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## 99 DERBY ROAD, SUNSHINE – CENTRAL APARTMENT AMENDMENT

### Town Planning Acoustic Assessment

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6 May 2025

SMA Projects

MD022-02F01 Town Planning Acoustic Assessment (r8)

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## Executive summary

Renzo Tonin & Associates was engaged by SMA Projects to assess the town planning application for the proposed mixed residential development (Subject Development) to be located at 99 Derby Road, Sunshine (the Subject Site). The assessment comprised:

- Review of the Subject Site, surrounds and proposed development
- Measurement and observation of the existing noise environment at the Subject Site
- Determination of relevant noise criteria and legislation:
  - Victoria Planning Provision Clause 58.04 / Standard D16 internal noise criteria
  - Australian Standard 2107 internal noise criteria
  - VCAT precedent sleep disturbance criteria for train noise
  - SEPP N-1/ EPA 1826 Noise Protocol noise limits
  - Environment Protection Act 2017 and Environment Protection Regulations 2021
- Glazing and facade specification for Victoria Planning Provision 58.04/ Standard D16 / AS2107 / Sleep disturbance criteria compliance within townhouses.

Provided that the advice given in this report is adhered, it is expected that the Subject Development can operate without adverse impact on residential amenity in the area and provide suitable residential amenity with respect to acoustics.

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# 1 Introduction

Renzo Tonin & Associates was engaged by SMA Projects to assess the town planning application for the proposed mixed residential development (Subject Development) to be located at 99 Derby Road, Sunshine (the Subject Site). This report documents the outcomes of the assessment. The work documented in this report was carried out in accordance with the Renzo Tonin & Associates Quality Assurance System, which is based on Australian Standard / NZS ISO 9001. Appendix A contains a glossary of acoustic terms used in this report.

## 2 Site and development overview

Renzo Tonin & Associates has based its assessment of the Subject Development on the following drawings:

- Project 211506, entitled '*Town Planning - 99 Derby Road, Sunshine*', dated April 2025, by MAP Architecture

The proposed development is to comprise a multiple residential buildings reaching heights of two, three, four and seven storeys. The development is proposed to include:

- Six storey serviced apartment building (not included in this assessment)
- Two, three and four storey townhouse buildings
- Seven storey apartment/townhouse buildings
- Car parking

Figure 1 presents an overview of the Subject Site surrounding land uses.

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Figure 1: Site overview





### 3 Existing noise environment

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#### 3.1 Site visits

Renzo Tonin & Associates made observations of the operation of the Subject Site during the following site visits:

- Friday morning 23<sup>rd</sup> August 2019 during monitor placement
- Friday morning 30<sup>th</sup> August 2019 during monitor retrieval

The following observations were made during the site visits:

Rail
<ul style="list-style-type: none"> <li>• Train passes from the nearby rail were identified as the dominant source of noise at the Subject Site and Subject Development</li> </ul>

#### 3.2 Noise monitoring

To quantify the existing noise levels at the Subject Site, Renzo Tonin & Associates conducted unattended noise monitoring from Friday 23<sup>rd</sup> August to Friday 30<sup>th</sup> August 2019. The monitor location is shown in Figure 1 and described in Table 1 below. APPENDIX B presents graphs of the monitored noise levels at each location.

**Table 1: Noise monitoring locations**

ID	Location	Description
L1	99 Derby Road (Subject Site)	i. Monitor Duration: Friday 23 <sup>rd</sup> August to Friday 30 <sup>th</sup> August 2019 ii. Microphone approximately 1.5 metres above ground level and approximately 100 metres from the nearest functioning rail line. iii. The monitor was set to record broadband and spectral noise descriptors, and audio to assist in source recognition

Notes:

- An NTI XL2 Class 1 noise monitor was used for the campaign. The calibration of the device was checked in the field immediately before and after the measurement using a Brüel & Kjær Type 4231 calibrator; no drift in calibration was observed. The noise monitor complies with AS IEC 61672.1:2004 *Electroacoustics - Sound Level Meters*; the calibrator complies with AS IEC 60942:2004 *Electroacoustics - Sound Calibrators* and; all carry current NATA certification or manufacturers certification, detailing Standard conformance testing within the last two years and one year respectively.

The tables below present relevant noise monitoring results for the assessment.

**Table 2: Period average background noise levels (for EPA 1826/ SEPP N-1 derivation)**

ID Location		Minimum period background noise level, L <sub>90</sub> dB(A) <sup>1</sup>		
		Day	Evening	Night
L1	99 Derby Road	44(40)	43(42)	42(39)
Period Definitions:	Day:	Weekdays 7am - 6pm;	Saturdays 7am - 1pm;	Sundays NA
	Evening:	Weekdays 6pm - 10pm;	Saturdays 1pm - 10pm;	Sundays 7am - 10pm
	Night:	All days 10pm - 7am		

Notes:

1. Formatted X(Y), with X being the minimum period average and; (Y) being the minimum hourly measurement that occurred during monitoring for each period.

**Table 3: Ambient energy average noise levels**

ID	Day/ Evening $L_{eq,16hr}$ dB(A)	Night $L_{eq,8hr}$ dB(A)
L1	56	52
Period Definitions:	Day: All days 6am – 10pm Night: All days 10pm - 6am	
Notes:	<ul style="list-style-type: none"> <li>Presented noise levels are the maximum measurement that occurred during monitoring for each period.</li> <li>The presented noise levels were dominated by noise from train movement</li> </ul>	

**Table 4: Train night-time maximum noise levels**

ID	Description	Overall dB(A)	Noise level dB, in frequency band (Hz)						
			63	125	250	500	1k	2k	4k
L1	95 <sup>th</sup> Percentile loudest $L_{max}$ dB(A) noise event between 10pm and 7am	79	84	80	70	75	76	72	64

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## 4 Criteria

### 4.1 Internal amenity criteria

#### 4.1.1 Victoria Planning Provision Clause 58.04

Victoria Planning Provision Clause 58.04-3 Standard D16 provide target criteria for environmental noise impacts on applicable developments in Victoria. These criteria cover continuous or semi-continuous noise sources including traffic and railway, and also noise from industrial zones.

Clause 58.04-3 Standard D16 states the following regarding rail noise:

*Buildings within a noise influence area specified in Table D3...(Railway servicing freight in Metropolitan Melbourne... Noise influence area... 135 metres from the centre of the nearest track)... should be designed and constructed to achieve the following noise levels:*

- *Not greater than 35dB(A) for bedrooms, assessed as an LAeq,8h from 10pm to 6am.*
- *Not greater than 40dB(A) for living areas, assessed LAeq,16h from 6am to 10pm.*

#### 4.1.2 Australian Standard 2107

*Australian/New Zealand Standard AS/NZS 2107: 2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors* (AS2107) provides target criteria for environmental noise impacts on houses, as presented in Table 5. These criteria are appropriate for continuous or semi-continuous noise sources (mechanical plant, traffic etc.).

**Table 5: AS2107 internal noise level criteria**

Type of occupancies within houses near entertainment districts or near major roads	Recommended design sound level range, L <sub>eq</sub> dB(A)
Living areas	35 to 45
Sleeping areas <sup>1</sup>	35 to 40

Notes: 1. Criteria in sleeping areas has been applied during the night time period, 10pm to 6am

The criteria are presented in terms of satisfactory and maximum equivalent continuous (L<sub>eq</sub>) noise levels over a ... *sufficiently long period to characterise the sound source.*

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#### 4.1.3 Rail noise – VCAT Precedent Criteria

The Victorian Civil & Administrative Tribunal (VCAT) has issued decisions regarding train noise criteria that are applicable precedents for the Subject Development. APPENDIX C summarises the relevant precedent criteria. These criteria are drawn from sleep disturbance studies summarised in NSW EPA document *Environmental Criteria for Road Traffic Noise, 1999* (ECRTN) and the subsequent New South Wales Office of Environment and Heritage *Road Noise Policy, March 2011* (RNP), which conclude that:

*From the research on sleep disturbance to date it can be concluded that:*

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

Based on the body of precedents in APPENDIX C and the sleep disturbance studies which the precedents are based on, Renzo Tonin & Associates considers that the following internal noise criteria are appropriate for the Subject Site.

- The 95% loudest  $L_{max}$  dB(A) rail-system noise event during the night time period (10pm to 7am) shall not exceed the criterion of 55dB(A) in bedrooms and 60dB(A) in living rooms
- Living rooms and bedrooms require appropriate ventilation systems, so that opening windows is not required to provide sufficient ventilation (where criteria are only satisfied when windows are shut)
- Windows and doors do not require to be fixed in the closed position. Residents may choose to close the doors and windows to minimise the external noise (providing they have acceptable alternative ventilation)

#### 4.1.4 Rail noise – Passenger Rail Infrastructure Noise Policy

In April 2013 the Victorian Government published the *Passenger Rail Infrastructure Noise Policy*. This document sets down noise investigation threshold criteria for change in land use near an existing passenger rail corridor, which trigger requirement for an acoustic assessment, such as documented in this acoustic report. As there is no proposal to rezone the land, the Passenger Rail Infrastructure Noise Policy has not been triggered. For commentary regarding impacts of future rail provisions, refer to Section 5.3.

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## 4.2 Noise emission criteria

### 4.2.1 EPA Publication 1826 Noise Protocol

From 1 July 2021, EPA Publication 1826 'Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues' (EPA Pub. 1826) superseded 'State Environmental Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1' (SEPP N-1). For the purposes of this assessment, EPA Publication 1826 uses the same methods to assess noise impacts as the superseded noise policies as SEPP N-1, but with slight amendments to the durations of day, evening and night, as set out in the Environment Protection Regulations 2021.

EPA Publication 1826 'Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues' – Part 1, (EPA Pub. 1826-P1) sets out noise limits for from commerce, industry and trade premises. Noise limits are calculated from planning overlays and background noise levels measured within an area in absence of intrusive commercial noise sources. Table 6 presents the applicable noise limits.

**Table 6: EPA 1826-P1 commercial noise criteria**

Period	Zoning level, $L_{eq}$ dB(A)	Background $L_{90}$ dB(A)	Background classification	Noise limit $L_{eq}$ dB(A)
Day	59	44	Low Background	56
Evening	52	42	Neutral	52
Night	47	41	Essential	47
Period Definitions:	Day: Monday-to-Saturday 7am-to-6pm, Evening: Monday-to-Saturday 6pm-to-10pm, Night: All days 10pm-to-7am	Sundays NA Sundays or Holidays 7am-to-10pm		

EPA 1826 night-time noise limits are typically more stringent than that of the day or evening periods. As such, compliance during the night-time period implies compliance during the day and evening periods, provided that emitted noise levels do not vary.

