I hereby give notice that a hearing by commissioners will be held on:

Date:	**Tuesday 15, Wednesday 16 and Thursday 17 June 2021**
Time:	**9.30 a.m.**
Meeting Room:	**Totara Room**
Venue:	**Level 2, Civic Annex, 31-33 Manukau Station Road, Manukau, Auckland**

HEARING REPORT

VOLUME 2 (APPENDIX 1)

PRIVATE PLAN MODIFICATION 52

520 GREAT SOUTH ROAD, PAPAKURA

520 GSR LIMITED

COMMISSIONERS

Chairperson	**Greg Hill**
Commissioners	**Karyn Kurzeja**
	Mark Farnsworth

Sam Otter
SENIOR HEARINGS ADVISOR

Telephone: 09 353 9587 or 021 196 2582
Email: sam.otter@aucklandcouncil.govt.nz
Website: www.aucklandcouncil.govt.nz

WHAT HAPPENS AT A HEARING

Te Reo Māori and Sign Language Interpretation
Any party intending to give evidence in Māori or NZ sign language should advise the hearings advisor at least ten working days before the hearing so a qualified interpreter can be arranged.

Hearing Schedule
If you would like to appear at the hearing please return the appearance form to the hearings advisor by the date requested. A schedule will be prepared approximately one week before the hearing with speaking slots for those who have returned the appearance form. If changes need to be made to the schedule the hearings advisor will advise you of the changes.
Please note: during the course of the hearing changing circumstances may mean the proposed schedule may run ahead or behind time.

Cross Examination
No cross examination by the applicant or submitters is allowed at the hearing. Only the hearing commissioners are able to ask questions of the applicant or submitters. Attendees may suggest questions to the commissioners and they will decide whether or not to ask them.

The Hearing Procedure
The usual hearing procedure is:

- **the chairperson** will introduce the commissioners and will briefly outline the hearing procedure. The Chairperson may then call upon the parties present to introduce themselves. The Chairperson is addressed as Madam Chair or Mr Chairman.
- The **applicant** will be called upon to present their case. They may be represented by legal counsel or consultants and call witnesses in support of the application. The hearing panel may ask questions of the speakers.
- The **local board** may wish to present comments. These comments do not constitute a submission however the Local Government Act allows the local board to make the interests and preferences of the people in its area known to the hearing panel.
- **Submitters** (for and against the application) are then called upon to speak. Submitters' active participation in the hearing process is completed after the presentation of their evidence so ensure you tell the hearing panel everything you want them to know during your presentation time. Submitters may be represented by legal counsel or consultants and may call witnesses on their behalf. The hearing panel may then question each speaker.
    - Late submissions: The council officer's report will identify submissions received outside of the submission period. At the hearing, late submitters may be asked to address the panel on why their submission should be accepted. Late submitters can speak only if the hearing panel accepts the late submission.
    - Should you wish to present written evidence in support of your submission please ensure you provide the number of copies indicated in the notification letter.
- **Council Officers** will then have the opportunity to clarify their position and provide any comments based on what they have heard at the hearing.
- The **applicant** or their representative then has the right to summarise the application and reply to matters raised. Hearing panel members may further question the applicant. The applicants reply may be provided in writing after the hearing has adjourned.
- **The chairperson** will outline the next steps in the process and adjourn or close the hearing.
- If adjourned the hearing panel will decide when they have enough information to make a decision and close the hearing. The hearings advisor will contact you once the hearing is closed.
- Decisions are usually available within 15 working days of the hearing closing.

Please note

- that the hearing will be audio recorded and this will be publicly available after the hearing
- catering is not provided at the hearing.

A NOTIFIED PRIVATE PLAN MODIFICATION TO THE AUCKLAND UNITARY PLAN BY 520 GSR LIMITED

TABLE OF CONTENTS **PAGE NO.**

The Hearing Report and other appendices are in Volume 1 of the hearing report.

APPENDIX 1

NOTIFICATION DOCUMENTATION AND DRAWINGS
STORMWATER MANAGEMENT PLAN
(REVISED MAY 2021)

The only document being reproduced here is one that was not included as part to the documents at notification. All other application documents can be found online here https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/unitary-plan/auckland-unitary-plan-modifications/Pages/details.aspx?UnitaryPlanId=81

REPORT

Tonkin+Taylor

Stormwater Management Plan

For Plan Change Area: 520, 522 Great South Road and 21 Gatland Road

Prepared for
520 GSR Limited
Prepared by
Tonkin & Taylor Ltd
Date
May 2021
Job Number
1009613.1000.v2

Exceptional thinking together
www.tonkintaylor.co.nz

Document Control

Title: Stormwater Management Plan					
Date	**Version**	**Description**	**Prepared by:**	**Reviewed by:**	**Authorised by:**
04/05/2020	Rev A	Draft	Charlotte Peyroux	Tom Bassett	
12/05/2020	Rev B	Draft with comments	Charlotte Peyroux	Tom Bassett	
21/05/2020	Rev C	Final for Plan Change	Charlotte Peyroux	Tom Bassett	Tom Bassett
30/03/2021	Rev D	Draft for Resource Consent	Charlotte Peyroux	Tom Bassett	
6/05/2021	Rev E	Final for Resource Consent	Charlotte Peyroux	Tom Bassett	Tom Bassett

Distribution:

