

90-102 REGENT STREET, REDFERN

Glare and Reflectivity Assessment

Prepared for:

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with The Trust Company (Australia) Limited ATF WH Gibbons Trust (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18313-R11-v3.0	2 October 2020	James Cleary	Neihad Al-Khalidy	Neihad Al-Khalidy
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EXECUTIVE SUMMARY

SLR Consulting Pty Ltd (SLR) has been engaged by The Trust Company (Australia) Limited ATF WH Gibbons Trust to assess the environmental impact of the proposed 90-102 Regent Street, Redfern student housing development, with regard to reflectivity of the facades. This report will form part of the application to the Department of Planning, Industry and Environment, reference number (SSD-10382).

SLR has initially identified areas that may be affected by adverse glare. Initial calculations showed that with uninterrupted glazed façades there will be some glare for motorists traveling along Regent Street, Gibbons Street, Marian Street, Cope Street, Redfern Street and a carpark in close proximity to the proposed site, though all glare conditions recorded for both motorists and pedestrians around the site were found to be below 500 Cd/m².

Further analysis is carried out considering the building forms, actual geometry and already planned mitigations outlined in **Section 3**. Based upon this assessment SLR has recommended the features identified below be retained or incorporated into the development design, in order to mitigate the potential for adverse glare from the development:

- Existing landscaping along Regent Street to be retained.
- Additional landscaping is recommended to be retained to Marian Street.
- Wing walls, façade articulations and setbacks should be retained.
- Retain setback of glazing from external façade.
- Fins provided to northern façade on level 15 are required to be provided at similar quantity and distribution to all northern facades from level 3 to 18. Alternatively screens like those used in earlier designs could be employed.
- Fins provided on level 15 are required to be provided at similar density to all east facades from level 3 to 18. Distribution of fins should be similar to that shown in previous designs.
- Glazing to the northern and eastern facades is to utilise anti-reflective clear glass with reflectivity coefficient of 10% or below

Taking into account all of the above, it is determined that the proposed Development will comply with the adopted glare limits.

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1 Introduction

SLR Consulting Pty Ltd (SLR) has been engaged by The Trust Company (Australia) Limited ATF WH Gibbons Trust to assess the environmental impact of the proposed 90-102 Regent Street, Redfern student housing development, with regard to reflectivity of the facades. This report will form part of the application to the Department of Planning, Industry and Environment, reference number (SSD-10382).

1.1 Development Site

The site is located at 90-102 Regent Street and is bounded by Marian Street to the north, Regent Street to the east and William Lane to the west, with a BP Service Station currently bounding the site to the south. The project site is currently occupied by low to mid-level mixed use development, which will be demolished to make way for the proposed.

