

Jordan Springs East Town Centre

Noise Impact Assessment

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1 INTRODUCTION

Acoustic Logic Consultancy (ALC) have been engaged to conduct an acoustic assessment of noise impacts associated with the Jordan Springs East Town Centre development. This report addresses noise impacts associated with noise intrusion from external noise sources to the proposed development and establishing appropriate criteria for the future assessment of noise emissions.

In this report we will:

- Identify relevant Council and Environment Protection Authority (EPA) noise emission criteria applicable to the development.
- Conduct an assessment of traffic noise impacts on the development;
- Discuss potential impacts on the residential component from the operation of retail/commercial tenancies;
- Provide preliminary/indicative acoustic treatments to the building façade if required to mitigate intrusive noise sources into the residential component.
- Identify nearby noise sensitive receivers and noise sources with the potential to adversely impact nearby developments.
- Assess noise emissions associated with mechanical plant in principle in conjunction with noise emission criteria.

This assessment has been conducted based on the architectural drawings provided by *PBD Architects* for the project (Project Number 1909, Issue P4, dated 27.09.2019).

2 SITE DESCRIPTION

Jordan Springs East Town Centre is proposed to be located on the eastern portion of the Jordan Springs East development. Adjacent to the site will be the internal collector road Wianamatta Drive which will provide linkage to Jordan Springs West and Ropes Crossing. The proposal includes the following uses:

- Ground floor retail including
 - Supermarket
 - Cafés / Take Away Food / Restaurants
 - Liquor Store
 - Medical Centre & Pharmacy
 - Swim School
- Level 1 commercial including:
 - Childcare Centre accommodating up to 154 children;
 - Gym
- Residential apartments and town houses above. In total there are 122 apartments and 13 townhouses proposed.

Generally surrounding the site are proposed single dwelling homes on newly subdivided land.

Refer to Figures 1 & 2 for site context and description.



Project Site

Figure 1 – Site Context

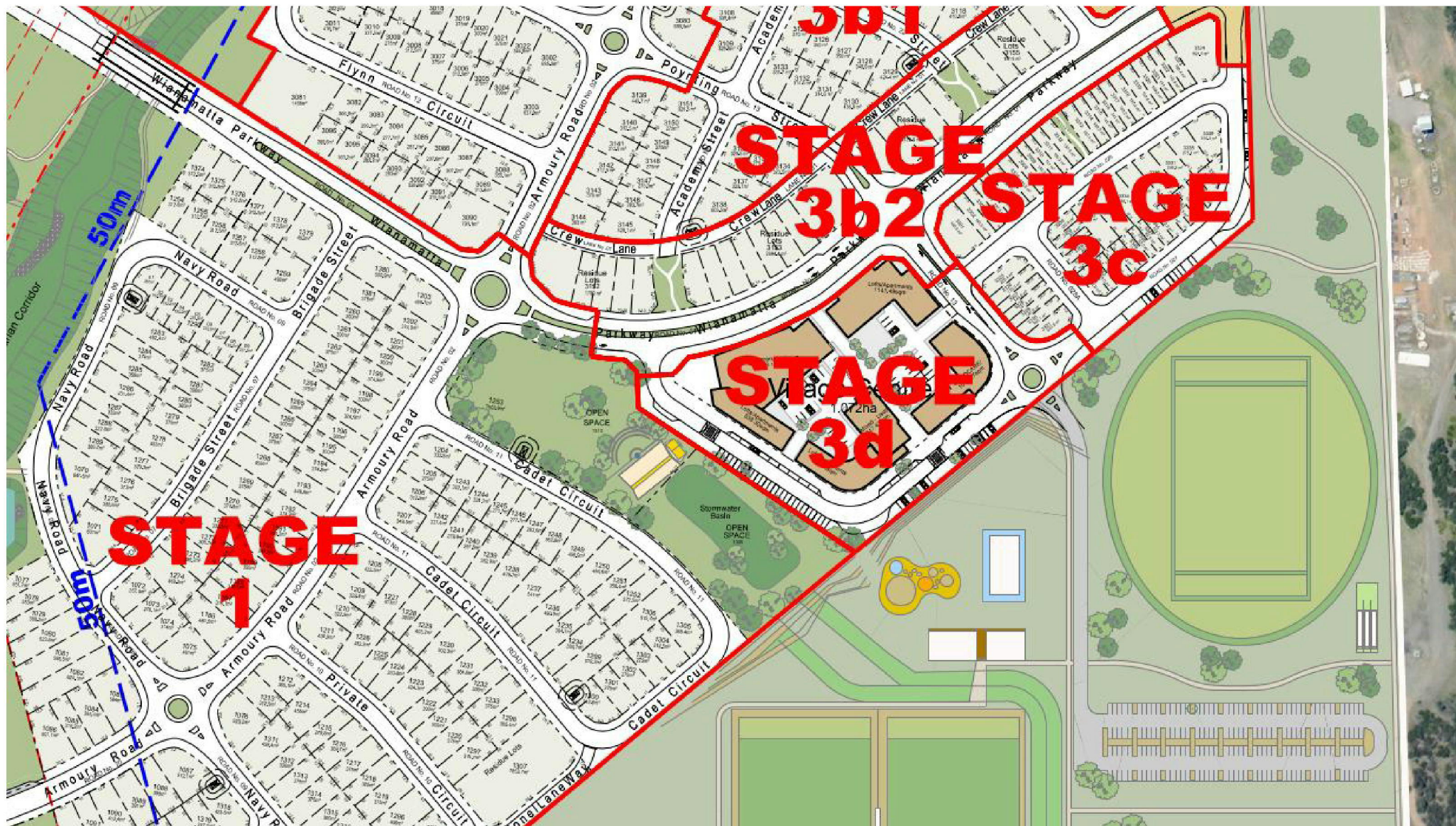


Figure 2 – Approved Masterplan Development

3 ENVIRONMENTAL NOISE DESCRIPTORS

Environmental noise constantly varies. Accordingly, it is not possible to accurately determine prevailing environmental noise conditions by measuring a single, instantaneous noise level.

To accurately determine the environmental noise a 15-20 minute measurement interval is utilised. Over this period, noise levels are monitored on a continuous basis and statistical and integrating techniques are used to determine noise description parameters.

In analysing environmental noise, three-principle measurement parameters are used, namely L_{10} , L_{90} and L_{eq} .

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

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

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

The L_{eq} parameter represents the average noise energy during a measurement period. This parameter is derived by integrating the noise levels measured over the 15 minute period. L_{eq} is important in the assessment of environmental noise impact as it closely corresponds with human perception of a changing noise environment; such is the character of environmental noise.

The L_{max} parameter represents the highest noise level during a given measurement period.

4 NOISE INTRUSION ASSESSMENT

Intrusive noise impacts on the residential component will primarily be from road traffic noise from the adjacent Wianamatta Drive.

4.1 TRAFFIC NOISE CRITERIA

Traffic noise impacts on the residential component of the development have been addressed in accordance with the requirements of the Penrith City Council and NSW Department of Planning requirements

4.1.1 Penrith City Council Development Control Plan 2014

Section C12 of the Penrith DCP details noise & vibration requirements for the site. Whilst generally guidance is given in regard to considerations for road traffic noise, there is no specific criteria detailed. Rather, the DCP refers to *relevant State Government authorities or agencies* – in this case the most appropriate policy for the assessment of road traffic noise would be NSW Planning's *Development Near Rail Corridors and Busy Roads* (DNRCBR). The specific requirements of this policy are detailed in the following section.