520 GSR Limited	1 electronic copy
Tonkin & Taylor Ltd (FILE)	1 electronic copy

Table of contents

Executive summary

520 GSR Limited (The applicant) has lodged a private Plan Change application to rezone the Plan Change Area (PCA) from Future Urban Zone (FUZ) for Mixed Housing Urban (MHU). The properties which form the PCA are 520 and 522 Great South Road and 21 Gatland Road (Refer to Figure 1-1). The applicant has also lodged a Resource Consent application for the development of 102 dwellings at 520 Great South Road, and Wainono Investments Limited has lodged a Resource Consent application for a subdivision to create 20 lots at 21 Gatland Road. We understand that the Subdivision Consent for 21 Gatland Road will be advanced once the Plan Change application has been processed. Accordingly, the proposed stormwater management approach for 21 Gatland Road will need to be consistent with the requirements of this Stormwater Management Plan (SMP) or a private stormwater discharge consent would need to be obtained. The property at 522 Great South Road does not have plans for redevelopment at this stage.

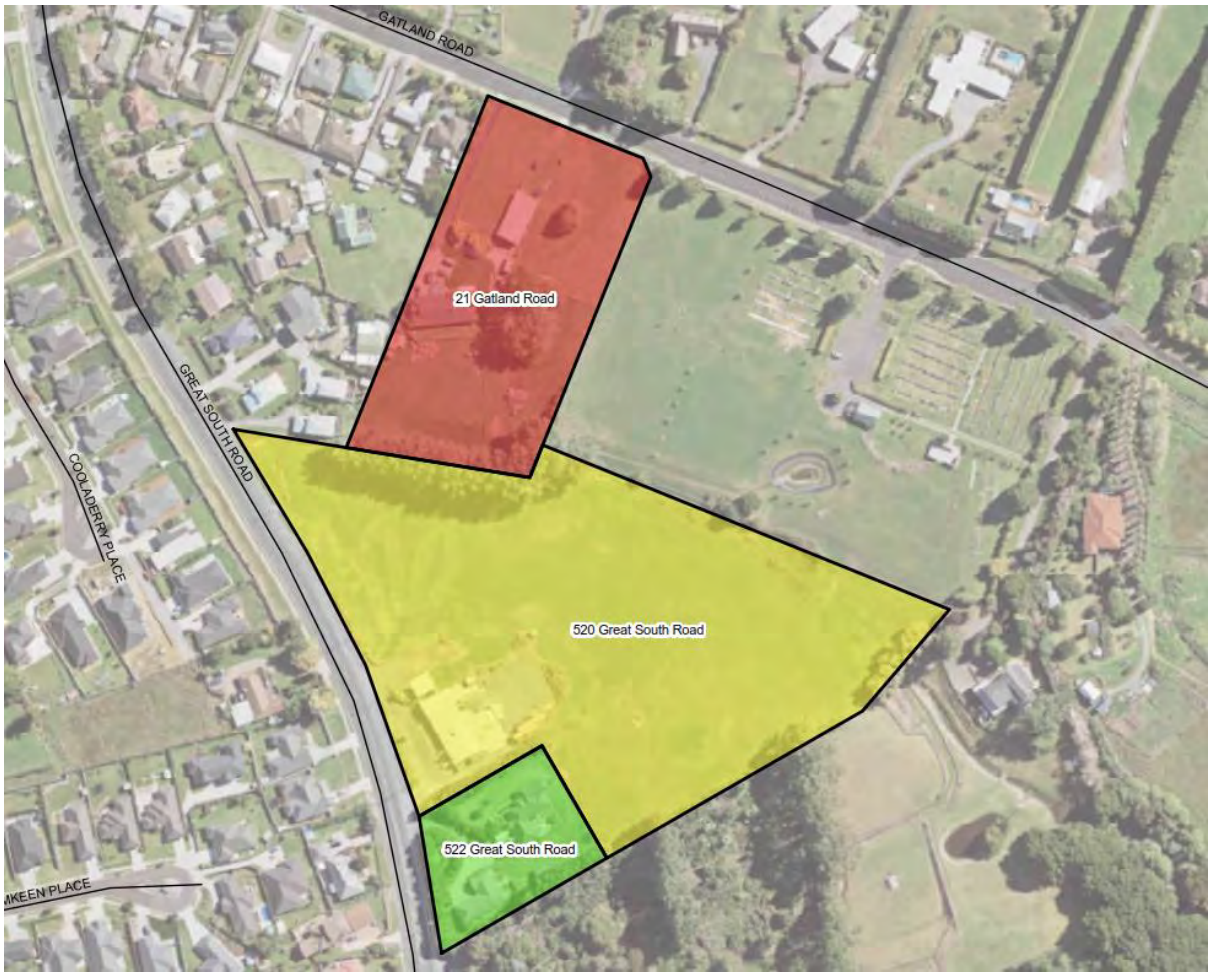


Figure 1-1: Properties which comprise the PCA

Tonkin + Taylor (T+T) previously prepared a high-level assessment of stormwater and flooding issues[1] and a SMP[3] to addresses stormwater management requirements for future development and to support the Plan Change application for the rezoning of all three properties in the PCA. This revision of the SMP has been updated to address Healthy Waters' comments from the Plan Change process and to provide additional detail to support the Resource Consent application for 520 Great

[1] Tonkin + Taylor, 28 June 2019, *520 Great South Road, Papakura – Stormwater Management and Flooding Assessment* (Job number: 1009613.000)

South Road.

