from research undertaken, as well as undertaking Valuation Office Agency (VOA) checks to identify those properties in residential occupation where council tax is applicable. The preliminary 25-degree test described within the BRE guidelines has also been applied in order to determine those sensitive receptors which require daylight and sunlight consideration, and these properties are listed in table 10.1.

10.17 The model used in this assessment has been constructed using measured survey and other available information. It includes the site and other relevant surrounding buildings.

Table 10.1 Sensitive Receptors Analysed Surrounding the Site

Sensitive Receptor	Daylight Assessed	Sunlight Assessed
Axis	✓	✓
Viadux Tower	✓	✓

Method of Baseline Data Collection

10.18 The assessment has been undertaken using computer modelling and simulation and the methodology is set out below.

Existing / Surrounding:

- 3D laser scanned land survey

The Development:

- Proposed massing provided by Jon Matthews Architects received on 12 August 2022

10.19 A site plan showing the location of the proposed development within the computer model is shown at Appendix 10.A.

10.20 Where plans or access to the properties were not available, the internal layouts have been based on assumptions (where possible from external observations, otherwise using professional judgements). Where the layouts have been estimated, this has no bearing on the assessment of the vertical sky component or annual probable sunlight hours tests which are both considered at the centre of the window. The internal dimensions are only relevant to the daylight distribution (the second method of daylight analysis). However, in the absence of suitable plans, estimation is the conventional approach.

Assessment of effects

Assessment Modelling

10.21 Computer simulation has been used to carry out the technical analysis using the tests recommended within the BRE guidelines. A three-dimensional (3D) computer model has been built in AutoCAD which includes the site, surrounding current sensitive receptors, the proposed development and any other background context massing which may have a bearing on daylight, and sunlight effects.

10.22 Specialist software, which uses the Waldram method of analysis as described in Appendix B of the BRE guidelines, has been used to quantify the level of daylight and sunlight within the residential receptors in the scenarios assessed.

Scenarios Considered

10.23 The following scenarios have been considered within this chapter and are described in more detail below:

- Current sensitive receptors in the baseline condition.
- Current sensitive receptors in the proposed condition.

10.24 The relevant current sensitive receptors include the consented Viadux and Axis tower.

Daylight

Vertical Sky Component (VSC)

10.25 The Vertical Sky Component (VSC) at the centre point of each affected window on the outside face of the wall in question. The VSC is an external daylighting calculation that measures the amount of direct daylight to a specific window point on the outside of a property. The calculations fundamentally assess the amount of blue sky that can be seen, converting results into a percentage. A window looking into an empty field will achieve a maximum value of 40%. However, the BRE suggests that 27% VSC is a good level of daylight.

10.26 If a window does not achieve 27% VSC in the proposed development scenario, then the VSC test will be calculated in the baseline condition scenario. If the reduction of VSC is less than 0.8 times

its former value, then the occupants of the adjoining building are likely to notice the reduction in daylight.

Daylight Distribution (DD)

10.27 The daylight distribution test calculates the area at working plane level inside a room that will have a direct view of the sky. This is done by plotting the no-sky line, which is the line on the horizontal working plane beyond which no direct light from the sky will reach. This no-sky line is plotted in both the baseline and proposed development scenario conditions so that the effect on daylight distribution can be quantified as either a loss or gain in lit area.

10.28 In respect of dwellings, the BRE guidelines state that daylight in living rooms, dining rooms and kitchens should be assessed. Bedrooms should also be checked, although it states that these are less important. Other rooms such as bathrooms, toilets, storerooms, circulation areas and garages need not be assessed.

Sunlight

The Annual Probable Sunlight Hours Method

10.29 For sunlighting, the same reference point is used for the VSC test to calculate Annual Probable Sunlight Hours (APSH), which is expressed as a percentage.

10.30 The BRE guidelines also note "Access to sunlight should be checked for the main window of each room which faces within 90 degrees (°) of due south". Therefore, any windows facing 90° of due north need not be analysed as they have limited expectation of sunlight.

10.31 Sections 3.2 of the BRE guidelines make recommendations concerning the effect of developments on levels of sunlight. The BRE guidelines note that "obstruction to sunlight may become an issue if:

- *some part of a new development is situated within 90° of due south of a main window wall of an existing building; and,*
- *in the section drawn perpendicular to the existing window wall, the new development subtends an angle greater than 25° to the horizontal measured from a point 2m above the ground."*

10.32 If these criteria are not met, the BRE guidelines recommend a more detailed check to calculate the effect of new development on the available sunlight. The BRE guidelines suggest "*all main living rooms of dwellings, and conservatories, should be checked if they have a window facing within 90° of due south. Kitchens and bedrooms are less important, although care should be taken not to block too much sun.*"

10.33 The available sunlight is measured in terms of the percentage of annual probable sunlight hours (APSH) at the centre point of the window on the plane of the inside surface of the wall. Probable sunlight hours is defined as:

“the total amount of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question.”

Application of Assessment Methodology

10.34 Each of the methods described above have been implemented in this assessment, using specialist computer software applied to three-dimensional AutoCAD models of the baseline condition and the proposed development.

10.35 The BRE guidelines is an advisory document and does not constitute a rigid set of rules. In its introduction it is stated:

(Its) "main aim is ... to help to ensure good conditions in the local environment, considered broadly, with enough sunlight and daylight on or between buildings for good interior and exterior conditions.

“The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and this document should not be seen as an instrument of planning policy. Its aim is to help rather than constrain the designer.

“Although it gives numerical guidelines, these should be interpreted flexibly because natural lighting is only one of many factors in Site layout design.”

10.36 In theory the BRE guidelines may be applied to any setting, whether that is a city centre, suburban area or rural village. However, the document notes:

“In special circumstances the developer or planning authority may wish to use different target values. For example, in a historic city centre a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings.” At page 4 it is stated that: “numerical values given here are purely advisory. Different criteria may be used, based upon the requirements for daylighting in an area viewed against other Site layout constraints.”

10.37 Care must therefore be taken in applying the recommendations of BRE guidelines because rigid application of the numerical guidelines could well give rise to underutilisation of land in city centre sites.

10.38 The BRE guidelines principal numerical target criteria for impact on surrounding buildings is based on the general premise that a reduction of more than 0.8 times a former value will be noticeable to the occupants. Where an existing value is low, for example to a window set beneath a projecting balcony on the floor above, even a small reduction in the baseline value can present itself as a large percentage change. Technically, this is a transgression of the guidelines even though, in reality, the reduction may be barely perceptible. Another issue with balconies is that they obstruct parts of the sky at higher altitudes that are less likely to be affected by development and constrain the view of sky to lower altitudes where the sky is more likely to be obstructed by

development. Account should therefore be taken of balconies or other external design features that artificially limit the daylight or sunlight that a building can potentially receive.

Significance Criteria

BRE Daylight and Sunlight

10.39 In order to determine the significance level attributable to each of the effects, the results of the daylight, sunlight and overshadowing analyses have been compared against the criteria set out within the BRE guidelines, as summarised within Table 10.2 (below):

Table 10.2 Methodology for Determining Impact Magnitude

BRE Test	BRE Criteria
VSC	The loss of daylight to a window will be noticeable if the VSC will be reduced to less than 27% and/or less than 0.8 times its former value.
Daylight Distribution	The loss of daylight to a room will be noticeable if the area of the working plane which can receive direct skylight will be reduced to less than 0.8 times its former value.
APSH	A window should still receive enough sunlight if it receives at least 25% APSH for the whole year including 5% during the winter months. If the available sunlight hours are less than this, and/or less than 0.8 times their former value, either during the winter or over the whole year, and/or the actual alteration is greater than 4% APSH, then a window may be adversely affected.

Impact Magnitude

10.40 Reference has also been made to Appendix I of the BRE guidelines which addresses Environmental Impact Assessments with regards to daylight and sunlight.

10.41 Appendix I, paragraph 3 states:

“Adverse impacts occur when there is a significant decrease in the amount of skylight and sunlight reaching an existing building where it is required, or in the amount of sunlight reaching an open space”

10.42 In regards to determining the magnitude of an effect, paragraphs 5 states:

“Where the loss of skylight or sunlight fully meets the guidelines in this book, the impact is assessed as negligible or minor adverse. Where the loss of light is well within the guidelines, or only a small number of windows or limited area of open space lose light (within the guidelines), a classification of negligible impact is more appropriate. Where the loss of light is only just within the guidelines, and a larger number of windows or open

space area are affected, a minor adverse impact would be more appropriate, especially if there is a particularly strong requirement for daylight and sunlight in the affected building or open space.”

10.43 Paragraph 6 continues:

“Where the loss of skylight or sunlight does not meet the guidelines in this book, the impact is assessed as minor, moderate or major adverse. Factors tending towards a minor adverse impact include:

- Only a small number of windows or limited area of open space are affected*
- The loss of light is only marginally outside the guidelines*
- An affected room has other sources of skylight or sunlight*
- The affected building or open space only has a low level requirement for skylight or sunlight*
- There are particular reasons why an alternative, less stringent, guideline should be applied.”*

10.44 Appendix I of the BRE guidelines states that impacts tending towards major adverse are typically where:

- “a large number of windows or large area of open space are affected;*
- The loss of light is substantially outside the guidelines;*
- All the windows in a particular property are affected;*
- The affected indoor or outdoor spaces have a particularly strong requirement for skylight or sunlight, e.g. a living room in a dwelling or a children’s playground.”*

10.45 In regards to beneficial impacts, these occur:

“When there is a significant increase in the amount of skylight and sunlight reaching an open space. Beneficial impacts should be worked out using the same principles as adverse impacts. Thus a tiny increase in light would be classed as a negligible impact, not a minor beneficial impact.”

10.46 The following broad classifications for the scale and magnitude of impacts have therefore been adopted within this chapter to reflect the provisions within Appendix I of the BRE guidelines:

- Major beneficial or adverse impact** - where the proposed development would cause a significant improvement (or deterioration) to the existing environment;

- **Moderate beneficial or adverse impact** - where the proposed development would cause a noticeable improvement (or deterioration) to the existing environment;
 - **Minor beneficial or adverse impact** - where the proposed development would cause a small improvement (or deterioration) to the existing environment; and
 - **Negligible** - no discernible improvement or deterioration to the existing environment.
- Numerical Significance Criteria adopted in this ES Chapter

10.47 Appendix I of the BRE guidelines provide that *“the assessment of impact will depend on a combination of factors, and there is no simple rule of thumb that can be applied.”*

10.48 Table 10.3 and Table 10.4 provide the numerical criteria broadly applied within the assessment to classify the magnitude of the daylight and sunlight impacts. It is important to note that these are broad guidelines, the significance of the impact is also a matter of professional judgement.

Table 10.3 Scale of Magnitude for Change in Daylight

Magnitude	Vertical Sky Component (VSC) Test	Daylight Distribution Test
Negligible	Proposed VSC $\geq 27\%$ OR Proposed VSC $< 27\%$ and ≥ 0.8 times former value	Proposed area is 0.8 times former value
Minor	Proposed VSC $< 27\%$ and between 0.6 and 0.79 times former value	Proposed area is between 0.6 and 0.79 times former value
Moderate	Proposed VSC $< 27\%$ and between 0.4 and 0.59 times former value	Proposed area is between 0.4 and 0.59 times former value
Major	Proposed VSC $< 27\%$ and < 0.4 times former value	Proposed area is < 0.4 times former value

Table 10.4 Scale of Magnitude for Change in Sunlight

Magnitude	Annual Probable Sunlight Hours (APSH) Test	APSH in Winter Test
Negligible	Proposed APSH $\geq 25\%$ OR Proposed APSH $< 25\%$ and ≥ 0.8 times former value	Proposed APSH in winter $\geq 5\%$
Minor	Proposed APSH $< 25\%$ and between 0.6 and 0.79 times former value	Proposed APSH in winter $< 5\%$ and between 0.6 and 0.79 times former value
Moderate	Proposed APSH $< 25\%$ and between 0.4 and 0.59 times former value	Proposed APSH in winter $< 5\%$ between 0.4 and 0.59 times former value

Major	Proposed APSH <25% and <0.4 times former value	Proposed area is <0.4 times former value
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10.49 The BRE guidelines work on the general principle that a reduction in daylight or sunlight to less than 0.8 times its former value will be noticeable, unless the quantity retained will be above a certain level, or, for sunlight, the loss in real terms is below 4%, at which point the magnitude of change becomes irrelevant.

10.50 The significance criteria set out above are consistent with daylight and sunlight assessments undertaken for many other developments within Manchester and are considered similarly appropriate for the Site. The assessment of the significance of the magnitude of each change is also subject to professional judgement having regard to the numerical guidelines set out above and the provisions within Appendix I of the BRE guidelines.

10.51 All effects are considered permanent unless otherwise stated.

Assumptions and Limitations

10.52 Where plans or access were not available, the internal layouts have been based on assumptions (where possible from external observation, otherwise using professional judgement). Where the layouts have been estimated, this has no bearing on the assessment of the vertical sky component or annual probably sunlight hours tests (detailed later in this chapter) which are both considered at the centre of the window. The internal dimensions are only relevant to the daylight distribution (the second method of daylight analysis); however, in the absence of suitable plans, estimation is the conventional approach.

Appendix D – Wind Microclimate Assessment EIA Addendum



10-12 Whitworth Street West

Wind Microclimate

August 2022

Prepared For:

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Executive Summary

In accordance with best practice, wind tunnel testing of a physical scale model has been combined with long-term wind statistics applicable to the site, to provide a detailed assessment of pedestrian level wind conditions in and around the site, based on the industry standard Lawson criteria for pedestrian safety and comfort.