### 4.2.2 Environment Protection Regulations for domestic plant

Noise from the operation of domestic plant located on a private title shall be designed to comply with, and be assessed against, the applicable criteria defined in the *Environment Protection Act 2017* and the *Environment Protection Regulations 2021*. The Act and Regulations refer to unreasonable noise and apply a requirement for inaudibility (which can be tested subjectively) during the night period. To this end, typically Renzo Tonin & Associates has found that domestic plant operating at a noise level 5 dB lower than background does not lead to adverse response.

EPA document *Noise Control Guidelines* (Publication 1254) states that the intrusive noise exceeding the background noise level by more than 5dB at the affected receiver during the day or evening, may be considered unreasonable.

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**Table 7: Criteria for noise from domestic plant**

Period	Background $L_{90}^1$ dB(A)		Permissible limit <sup>2</sup> $L_{eq}$ dB(A)
Day	40	+5 =	45
Evening	42	+5 =	47
Night	39	-5 =	34

Period Definitions: Day: 7am – 6pm; Evening: 6pm – 10pm; Night: 10pm – 7am

- Notes:
1. Minimum hourly background noise levels applied from Table 2
  2. Typically, Renzo Tonin & Associates has found that domestic plant operating at a noise level 5 dB lower than background does not lead to adverse response during the night time period; however it is difficult to guarantee inaudibility per Environment Protection Regulations 2021. Therefore we recommend that a clause to the effect of the following be included in the owners corporation rules:

*"If a valid complaint is raised relating to the audibility of a neighbour's domestic air-conditioning unit during the prohibited hours, then the subject air-conditioner shall be switched off during the prohibited hours.*

*Prohibited hours for heating:*

- 10pm – 7am Monday – Friday
- 10pm – 9am weekends & public holidays.

*Prohibited hours for cooling:*

- 11pm – 7am Monday – Friday
- 11pm – 9am weekends & public holidays."

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## 5 Noise impact assessment and recommendations

A CadnaA three-dimensional noise model implementing Nordic 1996 noise propagation algorithms was developed to calculate and assess the rail noise impacts to the Subject Development's façades, calibrated using monitored noise levels on site. The built form of the Subject Development and proximate buildings were integrated into the model.

The following propagation effects were included in the predictive model:

- Local topography
- Mitigation of noise with distance, including geometrical spreading and air absorption
- Reflections from buildings and environment
- Barrier effects due to obstructions between noise sources and residential receivers
- Ground absorption effects

The noise model included assessment of noise propagation over and reflection from adjacent buildings. Results from this model were used to calculate noise ingress to the development and determine the glazing and external wall specification detailed in Section 5.1.

### 5.1 Glazing and external wall specification

Table 8 and Table 9 provides details of the performance requirement for sound insulation of glazing systems and building elements along with an example of a specification that satisfies the performance requirement for conformance with:

- Victoria Planning Provision Clause 58.04 (Standard D16)
- Australian Standard 2107
- Rail Noise VCAT Precedent criteria

Façade elements and roofs (the construction of which has not yet been determined, specified at Detailed Design phase), shall be designed to provide 10dB greater performance than specified glazing elements. Ventilation shall be provided by means so as not to diminish sound insulation performance of the façade.

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Table 8: Glazing specification for development

	Performance requirement - Acoustic rating of glazing assembly $R_w$ ( $C_{tr}$ )	Example of acceptable glazing system	Laboratory test reference
All glazing identified with red mark-up (See APPENDIX D)  Notes for the Subject Development: Upgraded requirement only explicitly required for bedrooms.	32 (-2)	<b>Fixed / awning / sliding windows</b> Framing with single or double glazed system with at least one (1) pane of 6.38mm thick laminated glazing.  <b>Example system:</b> Capral® 419 Series Flushline frame incorporating one (1) pane of 6.38mm thick laminated glazing. AWS® 504 Series sliding window incorporating one (1) pane of 6.38mm thick laminated glazing.	Capral 4238-21 AWS ATF 813
	32(-2)	<b>Sliding doors</b> Framing with single or double glazed system with at least one (1) pane of 6.38mm thick laminated glazing.  <b>Example system:</b> AWS® 541 Series sliding door incorporating one (1) pane of 6.38mm thick laminated glazing.	AWS ATF793
All glazing identified with green mark-up (See APPENDIX D)	Rw 28	<b>Fixed windows/ Awning windows / Sliding windows / Sliding doors</b> Framing with single or double glazed system with at least one (1) pane of 6mm thick glazing.	ATF 769

NOTES:

- The term “glazing assembly” means the glass, frame and seals including the perimeter seal at the wall junction.
- The specified  $R_w$  ( $C_{tr}$ ) rating must be achieved by the glazing product specified or selected.
- The weighted sound reduction index  $R_w$  is a measure of the noise reduction property of a partition, a higher rating implying a higher sound reduction performance.

NOTES FOR GLAZING CONSTRUCTIONS:

- Where the information in this table is provided for the purpose of Council approvals process or cost planning it shall not be used for construction unless otherwise approved in writing by the acoustic consultant.
- Unless otherwise approved in writing by the acoustic consultant the design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification.
- Before committing to any form of construction or committing to any builder, advice should be sought from an acoustic consultant to ensure that adequate provisions are made for any variations which may occur as a result of changes to the glazing assembly where only an “estimate” is available for the sound insulation properties of recommended materials.
- The builder shall ensure that installation techniques will not diminish the  $R_w$  ( $C_{tr}$ ) performance of the glazing when installed on site.
- All openable glass windows and doors shall incorporate full perimeter acoustic seals equivalent to Q-Lon to enable the  $R_w(C_{tr})$  rating performance of the glazing to be maintained.
- The above glazing thicknesses should be considered the minimum thicknesses to achieve acoustical ratings. Thicker glazing may be required for structural loading, wind loading etc. If thicker glazing is used, check its suitability with the acoustic consultant.

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- The sealing of all gaps in acoustic rated glazing assemblies and partitions is critical in a sound rated construction. Use only sealer approved by the acoustic consultant.
- Check design of all junction details with acoustic consultant prior to construction.
- The information provided in this table is subject to modification and review without notice.
- The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

Table 9: Example sound insulation specification for building elements

	Example construction and acoustic rating $R_w$	
	Façade	Roof/ceiling
All glazing identified with red mark-up (See APPENDIX D)	$R_w$ 40 Typically achieved by one (1) layer 6mm fibre cement sheeting fixed 90mm stud frame fixed with one (1) layer of 10mm thick standard plasterboard. 75mm thick insulation having a density of not less than 11kg/m3 installed in cavities between studs.	$R_w$ 40 Typically achieved by a pitched 0.5mm thick metal deck over a ceiling consisting of a layer of 10mm thick standard plasterboard with 200mm thick insulation having a density of not less than 11kg/m3 laid atop.
All glazing identified with green mark-up (See APPENDIX D)		

NOTES:

- The weighted sound reduction index  $R_w$  is a measure of the noise reduction property of a partition, a higher rating implying a higher sound reduction performance.
- Where the information in this table is provided for the purpose of Council approvals process or cost planning it shall not be used for construction unless otherwise approved in writing by the acoustic consultant.
- Unless otherwise approved in writing by the acoustic consultant the design in this table is preliminary and a comprehensive assessment shall be conducted prior to Construction Certification.
- The builder shall ensure that installation techniques will not diminish the  $R_w$  performance of the glazing when installed on site.
- Note that any penetration (such may be provided for ventilation, heating or cooling outlet) shall be provided in a manner that does not diminish the sound insulation performance of the construction.

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## 5.2 Vibration impacts from rail

Given the significant distance (approximately 100 metres) between the nearest rail line and the Subject Development, Renzo Tonin & Associates expects vibrations levels will easily conform with '*human comfort*' thresholds, such as per BS 6472. As an example, Renzo Tonin & Associates typically suggests a vibration assessment be undertaken if the Subject Development is within 20 metres from a rail line.

## 5.3 Noise impacts from future rail provisions

Enquiries were made with VicTrack, Public Trains Victoria, Metro Trains Melbourne and other relevant infrastructure developments to better understand plans for the adjacent rail line. Based on this the following is understood:

- Based on current information available from the rail authorities there is nothing that can be relied upon suggesting that future expansion of rail lines
- The Sunbury line is currently undergoing upgrades to support planned traffic increases created by the Metro Tunnel project

We understand from SMA projects that discussions were had with Rail Projects Victoria, the Department of Jobs, Precincts and Regions, and VicTrack in 2019 to better understand plans for the Melbourne Airport Link proposal. In the context of the rail precinct adjacent to the Subject Site the following is understood:

- The works are to not alter the existing rail alignment adjacent to the Subject Site
- Concept plans were not yet in preparation and it would be some time before the concept planning works are undertaken

The noise assessment included assessment of freight, V-Line and metro train passage, the dictating  $L_{max}$  of which is not increased by increase in train traffic.

To generalise the effect of an increase in rail traffic, a doubling in volume would be expected to result in a 0 dB increase in  $L_{max}$  (maximum noise per rail pass) and 3 dB increase in  $L_{eq}$  (energy average noise levels) over existing noise levels. In this case sound insulation requirements in this report will likely remain the same as they are driven by the night-time train maximum noise levels ( $L_{max}$ ) measured at the Subject Site.

The Subject Development site is considered low risk, on the basis of the significant distance from the rail corridor, and relatively low train noise levels observed on site; even with any upgrades or potential expansions outlined above.

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## 5.4 Noise impacts from surrounding commercial uses

Noise levels from the surrounding commercial uses at the Subject Site were observed to be minimal. Noise from premises to the north primarily consisted of forklift operations at 100 Hampshire Road (Centre Com Warehouse), which is understood to operate during the day period only. Based on these observations, Renzo Tonin & Associates considers exceedance of EPA 1826/ SEPP N-1 noise limits at the Subject Development low risk.