The purpose of the SMP is to identify for Auckland Council how stormwater will be managed at the PCA. It demonstrates that the proposed stormwater management is the best practicable option, taking into consideration the existing site features and the future land use. This guidance is consistent with regulatory and stormwater-specific guidelines and based on conventional stormwater management techniques to meet Auckland Unitary Plan, Operative in Part (AUP), provisions. The Draft Drury-Opāheke Future Urban Zone Stormwater Management Plan[2] (FUZ SMP) has been referred to ensure to the stormwater management approach integrates with existing and future stormwater systems in the Slippery Creek catchment.

The SMP, as it stands, is intended to be adopted within Auckland Council's Network Discharge Consent (NDC) and provides an assessment to support the Plan Change application for 520 and 522 Great South Road and 21 Gatland Road, and the Resource Consent application for the development of 520 Great South Road. The SMP may need to be developed in further detail at future stages to address outcomes of Resource Consents and Engineering Plan Approvals for the proposed developments.

The overarching principles of the SMP are to:

- Recognise the key constraints and opportunities on site and in the greater Slippery Creek catchment
- Devise an integrated stormwater management approach to facilitate urban development.
- Develop a set of Best Practicable Options (BPO) for stormwater management that can be incorporated into the development
- Emphasise a water-sensitive design approach that manages the impact of land use change from rural to urban, and which protects and enhances stream systems and natural hydrology while mitigating hydrological changes and managing flooding effects
- Minimise the generation and discharge of contaminants/sediments into the sensitive receiving environment of the Manukau Harbour
- Protect key infrastructure, people and the environment from significant flood events.

To achieve these outcomes, the proposed stormwater management approach is to:

- Provide a minimum of Stormwater Management Area – Flow (SMAF) 1 hydrological mitigation for all impervious surfaces within the PCA. Any additional mitigation for stream erosion can be developed as the SMP progresses based on site observations of erosion and/or improved erosion modelling
- Limit the generation of contaminants through selection of green building materials and providing green infrastructure to treat runoff at-source or as close to the source as practicable
- Protect, restore and enhance the on-site intermittent stream (Watercourse A). Daylight the downstream piped section, restoring stream ecological values and function.
- Pass forward flows without on-site flood attenuation so that runoff flows into the Slippery Creek watercourse downstream before peak flooding from the upper reaches of the catchment, i.e. flows from 520 Great South Road and 21 Gatland Road will be discharged directly into Watercourse A and Slippery Creek and flows from 522 Great South Road will continue to flow in Great South Road stormwater system and overland to discharge to Drury Creek at the confluence with Slippery Creek and Hingaia Stream.

[2] Mott McDonald, 12 April 2019, *Drury-Opāheke Structure Plan Future Urban Zone – Draft Stormwater Management Plan.* Prepared for Auckland Council in support of the Drury-Opāheke Structure Plan.

To meet the stormwater management approach set out above, a treatment train approach has been adopted for the PCA. A toolbox of BPO (refer to Table 1.1) has been prepared to assist in selecting appropriate stormwater management devices to achieve water quality, hydrological mitigation, flood attenuation (where applicable) and water-sensitive design outcomes for corresponding land-use. The design of the proposed stormwater infrastructure for 520 Great South Road has been advanced as part of the Resource Consent process, and the preferred device selection is indicated by the red boxes in the table below.

Watercourse A is a highly modified and intermittent tributary of the Slippery Creek Stream which will remain the primary conveyance route for runoff from the 520 Great South Road and 21 Gatland Road. There is opportunity to improve stream ecological values and function through the restoration, protection and enhancement of Watercourse A.

Based on the investigations already completed, it is expected that stormwater effects from the PCA can be appropriately and adequately managed consistent with the requirements of the AUP.

Table 1.1: Stormwater management requirements and toolbox of BPO for stormwater management within the PCA

Activity	Component	Performance Standard	At-source	Close-to-source	Communal
Residential lots – Roof Area	Water quality	Eliminate the generation of contaminants at the source where possible, otherwise minimise	• Use of inert building materials	• Additional treatment may be provided by downstream stormwater conveyance (i.e. vegetated swales, where adopted)	
	Hydrological mitigation	Equivalent of SMAF1 hydrological mitigation	Retention and detention provided by: • Re-use of roof runoff through above or below ground rainwater storage tanks • Infiltration through soakage pits or trench drains • Rain gardens/planter boxes		
Residential lots – Hardstand and jointly owned access lanes	Water quality	Stormwater management of runoff from all impervious surfaces before discharging into the receiving environment. Minimise the generation of contaminants as much as possible. Where contaminants are generated, the preferred approach is to use green infrastructure to treat runoff at-source or as close to the source as practicable.	• Isolation of hazardous substances by providing roofs for communal waste storage areas • Gross Pollutant Traps downstream of communal waste storage areas in apartments or multi-unit developments	• Wetlands • Bioretention devices - Rain gardens - Tree pits - Filter strips/ swales • Proprietary treatment devices (i.e. storm filter and Chambermaxx storage) • Additional treatment may be provided by downstream stormwater conveyance (i.e. vegetated swales, where adopted)	