The proposed development represents a substantial structure with regards to wind effects but is partially sheltered from approaching winds by the built-up surrounding area and presents a narrow frontage to the most frequent extreme winds from the west-south-west.

As a result, the proposed development has no significant impact on wind conditions with regards to pedestrian safety.

In terms of pedestrian comfort, thoroughfares alongside the site are generally suitable, and at least tolerable, for pedestrian access to, and passage past, the proposed development.

Entrances to the proposed development enjoy suitable conditions for pedestrian ingress / egress.

With the purposely developed balustrades included, the proposed roof-top terraces are expected to enjoy acceptable conditions for associated recreational activities.

The proposed development has a mixed effect on the El Diablo Tequila and Taco Bar's outdoor seating, enhancing one area but making the east end of the walkway, outside of the arch recesses, windier than ideal for outdoor seating. Overall, this effect is reduced relative to the effect of the consented scheme. Otherwise, the proposed development has no significant impact on the pedestrian level wind conditions within the surrounding area.

With the introduction of consented future surrounding developments, part of the Deansgate Station platform, to the west of the site, becomes marginally windy, though likely still tolerable, for standing awaiting a train during winter, though this effect is expected to be largely driven by the future neighbouring Hotel development. Otherwise, no significant cumulative effects with the future surrounding developments are expected.

Overall, the wind effects are generally reduced relative to those reported in the 2016 ES for the consented scheme.

1. Introduction

Urban Microclimate Ltd. has been commissioned by Featherfoot Whitworth Street Ltd. to assess the potential impact of the proposed development at 10-12 Whitworth Street West in Manchester, on the pedestrian level wind environment in and around the site.

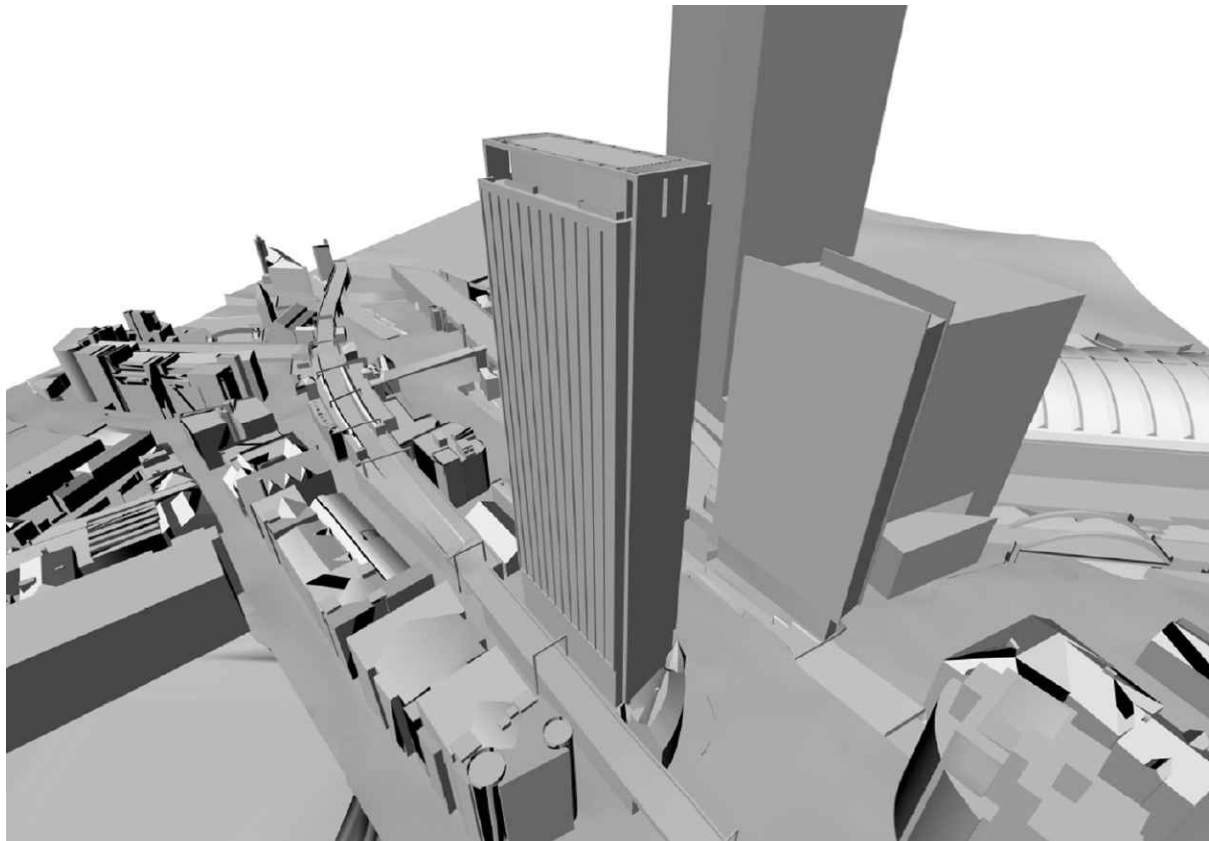
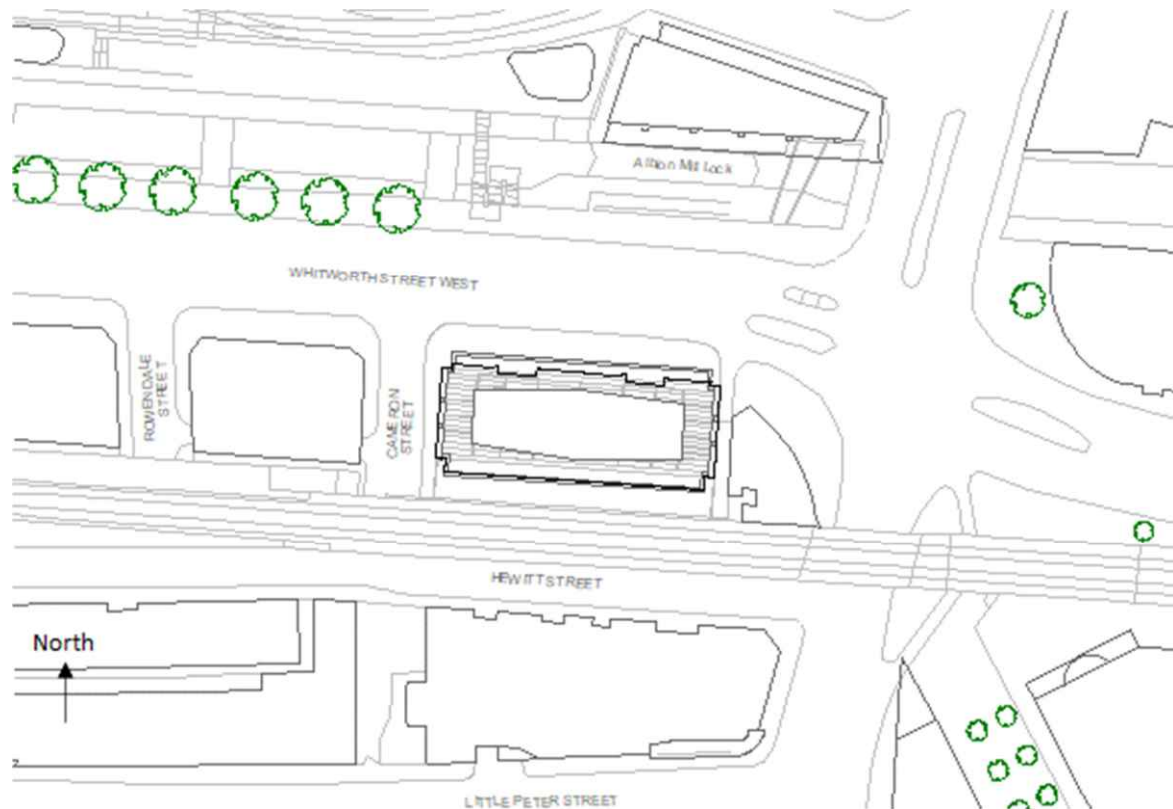
The assessment is based on boundary layer wind tunnel testing of a physical scale model, based on details of the proposed development issued by architects, from May to July 2022. This represents best industry practice, and provides a detailed, robust, quantitative assessment.

The proposed development comprises a 38-storey, rectangular, tower with private terraces at Level 36, and represents a minor material amendment to the extant consent for the site, which was supported by an Environmental Statement and approved under application reference 111003/FO/2016. The proposed massing is not significantly changed from the consented scheme, but the main entrances are relocated and the original communal roof-top terrace is replaced by the private terraces. The surrounding area has also undergone significant development since the 2016 ES, and the current assessment accounts for the updated surrounding context.

The scheme considered is illustrated in Figures 1.1, below.

Figure 1.1a: Proposed Development (Viewed from Northwest)



Figure 1.1b: Proposed Development (Viewed from Southeast)**Figure 1.1c: Proposed Siteplan**

2. Methodology and Criteria

2.1. Policy and Guidelines

National Planning Policy and Guidelines

There are no national planning policies directly relating to wind microclimate issues. However, the National Planning Policy Framework (updated in July 2021) emphasises the benefits of a high-quality built environment. An example of this is presented in Section 12, which states that developments should:

“establish or maintain a strong sense of place, using the arrangement of streets, spaces, building types and materials to create attractive, welcoming and distinctive places to live, work and visit”

The National Design Guide (October 2019) forms part of the associated planning practice guidance. Within this guide, the section Built Form B2 ‘Appropriate building types and forms’ states that:

“Proposals for tall buildings (and other buildings with a significantly larger scale or bulk than their surroundings) require special consideration. This includes their location and siting; relationship to context; impact on local character, views and sight lines; composition - how they meet the ground and the sky; and environmental impacts, such as sunlight, daylight, overshadowing and wind. These need to be resolved satisfactorily in relation to the context and local character.”

The section Context C1 ‘Understand and relate well to the site, its local and wider context’ goes on to state:

“Well-designed new development responds positively to the features of the site itself and the surrounding context beyond the site boundary. It enhances positive qualities and improves negative ones. Some features are physical, including:

- *environment – including landscape and visual impact, microclimate...”.*

Local Planning Policy

Manchester City Council's Local Development Framework Core Strategy Development Plan Document (adopted July 2012) includes Policy EN2 Tall Buildings, for which tall buildings are defined as buildings which are substantially taller than their neighbourhoods and / or which significantly change the skyline. Policy EN2 states:

“...tall buildings can have a significant impact on the local environment and its micro-climate. It is therefore expected that this impact be modelled and that submissions for tall buildings also include appropriate measures to create an attractive, pedestrian friendly local environment.”

The Guide to Development in Manchester, Supplementary Planning Document and Planning Guidance (adopted April 2007), Section 2. Design, Paragraph 2.40 (Hard landscaped areas within the public realm should be attractive) states:

"Where the public realm includes hard landscaped areas, its design should reflect the level and nature of their use, and should consider issues such as overshadowing, prevailing winds..."

Within the same guide, Section 12. The City Centre, Paragraph 12.8 (Development Quality) states:

"...Key questions will be ... the microclimate, including overshadowing and air turbulence effects, created by the relationship of the building to those adjacent; and the quality and usability of the spaces surrounding the building."

Additional Standards and Guidance

The assessment of environmental wind flows also lies outside the scope of BS EN 1991-1-4:2005, the current UK and European Standard for wind actions on structures, which focuses on wind loading issues.

The impact of environmental wind on pedestrian spaces and the consequent suitability of these spaces for planned usage are described by and compared against the industry standard Lawson criteria, which are recognised by Local Authorities as a suitable benchmark for wind assessments.

2.2. Assessment Methodology

In accordance with the above policies and guidelines, a detailed wind microclimate assessment has been undertaken. The assessment combines the following elements to determine the probability of local wind speeds exceeding thresholds that relate to pedestrian safety and to comfort levels perceived during standard pedestrian activities, based on the Lawson criteria for pedestrian comfort and safety:

- Measured pedestrian level wind speeds at key areas in and around the site, from model-scale boundary layer wind tunnel testing; with
- Long-term wind frequency statistics transposed from the nearest suitable weather centre to apply directly at the site.

Wind Tunnel Tests

Details of the wind tunnel testing are provided at Appendix A. The tests were conducted, via Imperial Consultants, in Imperial College London's boundary layer wind tunnel facility, where an atmospheric boundary layer representative of that at the site was simulated. The wind tunnel model was constructed at a scale of 1:300 and covers a full-scale extent of 450 m from the centre of the site (up to and beyond the extent of potential significant effects of the proposed development).

The development was modelled based on drawing information, including a 3D CAD model, provided by the design team from May to July 2022. The surrounding existing and consented buildings were represented to a sufficient level of detail to reproduce the wind flows at the site and on surrounding land. Existing mature trees were modelled in winter, or bare, format.

An initial experience-based assessment was carried out to identify areas of potential accelerated winds in and around the site and to identify the potential extent of likely significant wind effects within the surrounding area. Existing and proposed pedestrian activities were also reviewed to identify areas of increased sensitivity to wind effects, such as recreational areas and building entrances. Wind speed measurements were then taken at the 87 pedestrian level locations and 4 roof-top terrace locations identified. Measurements were taken at a height corresponding to 1.5 metres at full scale, for a full range of wind directions in increments of 22.5°. Recordings were taken for a sufficient length of time to determine the mean and gust wind speeds.

Wind tunnel tests were carried out for the following configurations:

- Existing site conditions;
- Proposed development with existing surrounds; and
- Proposed development with consented future surrounds.