Figure 1 Proposed Site Location

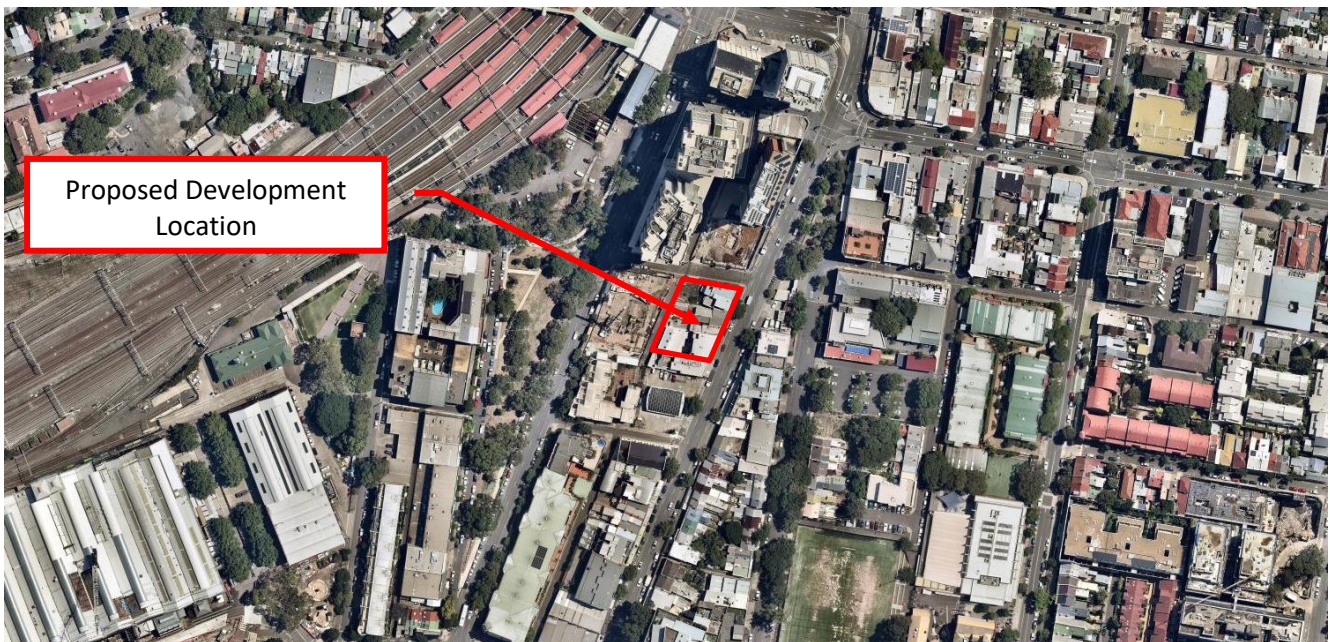


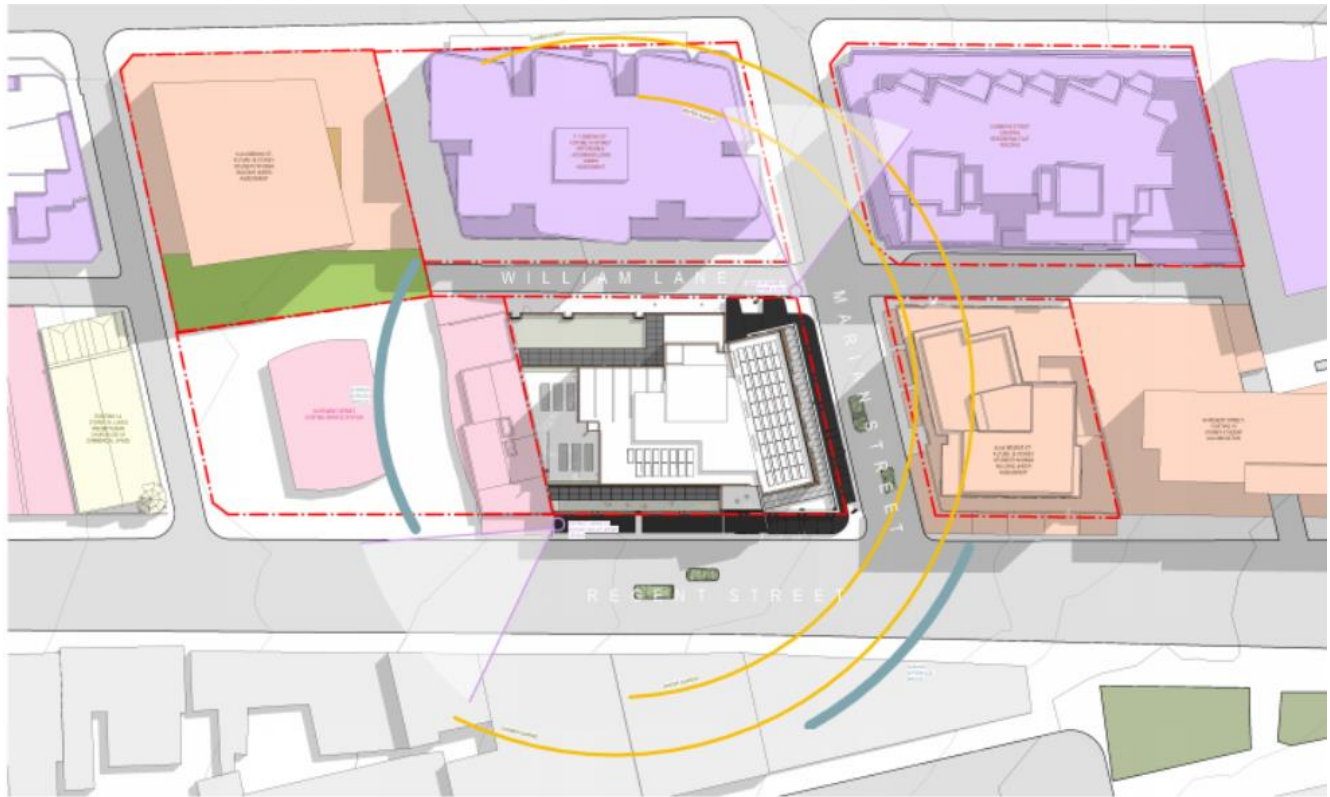
Image: Nearmap, 21 January 2020

1.2 Surrounds

Immediate surrounds of the site contain significant development at various stages of planning or completion. Immediately east of the site is a proposed 18 storey affordable housing building, with an 18 storey residential building to the northeast of the site at 9 Gibbons Street. Another 18-storey student housing development has been approved at 80-88 Regent Street, which sits just north of the site. In other directions the surrounding development is predominantly lower to medium level.

The site is approximately 150m southeast of Redfern Station.

Figure 2 Site and Surrounds Breakdown



1.3 Proposed Development Description

From the plans provided the proposed development comprises of the following:

- Ground Level with building office/reception, common area, retail tenancy, bike store and plant rooms;
- Level 2 with common area, outdoor areas and student apartments;
- Level 3-18 with student apartments; and
- No public access roof level.

2 Reflectivity Impact Methodology and Criteria

2.1 Glare Characteristics

With respect to the reflectivity impact of the proposed development, the following issues are relevant:

- At large incident angles (typically greater than 70°), the reflectivity of all glazing types *increases dramatically*. Thus, regardless of the glazing type, the potential for glare increases significantly when incoming solar rays can impact on a building close to parallel to the plane of the glazing.
- On a practical level, incoming solar rays with an altitude angle greater than 20° are intersected and obstructed by a typical windscreen roofline. In this Report, it is assumed that the sun altitude angle must be less than 25° to have the potential to produce a traffic disability glare event.
- Pedestrian discomfort glare can occur when the sun altitude is greater than 25°. However, in most such instances, a pedestrian has the ability to adjust their line of sight to a more horizontal view away from the glare source.