4.1.2 NSW Department of Planning – Development Near Rail Corridors and Busy Roads

Table 3.1 of the DNRCBR details the recommended internal noise criteria for various occupancies. A summary of the relevant criteria is detailed below.

Table 1 – Internal Noise Criteria

Type of Occupancy	Noise Level	Applicable Time Period
Residential Sleeping Areas (bedrooms)	35 dB(A) $L_{eq(9hr)}$	10pm – 7am
Residential Other Habitable Spaces	40 dB(A) $L_{eq(15hr)}$	Any Time
Child Care Centres	40 dB(A) $L_{eq(15hr)}$	When in Use

Furthermore, the NSW Department of Planning document "Development near Busy Roads and Rail Corridors - Interim Guideline" dictates that:

If internal noise levels with windows or doors open exceed the criteria by more than 10dB(A), the design of the ventilation for these rooms should be such that occupants can leave windows closed, if they so desire, and also to meet the ventilation requirements of the Building Code of Australia.

With windows open, the allowable internal noise goal is permitted to be 10dB(A) higher than when the windows are closed (ie – allowable level becomes 50 dB(A) in living rooms and 45 dB(A) in bedrooms at night). Given that a 10dB(A) reduction can be achieved across a façade open enough to satisfy ventilation requirements, this corresponds to an external noise level of 60dB(A) $L_{eq\ 15hour}$ and 55dB(A) $L_{eq\ 9\ hour}$.

4.1.3 Australian Standard AS2107:2016 – Recommended Design Sound Levels and Reverberation Times for Building Interiors

Australian Standard AS 2107-2016: *Recommended design sound levels and reverberation times for building interiors* specifies recommended internal noise levels for internal spaces. Table 2 details recommended sound levels for areas not addressed by the NSW Planning document applicable to the proposed redevelopment.

Table 2 – Recommended Design Sound Levels of AS2107:2016

Space /Activity Type	Recommended Maximum Design Sound Level
Coffee Shops / Restaurants	45 dB(A) _{Leq}
Small Retail Stores (General)	< 50 dB(A) _{Leq}

4.1.4 Internal Noise Objectives from Road Noise Sources

A summary of the projects internal noise level criteria are detailed in the table below.

Table 3 – Project Assessment Criteria

Space /Activity Type	Time	Assessment Criteria
Residential	Living Areas (Daytime 7am – 10pm)	40 dB(A) _{Leq(15hr)}
	Sleeping Areas (Night-time only 10pm – 7am)	35 dB(A) _{Leq(9hr)}
Child Care	When in Use	40 dB(A) _{Leq(15hr)}
Coffee Shops / Restaurants	When in Use	45 dB(A) _{Leq(15hr)}
General Retail	When in Use	50 dB(A) _{Leq(15hr)}

4.2 PREDICTED TRAFFIC NOISE LEVELS

CoRTN road traffic model is used to calculate traffic noise levels resultant on the façades of the future developments, based on the traffic volumes provided by WSP for the site (*Jordan Springs East Stage 3D – Traffic Impact Assessment*, Project Number 2197037A, dated June 2018). Noise level predictions are based on the following;

Peak hour traffic volumes are provided in the report for intersections on either side of the town centre;

- Intersection of Road 1 & Road 2 (west of site);
 - AM Peak – 941 vehicles/hour total
 - PM Peak – 1162 vehicles/hour total
- Intersection of Road 1 & Road 13 (east of site);
 - AM Peak – 997 vehicles/hour total
 - PM Peak – 1105 vehicles/hour total

It has been assumed that traffic during regular daytime hours (i.e. outside of AM/PM peaks) is approximately 80% of peak volumes as well as a day/night traffic split of 85/15 percent of total daily volumes. When considering this the total predicted daily traffic volume for Wianamatta Drive (Road 1) is approximately 15, 000 vehicles per day. Further, the heavy vehicle percentage for the roadway determined in the WSP report is 3% of total traffic.

Predicted traffic noise levels at the various buildings within the town centre are detailed in the following table

Table 4 – Predicted Noise Levels at Traffic Exposed Façades – CoRTN Model

Building	Façade	Predicted Noise Level dB(A) L_{eq}	
		Daytime (7am-10pm)	Night-time (10pm-7pm)
A	Western Façade	54 dB(A) $L_{eq}(15hr)$	49 dB(A) $L_{eq}(9hr)$
B & C	Northern Façade (Facing Wianamatta Drive)	63 dB(A) $L_{eq}(15hr)$	58 dB(A) $L_{eq}(9hr)$
	Side Façades	59 dB(A) $L_{eq}(15hr)$	54 dB(A) $L_{eq}(9hr)$
Townhouses	Eastern Façade	57 dB(A) $L_{eq}(15hr)$	52 dB(A) $L_{eq}(9hr)$

4.3 INTRUSIVE NOISE IMPACTS FROM FUTURE CHILDCARE CENTRE

Noise from the outdoor play area of the childcare centre located on the level 1 podium has the potential to impact residents within the development. Given the 'urban' environment that is consistent with a residential/retail interface, a certain level of noise impact would be expected. Notwithstanding, suitable internal noise levels may be achieved within residential apartments by closing doors and windows directly facing the outdoor play area or within the central courtyard.

Although it would be typical for the operator of a childcare centre be required to mitigate operational noise emissions, given the proximity of the proposed outdoor play area to the surrounding residential apartments it is likely that significant management controls or building treatments (enclosure) would be required to achieve the generally applied external noise emission criteria.

Given that compliance with typical external noise emission criteria would present significant operational restrictions on the centre, consideration could be given to an alternative internal noise criteria. In this regard, noise mitigation measures could be placed at the residential façades rather than at the childcare centre. As the residential building is yet to be constructed and still undergoing further design, there is opportunity to appropriately treat the residential façade of apartments to control noise intrusion. In adopting this approach, the following would need to be considered:

- Windows and doors to the apartments in question would be required to be closed in order to significantly reduce external noise levels – in this regard an appropriate internal noise level would need to be established (refer Section 6.1.3).
- Ventilation may need to be considered to apartments where it is required to keep window and doors closed. It is currently proposed that all apartments would have air conditioning installed to maintain comfortable internal amenity.
- In order to manage the expectations of future tenants, the proposed design solution should be advised.
- A formal mechanism of complaint handling will need to be adopted to ensure that the amenity of residents is maintained, and to protect the continued operation of the childcare centre.
- A noise emission criteria is still required for the centre at the façade of the residences, however this is may be different (higher) than typically external limits due to the increased façade treatment.

Predicted noise levels from the outdoor play area are detailed in Section 6.1.3 and indicate external noise levels in the order of 56-64 dB(A) L_{eq} at residential facades facing the childcare centre depending on the relative distance separation.

Australian Standard AS2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors* recommends the following internal noise targets for residential uses:

- Sleeping areas (night time) 35-40dB(A) L_{eq}
- Living areas 35-45dB(A) L_{eq}

For sleeping areas, 35dB(A) is adopted and 40dB(A) for living areas.