Consented surrounding developments were reviewed using publicly available information and professional experience to determine their relevance to the wind assessment. Buildings under construction at the time of assessment were included within the baseline, in their completed form. This includes the following schemes:

- Viadux (Ref 115871/FO/2017 & 126868/JO/2020)
- Plot 11 First Street (Ref 125573/FO/2019)

The future consented developments considered within the cumulative effects assessment comprises the following surrounding schemes:

- 2-4 Whitworth St West Hotel (Ref 126308/FO/2020)
- Plot 9 First Street (Ref 132600/FO/2021)
- One City Road (Ref 128002/FO/2020)
- Plot F, Great Jackson Street (Ref 132199/FO/2021)
- 325 Deansgate (Ref 125804/FO/2019)
- Plot G, Great Jackson Street (Ref 129273/FO/2021)
- Fusion, Great Jackson Street (Ref 129406/FO/2021)
- Transition (Plot E, Great Jackson Street) (Ref 116850/FO/2017)
- Alpha Place (Ref 120113/FO/2018)
- Hotspur Press (Ref 120635/FO/2018)

Further consented schemes in the area lie beyond the model extent and are considered too distant to have any significant cumulative effects with the development.

Wind Climate Data

A Weibull distribution was applied to long-term wind frequency statistics from Manchester Airport, with annual and seasonal data derived for 16 evenly spaced sectors. The Weibull parameters were corrected to open-country terrain at sea-level and then corrected to apply directly at the site, taking account of differences in upwind terrain and altitude between the weather centre and the site based on the widely-accepted Deaves and Harris log law wind model of the atmospheric boundary layer and BS EN 1991-1-4:2005. Historical data is used as standard practice due, in part, to lack of certainty in potential future changes in wind patterns, though any changes are expected to be minor.

Assessment Criteria

Details of the Lawson criteria for pedestrian comfort are presented in Table 2.1 and are based on the exceedance of threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring less than 5% of the time. The thresholds represent upper bounds of acceptability for a range of common activities. The value of 5% has been established as giving a reasonable allowance for extreme and relatively infrequent winds that are acceptable within each category.

Table 2.1: Lawson Criteria for Pedestrian Comfort

Threshold Mean-hourly Wind Speed Exceeded < 5% of the Time	Comfort Rating / Activity		Qualifying Comments
4m/s	C4	Long-term Sitting	Reading a newspaper and eating and drinking.
6m/s	C3	Standing or short-term Sitting	Appropriate for bus stops, window shopping and building entrances.
8m/s	C2	Walking and Strolling	General areas of walking and sightseeing.
10m/s	C1	Business walking	Local areas around tall buildings where people are not likely to linger.

Details of the Lawson criteria for pedestrian safety, or distress, are presented in Table 2.2 and are based on the exceedance of the threshold wind speeds, considering mean-hourly and gust-equivalent-mean values, occurring once per annum. These thresholds represent wind speeds with the potential to destabilise the less able or more susceptible members of the public (including elderly, cyclists and children) and able-bodied users.

Table 2.2: Lawson Criteria for Pedestrian Safety or Distress

Threshold mean-hourly wind speed exceeded once a year	Safety Rating		Qualifying Comments
15 m/s	S2	Unsuitable for general public	Less able and cyclists find conditions physically difficult.
20 m/s	S1	Unsuitable for able-bodied	Able-bodied persons find conditions difficult. Physically impossible to remain standing during gusts.

The pedestrian level wind environment assessment is summarised in terms of suitability for various activities, based on the Lawson criteria described above. The assessment takes full account of seasonal variations in wind conditions and pedestrian activities. Thus, conditions for recreational activities focus on summer, but also consider spring and autumn.

Recreational activities do not consider winter comfort ratings as it is anticipated that users would not demand suitable conditions 95% of the time in winter but would instead be satisfied to use the amenity spaces on occasions when conditions, including precipitation and temperature, permit. Conditions for pedestrian thoroughfare, access or waiting (for example at bus stops) consider all seasons, with winter being predominantly the critical season due to generally higher wind speeds in the winter months.

The activities considered, and their relation to the comfort criteria detailed above, are shown in Table 2.3. The table is ordered in terms of decreasing sensitivity to wind speeds. Conditions considered suitable for the more sensitive activities would also be suitable for the subsequent, less sensitive, uses.

Table 2.3: Suitability Assessment

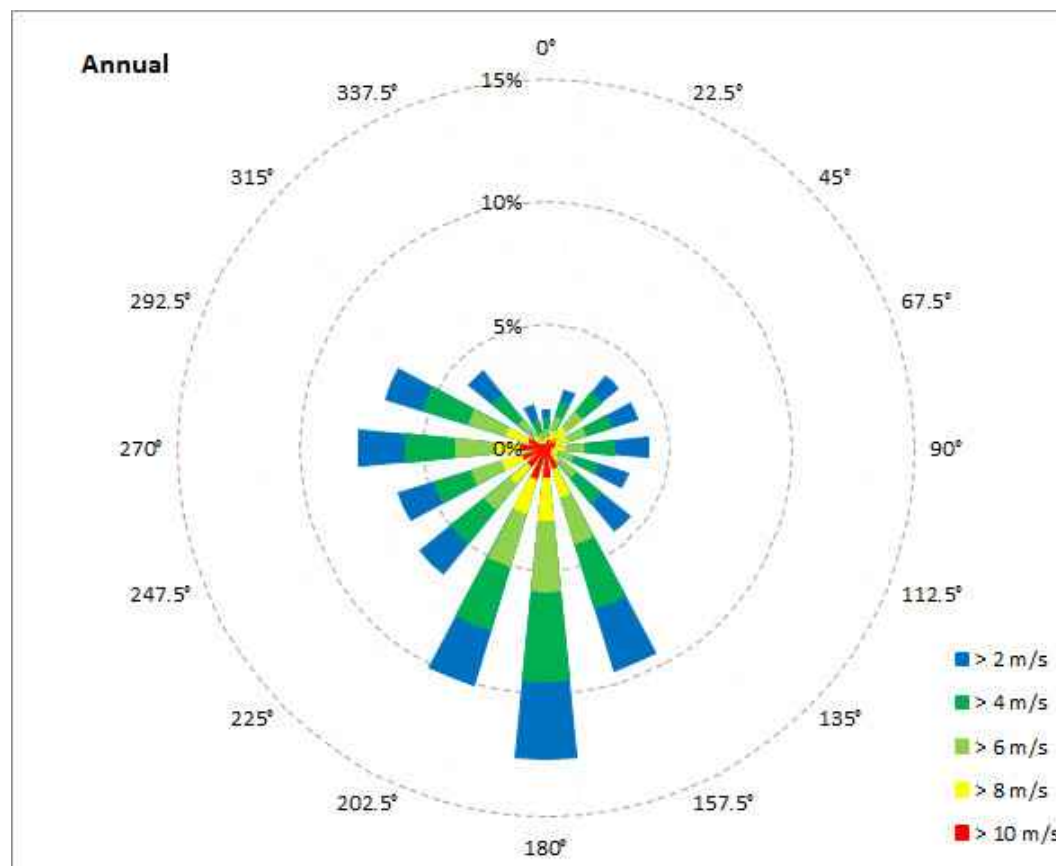
Suitability		Target Lawson comfort and safety criteria for specified seasons
Outdoor seating	For long periods of sitting, such as for an outdoor café or picnic area.	'Long-term sitting' (C4) in at least summer.
Entrances, waiting areas	For pedestrian ingress / egress at entrances, or short periods of sitting or standing such as at a bus stop, taxi rank, meeting point, window shopping, etc.	'Standing or short-term sitting' (C3) in all seasons.
General leisure (excluding seating areas)	For leisure uses excluding long periods of outdoor sitting, such as active leisure, general park spaces, children's play area, etc.	'Standing or short-term sitting' (C3) from spring to autumn.
Thoroughfare	For pedestrian access to, and passage through, the Site and surrounding area.	'Business walking' / 'Walking or strolling' (C1/C2) in all seasons - 'Walking or strolling' (C2) desired but 'Business walking' (C1) may be acceptable in some areas.
Unsuitable	Unsuitable for all activities.	Exceeds comfort criterion for 'Business walking' (C1) or safety criteria (S1/S2).

3. Assessment

3.1. Existing Site Conditions

The wind climate expected at the site is summarised in Figure 3.1 in terms of the annual wind speed and direction probability distributions at a reference height of 116 m, corresponding to the approximate maximum roof height of the proposed development, relative to local ground level. Seasonal wind speed and direction probability distributions are presented in Appendix A.

Figure 3.1: Wind Climate at Site (at reference height of 116 m)



Based on the wind climate statistics, winds from the southerly quadrant are prevalent. Light to moderate winds from the south and south-south-east are most common, whilst stronger winds more frequently blow from the south-south-west. Winds from the west-south-west also occur frequently, and extreme wind speeds (relevant to pedestrian safety) are most likely to blow from this direction. Northerly winds are generally light and rare, though cold north-easterly winds are common during spring. Wind speeds are generally higher during winter and lower during summer.

The existing site comprises a cleared area of hard standing and existing conditions are therefore dictated by the surrounding buildings and railway viaducts. The resulting pedestrian level wind conditions at each measurement location in and around the site is

presented in terms of the Lawson comfort and safety criteria in Appendix A and summarised below.

Conditions in and around the existing site rate as safe for all users, in accordance with the Lawson criteria for pedestrian safety.

In terms of pedestrian comfort, conditions are suitable for at least leisurely strolling on surrounding thoroughfares and pedestrian crossings.

Entrance to the surrounding buildings generally enjoy suitable conditions for pedestrian ingress / egress. The southwest entrance to The Hacienda Apartments, from Whitworth Street West, is marginally windy, but is expected to be tolerable, for pedestrian ingress / egress during winter and spring, as westerly winds are channelled around the curved façade.

The east ends of the platforms at Deansgate-Castlefield Station, to the north of the site, and Deansgate Station, to the west of the site, are suitable for at least short periods of standing. These conditions are considered suitable for awaiting trains.

The spill-out seating around the northeast side of the City Road Inn enjoys suitable wind conditions for long period of outdoor sitting during at least summer and autumn and is expected to be considered acceptable.

Deansgate Locks, along the north side of the Rochdale Canal to the north of the site, includes several bars with spill-out seating on the walkway. A small area in front of the El Diablo Tequila and Taco Bar, on the west side of the stairs up to Deansgate-Castlefield Station, appears to be susceptible to mild downdraughts from the Axis tower, for southerly winds, and may be marginally windy for long periods of outdoor sitting during summer. Otherwise, the walkway is relatively sheltered, and conditions are considered suitable for outdoor seating during at least summer. The recessed areas within the arches are also expected to be more sheltered.

The railway viaduct to the south of the site is suitable for work activities.

3.2. Impact of Proposed Development

The proposed development represents a substantial structure with regards to wind effects. The orientation is such that a wide façade is presented to prevailing southerly winds, though the development does benefit from some shelter from the most frequent strong winds from the south-south-west, created by the larger Deansgate Square development. In addition, downdraughts from the southern façade are prevented from reaching pedestrian level directly, by the railway viaduct immediately to the south of the site. The space between is also protected by gates at each end (see designed-in features listed below), which also prevent the creation of any highly accelerated winds at the southwest and southeast corners. Winds from the southerly sector do still reach pedestrian levels in the passages on the west and east sides of the development. The extent of resulting accelerated pedestrian

winds is partially alleviated by the back pressure created by the large developments to the north, though some localised acceleration of winds does occur around the development's northeast corner.

The development is better orientated with respect to the most frequent extreme winds from the west-south-west, substantially limiting the effects of downdraughts from the west façade, though west-north-westerly winds channelling around the southwest corner of the development do impact on the railway viaduct. West-north-westerly winds are also channelled along the development's north elevation, creating some localised accelerations of winds around the development's northeast corner.

The development is partially sheltered from north-easterly winds which, although common in spring, are generally lighter than south-westerly winds.

As a result of the above wind effects, some key design features were purposely developed during an interactive wind tunnel workshop to allow the proposal to respond to the conditions. Key features implemented include:

- 2.4 m high, solid gate across the passage between the development's southwest corner and the railway viaduct;
- 2.1 m high, solid gate across the passage between the development's southeast corner and the railway viaduct;
- 2.1 m high, 50% solid gate across the passage between the development and the City Road Inn, to the east;
- 1.5 m high solid balustrades around the northern roof-top terraces; and
- 3.0 m high solid balustrades around the southern roof-top terraces.

These features, as modelled, are illustrated in Appendix A.

The resulting pedestrian level wind environment in and around the site is presented in terms of the Lawson comfort and safety criteria in Appendix A and is further summarised graphically in Figure 3.2 in terms of suitability for pedestrian activities. This presentation applies expert judgement to extrapolate from the key-point measurements in order to cover the site and surrounding area.

Pedestrian Safety

With the introduction of the proposed development, pedestrian level wind conditions in and around the site remain rated as safe for all users.

The railway viaduct on the south side of the development is however susceptible to west-north-westerly and, to a lesser extent, westerly winds accelerating around the southwest corner of the development. Resulting conditions very marginally exceed the safety criterion for the general public (at measurement location 68, as illustrated in Appendix A) but remain safe for able-bodied workers. As no publicly accessible spaces are affected, this effect is not considered significant.

The proposed development is thus considered to have no significant impact with respect to pedestrian safety.

Pedestrian Comfort

Thoroughfares

In terms of pedestrian comfort, with respect to wind force, wind conditions are marginally windy for leisurely strolling during winter in the immediate vicinity of the proposed development's northeast corner. Conditions are suitable, ideally, only for fast walking normally associated with business activities. However, conditions are only marginally above the Lawson criterion for leisurely strolling and are likely to be considered tolerable for pedestrian access to and passage past the development.

Away from the northeast corner of the development, conditions remain suitable for at least leisurely strolling. The wider effect on thoroughfares and pedestrian crossings around the site is therefore negligible and conditions remain suitable for pedestrian access to and passage past the development.