Activity	Component	Performance Standard	At-source	Close-to-source	Communal
	Hydrological mitigation	Equivalent of SMAF1 hydrological mitigation	• Permeable pavement and porous concrete (private application only)	• Infiltration through soakage pits and trench drains. • Wetlands • Bioretention devices - Rain gardens - Tree Pits - Filter strips/ swales • Proprietary treatment devices (i.e. storm filter and Chambermaxx storage)	
Roads, Carparking and HCGA Carriageway	Water quality	Stormwater management of runoff from all impervious surfaces before discharging into the receiving environment. Minimise the generation of contaminants as much as possible. Where contaminants are generated, the preferred approach is to use green infrastructure to treat runoff at-source or as close to the source as practicable.	• Grated catchpits and inlets to stormwater infrastructure • Gross Pollutant Trap	• Wetlands • Bioretention devices - Rain gardens - Tree Pits - Filter strips/ swales • Proprietary treatment devices (i.e. storm filter and Chambermaxx storage)	

Activity	Component	Performance Standard	At-source	Close-to-source	Communal
	Hydrological mitigation	Equivalent of SMAF1 hydrological mitigation		• Infiltration through soakage pits and trench drains. • Wetlands • Bioretention devices - Rain gardens - Tree Pits - Filter strips/ swales • Proprietary treatment devices (i,e. storm filter and Chambermaxx storage)	
Public spaces only i.e. Roads, Carparking, HCGA Carriageway, Open Spaces and Riparian Margins	Stormwater conveyance	Convey runoff generated from the 10 year ARI through a public piped stormwater network. Allowance for runoff flows greater than the 10 year ARI should be made in overland flow paths. Existing overland flow paths should be protected.	**Primary Conveyance** • Retain and enhance intermittent streams • Vegetated swales • Open channels • Pipe network **Secondary Conveyance** • Retain and enhance intermittent streams • Vegetated swales • Open channels • Road corridor • Piped (not preferred)		

Activity	Component	Performance Standard	At-source	Close-to-source	Communal
Watercourse A	Stream hydrology and erosion protection	Enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below the relevant thresholds.	• Green outfall from stormwater network into Watercourse A • Riparian margin and channel enhancement and planting, where necessary to mitigate identified adverse effects • Daylight and meandering of Watercourse A to naturalise form • With reference to the Assessment of Ecological Effects (by Freshwater Solutions)		

1 Introduction

This Stormwater Management Plan (SMP) has been prepared by Tonkin + Taylor (T+T) to support a private Plan Change application, by 520 GSR Limited (the applicant), to re-zone three properties in Papakura from Future Urban Zone (FUZ) to Mixed Housing Urban (MHU). The properties which form the Plan Change Area (PCA) are 520 and 522 Great South Road and 21 Gatland Road. The applicant has also lodged a Resource Consent application for the development of 102 terraced dwellings at 520 Great South Road, and Wainono Investments Limited has lodged a Resource Consent application for a subdivision to create 20 lots at 21 Gatland Road. There are no plans for redevelopment of the property at 522 Great South Road at this stage.

T+T previously prepared a high-level assessment of stormwater and flooding issues, and a Stormwater Management Plan (SMP) to addresses stormwater management requirements for future development and to support the Plan Change application. This revision of the SMP has been updated to address Healthy Waters' comments from the Plan Change process and to provide additional detail to support the Resource Consent applications for 520 Great South Road and 21 Gatland Road.

The purpose of the SMP is to identify for Auckland Council how stormwater will be managed in the PCA. It demonstrates that the proposed stormwater management is the Best Practicable Option (BPO), taking into consideration the existing site features and the future land use master plan.

The SMP, as it stands, is intended to be adopted within Auckland Council's Network Discharge Consent (NDC). It provides an assessment to support the Plan Change application for 520 and 522 Great South Road and 21 Gatland Road, and the Resource Consent application for the development of 520 Great South Road and 21 Gatland Road. The SMP may need to be developed in further detail at future stages to address outcomes of Resource Consents and Engineering Plan Approvals for the proposed developments.

This SMP has been prepared using the Auckland Council SMP template. The text **'***Not applicable within this SMP***'** indicates sections that are not relevant to this development or to the Plan Change and Resource Consent applications which have been considered for this revision of the SMP. This SMP will inform the stormwater management approach for future Resource Consent and Engineering Plan Approval applications for the proposed development and may need to be developed in further detail at future stages.

2 Existing site appraisal

This section of the report summarises the existing site characteristics and conditions within the PCA, as they relate to stormwater management.

2.1 Summary of data sources and dates

This section provides a summary of key datasets used in the preparation of this SMP, including those that have been used to generate supporting figures. The supporting figures are provided in Appendix A1.