Further discussion in this regard is provided in Section 6.1.3.

4.4 RECOMMENDED CONSTRUCTIONS

A preliminary assessment of façade requirements to achieve required indoor noise levels has been undertaken based on the predicted noise levels in Section 4.2, 4.3 & 6.1.3. Dimensions of rooms, setbacks from roadways, window openings and floor areas have been used based on architectural drawings provided by *PBD Architects* for the project (Project Number 1909, Issue P4, dated 27.09.2019). It is recommended that all façade requirements are reviewed and confirmed during the detailed design phase of the project.

4.4.1 Glazed Windows and Doors

The following constructions are recommended to comply with the project noise objectives. Aluminium framed/sliding glass doors and windows will be satisfactory provided they meet the following criteria. All external windows and doors listed are required to be fitted with Q-Ion type acoustic seals. **(Mohair Seals are unacceptable)**.

Thicker glazing may be required for structural, safety or other purposes. Where it is required to use thicker glazing than scheduled, this will also be acoustically acceptable. Refer to Table below and markup of the recommended glazing constructions are detailed in the appendices of this report.

Table 5 - Recommended Glazing Construction

Building	Façade	Area	Recommended Glazing
Residential Apartments (Ground Floor)	All	All	6mm Float/Toughened or 6/12/6mm IGU
Residential Apartments (All other Levels)	Refer to Appendix One for Glazing Markup		
Retail/Commercial	All	All	6mm Float/Toughened or 6/12/6mm IGU

In addition to complying with the minimum scheduled glazing thickness, the R_w rating of the glazing fitted into open-able frames and fixed into the building opening should not be lower than the values listed in Table 6 for all areas. Where nominated, this will require the use of acoustic seals around the full perimeter of open-able frames and the frame will need to be sealed into the building opening using a flexible sealant.

Table 6 - Minimum R_w of Glazing Assembly (with Acoustic Seals)

Glazing Assembly	Minimum R_w of Installed Window
6mm Float / Toughened	29
6/12/6mm IGU	32
6.38mm Laminated	31
6.38/12/6mm IGU	34
10.38mm Laminated	35
10.38/12/6mm IGU	38

4.4.2 External Wall Construction

External walls are proposed to be of masonry construction and will not require additional acoustic treatment. In the event any penetrations are required through the external lining of any of the system for other building services, gaps should be filled with acoustic sealant to ensure compliance with acoustic criteria stipulated within this report.

4.4.3 External Roof & Ceiling Construction

Roof is proposed to be of masonry construction and will not require additional acoustic treatment. In the event any penetrations are required through the external lining of any of the system for other building services, gaps should be filled with acoustic sealant to ensure compliance with acoustic criteria stipulated within this report.

5 NOISE EMISSION CRITERIA

Noise emissions associated with the operation of the site have been adopted from the following:

- Penrith City Council Development Control Plan (DCP) 2014;
- NSW Environment Protection Authority (EPA) – *Noise Policy for Industry (2017)*;

5.1 PENRITH CITY COUNCIL DEVELOPMENT CONTROLPLAN 2014

There are no specific management controls for noise within the Penrith City Council DCP, however reference is made to the NSW EPA *Industrial Noise Policy*. We note that this document has been superseded by the *Noise Policy for Industry (2017)*, which will be used to determine appropriate noise goals for the site.

5.2 NSW EPA NOISE POLICY FOR INDUSTRY (2017)

Noise sources covered by this code are mechanical services and plant noise. Section 2.4.3 of the Noise Policy for Industry addresses the effect of changing land use. In the case of the Jordan Springs East development, the further development of residential subdivisions surrounding the town centre will significantly affect the background noise levels. The following changes would be expected to impact the existing background noise levels;

- Introduction of local roadways surrounding the site, expected to carry a mixture of local and through traffic;
- New mechanical plant servicing surrounding residential/commercial dwellings.

When considering effects of changing use, the NSW EPA Noise Policy for Industry states the following:

When land uses in an area are undergoing significant change, for example, residential subdivision with associated development of local and regional roads, the background noise levels would be expected to change, sometimes significantly. The impact of noise from an existing industry on a proposed new residential area should be made using the recommended amenity noise level for the residential land use, not the project intrusiveness level. Where impacts exceed the amenity noise level, consideration should be given to how these impacts can be avoided or mitigated, such as modifying the location of the proposed residential development, placing screening land uses in-between the proposed residences and existing industry, or ensuring residences are built in a manner that provides acceptable indoor noise amenity.

Considering the above, noise emission requirements as detailed in the Noise Policy for Industry will be determined with reference to the amenity noise levels.

5.2.1 Project Amenity Criterion

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

The EPA's NPI sets out acceptable noise levels for various localities. The recommended noise amenity area is based upon the measured background noise levels at the sensitive receiver. Based on the zoning for the site, the Noise Policy for Industry suggests the adoption of the 'suburban' categorisation.

The NPI requires project amenity noise levels to be calculated in the following manner;

$$L_{Aeq,15min} = \text{Recommended Amenity Noise Level} - 5 \text{ dB(A)} + 3 \text{ dB(A)}$$

The amenity levels appropriate for the receivers surrounding the project site are presented in Table 7.

Table 7 – EPA NPI Project Amenity Noise Levels

Type of Receiver	Time of day	Recommended Noise Level dB(A) $L_{eq}(\text{period})$	Project Amenity Noise Level dB(A) $L_{eq}(15\text{min})$
Residential – Suburban	Day	55	53
	Evening	45	43
	Night	40	38
Commercial Premises	When in Use	65	63
Industrial Premises	When in Use	70	68

The NSW EPA Noise Policy for Industry (2017) defines;

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

5.2.2 Sleep Arousal Criteria

Potential sleep arousal impacts should be considered for noise generated after 10pm or before 7am. The *Noise Policy for Industry* recommends the following noise limits to mitigate sleeping disturbance:

Where the subject development / premises night -time noise levels at a residential location exceed:

- $L_{Aeq,15min}$ 40 dB(A) or the prevailing RBL plus 5 dB, whichever is the greater, and/or
- L_{Fmax} 52 dB(A) or the prevailing RBL plus 15 dB, whichever is the greater,

a detailed maximum noise level even assessment should be undertaken.

As background noise levels have not been measured at the site, reference will be made to the minimum sleep disturbance levels detailed in the policy.

In addition, NSW EPA Road Noise Policy states:

- Maximum internal noise levels below 50–55 dB(A) are unlikely to awaken people from sleep
- One to two noise events per night with maximum internal noise levels of 65–70dB(A) are not likely to affect health and wellbeing significantly

5.2.3 Summarised EPA Noise Policy for Industry Requirements

Table 8 – EPA NPI Summarised Noise Levels

Receiver	Time Period	Project Noise Trigger Level dB(A) L_{eq}	NPI Criteria for Sleep Disturbance
Residents Surrounding Site	Day	53	-
	Evening	43	-
	Night	38	40 dB(A) $L_{eq, 15min}$; 52 dB(A) L_{Fmax}

5.3 NOISE CRITERIA FOR CHILDCARE CENTRE

5.3.1 For Residents External to the Development

Typically external noise emissions goals from a childcare centre are determined with reference to the prevailing background noise level at surrounding residents, with the adoption of a 'background + 5-10dB(A)' assessment criteria.