Building Entrances and Waiting Areas

The main entrances to the development are recessed into the northern façade and enjoy suitable conditions for pedestrian ingress / egress. The secondary entrances on the south side are sheltered by the solid gates at each end of the passage and also enjoy suitable conditions for pedestrian ingress / egress.

As for existing conditions, the southwest entrance to The Hacienda Apartments, from Whitworth Street West, is considered marginally windy, but tolerable, for pedestrian ingress / egress during winter and spring. Otherwise, entrances to surrounding buildings are expected to remain suitable for pedestrian ingress / egress. The proposed development therefore has no significant effect on surrounding entrances.

The east ends of the platforms at Deansgate-Castlefield Station, to the north of the site, and Deansgate Station, to the west of the site, remain suitable for awaiting trains.

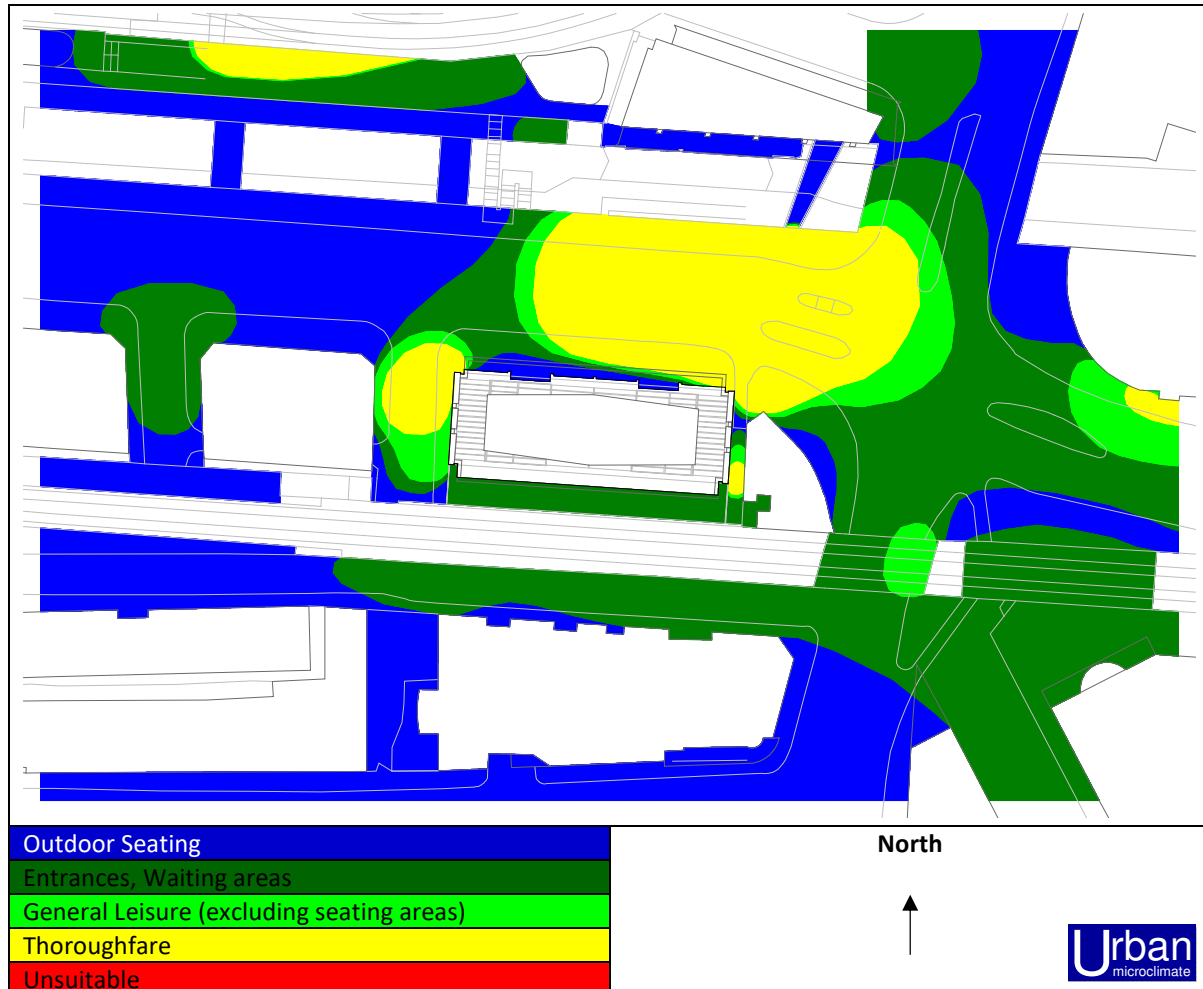
Amenity Spaces

The spill-out seating for the City Road Inn remains suitable for long periods of outdoor sitting during at least summer.

The proposed development has a mixed effect on the outdoor seating area in front of El Diablo Tequila and Taco Bar, on Deansgate Locks. The additional shelter provided to the Axis tower from southerly winds, enhances conditions on the west side of the stairs up to Deansgate-Castlefield Station, with conditions becoming suitable for long periods of outdoor sitting during summer. However, the east end of the restaurant's seating becomes too windy for long periods of outdoor sitting due to the slight increase in channelling of

westerly winds. Otherwise, the seating along the remainder of Deansgate Locks is not significantly affected and remains suitable for outdoor seating during at least summer. Again, the recessed areas within the arches are also expected to be more sheltered.

Figure 3.2: Suitability Assessment



Railway Viaduct

The railway viaduct to the south of the site remains suitable, in terms of comfort, for work activities.

Roof-Top Terraces

The tall solid balustrades are effective in sheltering the proposed private roof-top terraces. The northeast terrace rates, in accordance with the Lawson criteria, as comfortable for short periods of outdoor sitting during summer. However, it is standard practice to apply the Lawson criteria slightly less rigorously to private elevated spaces, due to their less frequent use, likely expectations of conditions at elevated levels and the opportunity for the occupant to select whether or not to use the space on a given day. As the criterion for long-term sitting is only marginally exceeded (with the threshold exceeded for approximately

5.5% of the summer, against a target of 5%), conditions are expected to be considered acceptable.

The remaining private terraces enjoy amenable conditions for long periods of outdoor sitting during at least summer.

3.3. Cumulative Effects

The introduction of future surrounding developments generally increases the shelter enjoyed by the proposed development from approaching winds, particularly from the most frequent strong winds from the south-south-west. The localised shelter, at lower-levels, from west-north-westerly winds is also enhanced.

The resulting pedestrian level wind conditions in and around the Site is presented in terms of the Lawson comfort and safety criteria in Appendix A and summarised below.

Pedestrian Safety

With the introduction of the proposed development and future surrounding developments, pedestrian level wind conditions in and around the site remain rated as safe for all users. Conditions on the railway viaduct also rate as safe for all users.

The proposed development is thus considered to have no significant cumulative impact with respect to pedestrian safety.

Pedestrian Comfort

Thoroughfares

In terms of pedestrian comfort, with respect to wind force, wind conditions are suitable for at least leisurely strolling. The cumulative effect on thoroughfares and pedestrian crossings around the site is therefore negligible and conditions remain suitable for pedestrian access to and passage past the development.

Building Entrances and Waiting Areas

The main and secondary entrances to the development retain suitable conditions for pedestrian ingress / egress.

As for existing conditions, the southwest entrance to The Hacienda Apartments, from Whitworth Street West, is considered marginally windy, but tolerable, for pedestrian ingress / egress during winter and spring. Otherwise, entrances to surrounding buildings are expected to remain suitable for pedestrian ingress / egress. The proposed development therefore has no significant cumulative effect on surrounding entrances.

The east end of the platform at Deansgate-Castlefield Station, to the north of the site, remains suitable for awaiting trains. On the Deansgate Station platform, to the west of the

site, the area towards the southwest end of the future Hotel development (at 2 - 4 Whitworth Street West) becomes marginally windy, though likely still tolerable, for standing awaiting a train during winter. However, most of the platform is expected to retain suitable conditions for such uses and this cumulative effect is expected to be largely driven by the Hotel, particularly the channelling of west-north-westerly winds around the Hotel's southwest corner.

Amenity Spaces

Conditions at surrounding amenity spaces are not significantly changed from those discussed above for the existing surrounding context.

Roof-Top Terraces

Conditions at the proposed development's roof-top terraces are not significantly changed from those discussed above for the existing surrounding context and are expected to be considered acceptable for proposed recreational uses.

3.4. Comparison with Consented Scheme

The 2016 ES for the consented scheme considered a largely low-to-mid rise surrounding context, within which the development represented a dominant structure. Consented future surrounding developments considered for cumulative effects were limited to the, now-completed, Axis tower. This single scheme was however sufficient to alleviate some of the wind effects.

Pedestrian level wind conditions marginally rated as unsuitable, in terms of pedestrian safety, for the general public around the northwest corner of the development. This localised effect was considered moderate adverse but would have been mitigated by either the introduction of the Axis tower or further development of wind mitigation measures as part of the detailed design. Residual effects with regards to pedestrian safety were therefore expected to be negligible. The effect of the current proposed development on pedestrian safety is similarly considered negligible.

In terms of pedestrian comfort, wind conditions were expected to be marginally windy but tolerable for pedestrian passage around the northwest corner of the development and in the northern parts of Cameron Street. This minor adverse effect was expected to be reduced to negligible by either the introduction of the Axis tower or further development of wind mitigation measures as part of the detailed design. The proposed development has a potential minor adverse effect at the northeast corner of the development but this effect would also be alleviated with the introduction of consented future surrounding developments.

The main entrances to both the consented and the proposed development enjoy suitable conditions for pedestrian ingress / egress.

The consented scheme had no significant effects on surrounding station platforms. In the context of existing surrounding buildings, the proposed development likewise has no significant effect. Within the future surrounding context part of the Deansgate Station platform, to the west of the site, becomes marginally windy, though likely still tolerable, for standing awaiting a train during winter. However, most of the platform is expected to retain suitable conditions for such uses, such that the effect would be considered no worse than minor adverse. This effect is also expected to be largely driven by the future neighbouring Hotel development.

Within the surrounding area, the consented scheme was expected to have a minor adverse effect on the entrances to the Hobs commercial outlet and a minor adverse cumulative effect at the northwest entrance to The Hacienda Apartments. Both of these effects are alleviated within the current context and the proposed development has no significant adverse effects on surrounding building entrances.

The consented scheme was expected to have a minor adverse effect on the spill-out seating for the City Road Inn, though was this effect would have been reduced to negligible with the introduction of the Axis tower. The effect of the proposed development is also considered negligible.

For the consented scheme, the walkway spill-out seating at Deansgate Locks was expected to be too windy for comfortable long-term seating activities, though the recessed areas within the arches were expected to be more sheltered. This effect was considered minor to no worse than moderate adverse, reducing to minor adverse with the introduction of the Axis tower. The proposed development has a mixed effect on Deansgate Locks, slightly enhancing conditions in front of part of the of El Diablo Tequila and Taco Bar but also deteriorating conditions in front of parts of the same establishment. The remainder of the walkway is not significantly affected by the proposed development. The effect of the proposed development is therefore considered less significant than the consented scheme.

4. Conclusions

Existing Site Conditions

Pedestrian level wind conditions in and around the existing site rate as safe for all users and are considered comfortable for at least leisurely strolling. Entrances generally enjoy suitable conditions for pedestrian ingress / egress, though the southwest entrance to The Hacienda Apartments is marginally windy but tolerable. Station platforms are suitable for awaiting a train. Café and bar spill-out seating is generally suitable for such outdoor seating uses during at least summer, though part of El Diablo Tequila and Taco Bar's frontage may be marginally windy.

Impact of Proposed Development

The proposed development has no significant impact on wind conditions with regards to pedestrian safety.

In terms of pedestrian comfort, thoroughfares alongside the site are generally suitable, and at least tolerable, for pedestrian access to, and passage past, the proposed development.

Entrances to the proposed development enjoy suitable conditions for pedestrian ingress / egress.

The proposed roof-top terraces are expected to enjoy acceptable conditions for associated recreational activities.

Within the surrounding area, the proposed development has a mixed effect on the El Diablo Tequila and Taco Bar's outdoor seating, enhancing one area but making the east end of the walkway, outside of the arch recesses, windier than targeted for outdoor seating. Otherwise, the proposed development has no significant impact on the pedestrian level wind conditions within the surrounding area.

With the introduction of consented future surrounding developments, part of the Deansgate Station platform, to the west of the site, becomes marginally windy, though likely still tolerable, for standing awaiting a train during winter, though this effect is expected to be largely driven by the future neighbouring Hotel development. Otherwise, no significant cumulative effects with the future surrounding developments are expected.

The above effects are generally reduced relative to those reported in the 2016 ES for the consented scheme.

Appendix A – Wind Tunnel Testing and Results

Wind Tunnel

The wind tunnel tests were carried out in Imperial College's boundary layer wind tunnel facility. This tunnel has a working section 3.0 m wide, 1.5 m high and 20 m long.

An atmospheric boundary layer, representative of the conditions at the site, was simulated using an arrangement of roughness elements distributed over the floor of the wind tunnel and a 2-dimensional barrier with spires at the entrance to the test section.

The boundary layer simulation was calibrated against the variation in mean wind speed and the intensity and scale of the turbulence with height above ground level appropriate to the site, based on profiles derived using the widely accepted Deaves and Harris log law wind model and a detailed terrain analysis for the area surrounding the site. This method yields a good approximation of the mean flow and turbulence characteristics and fully meets the requirements of clause NA2.2 'Guidance on design assisted by testing and measurements' from the UK National Annex to BS EN 1991-1-4:2005.