Table 2.1: Data Sources

Existing site appraisal item	Source and date of data used
Topography	• Auckland Council GeoMaps - AUP management layers: Contours (2020) • Topographic survey by Yeomans Survey Solutions (September 2019)
Geotechnical / soil conditions	• Geological and Nuclear Sciences (GNS) Auckland geological map (2019) • S-MAP Landcare Research (2019) • 520 Great South Road Geotechnical Investigation by ENGEO (July 2019) • 520 Great South Road Soakage Testing prepared by ENGEO (February 2021)
Existing stormwater network	• Auckland Council GeoMaps - AUP management layers: Underground services - Stormwater (2020) • Topographic survey by Yeomans Survey Solutions (September 2019) • Site visit by T+T (10 April 2019) • 520 Great South Road Assessment of Ecological Effects prepared by Freshwater Solutions (April 2020) • Infrastructure Report – Proposed development 520 Great South Road prepared by Maven Associates, (May 2021)
Existing hydrological features	• Topographic survey by Yeomans Survey Solutions (September 2019) • Site visit by T+T (10 April 2019) • 520 Great South Road Assessment of Ecological Effects prepared by Freshwater Solutions (April 2020)
Stream, river, coastal erosion	• Auckland Council GeoMaps - AUP management layers: Catchments and Hydrology - River names (2020)
Flooding and flow paths	• Auckland Council GeoMaps - AUP management layers: Catchments and Hydrology - Overland Flow Paths, Flood Prone Areas, Flood Sensitive Areas and Flood Plains (2020)
Coastal Inundation	• Auckland Council GeoMaps - AUP management layers: Emergency Management - Coastal inundation (2020)
Ecological / environmental areas	• Auckland Council GeoMaps - AUP management layers: Significant Ecological Areas (2020) • 520 Great South Road Assessment of Ecological Effect prepared by Freshwater Solutions (April 2020)
Cultural and heritage sites	• Auckland Council GeoMaps - AUP management layers: Cultural Heritage Inventory (2020)

Existing site appraisal item	Source and date of data used
Contaminated land	• 520 Great South Road, Papakura Ground Contamination Assessment prepared by Williamson Water & Land Advisory Ltd (28 November 2019)

2.2 Location and general information

The PCA is located on the edge of a predominantly rural area within the Papakura Local Board Area of Auckland Council, and within the Drury-Opāheke FUZ as zoned in the Auckland Unitary Plan, Operative in Part (AUP). It comprises three properties with a combined area of 46,268 m^2. It is bounded by Gatland Road and Papakura South Cemetery to the north and east, Great South Road and residential housing to the west, and an unnamed paper road and rural properties to the south. The PCA is surrounded by a mixture of established residential properties, public open spaces and rural land.

Table 2.2 provides key property details of the PCA and Figure 2-1 and Figure 2-2 show the location and extent.

Table 2.2: Property Information

Existing site element	
Site address	The PCA comprises three separate titles: • 520 Great South Road, Papakura • 522 Great South Road, Papakura • 21 Gatland Road, Papakura.
Legal description and property area	520 Great South Road: Lot 2 DP 172553, 30,198 m^2 522 Great South Road: Lot 1 DP 172553, 4,000 m^2 21 Gatland Road: Lot 16 DP 43579, 12,070 m^2
Current Land Use	520 Great South Road comprises open greenspace and one commercial building. The other two properties hold residential buildings.
Current building coverage	Approximately 2,900 m^2 (8 %) of the PCA comprises buildings or other impervious surfaces.
Historical Land Use	Rural