As discussed above, given the changing use and ongoing development of the site the current background noise level it is not necessarily appropriate to determine noise emission goals as it is likely to significantly change in the near future. In this regard the NSW NPI amenity goal will be adopted for the relevant time period of operation.

5.3.2 For Residents Within the Development

As discussed in Section 4.3, the ongoing design and development of the project allows for acoustic treatments to be incorporated within the residential façades (rather than at the source of noise). It is proposed that an internal noise criteria instead be adopted, to be applied with the doors and windows of residences closed. This approach is consistent with the assessment of other external noise sources (such as road/rail impacts).

Australian Standard AS2107:2016 *Acoustics – Recommended design sound levels and reverberation times for building interiors* recommends the following internal noise targets for residential uses:

- Sleeping areas (night time) 35-40dB(A) L_{eq}
- Living areas 35-45dB(A) L_{eq}

For sleeping areas, 35dB(A) is adopted and 40dB(A) for living areas.

6 NOISE EMISSION ASSESSMENT

Noise impacts associated with the development have been assessed for the following:

- Future retail and commercial tenancies;
- Use of associated loading docks;
- Mechanical plant noise emissions (in principle).

Each of these noise sources will be discussed in detail.

6.1 FUTURE COMMERCIAL USES OF THE SITE

Future residential development will be located above lower level commercial/retail uses part of the development. The primary source of noise generated by these commercial uses is likely to be outdoor dining areas associated with food and beverage outlets. It would be expected that all individual retail/commercial tenancies would be subject to a separate development application, at which time the specific measures required to control noise emissions could be addressed. Key acoustic considerations for the proposed tenancies are detailed below.

6.1.1 Retail/Food & Beverage Tenancies

- Retail outlets are expected to have the minimal impact on the proposed residential uses.
- Licensed tenancies (especially those which are proposed to operate during the night time period) will likely have a higher potential acoustic impact, pending their capacity and siting. Tenancies of this nature would require a noise impact assessment to be conducted to determine appropriate management controls and treatments in order to mitigate noise impacts to nearby residents of the development.
- Any outdoor areas would generally be covered by an awning, and as such screened to the residents above
- Residents within the proposed precincts are the most likely to be affected by noise emissions from retail tenancies. Provided that noise controls are implemented to control noise to these residents, impacts to residents external to the precinct (identified in Section 2) are expected to be minimal.

Notwithstanding the above, it is recommended that all proposed retail/commercial/hospitality uses within the precinct be subject to a separate development application once specific uses and operators have been determined. At this time, individual tenancies should demonstrate that noise emission requirements are able to be met, and the specific management controls/building treatments which may be implemented to ensure compliance. Further, the cumulative impacts of noise from the combined operation of all retail tenancies should be considered when assessing noise from individual tenancies.

6.1.2 Gym Tenancy

Residents located directly above the gym are the most likely to be affected by this operation. In order to manage this, it is likely that a combination of management conditions and building controls would need to be implemented, including:

- Management of gym activities and patrons to control noise and vibration emissions;
- The limiting of amplified music levels within the space;
- Installation additional ceilings below the concrete slab where required;
- Installation of isolated flooring/machinery to prevent structure borne (impact) noise to residents directly above. In this regard, we note the following indicative treatments:
 - The concrete floor slab for the gym should be designed with a natural frequency of at least 10Hz.
 - Rowing machines and similar will to be installed on isolation mounts;
 - Pin loaded weights machines to have spring isolation incorporated;
 - Free weights areas to have multilayer rubber or spring isolation flooring;

6.1.3 Assessment of Operational Noise from Childcare Centre

6.1.3.1 Centre Operation

The centre is currently proposed to operate between 7am – 7pm, with a 30 minute period prior to 7am for staff arrival.

A total of 154 childcare spaces have been proposed, with a mixture of ages to be accommodated. The current breakdown of numbers is:

- 0-1 Years Old – 20 places;
- 1-2 Years Old – 20 places;
- 2-3 Years Old – 48 places;
- 3-4 Years Old – 22 places;
- 4-5 Years Old – 44 places.

6.1.3.2 Noise Source Data

The following noise source will be the basis for the detailed assessments.

6.1.3.2.1 Outdoor Play Sound Power Level (SWL)

Noise emissions from outdoor play activities were predicted using sound power levels for childrens speech which have previously been measured by this office, detailed in the table below.

Table 9 –Sound Power Levels (Mid-Point)

Number of Children	Age	Sound Power Level
10	0 – 2 Years	78 dB(A)
10	2 – 3 Years	85 dB(A)
10	3 – 6 Years	87 dB(A)

6.1.3.3 Predicted Noise Levels

Predicted noise levels from the operation of the child care assessment is presented below.

6.1.3.3.1 Noise from Use of the Outdoor Play Area

Noise from use of the outdoor play area has been predicted based on the following assumptions:

- It has been assumed that the children will be roughly evenly distributed in the outdoor play area;
- There are two general situations for the use of the child care facility:
 - General daytime operation of the facility (7am – 6pm) – During this time, it has been assumed that the child care facility would be at capacity. The following outdoor play area use has been assumed:
 - All 0-1 year old children outside at any one time; and
 - In addition up to 50 children aged 2-5 (equivalent of 2 classes) at any one time.
 - It is assumed that educators would rotate classes between external play and indoor activities to control student numbers within the external play area.
 - Early evening operation (6pm – 7pm) – This time period would involve parents/carers gradually picking children up, with the centre operating at a lower capacity. It is not recommended that the outdoor play area be used during this time.
- Recommended acoustic treatments in Section 6.1.3.4 of this report have been implemented.

The predicted cumulative noise levels at the nearest noise receivers have been summarised in Table 10.

Table 10 –Predicted Cumulative Outdoor Play Noise Levels at Receivers

Noise Receiver	Time of Day	Predicted Noise Levels	Criteria	Compliance
Residents Surrounding Site (External)	7am-6pm (Daytime)	<45 dB(A) $L_{eq(15min)}$	53 dB(A) $L_{eq(15min)}$ (External Noise Level)	Yes*
	6pm -7pm (Evening)	Not in Use	N/A	Yes*
Residents Within Town Centre Site (Internal)	7am-6pm (Daytime)	<35 dB(A) $L_{eq(15min)}$	35-40 dB(A) $L_{eq(15min)}$ (Internal Noise Level)	Yes*
	6pm -7pm (Evening)	Not in Use	N/A	Yes*

*Refer Section 6.1.3.4 for recommended treatments and management controls to achieve compliant noise levels as detailed above.

6.1.3.4 Recommendations for Childcare Centre Operation

Recommended building treatments and management controls to control noise emissions from the outdoor play area of the childcare centre are detailed below.