Figure A.1 presents the variation of mean wind speed, longitudinal turbulence intensity and gust wind speed used in the tests. The wind speed profiles are normalised by the mean wind speed at a reference height of 116 m.

Instrumentation

Measurements of pedestrian level wind speed were made using instruments known as Irwin probes. These are standard devices for such measurements. The probes consist of a small tube with a pit at its base. The pressure difference between the top of the tube and the pit is calibrated against wind speed. The top of the tube is set at an equivalent full-scale height of 1.5 m to measure wind speeds at pedestrian height. The sampling rate, combined with the wind tunnel running speed and the linear scale of the model, were appropriate to the model scale simulation used.

People subjected to fluctuating or gusty wind conditions will react to either the mean wind strength or to the maximum gust that occurs. For this reason, both the mean and maximum gust speeds were determined for each measurement location. The gust speed was then converted to a gust-equivalent-mean value based on a factor of $1 / 1.85$.

Measurements were made for a full range of wind directions in 22.5° increments. This is a standard and widely applied approach and is considered suitable to provide a robust and appropriate assessment, whilst helping optimise the testing efficiencies. The wind tunnel measurements were recorded as non-dimensional wind speed ratios relative to the wind tunnel reference wind speed.

Wind Tunnel Model

The wind tunnel model of the proposed development and existing / consented surrounding area was constructed by Multiservicesvs Ltd., based on drawings, a 3D CAD model and survey information provided by the design team from May to July 2022. The linear scale of the model is 1:300. The model was constructed on a circular baseboard of diameter 3.0 m, with the development located at the centre of the baseboard.

Existing mature trees were modelled in winter, or bare, format.

Figure A.2 illustrates the models for existing site conditions, the proposed development in the context of existing surrounding conditions and the proposed development with consented future surrounding developments. Details of key designed-in features are also presented.

Wind Climate Statistics

The wind climate, based on statistics from Manchester Airport for the period 2001 to 2015 transposed to apply to the site, is summarised in Figure A.3 in terms of the seasonal wind speed and direction probability distributions at a reference height of 116 m, corresponding to the approximate maximum roof height of the proposed development above the local ground level. The factors applied to correct the statistics from open-country terrain to reference height at the site are also presented.

Pedestrian Level Wind Environment Results

The measured wind speed ratios from the wind tunnel tests are combined with the wind statistics applicable to the site to assess the pedestrian level wind environment based on the Lawson criteria for pedestrian comfort and safety. The resulting annual and seasonal ratings for each measurement location are summarised in Figures A.4 for the following scenarios:

- Existing site conditions
- Proposed development with existing surrounds
- Proposed development with consented future surrounds

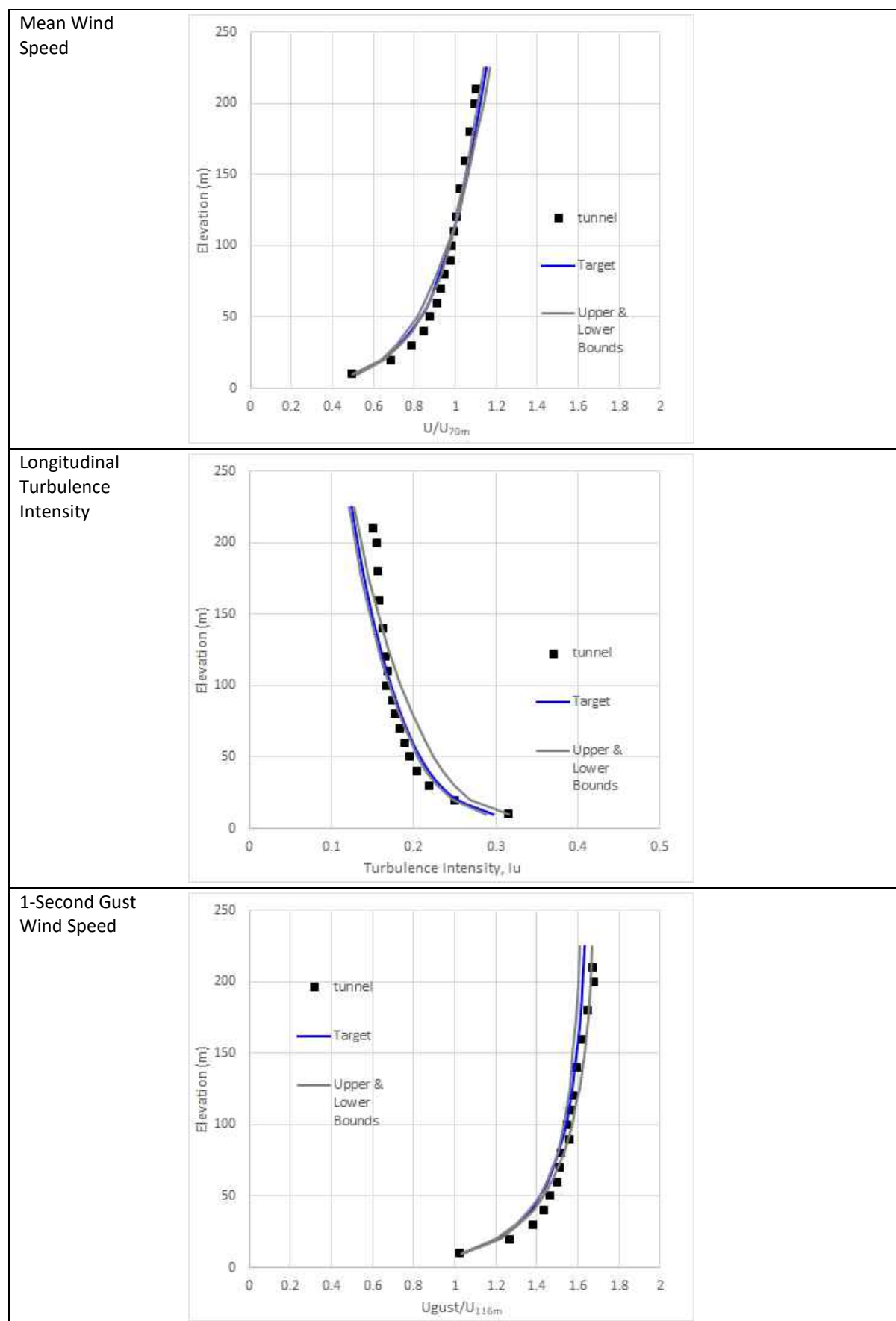
Figure A.1: Wind Tunnel Boundary Layer Simulation

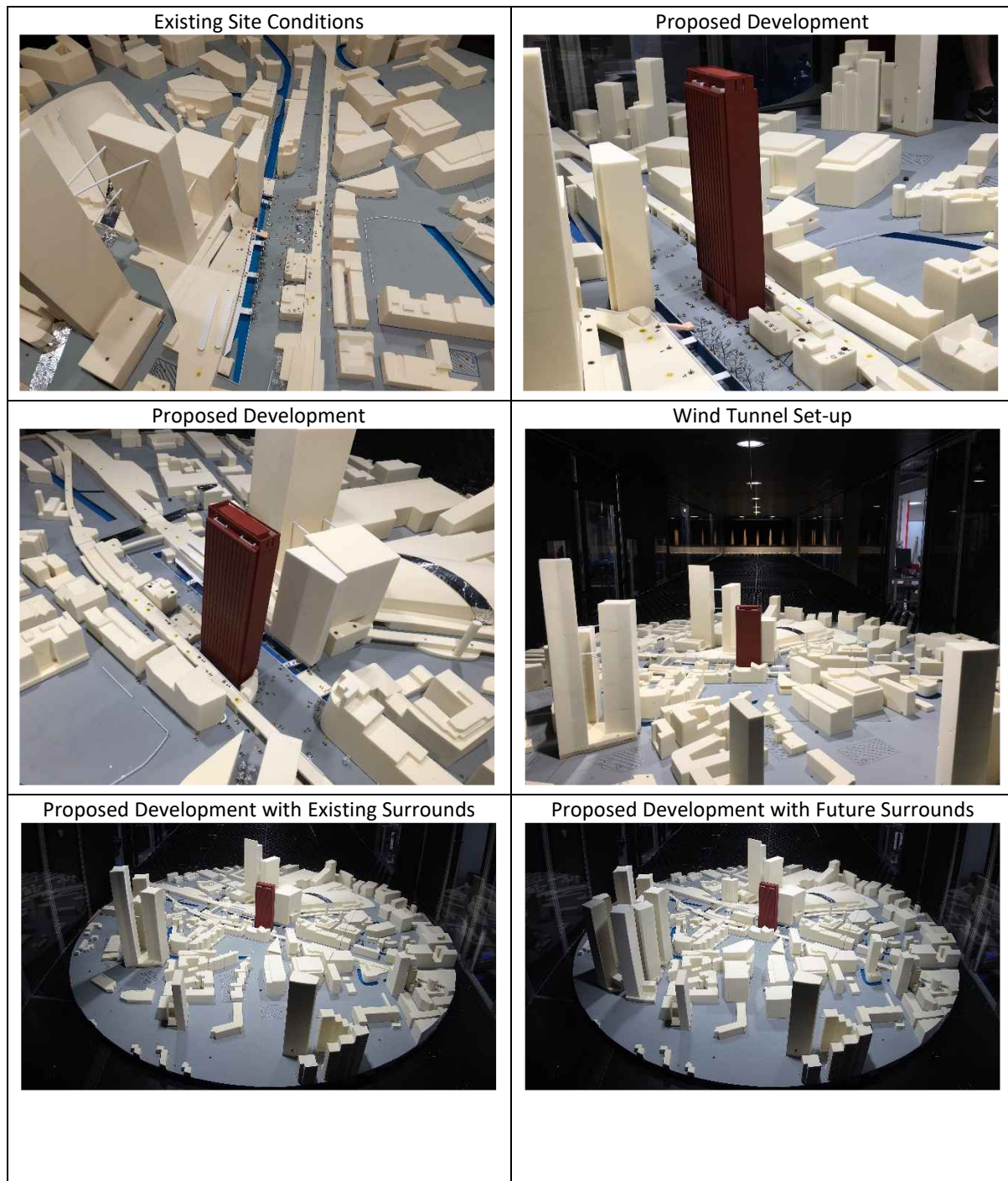
Figure A.2a: Wind Tunnel Models

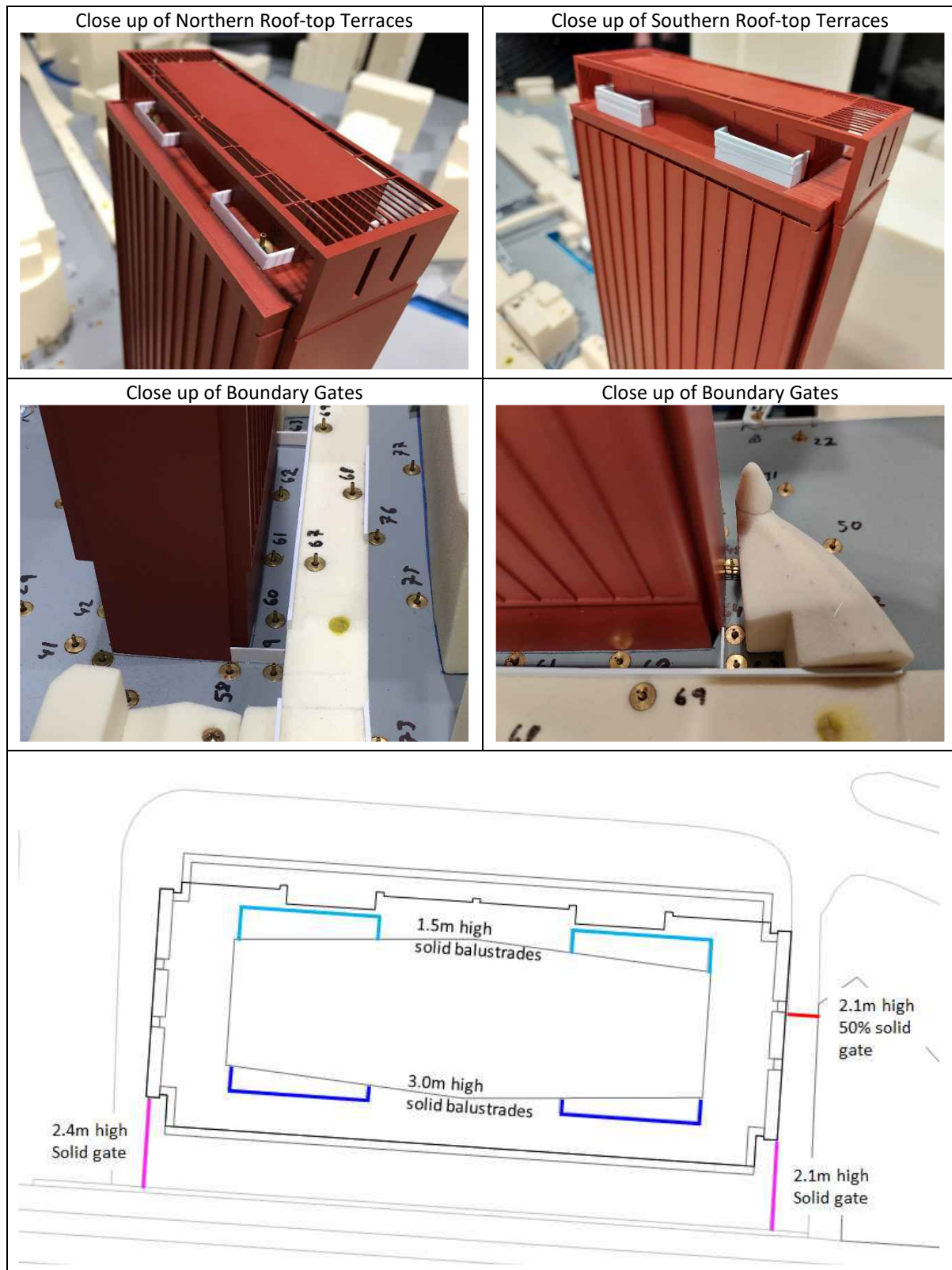
Figure A.2b: Wind Tunnel Models – Designed-In Features