## 5.5 Noise emissions from the Subject Development

### 5.5.1 Residential plant noise

Whilst details of mechanical plant selection and location are not available during the Concept Design / Town Planning phase, Renzo Tonin & Associates is able to provide commentary on the likely compliance of the Subject Development with noise criteria, drawing on experience from similar projects:

- Domestic air conditioner condensers are generally located in garages, on roof decks or on balconies; these do not generally generate significant noise and are generally found to result in an acceptable outcome with respect to EPA guidelines.
  - During the detailed design phase, equipment performance is specified such that the applicable criteria shall be achieved
  - Renzo Tonin & Associates recommends that a clause to the effect of the following be included in the owner's corporation rules:
 

*"If a valid complaint is raised relating to the audibility of a neighbour's domestic air-conditioning unit during the prohibited hours, then the subject air-conditioner shall be switched off during the prohibited hours. Prohibited hours for heating: 10pm – 7am Monday – Friday and; 10pm – 9am weekends & public holidays. Prohibited hours for cooling: 11pm – 7am Monday – Friday and; 11pm – 9am weekends & public holidays."*

It is anticipated that plant noise from the Subject Development can achieve compliance with noise criteria

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## 6 Conclusion

Renzo Tonin & Associates was engaged by SMA Projects to assess the town planning application for the proposed mixed residential development (Subject Development) to be located at 99 Derby Road, Sunshine (the Subject Site). The assessment comprised:

- Review of the Subject Site, surrounds and proposed development
- Measurement and observation of the existing noise environment at the Subject Site
- Determination of relevant noise criteria and legislation:
  - Victoria Planning Provision Clause 58.04 / Standard D16 internal noise criteria
  - Australian Standard 2107 internal noise criteria
  - VCAT precedent sleep disturbance criteria for train noise
  - SEPP N-1/ EPA 1826 Noise Protocol noise limits
  - Environment Protection Act 2017 and Environment Protection Regulations 2021
- Glazing and facade specification for Victoria Planning Provision 58.04/ Standard D16 / AS2107 / Sleep disturbance criteria compliance within townhouses.

Provided that the advice given in this report is adhered to, it is expected that the Subject Development can operate without adverse impact on residential amenity in the area and provide suitable residential amenity with respect to acoustics.

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## APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

Adverse weather	Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter).
Ambient noise	The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far.
Background noise	Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below).
Decibel [dB]	<p>The units that sound is measured in. The following are examples of the decibel readings of every day sounds:</p> <p>0dB The faintest sound we can hear</p> <p>30dB A quiet library or in a quiet location in the country</p> <p>45dB Typical office space. Ambience in the city at night</p> <p>60dB CBD mall at lunch time</p> <p>70dB The sound of a car passing on the street</p> <p>80dB Loud music played at home</p> <p>90dB The sound of a truck passing on the street</p> <p>100dB The sound of a rock band</p> <p>120dB Deafening</p>
dB(A)	A-weighted decibels. The A-weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter.
Frequency	Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz.
L <sub>Max</sub>	The maximum sound pressure level measured over a given period.
L <sub>10</sub>	The sound pressure level that is exceeded for 10% of the time for which the given sound is measured.
L <sub>90</sub>	The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A).
L <sub>eq</sub>	The "equivalent noise level" is the summation of noise events and integrated over a selected period of time.
Reflection	Sound wave changed in direction of propagation due to a solid object obscuring its path.
Sound	A fluctuation of air pressure which is propagated as a wave through air.
Sound level meter	An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels.
Sound pressure level	The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone.

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## APPENDIX B      Unattended noise monitoring

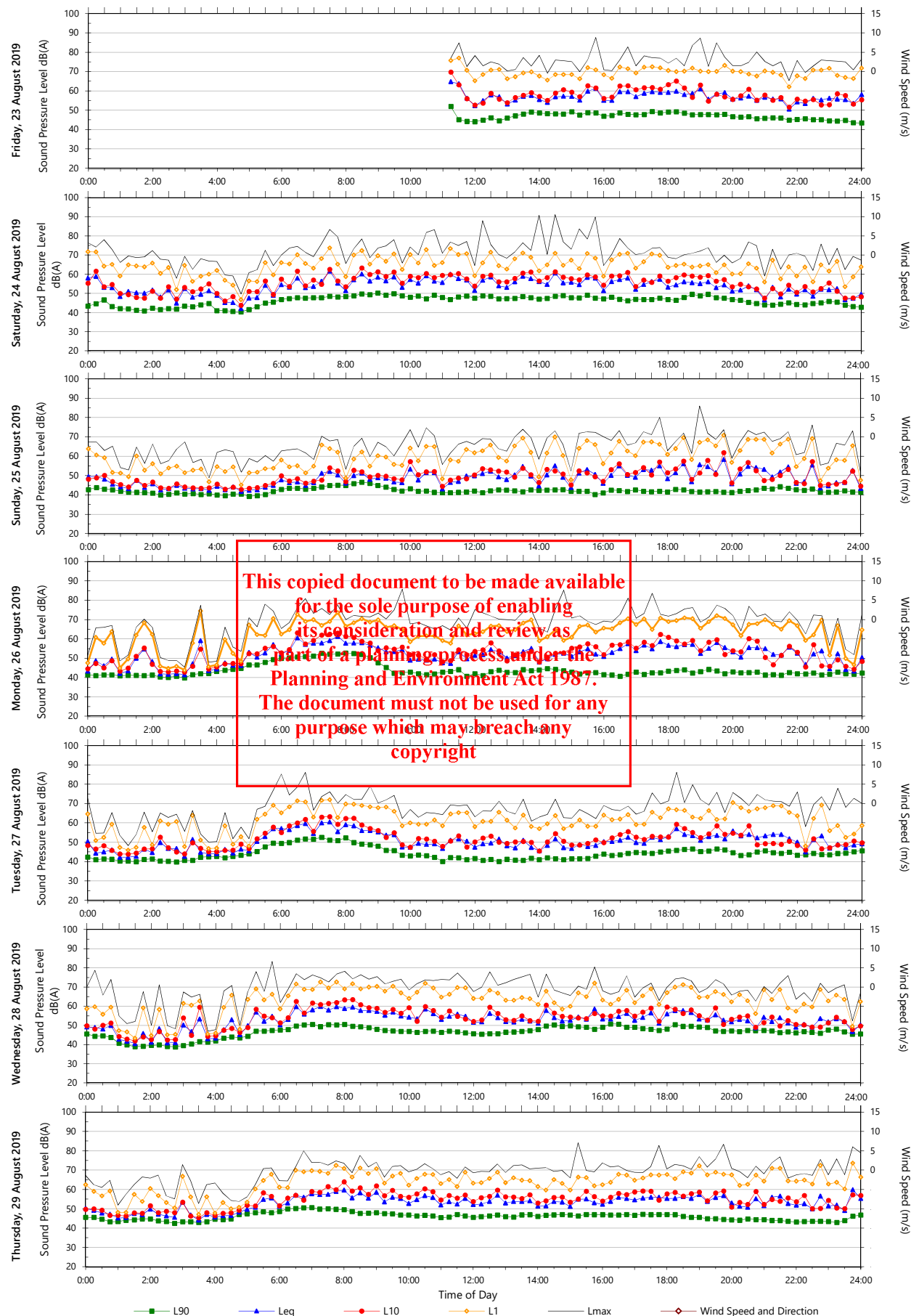
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# Unattended Monitoring Results

Location: 99 Derby Road, Sunshine



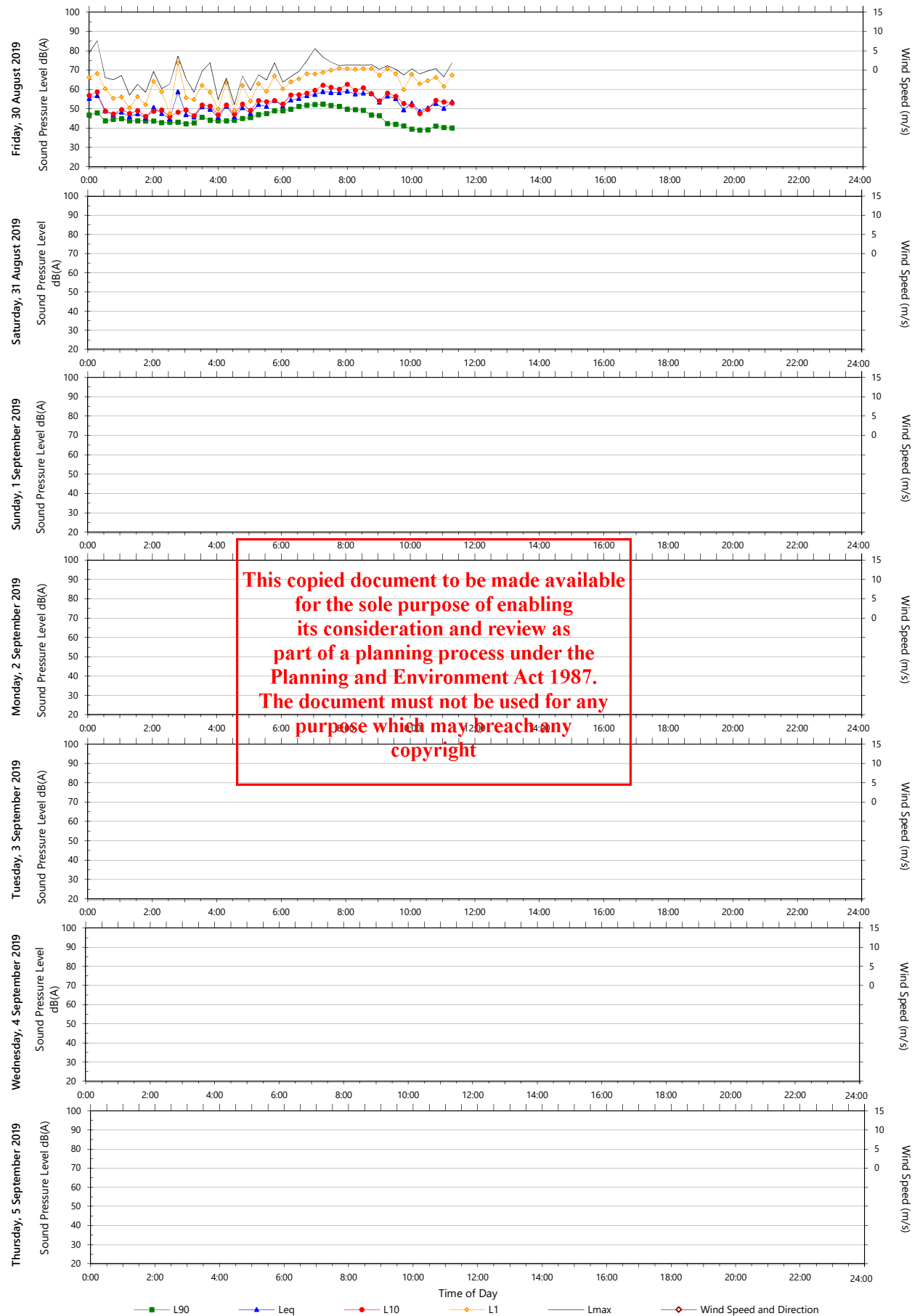
Data File: 2019-08-23\_SLM\_001\_123\_Rpt\_Report.txt