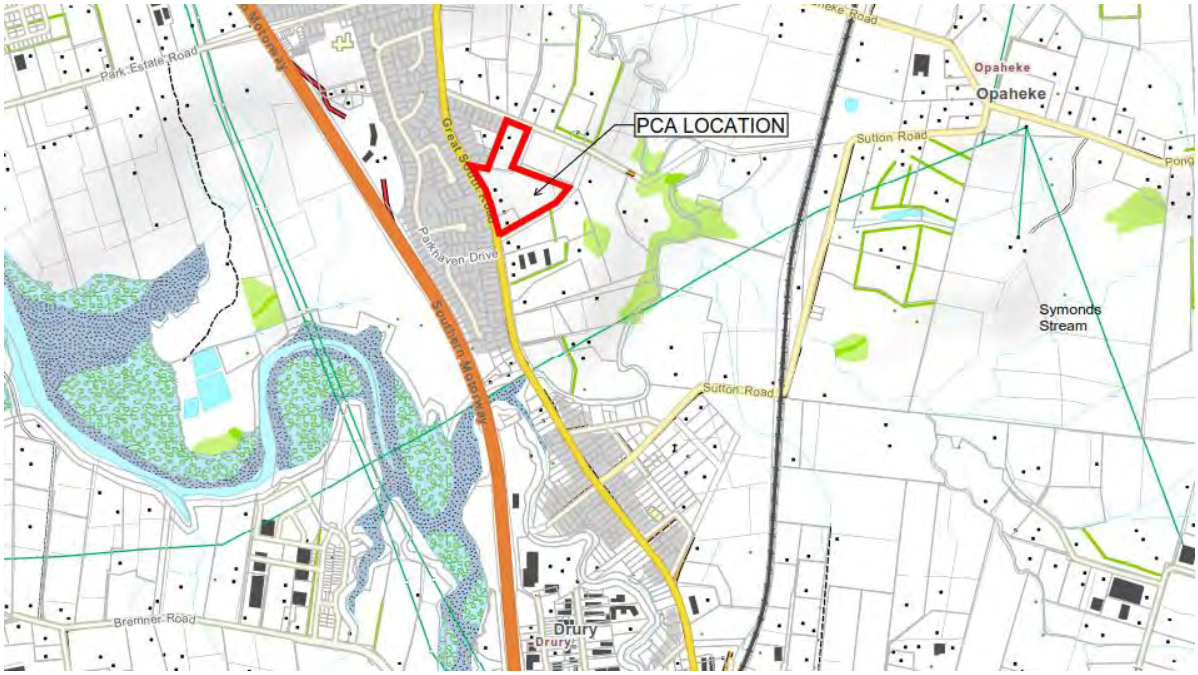


Figure 2-1: Map showing PCA location

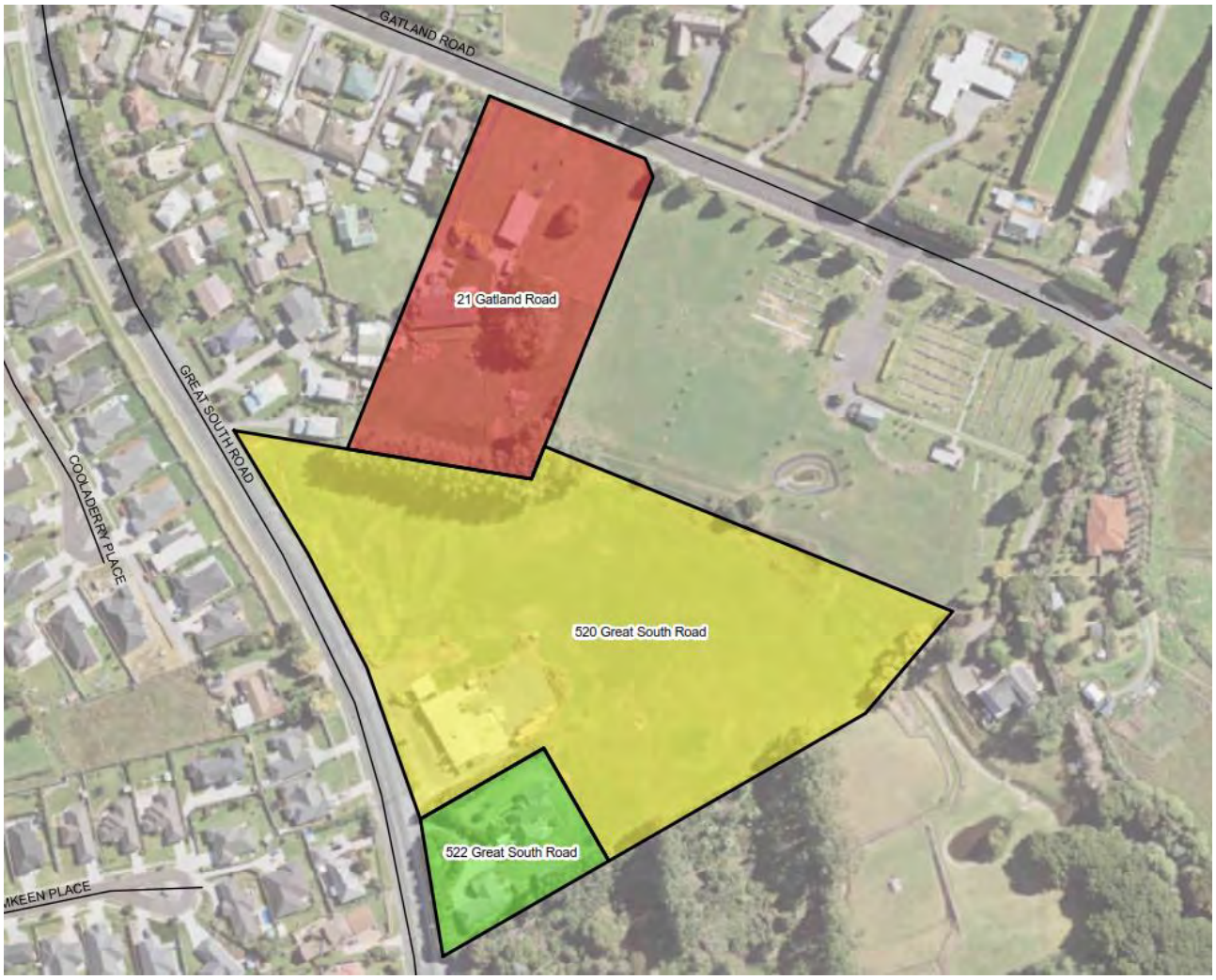


Figure 2-2: Properties which comprise the PCA

2.3 Topography and catchment

The PCA is located within the lower Slippery Creek catchment (refer to Figure 2-3) which is part of the greater Drury-Opāheke catchment. The Draft Drury-Opāheke Future Urban Zone Stormwater Management Plan[3] (FUZ SMP) notes that the topography across the majority of the Drury-Opāheke catchment is characterised by low elevation gently undulating land. The Slippery Creek catchment is approximately 46.3 km^2 and predominantly rural with 50% in pasture and 25% in exotic forest. The PCA comprises approximately 0.1% of the greater Slippery Creek catchment.