- All glazing (including residential facades) to be installed as per the recommendations of Section 4.4.
- Signs reminding staff and visitors to minimise noise at all times shall be installed at entry / exit points from the child care centre.
- Management is to ensure children are supervised at all times to minimise noise generated by the children whenever practical and possible.
- Install a contact phone number at the front of the centre so that any complaints regarding centre operation can be made.
- The facility must not hold more than 154 children at any one time.
- Use of the outdoor play area is to be restricted as follow;
 - During the evening period (6pm – 7pm), the outdoor play area is not to be used by children.
 - During the daytime period (7am – 6pm), all 0-1 year old children within the centre (20) and an additional 50 2-5 year old children may be in the outdoor play area at any one time.
- Regular landscape maintenance which requires powered tools should be undertaken during daytime hours only (7am – 6pm).
- Internal cleaning activities should be undertaken with all façades (windows and doors) closed and may be undertaken at any time.

6.2 NOISE GENERATED BY LOADING DOCKS

Operational noise levels are predicted and assessed against the NPI criteria detailed in Section 5. Noise emissions from the loading dock is based on the following assumptions:

- Two movements (in or out) from large trucks to the loading dock during a given 15-minute period
- It takes approximately 1 minute for a truck to manoeuvre into/out of the loading dock.
- Engine noise from articulated truck manoeuvring within the loading dock: 100 dB(A)_{Leq} sound power.

Table 11 Noise Emissions from Loading Docks

Activity	Time	Permitted Noise Level	Predicted Noise Level	Comment
Noise from Use of Loading Docks	Daytime 7am – 6pm	≤ 53 dB(A) _{Leq(15min)}	53 dB(A) _{Leq(15min)}	Achieves daytime noise emission level

6.2.1 Recommendations for Loading Dock

- Loading dock to be in operation only between the hours of 7am – 6pm only. Operation outside of these hours would be subject to a separate development application
- Forklifts to service loading / unloading of delivery vehicles should be electric or LPG type (no diesel forklifts) and use non-tonal movement beacons.
- Garbage compaction should occur within the loading dock area only (i.e. not externally on the site)

6.3 NOISE FROM MECHANICAL PLANT

Mechanical design is still only preliminary, and as such a detailed acoustic assessment is not been undertaken. An assessment of likely acoustic treatments required to typical/primary plant items is presented below.

- Refrigeration equipment:
 - Refrigeration compressors are recommended to be located within enclosure plant rooms.
 - Locate refrigeration condensers as far as practicable from adjacent noise sensitive development. Noise screening (using either a dedicated noise screen or the building shell between the condensers and noise sensitive buildings) may be required.
 - To ensure compliance with NPI requirements during day, evening and night time, additional review is recommended following final plant selection and review of night time operational speeds.
- Major fans (typically with a sound power over 80(A) – such as kitchen exhaust, major toilet exhaust and major relief air fans) will require acoustic treatment if located externally. Whenever possible for major fans, it is recommended that axial (as opposed to roof mounted fans) are to be used as this will enable acoustic treatment to be incorporated within ductwork running to atmosphere.

Cumulative assessment of both plant noise with other noise sources is recommended when conducting acoustic design of plant items. Compliance with EPA acoustic criteria (as set out in Section 5) will be achievable, provided that detailed acoustic review of plant items is undertaken once plant is selected, and acoustic treatments similar to those outlined above are adopted.

7 CONCLUSION

This report presents the assessment of potential noise impacts associated with the Jordan Springs East Town Centre.

An assessment of noise impacts to the site from the surrounding roadways has been undertaken. All development on the site is capable of complying with the noise intrusion requirements of NSW Planning and the requirements of the Penrith City Council Development Control Plan 2014.

Noise impacts from mechanical plant to service the development is to be assessed with reference to the requirements of the NSW EPA Noise Policy for Industry (2017), as detailed in Section 6.3. The assessment of specific plant items should be undertaken as part of the development application process for individual lots within the precinct, however consideration must be given to the cumulative noise impacts from each site to ensure that the overall level of noise emitted from mechanical plant achieves above requirements.

It is recommended that all individual retail/commercial tenancies demonstrate compliance with relevant noise emission criteria as part of their planning application.

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

Yours faithfully,

A handwritten signature in black ink, appearing to read 'Alex Washer', is positioned above the printed name.

Acoustic Logic Consultancy Pty Ltd
Alex Washer

APPENDIX A – RESIDENTIAL GLAZING MARKUP

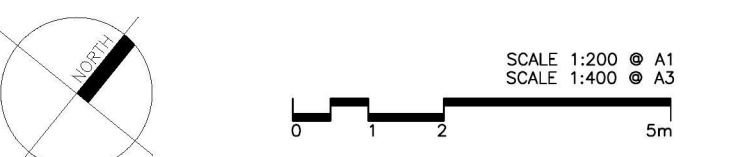
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 - AH ACCESS HATCH
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 - FH FIRE HYDRANT
 - FHR FIRE HOSE REEL
 - FS FIRE STAIRS
 - GC GARBAGE CHUTE
 - GW GREEN WALL
 - HW HIGHLIGHT WINDOW
 - MV MECHANICAL RISER TO FUTURE DETAIL
 - NB MAILBOX TO FUTURE DETAIL
 - R 240L RECYCLING BIN
 - SK SKYLIGHT
 - ST STORAGE
 - WT HOT WATER UNITS