Template: QTE-26 Logger Graphs Program (r31)

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# Unattended Monitoring Results

Location: 99 Derby Road, Sunshine



Data File: 2019-08-23\_SLM\_001\_123\_Rpt\_Report.txt

Template: QTE-26 Logger Graphs Program (r31)

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## APPENDIX C VCAT train noise precedents

Date	VCAT #	Title	Rail corridor	Applicable noise sources	Comment	Habitable room criterion	
						Leq dB(A)	L <sub>max</sub> dB(A)
2014 July 25	845	AXF Group Pty Ltd v Whitehorse CC	Belgrave, Lilydale lines. Near Box Hill Station. Passenger trains.	...rail system...	L <sub>Amax</sub> ... maximum noise level not exceeded by 95% of trains...	-	Bed 55dB Living 60dB
2014 May 5	513	Strathelie Property Holdings Pty Ltd v Yarra CC	Hurstbridge, South Morang lines Near Victoria Park Station Passenger trains.	...Train station and ...railway line,...	...with windows closed...	-	Bed 50dB Living 60dB
2012 Mar 23	323	Wang v Moreland CC	Upfield Line Near Coburg Station. Passenger trains.	Trains ... train horns ... (boom gate)...bells ... traffic...	Stringent criterion applied to ... mitigate both the continuous rumble and the short sharp peaks. Residents can... choose to seal the doors and windows to minimise the external noise.	-	Bed 50dB Living 60dB
2012 Aug 9	1180	ACCC Pty Ltd tas AWC Property v Yarra CC (Red Dot)	Alamein, Belgrave, Glen Waverley, Lilydale lines. Near Richmond Station Passenger and freight trains.	Trains... (passenger and freight) ... announcements ... horns	Stringent criterion used ...Given only ...4.5 hours ... (with)...limited trains... (and)... no announcements or train horns...(which can be)... occasional, random and annoying...	-	Bed 50dB
2012 Jul 10	906	Lend Lease Apartments (Armada) Pty Ltd v Stonnington CC	Cranbourne, Frankston, Pakenham lines. Near Toorak Station. Passenger and freight trains.	... rail system...	Leq dB(A) criterion introduced to address any future increases in freight train numbers	Bed 35dB (hourly)	Bed 55dB
2012 Jan 23	-	Regional Rail Link Section 2 Noise Impacts And Mitigation Advisory Committee Report	West of Werribee and Deer Park Passenger trains. (possible future provision for freight)	Trains	-	Bed 40dB (10pm-7am) Living 45dB (7am-10pm)	All 65dB
2011 Nov 8	2175	Richmond Icon Pty Ltd v Yarra CC	Alamein, Belgrave, Glen Waverley, Lilydale lines. Near Richmond Station. Passenger and freight trains.	Trains (passenger and freight)	...maximum noise level not exceeded by 95% of train... Each case ...assessed on...merits... (with regard to)...number of tracks...trains... types... nature of noise on the tracks... This instance involved frequent trains thumping over rail points.	-	Bed 50dB
2011 Mar 22	475	Pomeroy Pacific Pty Ltd v Moreland CC No. 2	Craigieburn line. Near Pascoe Vale Station. Passenger trains.	Trains	-	-	Bed 55dB Living 60dB

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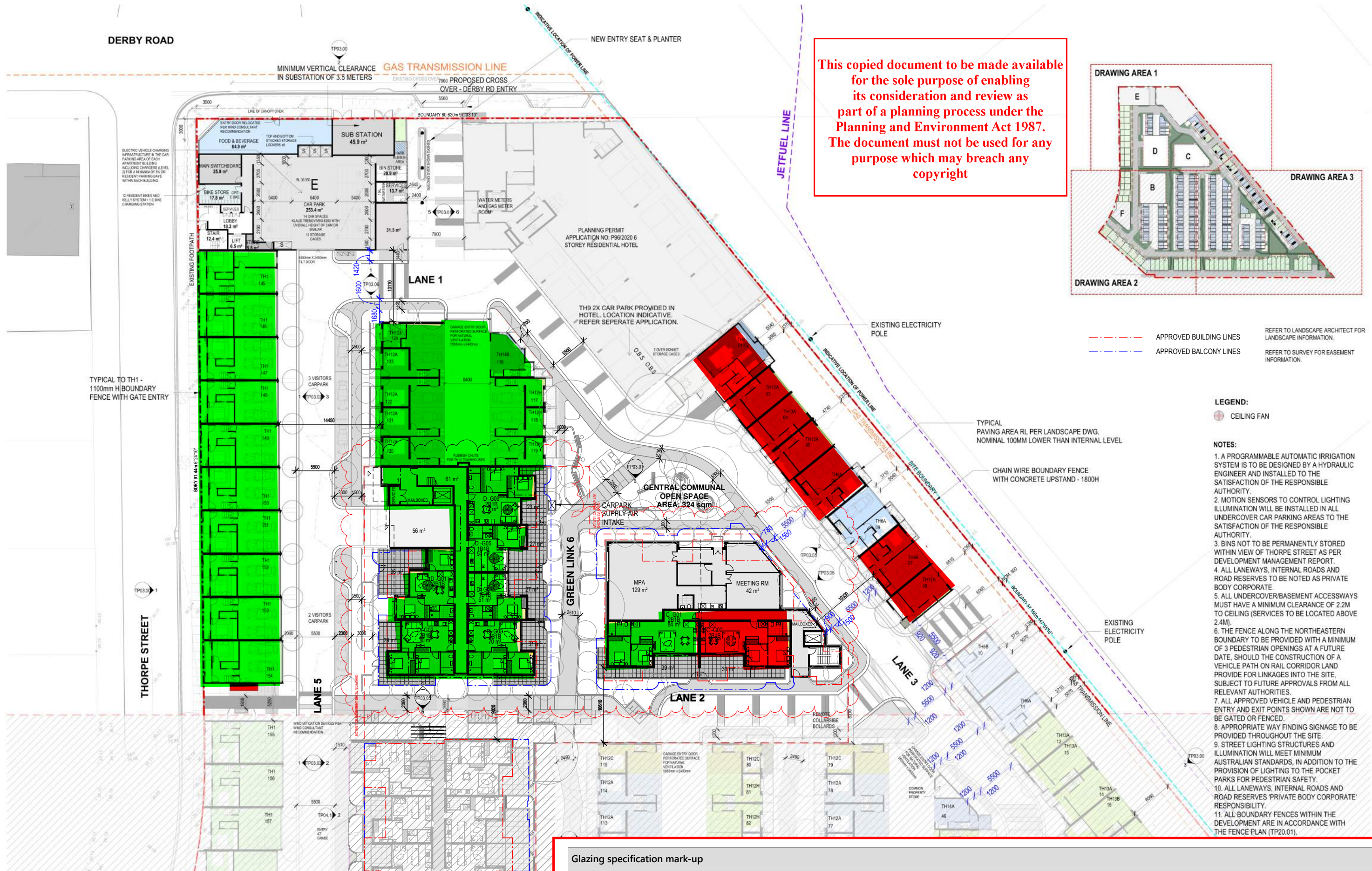
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## APPENDIX D      Glazing specification

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APPROVED BUILDING LINES  
APPROVED BALCONY LINES  
REFER TO LANDSCAPE ARCHITECT FOR LANDSCAPE INFORMATION.  
REFER TO SURVEY FOR EASEMENT INFORMATION.

LEGEND:  
CEILING FAN

- NOTES:
1. A PROGRAMMABLE AUTOMATIC IRRIGATION SYSTEM IS TO BE DESIGNED BY A HYDRAULIC ENGINEER AND INSTALLED TO THE SATISFACTION OF THE RESPONSIBLE AUTHORITY.
  2. MOTION SENSORS TO CONTROL LIGHTING ILLUMINATION WILL BE INSTALLED IN ALL UNDERCOVER CAR PARKING AREAS TO THE SATISFACTION OF THE RESPONSIBLE AUTHORITY.
  3. BINS NOT TO BE PERMANENTLY STORED WITHIN VIEW OF THORPE STREET AS PER DEVELOPMENT MANAGEMENT REPORT.
  4. ALL LANEWAYS, INTERNAL ROADS AND ROAD RESERVES TO BE NOTED AS PRIVATE BODY CORPORATE.
  5. ALL UNDERCOVER/BASEMENT ACCESSWAYS MUST HAVE A MINIMUM CLEARANCE OF 2.2M TO CEILING (SERVICES TO BE LOCATED ABOVE 2.4M).
  6. THE FENCE ALONG THE NORTHEASTERN BOUNDARY TO BE PROVIDED WITH A MINIMUM OF 3 PEDESTRIAN OPENINGS AT A FUTURE DATE, SHOULD THE CONSTRUCTION OF A VEHICLE PATH ON RAIL CORRIDOR LAND PROVIDE FOR LINKAGES INTO THE SITE, SUBJECT TO FUTURE APPROVALS FROM ALL RELEVANT AUTHORITIES.
  7. ALL APPROVED VEHICLE AND PEDESTRIAN ENTRY AND EXIT POINTS SHOWN ARE NOT TO BE GATED OR FENCED.
  8. APPROPRIATE WAY FINDING SIGNAGE TO BE PROVIDED THROUGHOUT THE SITE.
  9. STREET LIGHTING STRUCTURES AND ILLUMINATION WILL MEET MINIMUM AUSTRALIAN STANDARDS, IN ADDITION TO THE PROVISION OF LIGHTING TO THE POCKET PARKS FOR PEDESTRIAN SAFETY.
  10. ALL LANEWAYS, INTERNAL ROADS AND ROAD RESERVES 'PRIVATE BODY CORPORATE' RESPONSIBILITY.
  11. ALL BOUNDARY FENCES WITHIN THE DEVELOPMENT ARE IN ACCORDANCE WITH THE FENCE PLAN (TP20.01).