- It is assumed that glare events can only occur when the solar altitude is greater than about 3°, enabling the entire solar disc to be visible.

2.2 Glare Acceptability Criteria

The criteria used within this report to assess the acceptability or otherwise of glare events are the limiting values of the so-called “*Threshold Increment Value*”, or *TI Value*, of the reflection condition, as shown in.

Table 1 Threshold Increment (TI) Criteria

Glare Category	Classification	TI Acceptable Limit
Disability Glare	Major Roads	10
(for motorists)	Minor Roads	20

2.3 Threshold Increment Calculations

TI values are calculated in accordance with AS/NZS 4282-2019 and are the measure of disability glare expressed as the percentage increase in contrast required between an object and its background for it to be seen equally well with a source of glare present. Note: Higher values of TI correspond to greater disability glare. The calculation process involves the following:

- Set the source Point Spacing
- Set the Observer Height
- Set the Viewing Direction of the Observer
- Set the Windshield (windscreen) cut-off angle according to the requirement in the standard (20° for AS/NZS 4282:2019)
- Select the appropriate Adaptation Luminance in accordance with AS/NZS 4282:2019.
- Calculate the TI Value in accordance with AS/NZ 4282:2019 formulae.

SLR assessed TI Values at the identified assessment points in 5-minute intervals throughout the entire calendar year.

2.4 Reflectivity Methodology

SLR Consulting carries out reflectivity TI calculations using a three-stage screening process:

In the first stage, road traffic conditions are examined to exclude reflection conditions which are “*not possible*”.

- For example, traffic along streets can be one-way. Thus, it may not be possible for drivers to be impacted by solar reflections in certain instances if the reflected ray off a building of interest is in the same direction as the direction of travel of the motorist, i.e. the incoming reflection is from “behind” the motorist.
- The orientation of a building may mean that certain situations are not possible.

In the second stage, the potential for reflections is established by carrying out a “baseline” screening calculation.