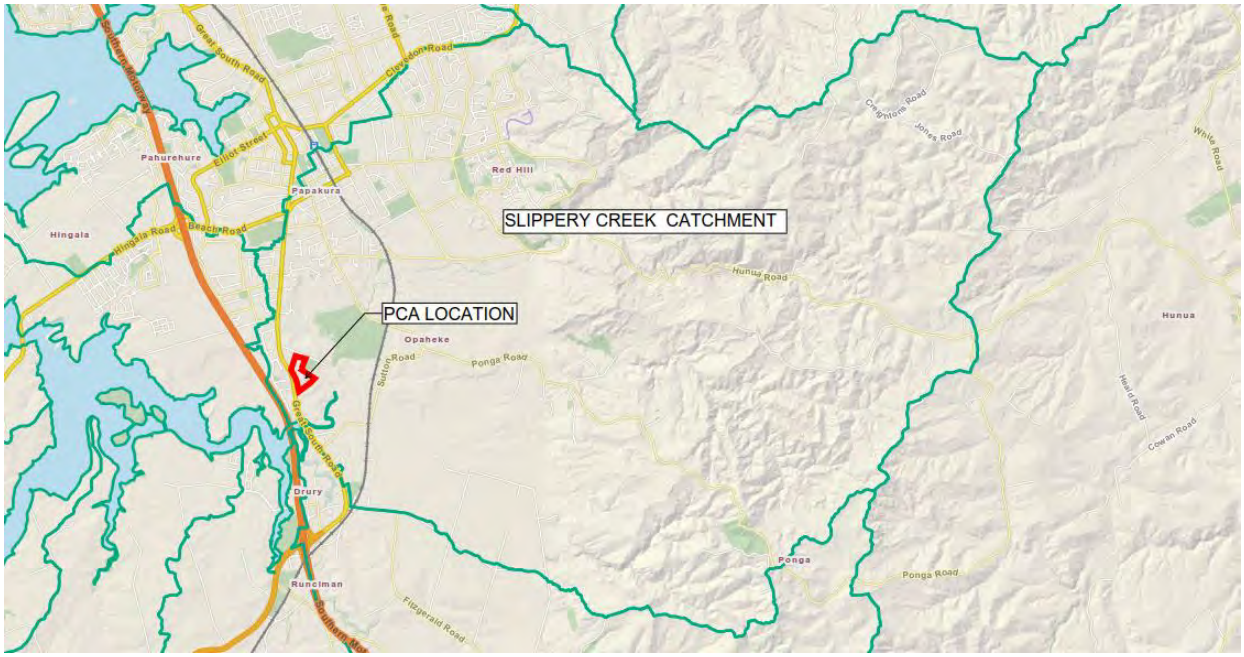


Figure 2-3: Location of PCA within the Slippery Creek catchment

Elevations within the PCA range from approximately 10 m RL to 20 m RL, as shown on Figure 2-4. There is elevated terrain in the southern corner of 520 Great South Road, effectively the boundary between two PCA sub-catchments:

- The majority of the PCA slopes towards an open channel (Watercourse A) which runs generally along the boundary between the PCA and Papakura South Cemetery.
- Part of the southern corner of 520 Great South Road and all of 522 Great South Road slope south.

The PCA northern sub-catchment is part of a wider contributing catchment to Watercourse A. The PCA southern sub-catchment is at the top of the catchment and receives no runoff from outside the PCA boundary. These two sub-catchments are shown in Figure 2-5 and summarised below:

- Sub-catchment A includes all of 21 Gatland Road and the majority of 520 Great South Road, in addition to the upstream developed residential area to the west and Papakura South Cemetery to the north.
- Sub-catchment B includes all of 522 Great South Road and the southern corner of 520 Great South Road.

[3] Mott McDonald, 12 April 2019, *Drury-Opāheke Structure Plan Future Urban Zone – Draft Stormwater Management Plan.* Prepared for Auckland Council in support of the Drury-Opāheke Structure Plan.

Figure 2-4: PCA topography (Auckland Council Geomaps, 2020)

Figure 2-5: PCA pre-development sub-catchments

2.4 Geotechnical

The Geological and Nuclear Sciences (GNS) Auckland geological map classifies the underlying geology of the PCA as *alluvial deposits of the Puketoka formation, which comprises pumiceous mud, sand and gravel with muddy peat and lignite, rhyolite pumice, including non-welded ignimbrite, tephra and alluvia.*[4].

S-MAP Landcare Research describes the soil as primarily well-drained clay and loam.

ENGEO completed geotechnical investigations at six boreholes within 520 Great South Road in March 2019. Detailed logs/results are included in the Geotechnical Investigations report[4], with the findings summarised below:

- Topsoil was encountered at all borehole locations to depths between 0.3 m and 0.5 m.
- Uncontrolled fill was encountered beneath the topsoil in two of the boreholes and extending 0.5 m to 1.0 m deep. The fill was described as hard clayey silt with minor sand, trace gravel and organics, and was typically brown and grey.
- Beneath the topsoil and uncontrolled fill, all boreholes encountered clayey silt and silty clay soils with variable content of sand and gravel typical of the Puketoka Formation. These materials were generally found to be firm to hard in consistency, relatively plastic and cohesive. Organic silt was encountered in one of the boreholes from 3.3 m to 4.2 m.
- Groundwater was recorded at depths between 1.8 m and 4.6 m below existing ground levels in five of the six boreholes.

Percolation testing was carried out by ENGEO on 20 January 2021 at 520 Great South Road to assess the suitability of site soils for stormwater soakage design. More specifically, to confirm that the soil infiltration rate of 2 mm/hr used by the Maven in their rain garden design is feasible.

A falling head soakage test was completed in accordance with Auckland Council's Technical Report 2013/040[5] at one borehole location (refer Figure 2-6) that was hand augured to a depth of 3 m. The results showed a percolation rate of 4.2 mm/hr or 0.07 L/m^2/minute, which indicates that infiltration is feasible for the PCA. The ENGEO percolation testing memo[6] is included in Appendix A2.

Site-specific soakage testing is also recommended for 21 Gatland Road and 522 Great South Road (at the time of future development of these properties) to confirm the retention strategy (i.e. is infiltration viable) and inform conceptual or detailed design of devices which rely on infiltration for retention.