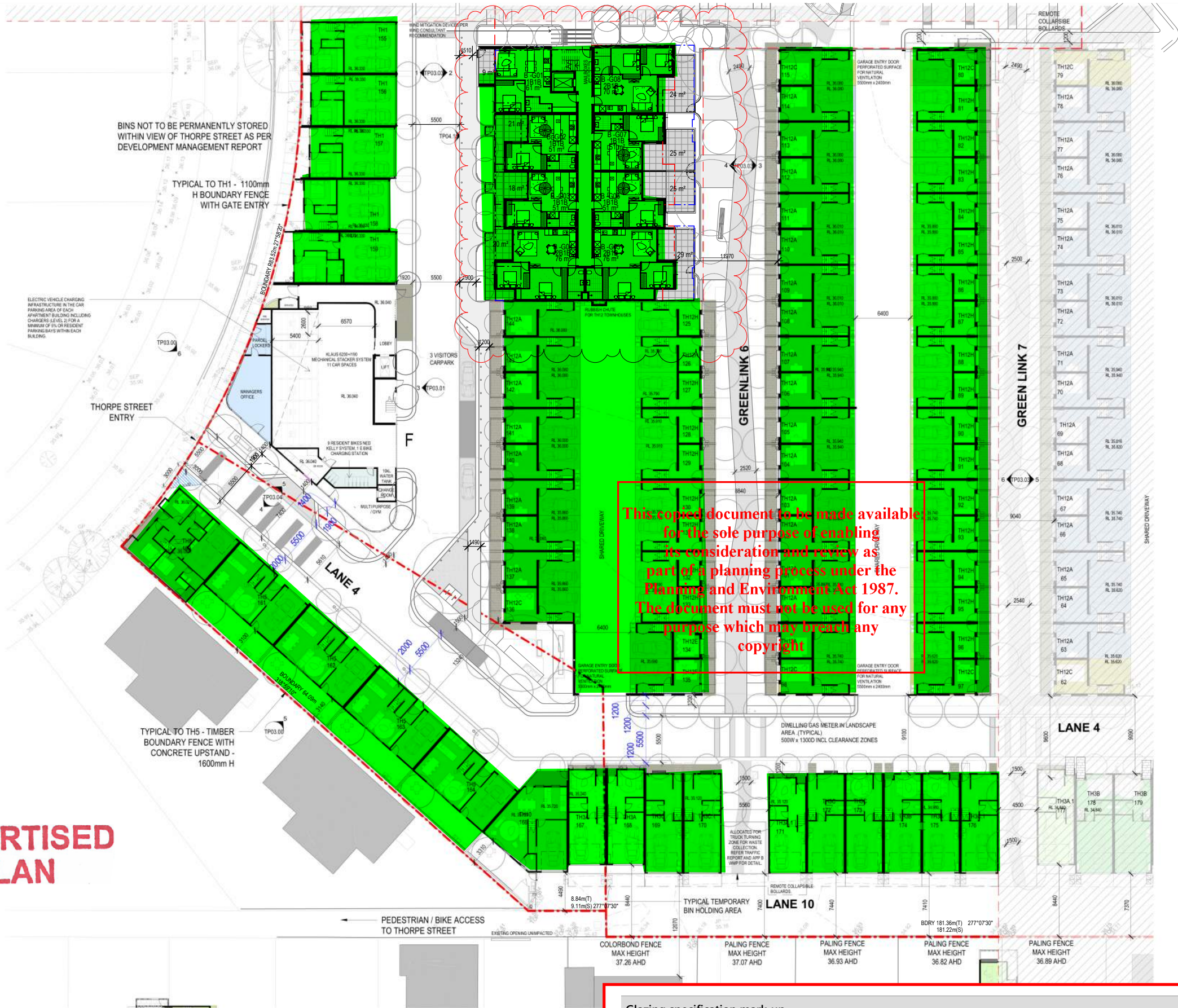
Glazing specification mark-up

	Type	Rw (Ctr)	Example of acceptable glazing system
Notes for the Subject Development: Upgraded requirement only explicitly required for bedrooms.	Fixed, awning and sliding windows	32 (-2)	Framing incorporating single or double glazed system with at least one (1) pane of 6.38mm thick laminated glazing.
	Sliding doors	32 (-2)	Framing incorporating single or double glazed system with at least one (1) pane of 6.38mm thick laminated glazing.
	Fixed, awning and sliding windows	Rw 28	Framing incorporating 6mm thick single glazing or 6/12/6 double glazing as per ESD requirements.
	Sliding doors	Rw 28	Framing incorporating 6mm thick single glazing or 6/12/6 double glazing as per ESD requirements.

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--- APPROVED BUILDING LINES  
--- APPROVED BALCONY LINES

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  11. ALL BOUNDARY FENCES WITHIN THE DEVELOPMENT ARE IN ACCORDANCE WITH THE FENCE PLAN (TP20.01).
  12. ELECTRICAL OUTLETS ARE PROVIDED IN EACH TOWNHOUSE GARAGE FOR ELECTRIC

Glazing specification mark-up

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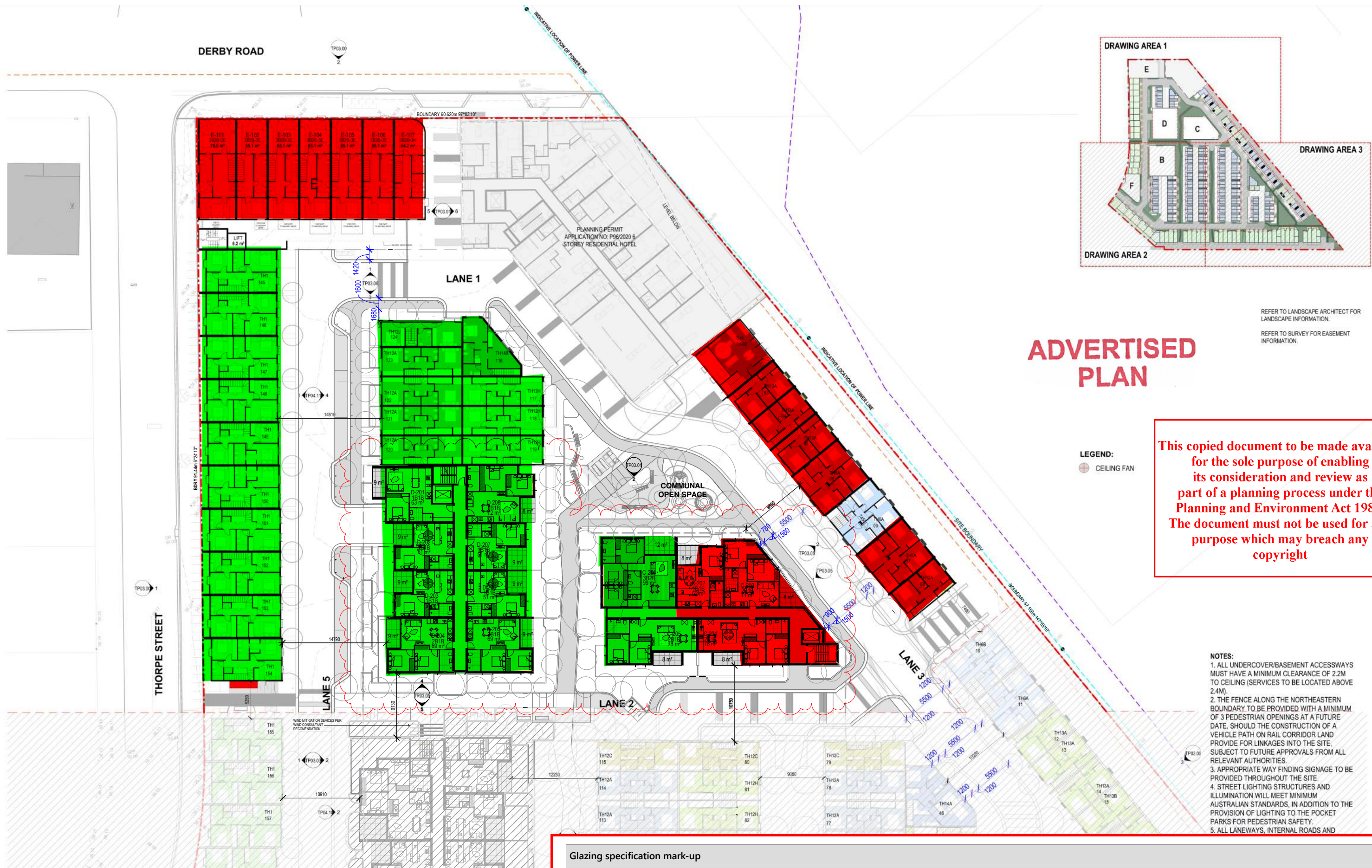
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- 6. ALL BOUNDARY FENCES WITHIN THE DEVELOPMENT ARE IN ACCORDANCE WITH THE FENCE PLAN (TP20.01).