- **In the “baseline” analysis, the facade of interest is assumed to consist totally of reflection-producing glazing.** The reflectivity coefficient of the glazing to be used is however taken into account in these baseline screening calculations.

If a reflection potential is established, the mitigating impacts of the façade structure are considered in the third stage:

Third stage assessment utilises the actual details of the facade geometry, taking into account recessing of glazing, blockage produced by horizontal and vertical shading elements, sections of masonry facade, etc. These features are assessed against second stage conditions capable of causing adverse glare, to determine the potential for façade reflections.

Where existing façade elements have been deemed insufficient to mitigate potential glare, SLR has calculated a suitable provision of blades or other practical reflective shielding for the proposed façade orientation to mitigate adverse glare conditions. Refer **Section 4**.

3 Glare Impact Analysis

3.1 Traffic Disability Glare

The proposed development has frontage to Regent Street, Marian Street and William Lane, with glazing provided to all available aspects to varying degrees. The façades will receive significant shielding to the west and north with shielding being limited to lower levels outside these aspects. **Figure 3** and **Figure 4** shows possible reflection conditions.

For the purposes of this analysis it is assumed that the development's glazing will have a reflectivity coefficient of *less than 20%*.

For this report Railway Lines, Redfern Street, Regent Street and Gibbons Street can be considered major roads, therefore the TI value will be required to be less than 10. All other roads in question can be considered as minor roads, which mean the required TI value will need to be less than 20.