- MATERIALS LEGEND:
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 - AFL ALUMINIUM ELLIPTICAL FIXED LOUVERS
 - AW AWNING TO FUTURE DETAILS
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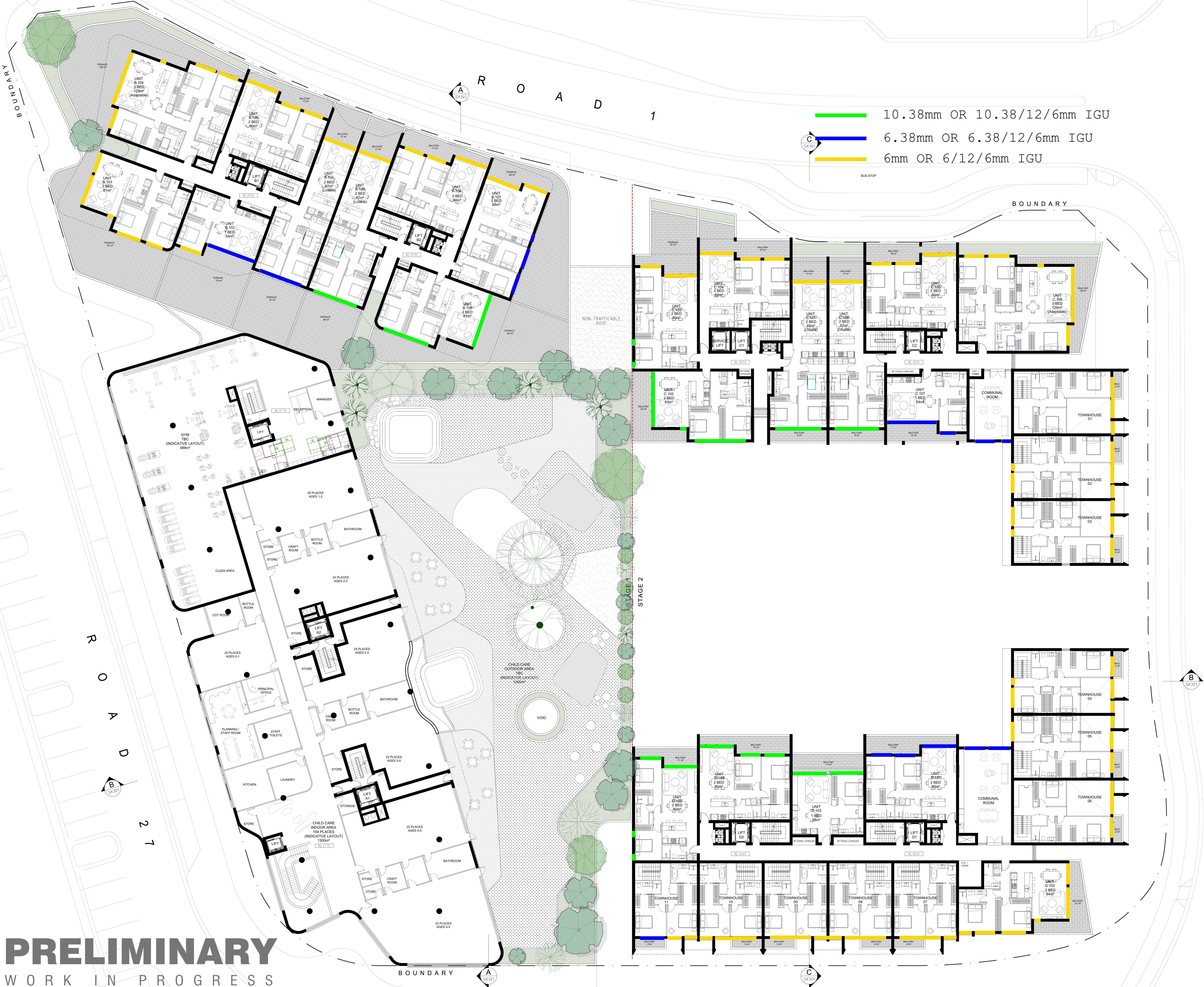
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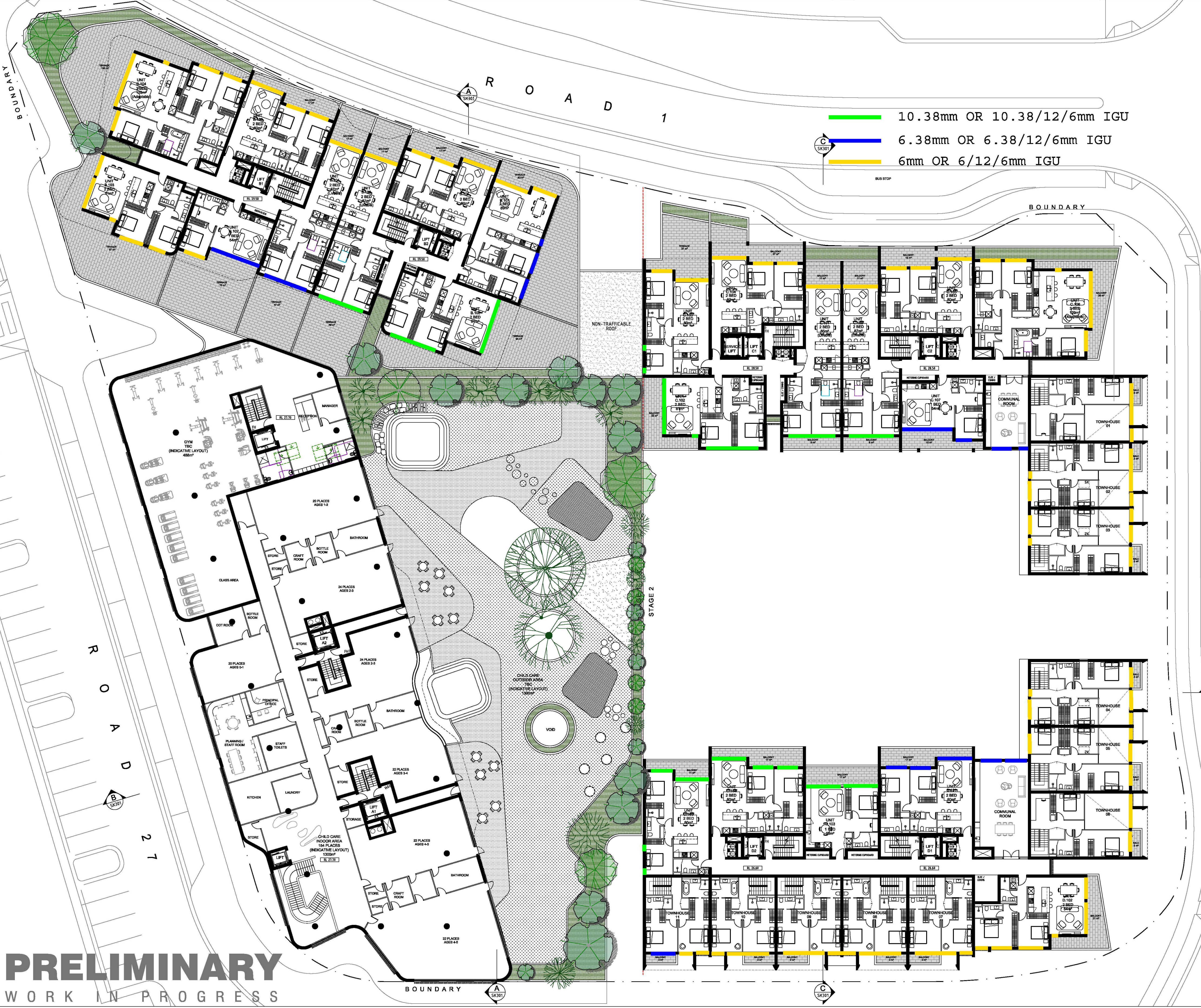
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PROJECT:
**JORDAN SPRINGS
EAST VILLAGE CENTRE**

May 2019
DRAWING TITLE:
LEVEL 1 FLOOR PLAN

SCALE: 1:200 @ A1 PROJECT NO: 1909	DRAWING NO: DA102	ISSUE: P4
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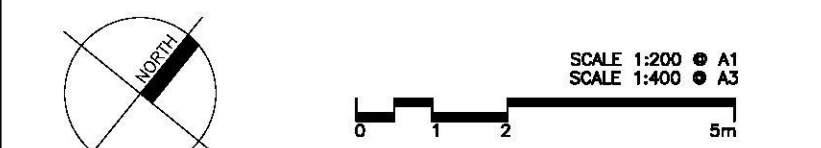
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AH	ACCESS HATCH
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FH	FIRE HYDRANT
FHR	FIRE HOSE REEL
FS	FIRE STAIRS
GC	GARBAGE CHUTE
GW	GREEN WALL
HW	HIGHLIGHT WINDOW
MV	MECHANICAL RISER TO FUTURE DETAIL
NB	MAILBOX TO FUTURE DETAIL
R	240L RECYCLING BIN
SK	SKYLIGHT
ST	STORAGE
WT	HOT WATER UNITS

MATERIALS LEGEND:

AFG	ALUMINIUM FRAMED GLAZING
AFL	ALUMINIUM ELLIPTICAL FIXED LOUVERS
AW	AWNING TO FUTURE DETAILS
BC	BATTEN CLADDING (TO FUTURE DETAIL)
FB	FACE BRICK
GB	FRAMELESS TOUGHENED GLASS BALUSTRADE (TO BCA/AUSTRALIAN STANDARDS)
MF	METAL FENCING (TO FUTURE SELECTION)
PC	COMPOSITE PANEL CLADDING
PSK	PRIVACY SCREEN (TO FUTURE SELECTION)
PTX	PAINT FINISH TYPE X
RD	ROLLER DOOR
RP	RIVER PEBBLES
RW	RENDERED WALL/SELECTED PAINT FINISH
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PROJECT:
**JORDAN SPRINGS
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May 2019
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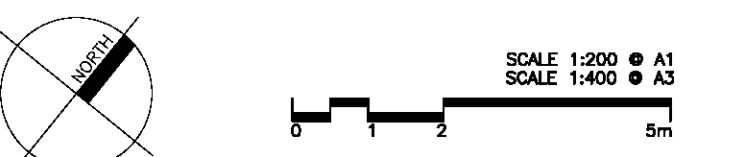
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 - NB MAILBOX TO FUTURE DETAIL
 - R 240L RECYCLING BIN
 - SK SKYLIGHT
 - ST STORAGE
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- MATERIALS LEGEND:
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May 2019
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LEVEL 2 FLOOR PLAN

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PROJECT NO: 1909		



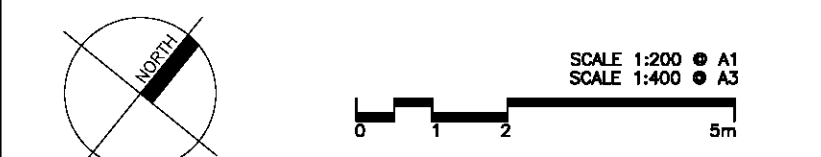
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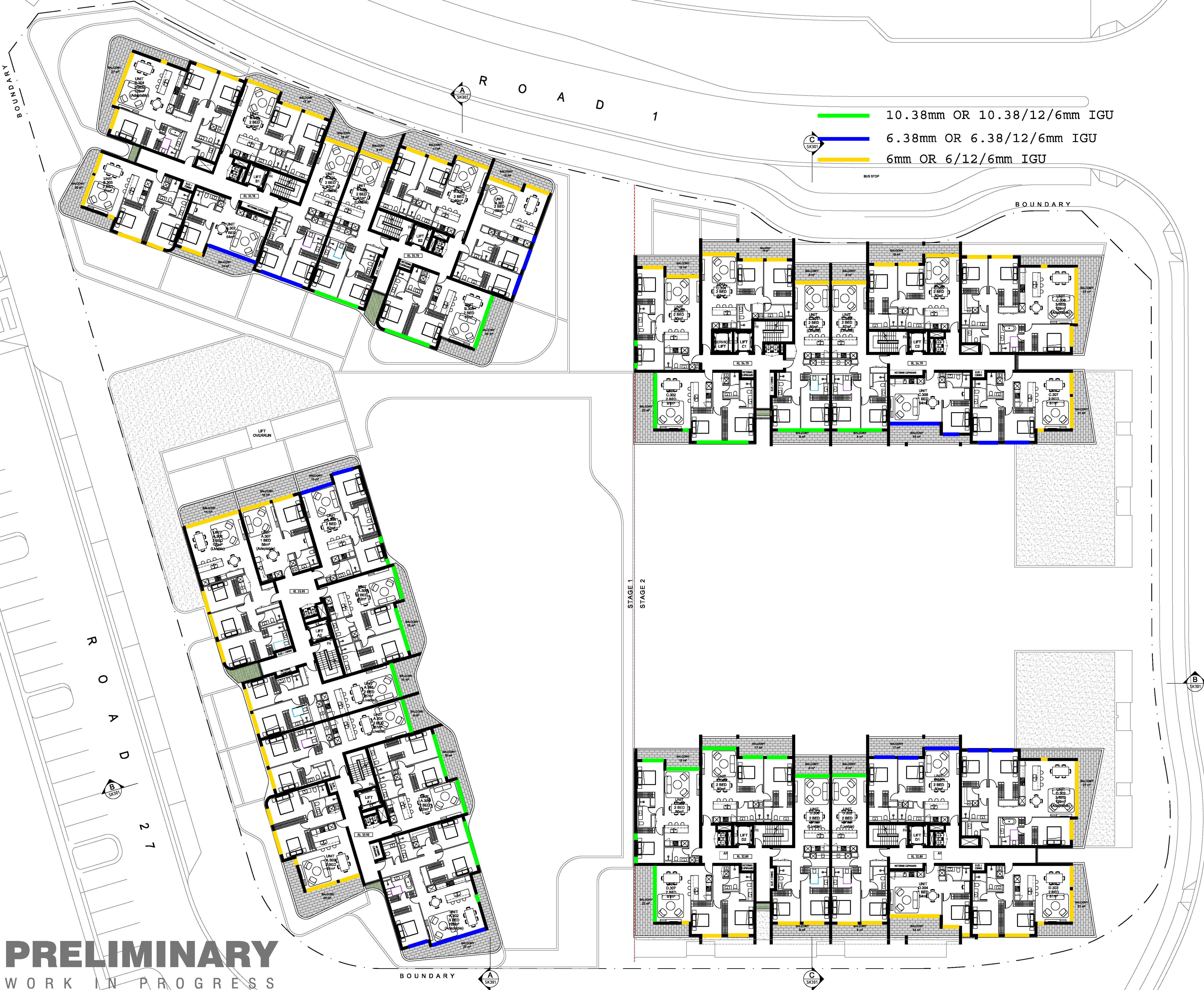
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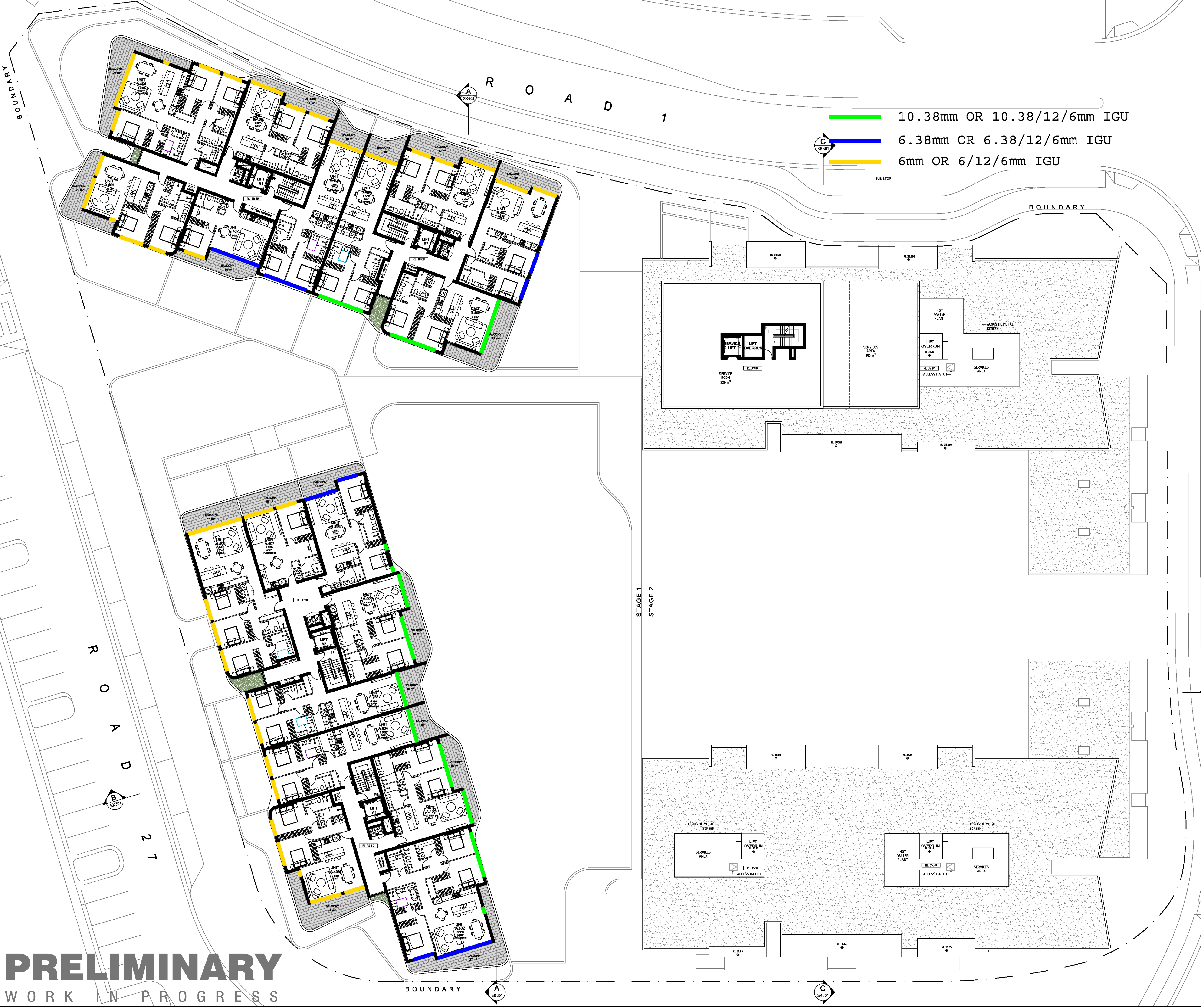
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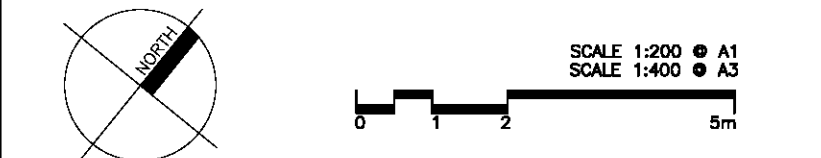