ROOF LEGEND

PV - PHOTOVOLTAIC ARRAY  
SL - SKYLIGHT  
ST - SKYTUBE  
ALL TOWNHOUSES ARE TO HAVE AN INDIVIDUAL 2.5 KW PV CAPACITY

ROOF MATERIALS AND FINISHES	
CODE	DESCRIPTION
RF01	COLOURBOND METAL ROOFING - COLOUR SURFMIST
RF02	LIGHT GREY TRAFFICABLE WATERPROOF MEMBRANE

Glazing specification mark-up

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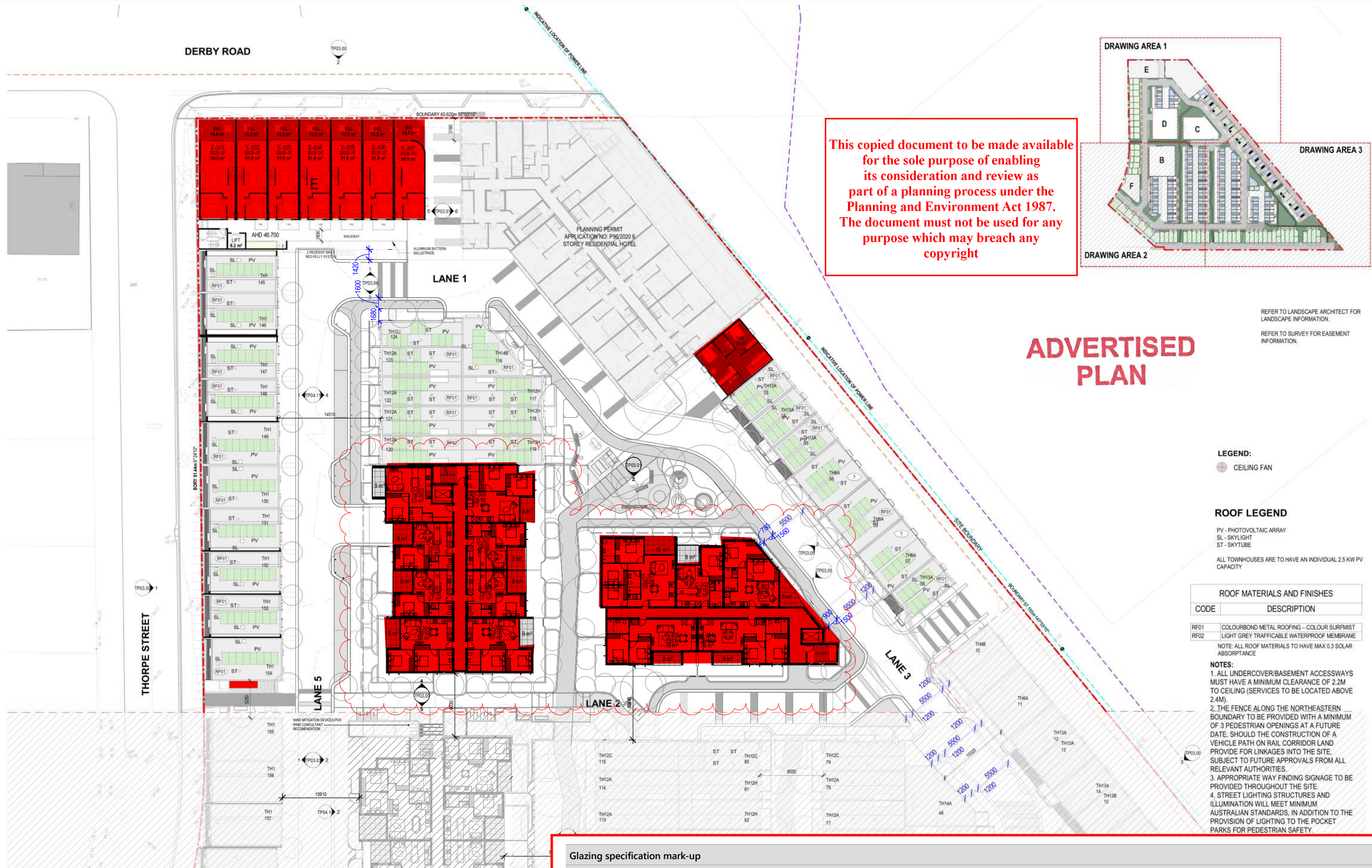
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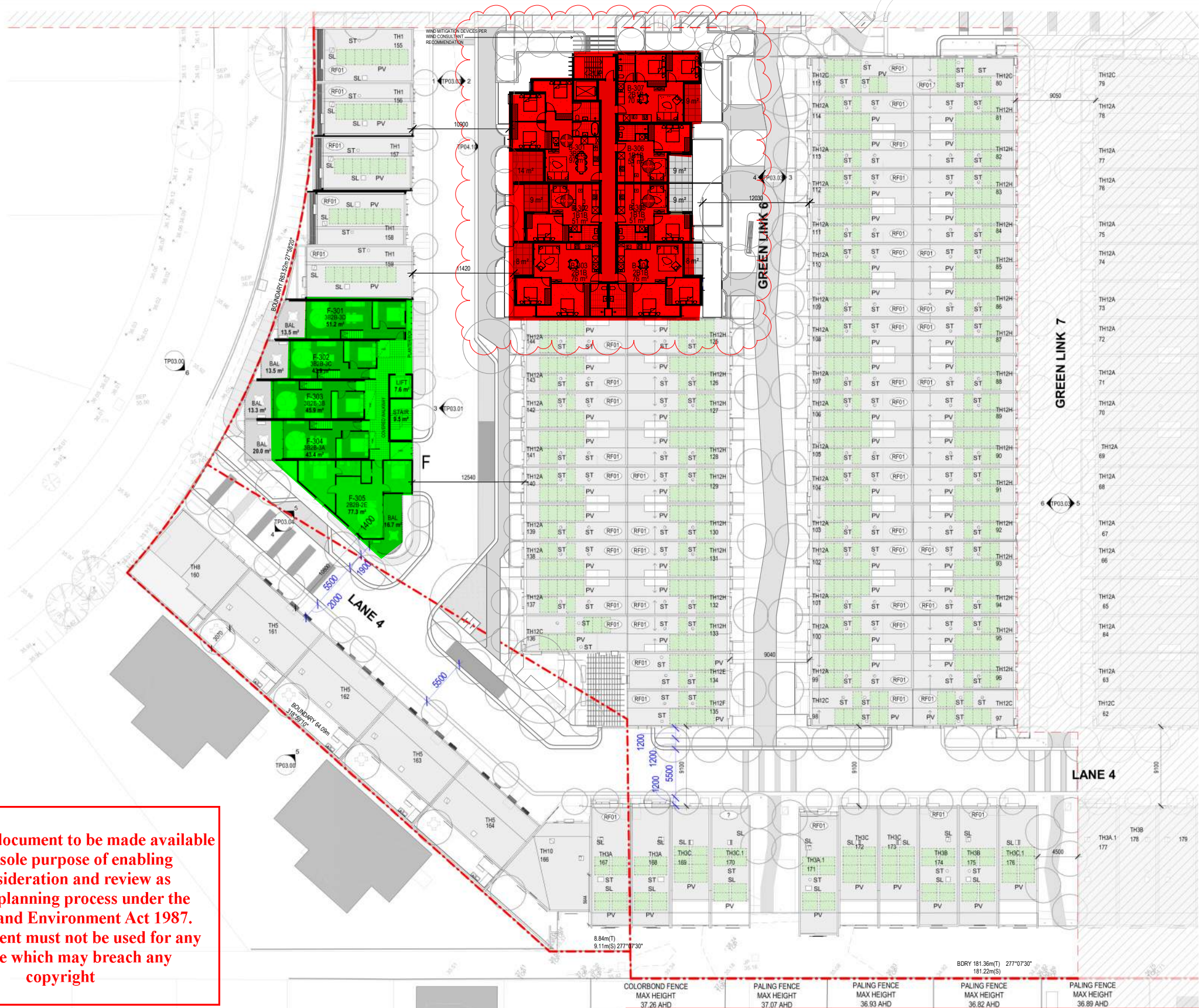
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- REFER TO SURVEY FOR EASEMENT INFORMATION.
- LEGEND:**
- CEILING FAN
- ROOF LEGEND**
- PV - PHOTOVOLTAIC ARRAY  
SL - SKYLIGHT  
ST - SKYTUBE
- ALL TOWNHOUSES ARE TO HAVE AN INDIVIDUAL 2.5 KW PV CAPACITY
- ROOF MATERIALS AND FINISHES**
- | CODE | DESCRIPTION                                |
|------|--|
| RF01 | COLOURBOND METAL ROOFING - COLOUR SURFMIST |
| RF02 | LIGHT GREY TRAFFICABLE WATERPROOF MEMBRANE |
- NOTE: ALL ROOF MATERIALS TO HAVE MAX 0.3 SOLAR ABSORPTANCE
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CEILING FAN

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  5. ALL LANEWAYS, INTERNAL ROADS AND ROAD RESERVES 'PRIVATE BODY CORPORATE' RESPONSIBILITY.
  6. ALL BOUNDARY FENCES WITHIN THE DEVELOPMENT ARE IN ACCORDANCE WITH THE FENCE PLAN (TP20.01).