Figure 3 Possible Reflectivity Conditions Lower Levels

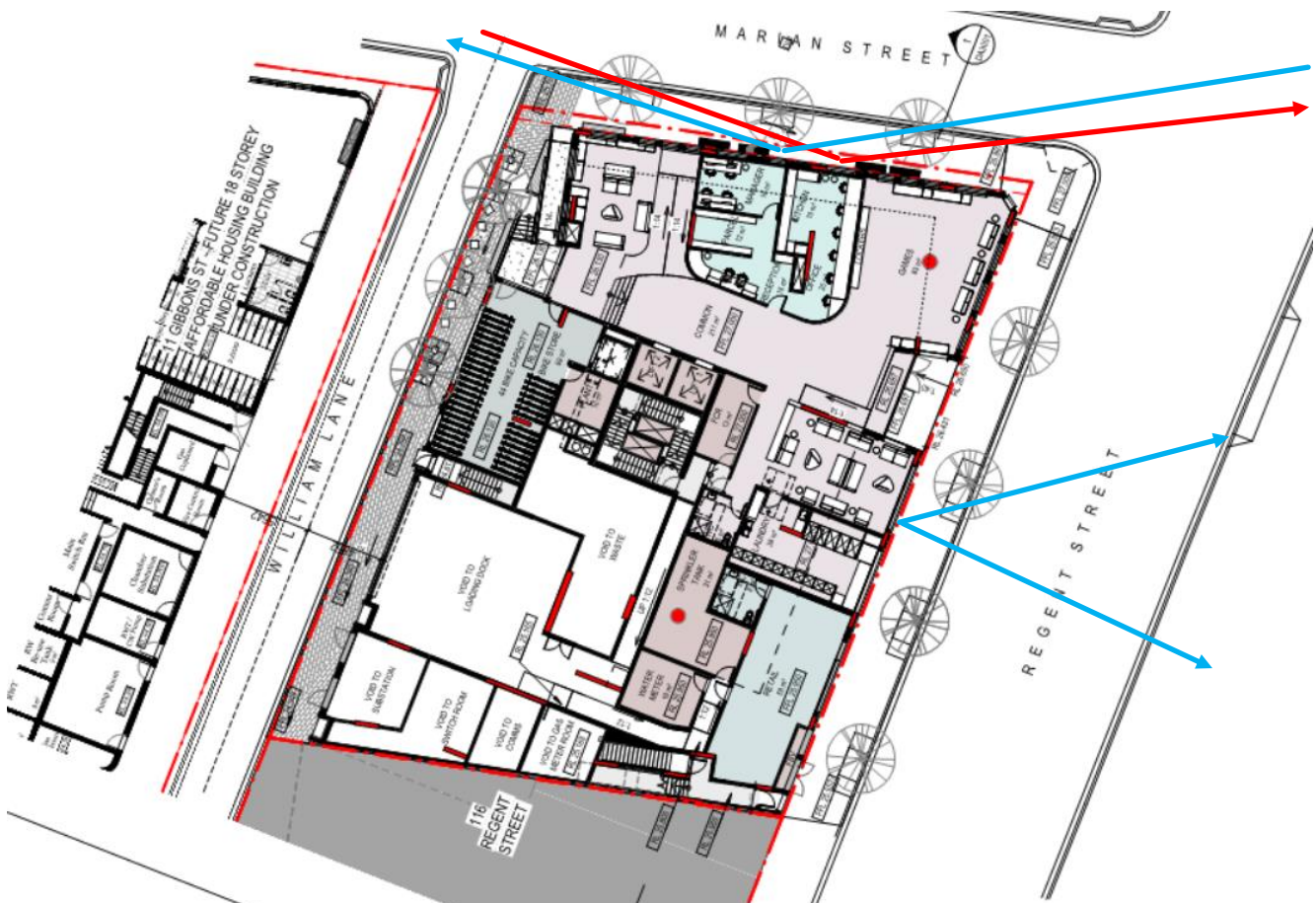


Figure 4 Possible Reflection Conditions Upper Levels (Level 15 Pictured)



Figure 5 Observer Points



3.1.1 Reflection Impacting on Railway Line

The potential risk of disability glare for motorists will be considered for north bound trains.

Western Façades

Reflection conditions associated with the developments western façades that have been examined are:

- Low altitude afternoon rays striking the façade and reflecting to the west, as shown in **Figure 4**.

3.1.2 Reflections impacting on Regent Street

The potential risk of disability glare for motorists will be considered for south bound traffic.

Northern Façades

Reflection conditions associated with the developments northern façades that have been examined are:

- Low altitude afternoon rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

Eastern Façades

Reflection conditions associated with the developments eastern façades that have been examined are:

- Low altitude morning rays striking the façade and reflecting to the north, as shown in **Figure 3** and **Figure 4**.

3.1.3 Reflection Impacting on Gibbons Street

The potential risk of disability glare for motorists will be considered for north bound traffic.

Western Façades

Reflection conditions associated with the developments western façades that have been examined are:

- Low altitude afternoon rays striking the façade and reflecting to the west, as shown in **Figure 3**.

3.1.4 Reflection Impacting on Marian Street

The potential risk of disability glare for motorists will be considered for west bound traffic.

Northern Façades

Reflection conditions associated with the developments northern façades that have been examined are:

- Low altitude afternoon rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

3.1.5 Reflection Impacting on William Lane

The potential risk of disability glare for motorists will be considered for south bound traffic.

Northern Façades

Reflection conditions associated with the developments northern façades that have been examined are:

- Low altitude afternoon rays striking the façade and reflecting to the west, as shown in **Figure 4**.

3.1.6 Reflection Impacting on Cope Street

The potential risk of disability glare for motorists will be considered for north bound traffic.

Eastern Façades

Reflection conditions associated with the developments eastern façades that have been examined are:

- Low altitude morning rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

3.1.7 Reflection Impacting on Turner Street

The potential risk of disability glare for pedestrians will be considered for west bound pedestrians.

Eastern Façades

Reflection conditions associated with the developments eastern façades that have been examined are:

- Low altitude morning rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

Northern Façades

Reflection conditions associated with the developments northern façades that have been examined are:

- Low altitude afternoon rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

3.1.8 Reflection Impacting on Redfern Street

The potential risk of disability glare for motorists will be considered for west bound traffic.

Eastern Façades

Reflection conditions associated with the developments eastern façades that have been examined are:

- Low altitude morning rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

Northern Façades

Reflection conditions associated with the developments northern façades that have been examined are:

- Low altitude afternoon rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

3.1.9 Reflection Impacting on Carpark

The potential risk of disability glare for motorists will be considered for west bound traffic.

Eastern Façades

Reflection conditions associated with the developments eastern façades that have been examined are:

- Low altitude morning rays striking the façade and reflecting to the east, as shown in **Figure 3** and **Figure 4**.

3.2 Initial Calculations

3.2.1 Railway Line

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be no glare for trains travelling along the railway line.