Figure A.3a: Wind Speed Correction Factors, Open Country to Ref. Height (116m) at Site

Direction	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
Factor	1.37	1.35	1.34	1.33	1.35	1.36	1.36	1.36
Direction	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
Factor	1.35	1.35	1.35	1.37	1.37	1.37	1.37	1.37

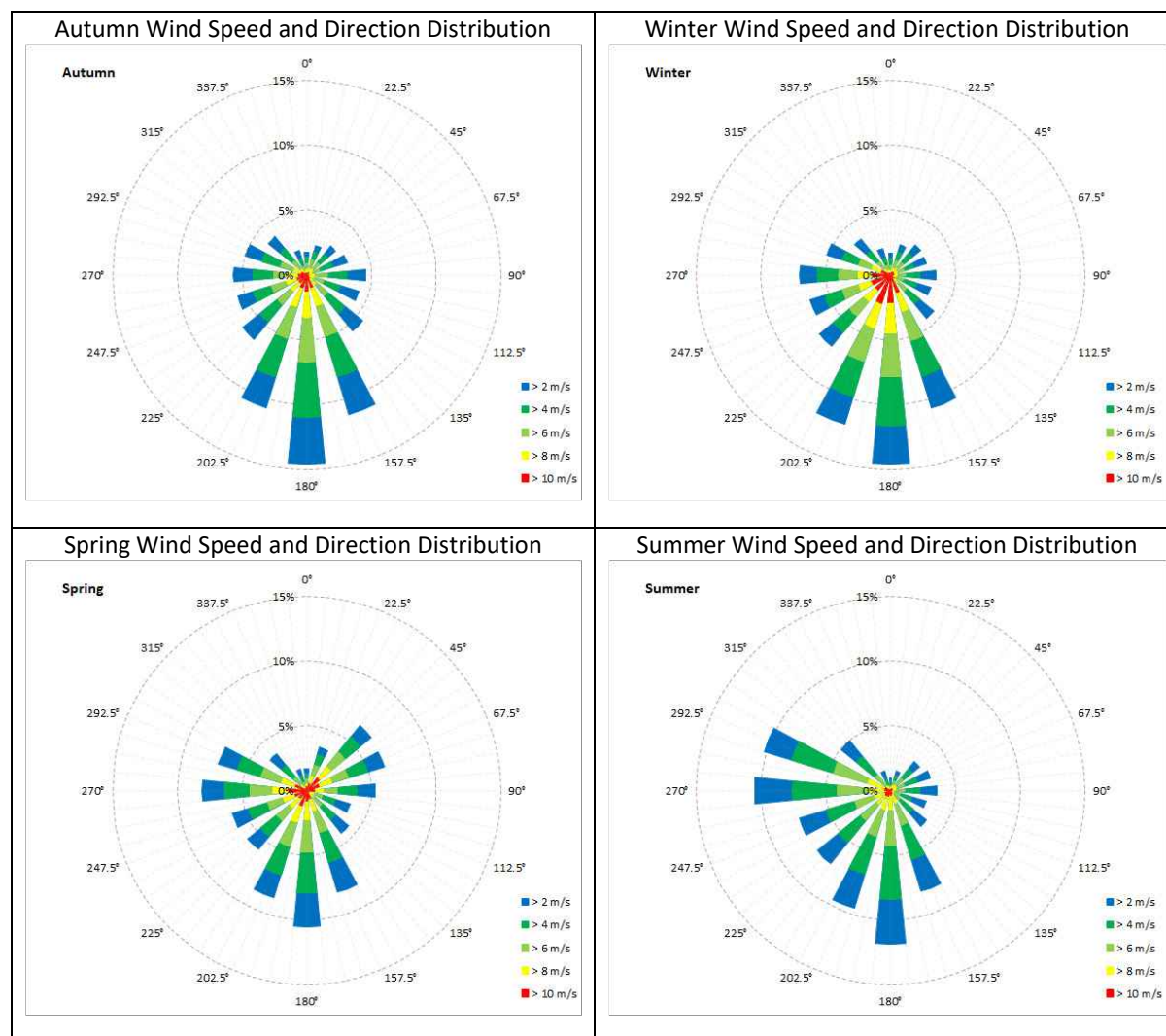
Figure A.3b: Wind Climate at Site (at reference height of 116m)

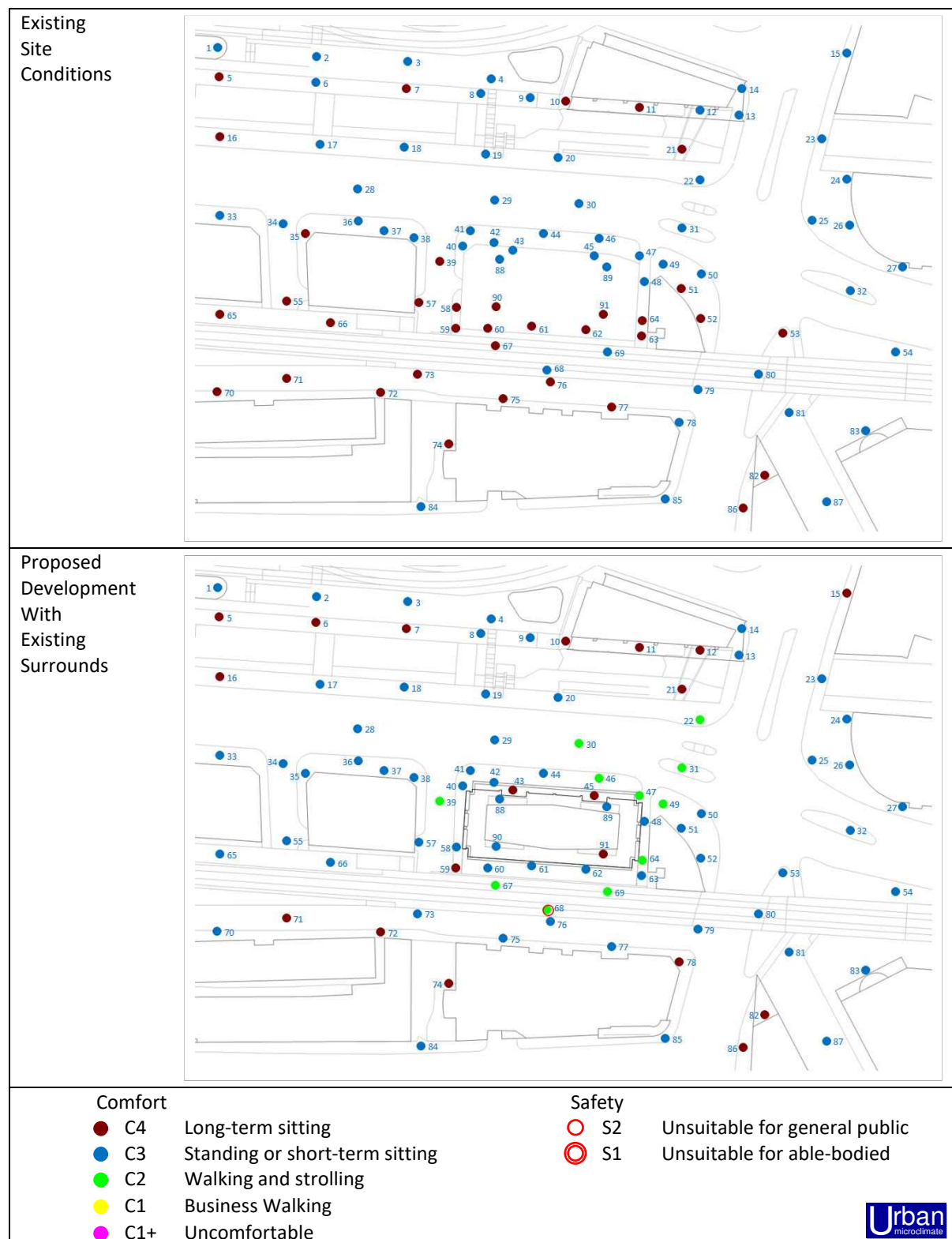
Figure A.4a: Wind Environment – Annual Comfort and Safety Ratings

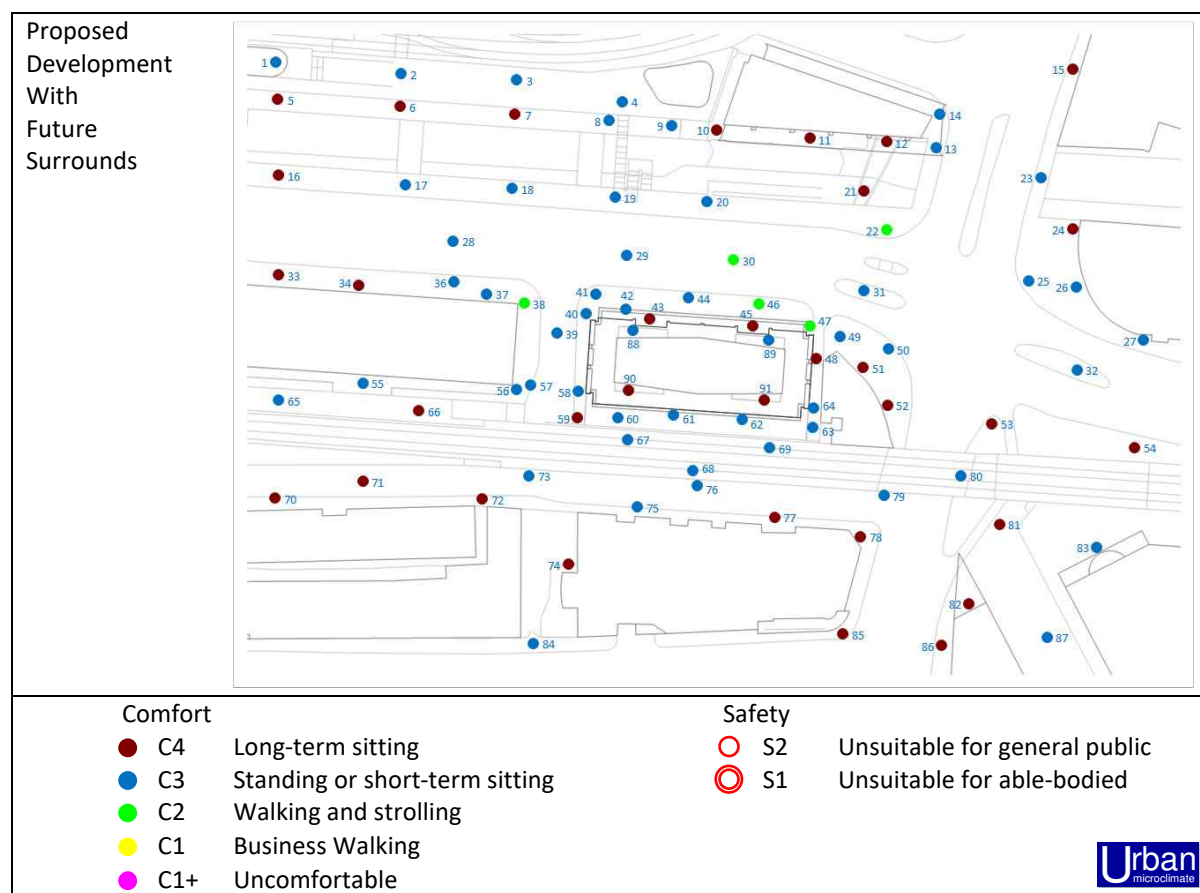
Figure A.4a: Wind Environment – Annual Comfort and Safety Ratings