## ROOF LEGEND

PV - PHOTOVOLTAIC ARRAY  
SL - SKYLIGHT  
ST - SKYTUBE

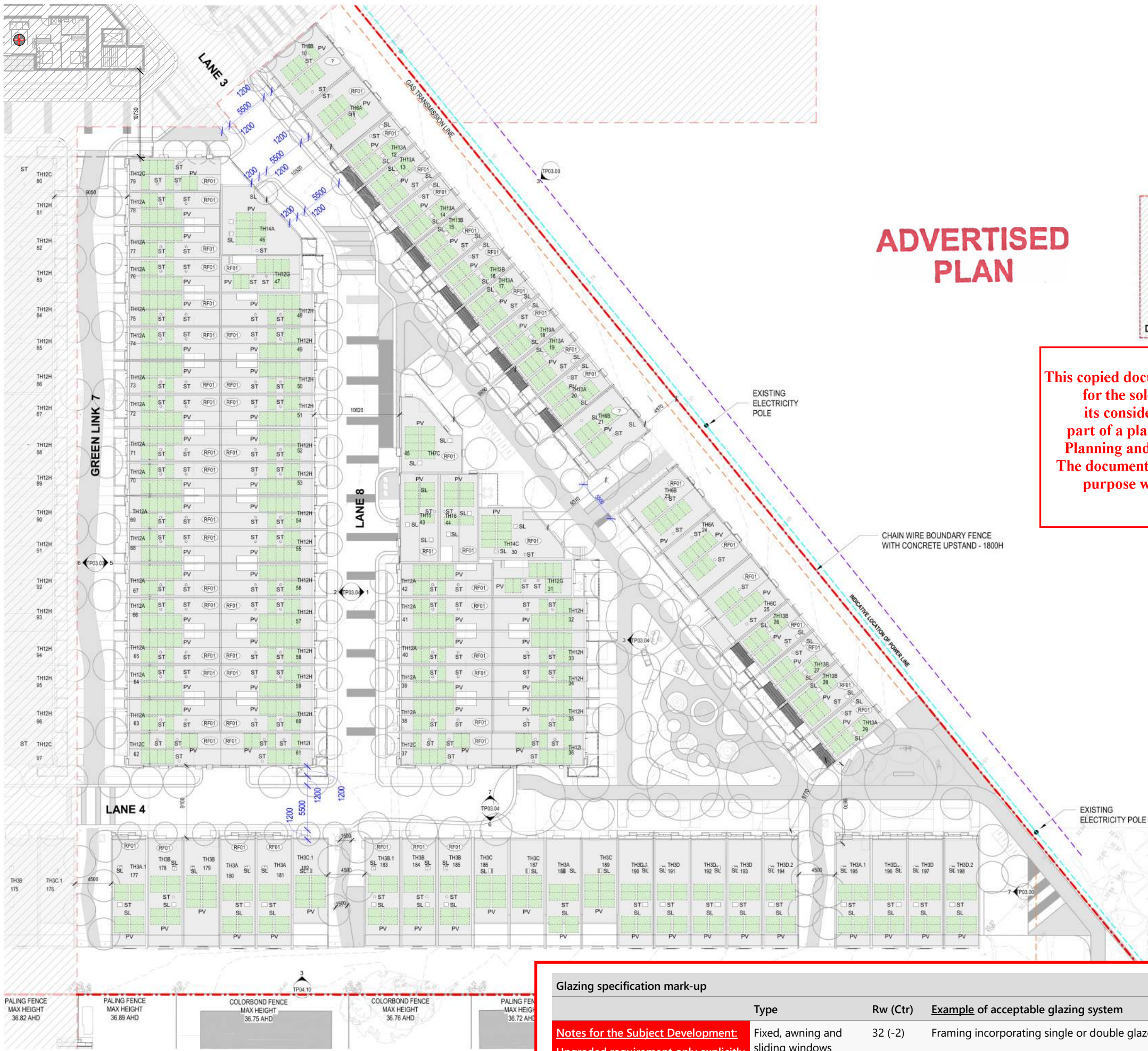
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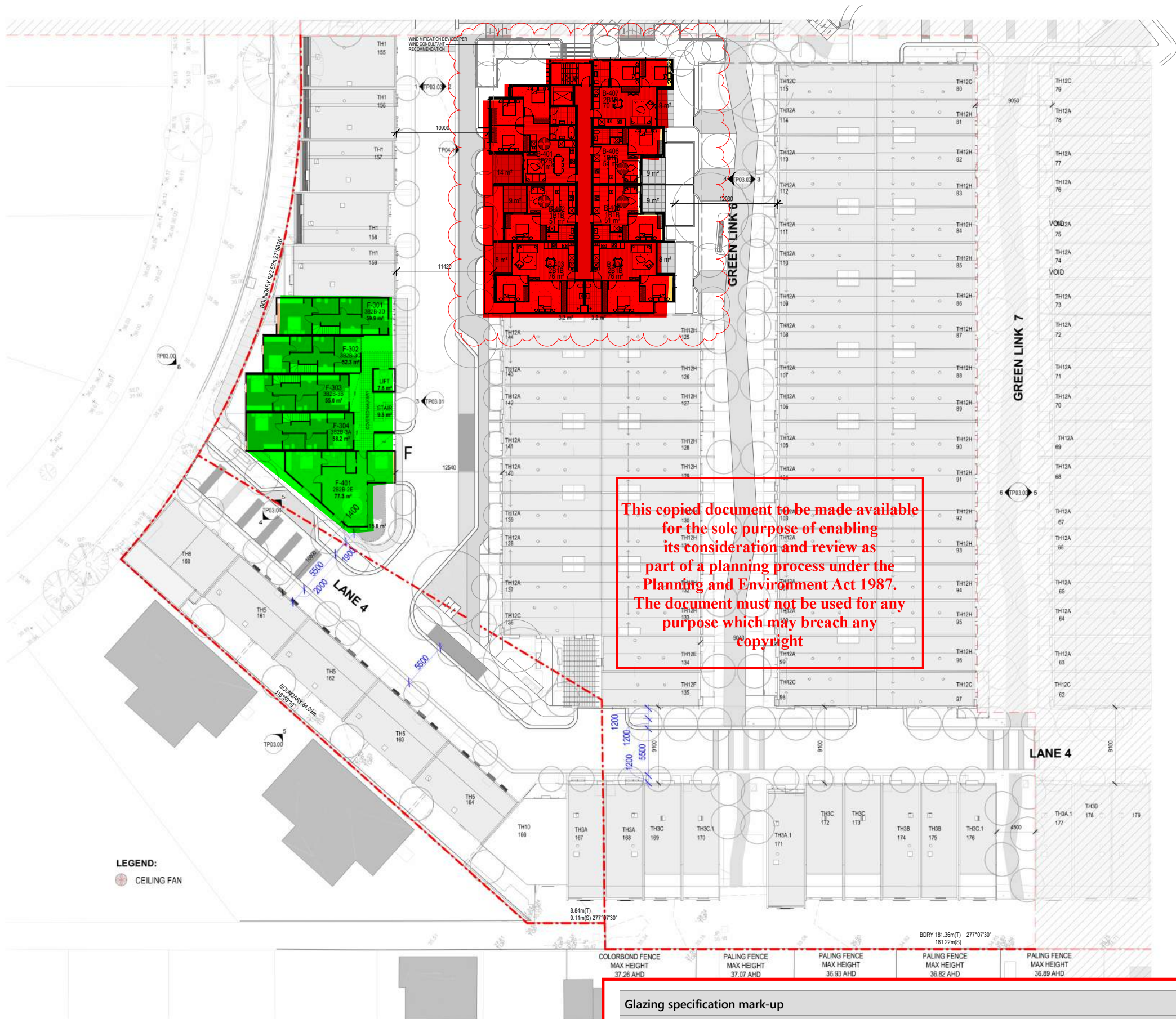
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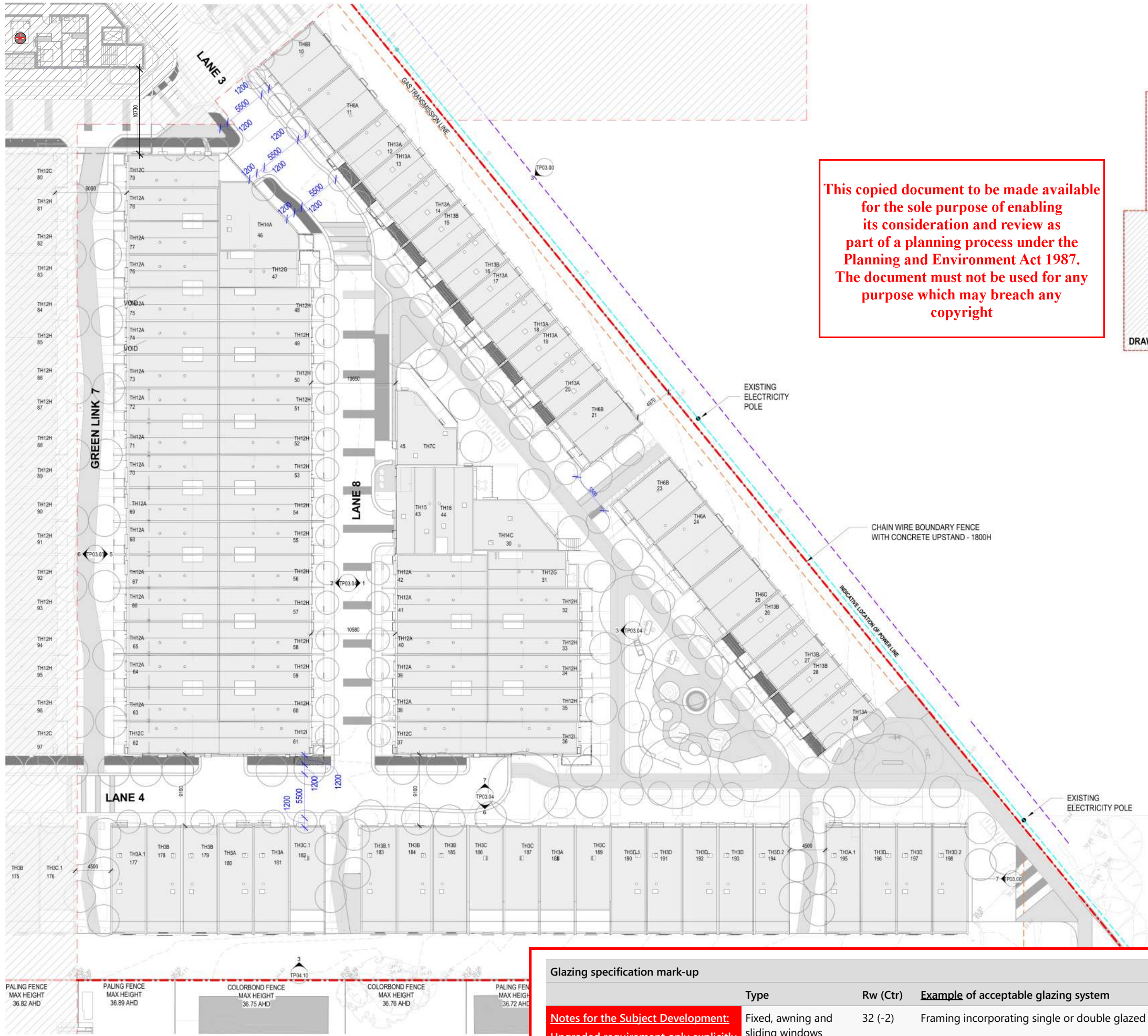