3.2.2 Regent Street

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be some glare for motorists travelling south. The maximum TI value calculated was 14.4, which is above the allowable limit of 10. The occurrence was recorded on the 19th of June, at 9:45 am.

3.2.3 Gibbons Street

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be some glare for motorists travelling north. The maximum TI value calculated was 1.3, which is below the allowable limit of 10.

3.2.4 Marian Street

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be some glare for motorists travelling west. The maximum TI value calculated was 32.5, which is above the allowable limit of 20. The occurrence was recorded on the 13th of September, at 5:00pm.

3.2.5 Cope Street

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be some glare for motorists travelling north. The maximum TI value calculated was 12.4, which is below the allowable limit of 20.

3.2.6 Turner Street

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be no glare for motorists travelling along Turner Street.

3.2.7 Redfern Street

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be some glare for motorists travelling west. The maximum TI value calculated was 7.2, which is below the allowable limit of 10.

3.2.8 Carpark

Preliminary calculations show that (assuming uninterrupted glazing flush with building perimeter) there will be some glare for motorists travelling west. The maximum TI value calculated was 8.7, which is below the allowable limit of 20.

3.3 Further Analysis

From plans and elevations provided, it is evident the building exterior is not 100% glazing and contains a number of features that will reduce the solar reflectivity off the façades. These include:

- Materials other than glazing used. There are areas of the façade that are not glazed.
- Some glazed areas are also set back from the façade.
- Wing walls provide shielding from adverse glare associated with apartment glazing.
- Screens have been provided to some north aspect glazing.
- Existing landscaping will provide shielding to lower level facades.
- Awnings have been provided over glazing, particularly to lower levels.

- The model used assumed that there were no surrounding buildings. In reality it can be seen that there are significant buildings, both planned and existing around the site to the north, east, south and west. It is likely that these buildings will provide shielding at certain times of the year.

SLR has reviewed these design features against the angle of incidence, azimuth angle and façade position associated with recorded exceedances found in the initial assessment. Through this further assessment SLR has calculated where façade features will mitigate incoming solar rays associated with adverse glare conditions.

3.4 Pedestrian Discomfort Glare

The initial calculations show that there will be some glare for pedestrians around the proposed development. The values calculated were all above the allowable limits of 3 and 2 for footpaths and pedestrian crossings. Recommendations:

TI values will likely be reduced due the reasons mentioned in **section 3.3**.

Pedestrians are also able to adjust their line of sight to reduce the effects of discomfort glare.