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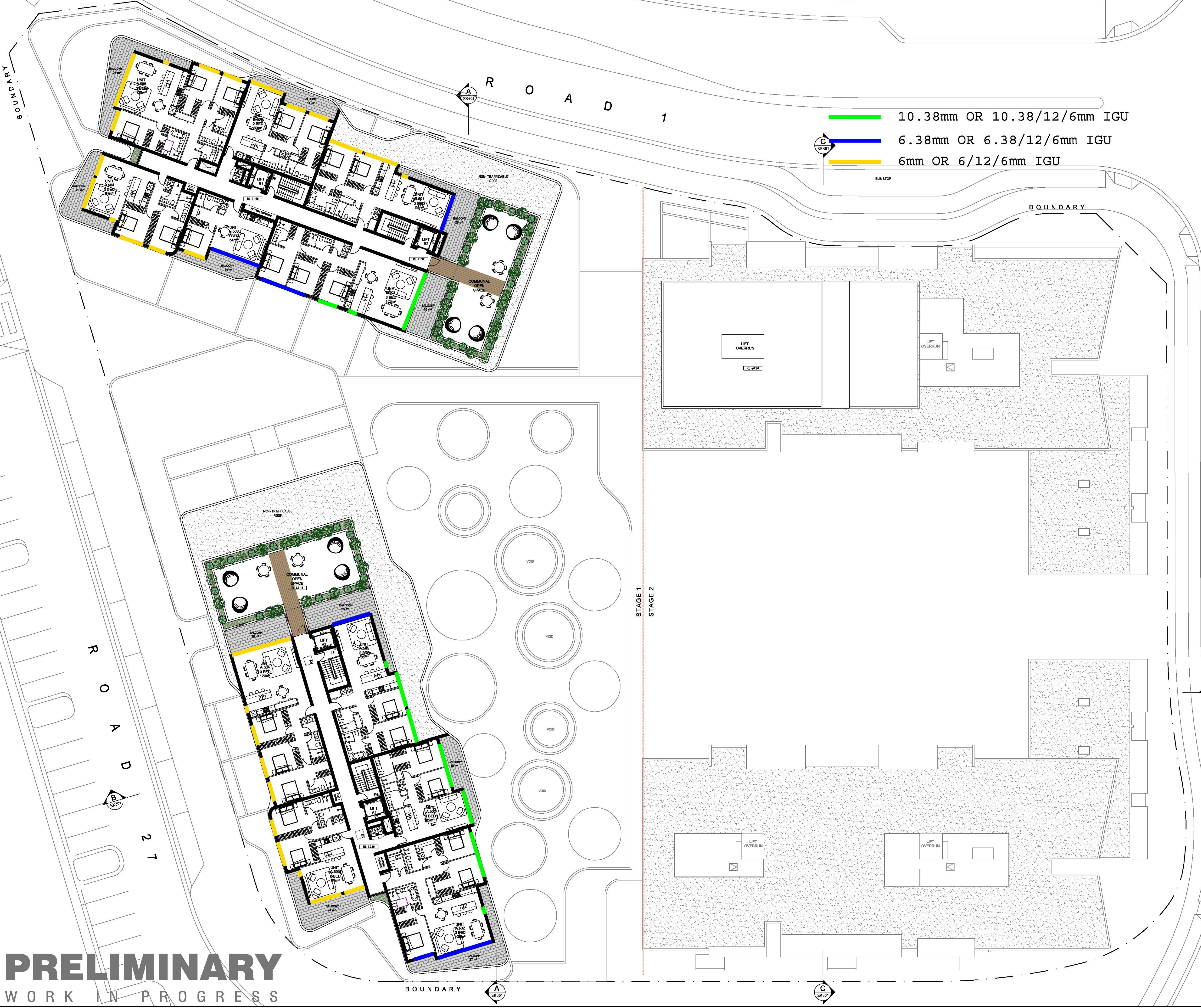
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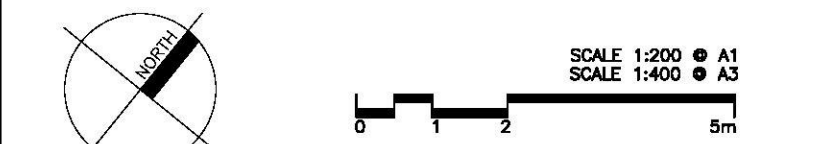
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May 2019
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