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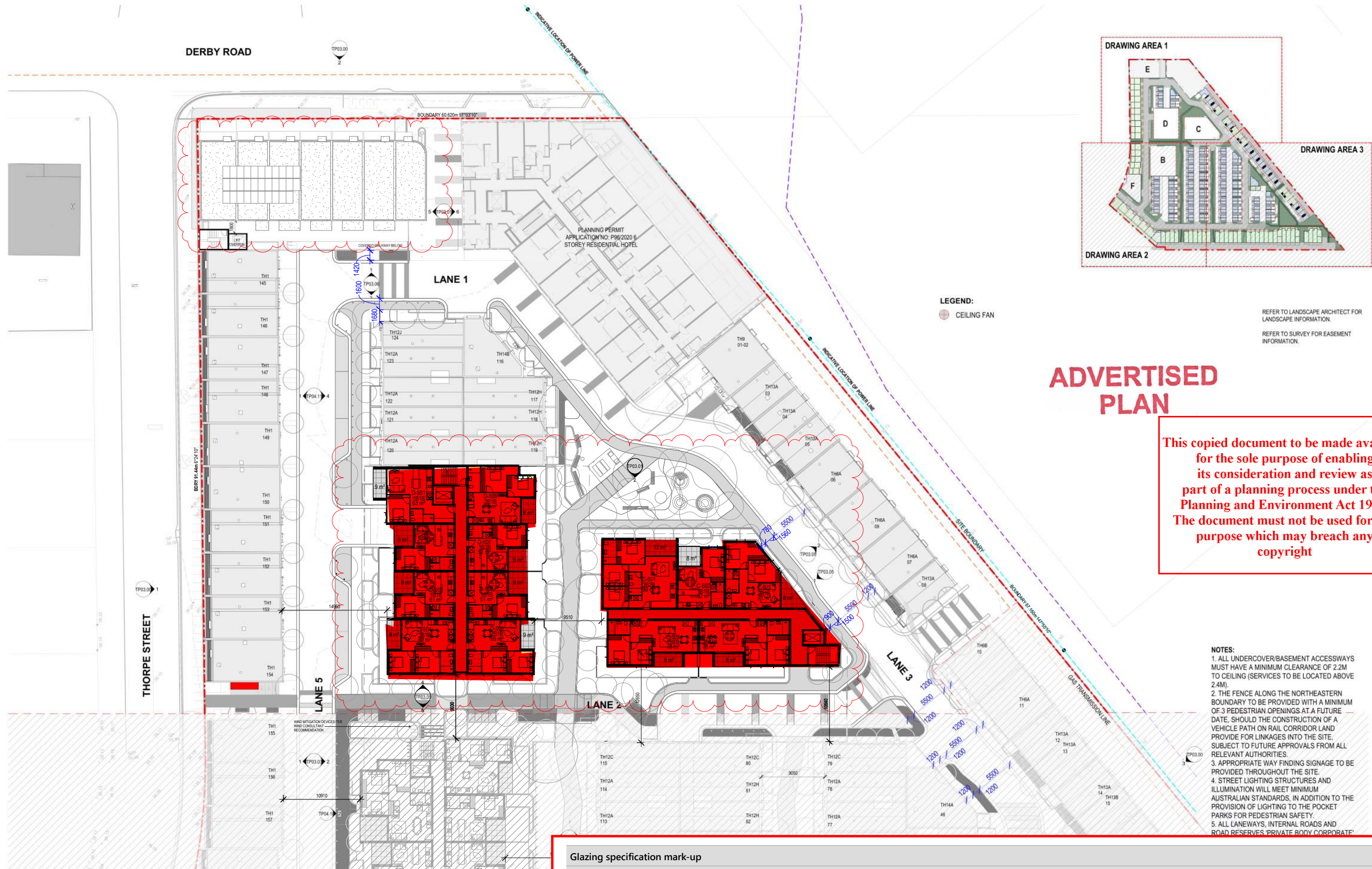
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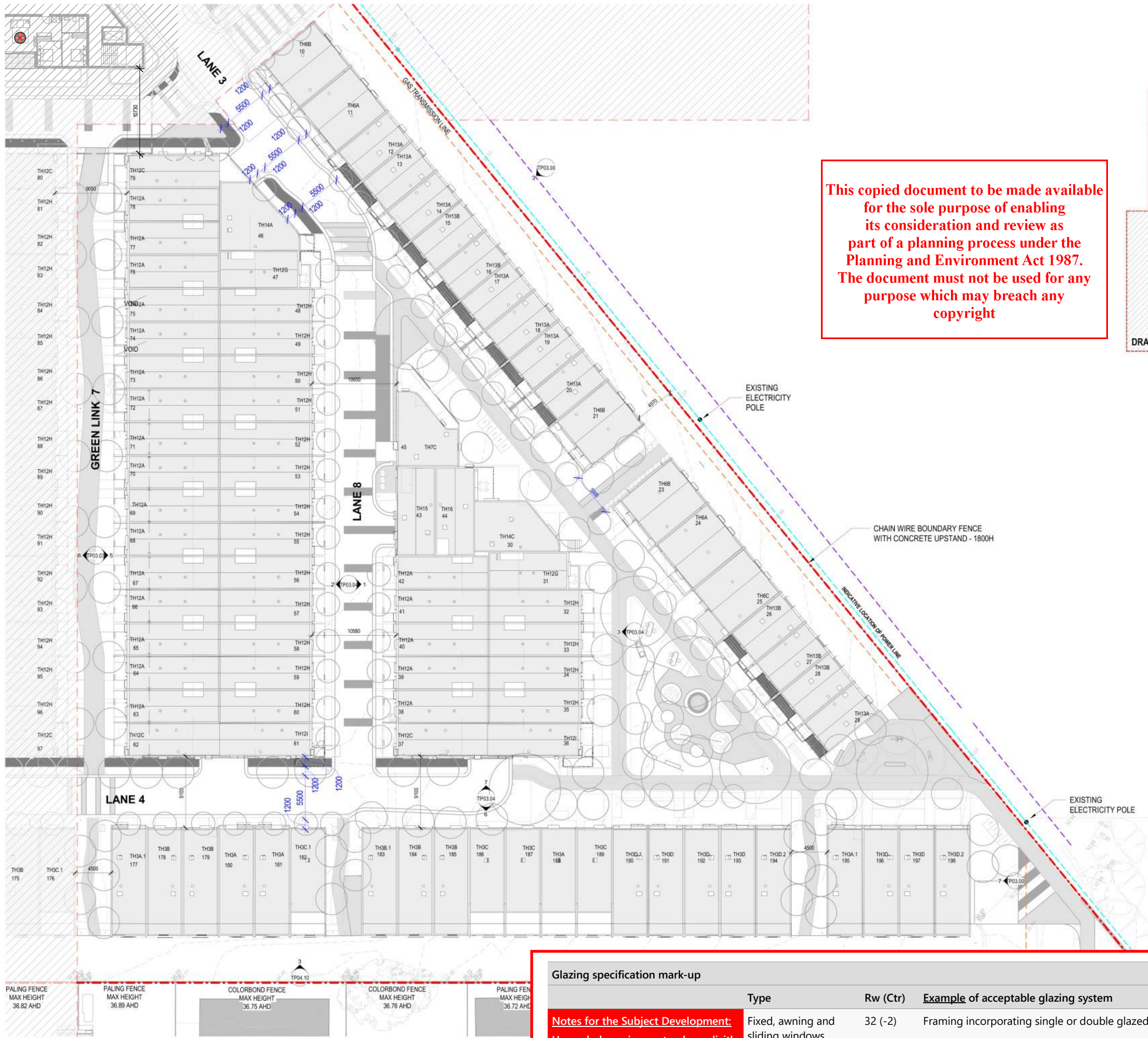
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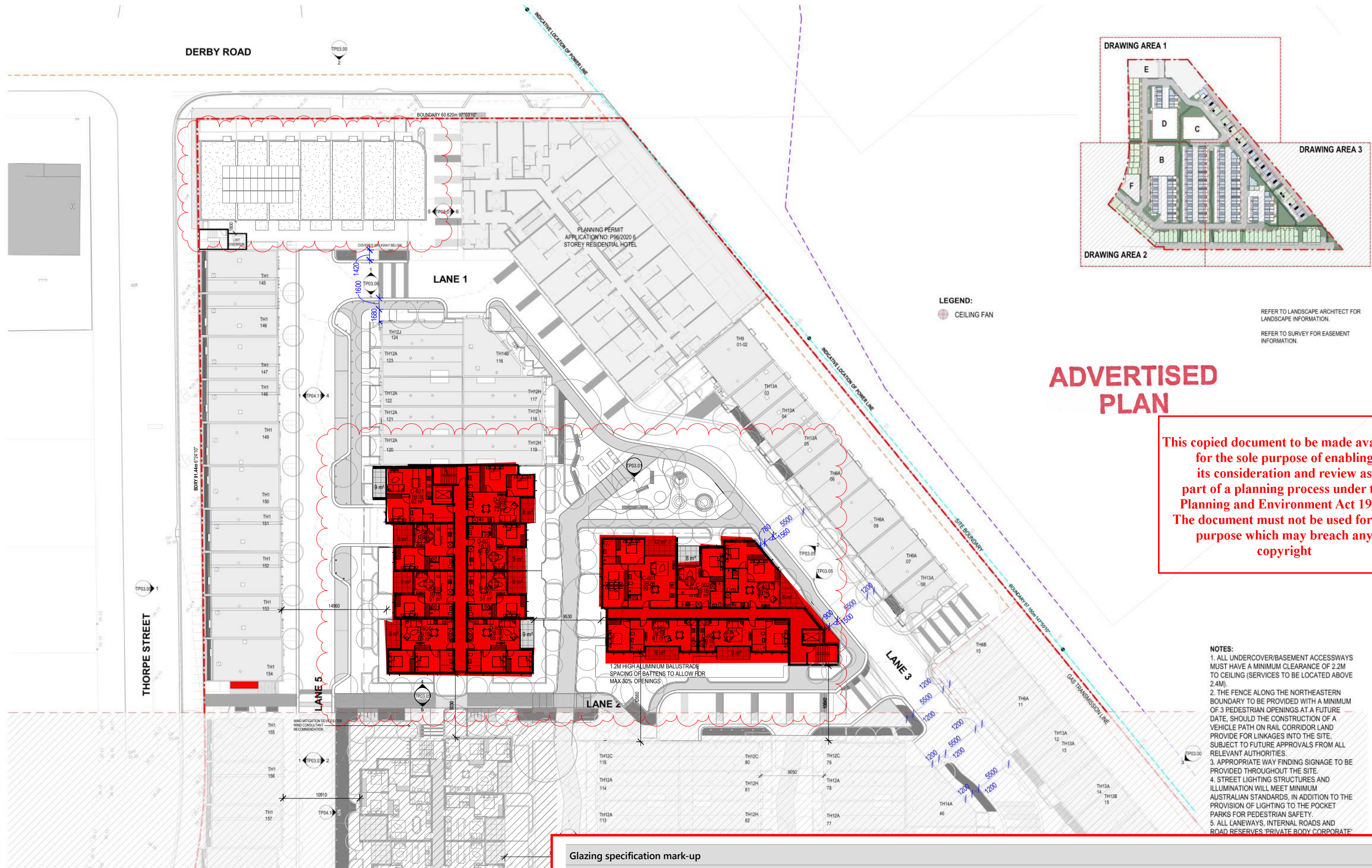
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