4 Planned Mitigation Treatments and Recommendations

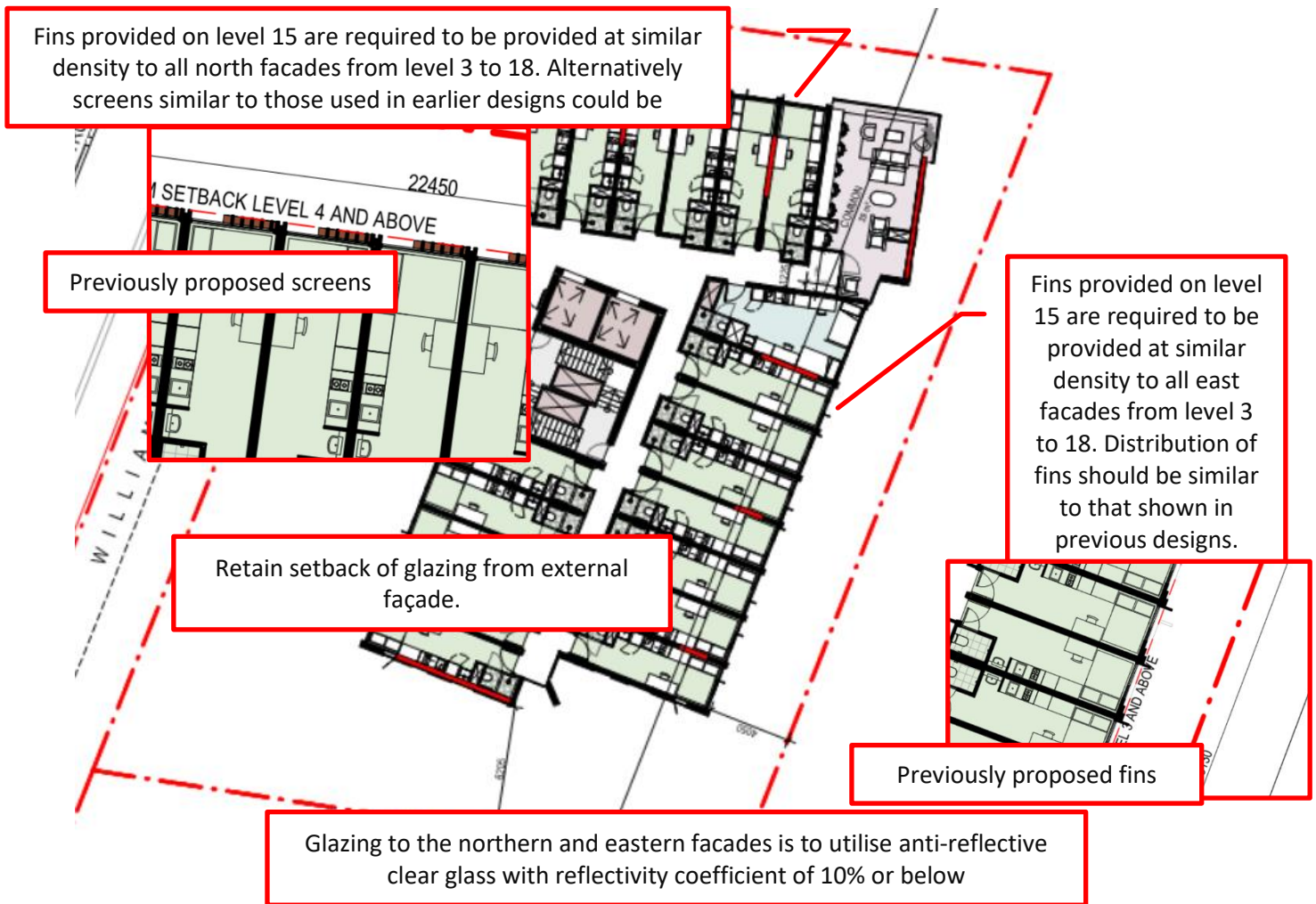
Having considered areas of the façade assessed as having a potential for adverse glare conditions in the initial stages, SLR undertook detailed assessment against recorded glare conditions noting angle of incidence, azimuth angle and facade position. These results are then examined against the existing façade geometry and features to consider if glare conditions are possible, given mitigating façade features such as façade mullion protrusions, screens, façade wing walls, blades, etc. Where existing façade elements have been deemed insufficient to mitigate potential glare, additional recommendations have been put forward.

With an aim to ensure that there are no elements within the proposed development capable of causing adverse disability or discomfort glare, SLR has reviewed the development in relation to glare, with additional building elements incorporated into the design. Based off this, recommendations outlined below are to be provided to the façades of the proposed development in order to mitigate the potential for adverse glare conditions:

- Existing landscaping along Regent Street to be retained.
- Additional landscaping is recommended to be retained to Marian Street.
- Wing walls, façade articulations and setbacks should be retained.
- Retain setback of glazing from external façade.
- Fins provided to northern façade on level 15 are required to be provided at similar quantity and distribution to all northern facades from level 3 to 18. Alternatively screens like those used in earlier designs could be employed.
- Fins provided on level 15 are required to be provided at similar density to all east facades from level 3 to 18. Distribution of fins should be similar to that shown in previous designs.
- Glazing to the northern and eastern facades is to utilise anti-reflective clear glass with reflectivity coefficient of 10% or below

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Figure 7 Façade Treatment – Upper Levels



5 Conclusion

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Further analysis is carried out considering the building forms, actual geometry and already planned mitigations outlined in **Section 3**. Based upon this assessment SLR has recommended the features identified below be retained or incorporated into the development design, in order to mitigate the potential for adverse glare from the development:

- Existing landscaping along Regent Street to be retained.
- Additional landscaping is recommended to be retained to Marian Street.
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Taking into account all of the above, it is determined that the proposed Development will comply with the adopted glare limits.

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