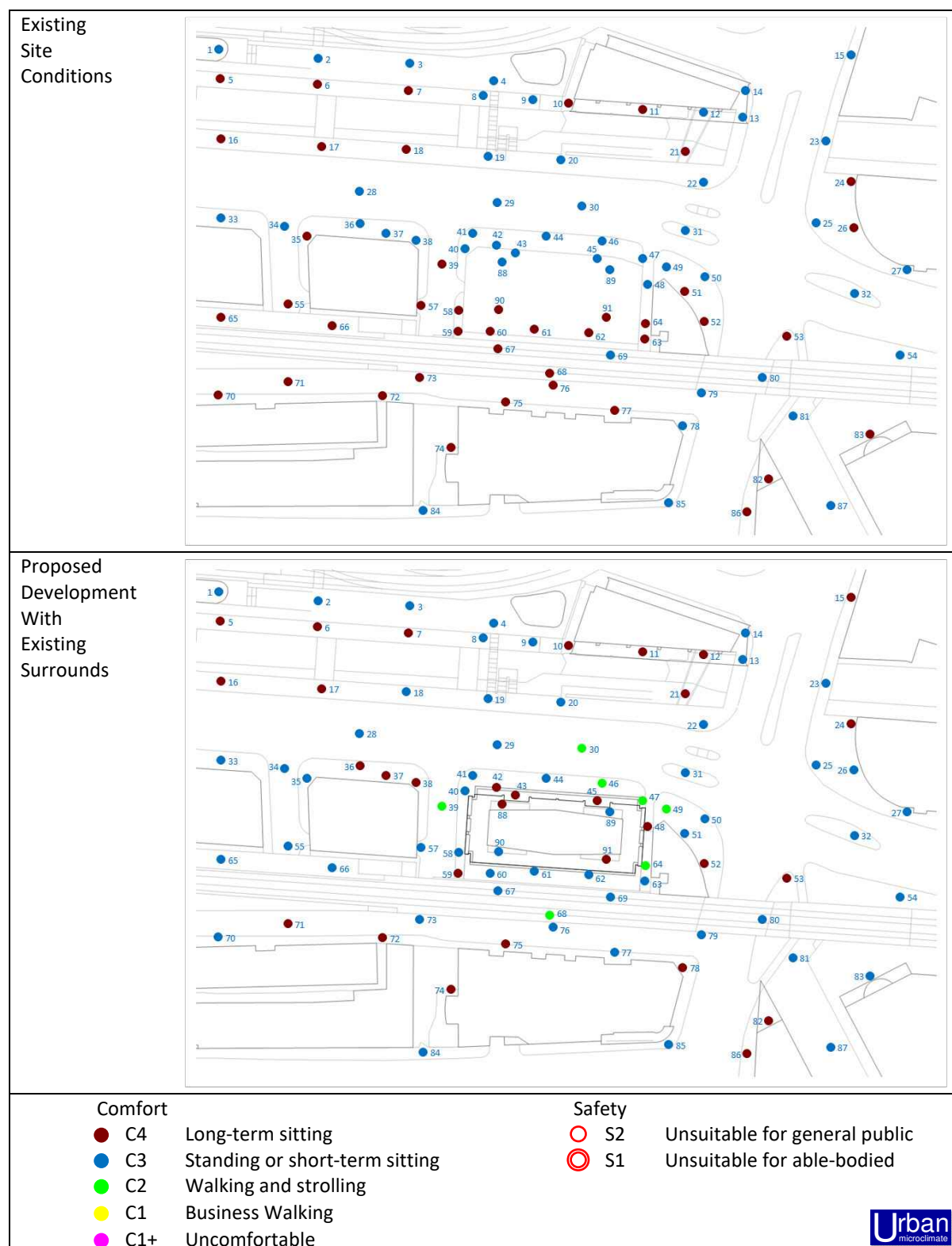
Figure A.4b: Wind Environment – Autumn Comfort and Safety Ratings

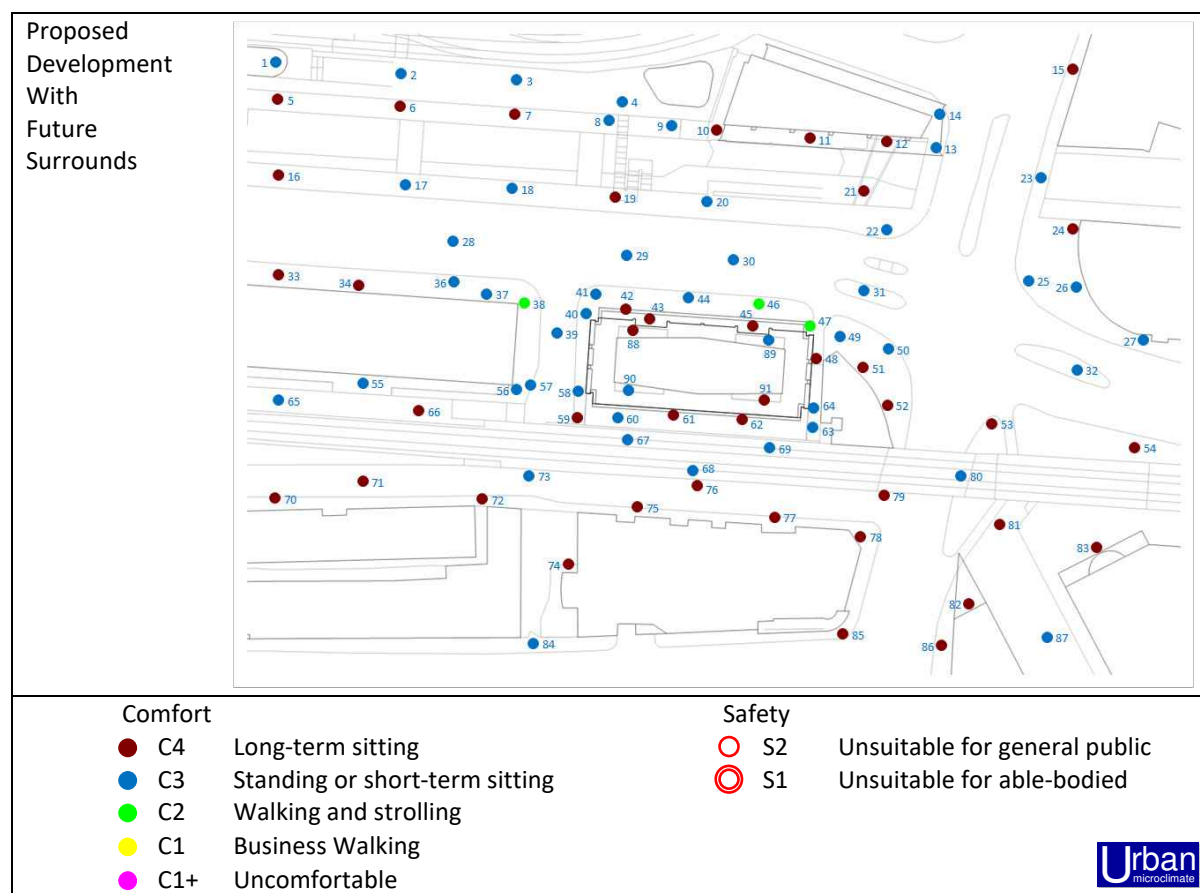
Figure A.4b: Wind Environment – Autumn Comfort and Safety Ratings

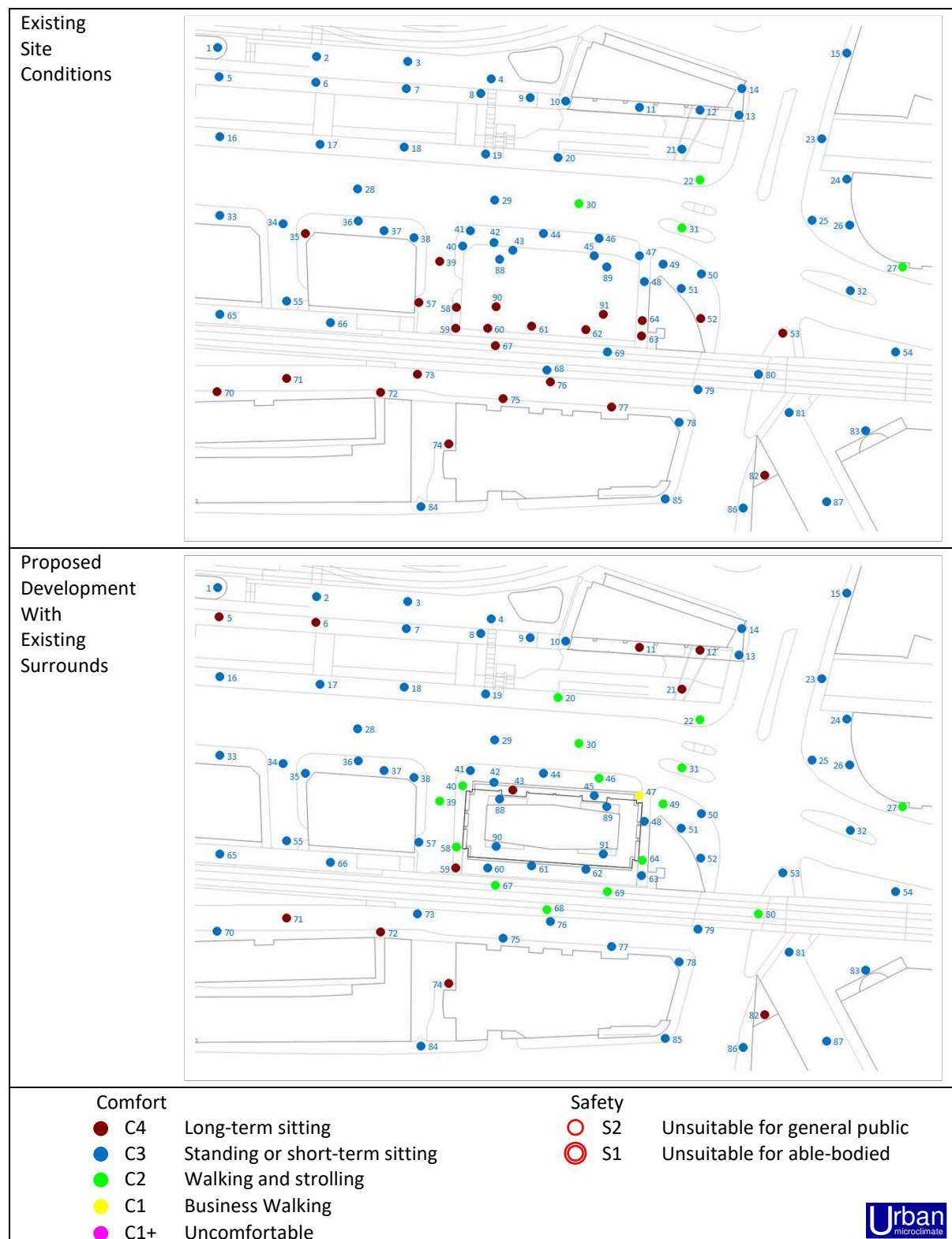
Figure A.4c: Wind Environment – Winter Comfort and Safety Ratings

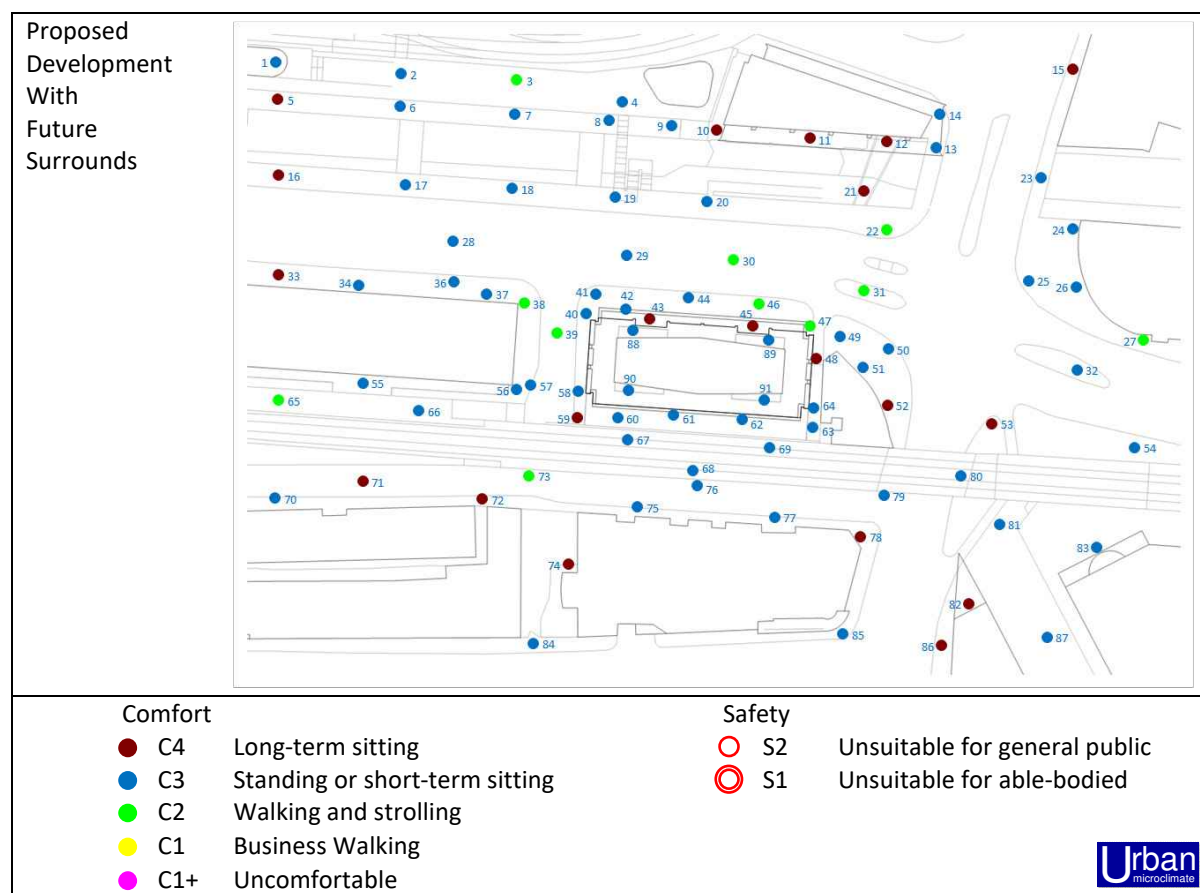
Figure A.4c: Wind Environment – Winter Comfort and Safety Ratings

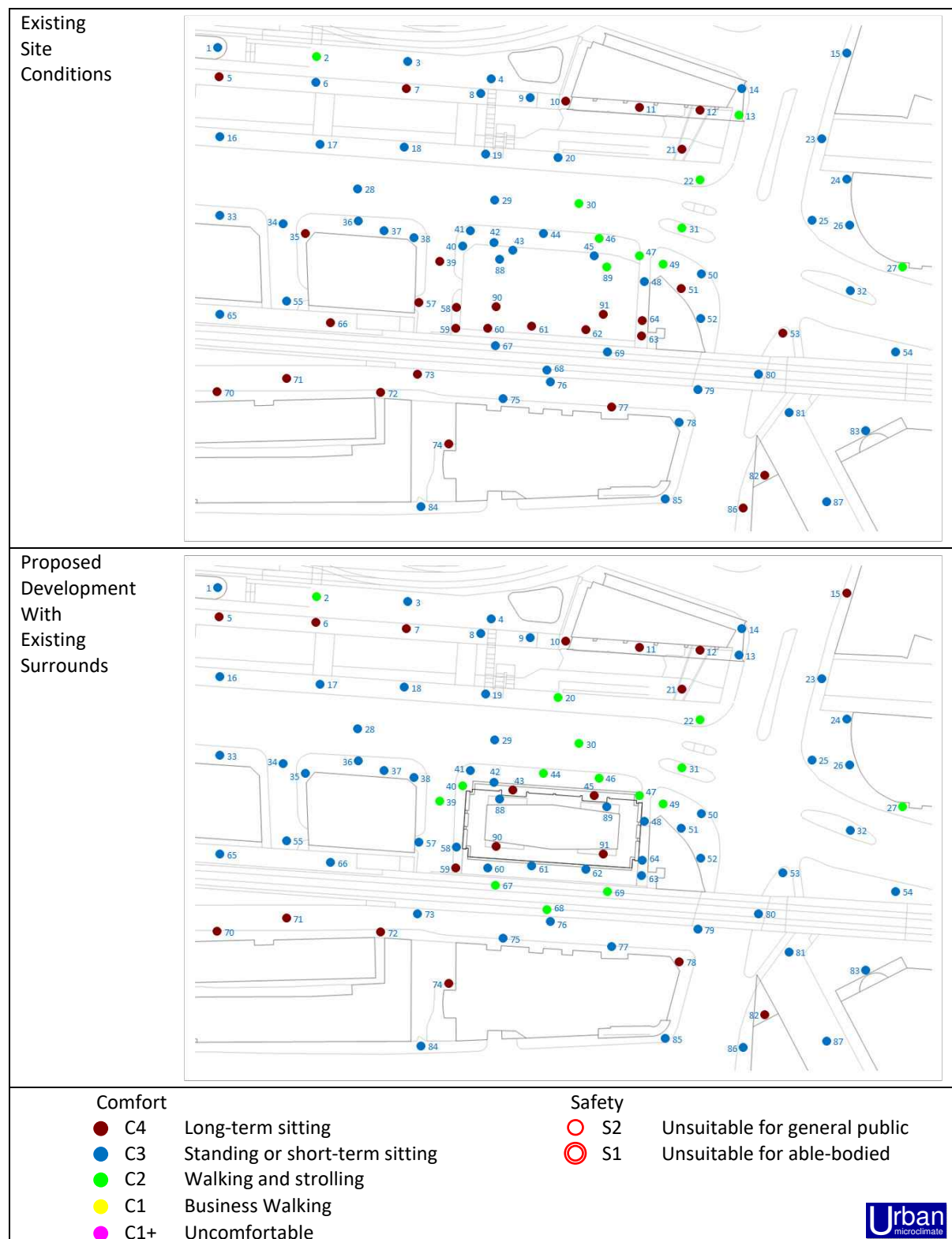
Figure A.4d: Wind Environment – Spring Comfort and Safety Ratings

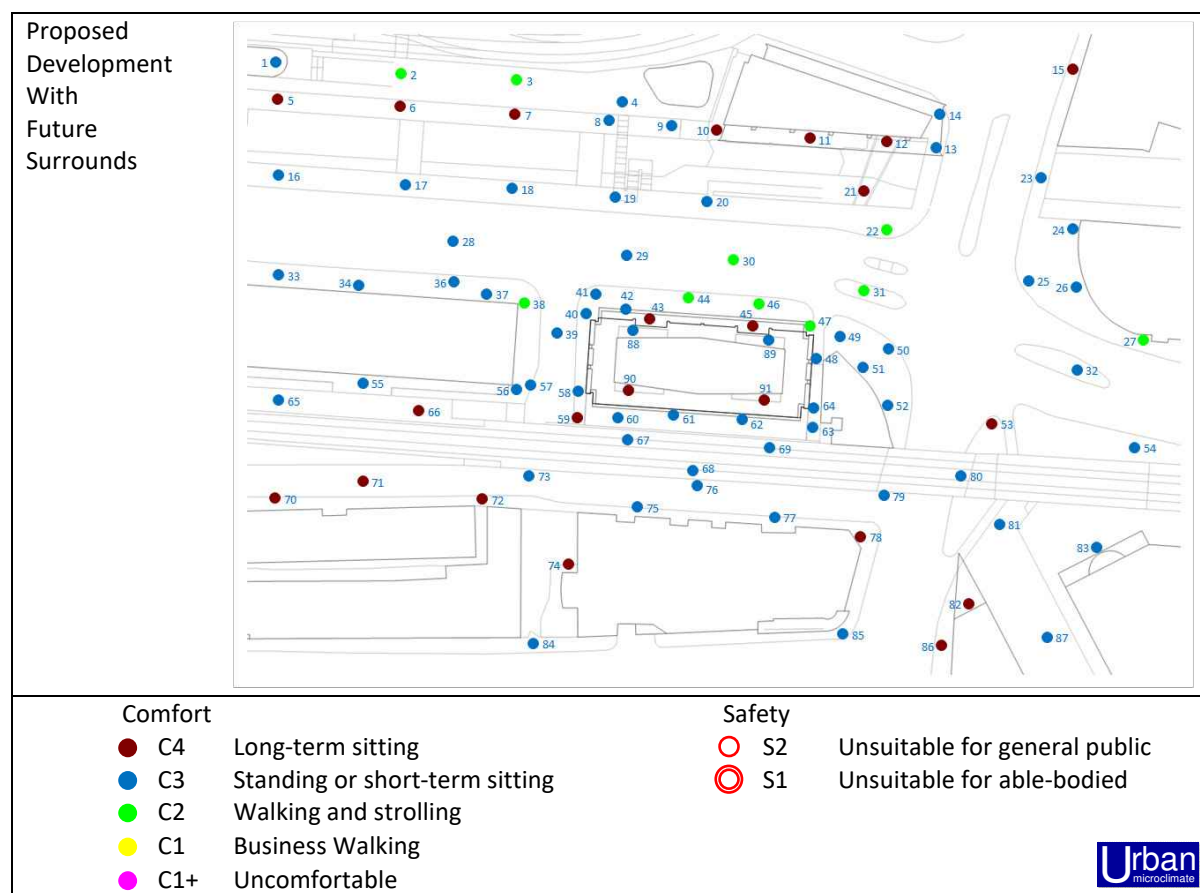
Figure A.4d: Wind Environment – Spring Comfort and Safety Ratings

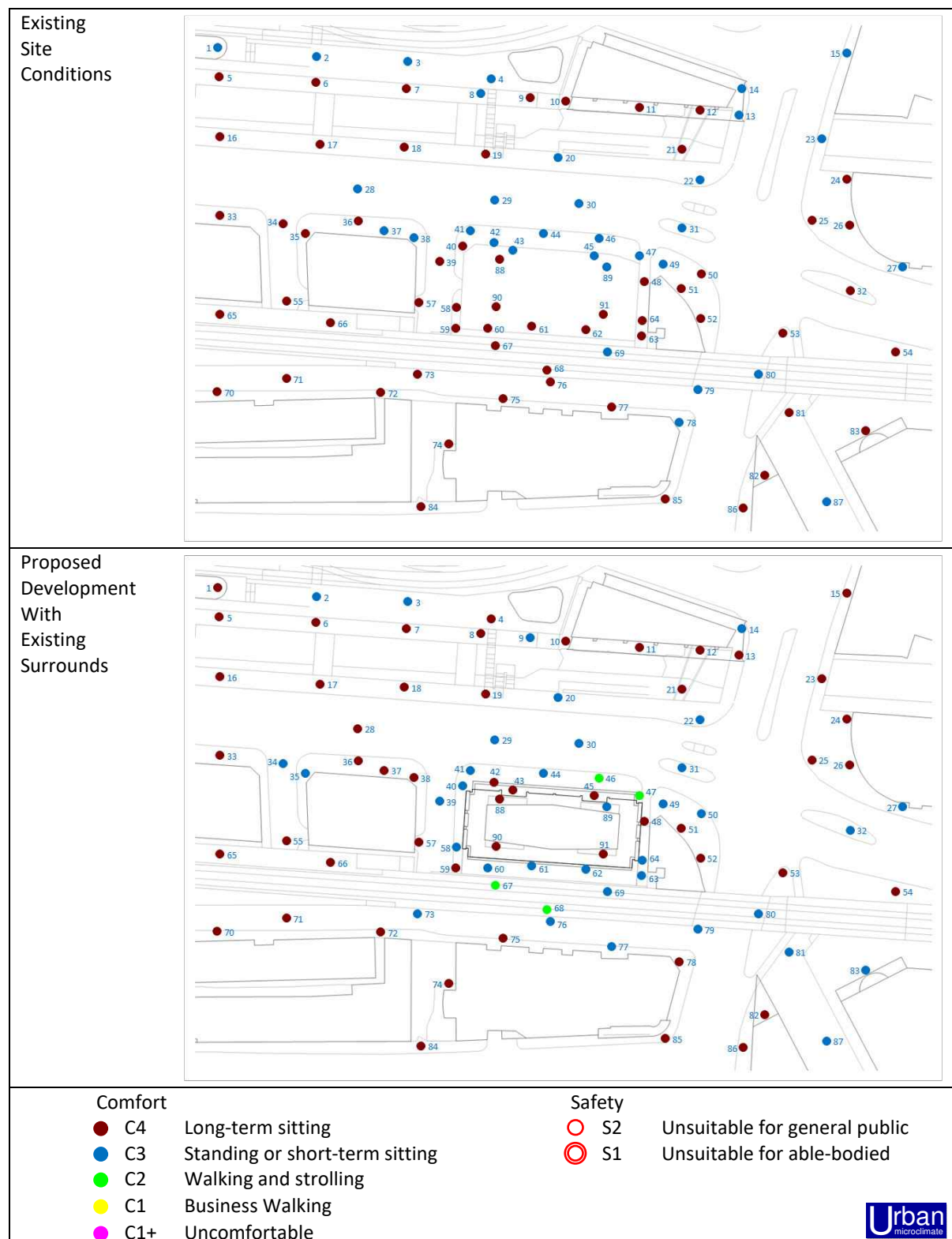
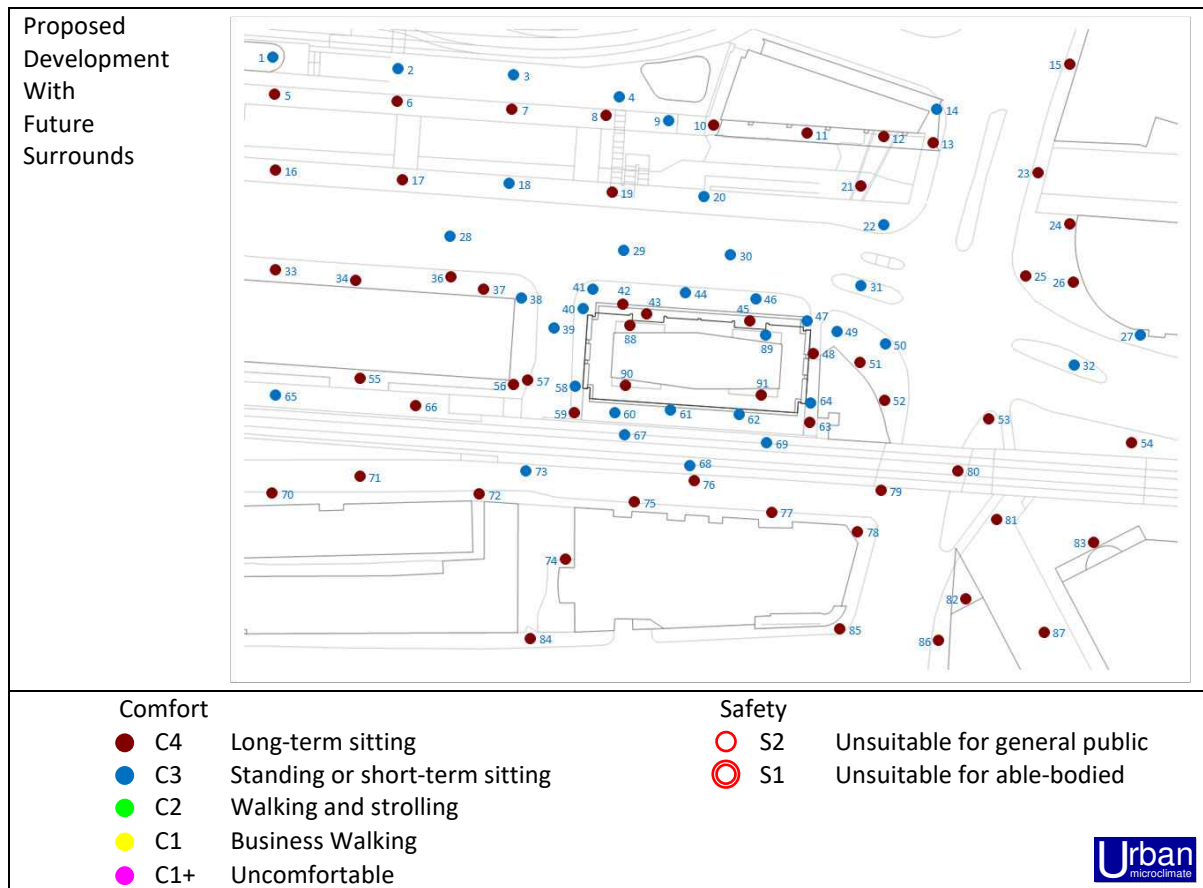
Figure A.4e: Wind Environment – Summer Comfort and Safety Ratings

Figure A.4e: Wind Environment – Summer Comfort and Safety Ratings

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