[4] Engeo, 2 July 2019, 520 Great South Road - Geotechnical Investigation
[5] Auckland Council, October 2013, Guidance Document 2013/040 - Stormwater Disposal via Soakage in the Auckland Region
[6] ENGEO, 22 February 2021, *Soakage Testing – 520 Great South Road, Drury, Auckland* (Reference 15392.000.000-06)

Figure 2-6: Percolation testing location (ENGEO, 2021)

2.5 Existing public stormwater infrastructure

Auckland Council GeoMaps indicates public stormwater infrastructure along the western side of Great South Road and the southern side of Gatland Road, as shown in Figure 2-7. There is no public stormwater infrastructure mapped within the PCA, however, the Gatland Road branch is piped along the paper road along the western boundary of the Papakura South Cemetery and discharges into Watercourse A. There is also a public connection between a pond in the Papakura South Cemetery and a private pipe in 520 Great South Road.

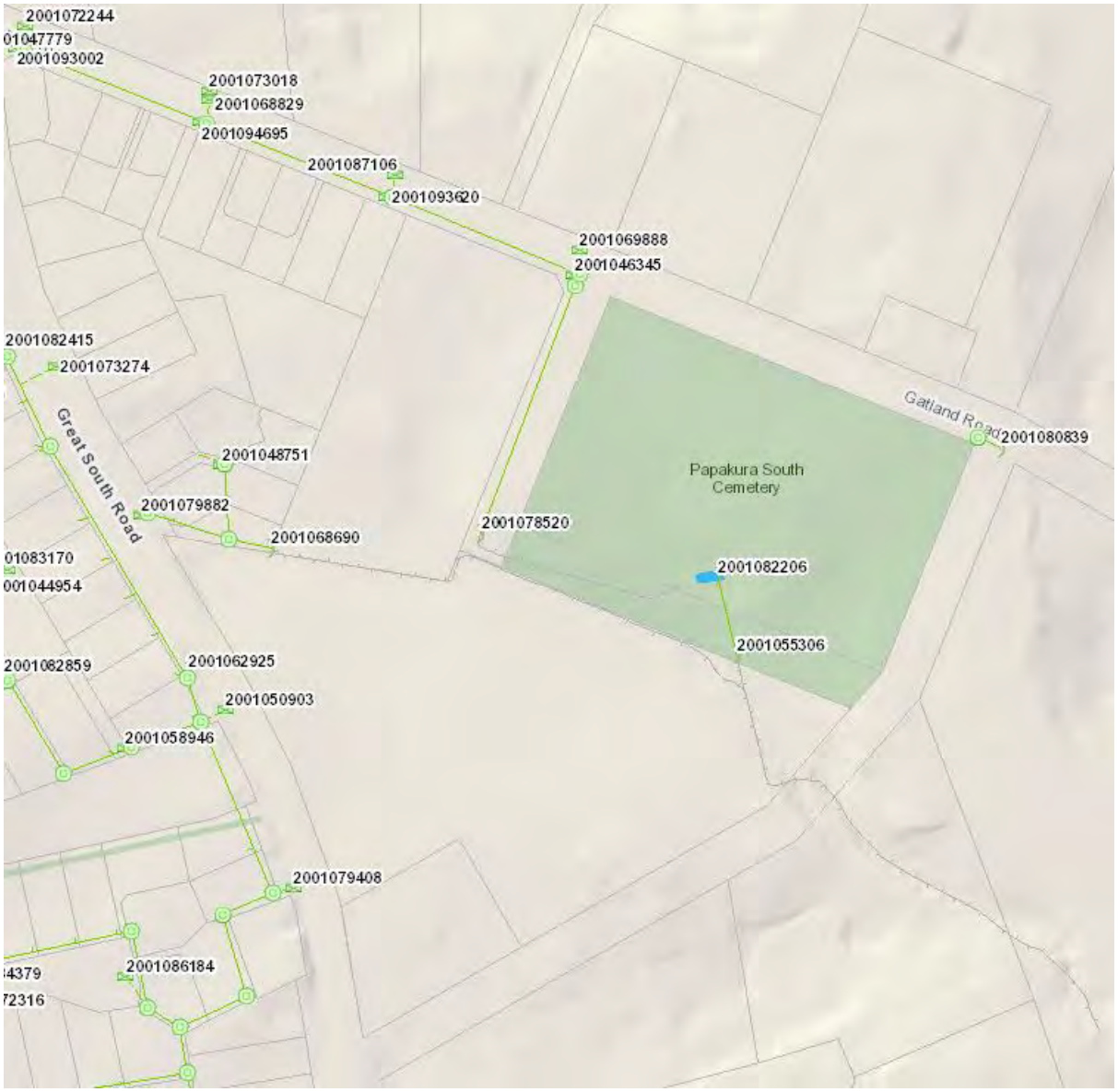


Figure 2-7: PCA existing public stormwater infrastructure (Auckland Council Geomaps, 2020)

2.6 Existing private stormwater drainage and hydrological features

2.6.1 Sub-catchment A

Existing drainage in the PCA includes two open drains:

- Watercourse A
- An open drain which flows from north to south within 21 Gatland Road and discharges into Watercourse A.

Watercourse A discharges to a small online pond within 520 Great South Road. Outflows from the pond are conveyed either in a 450 mm diameter private stormwater pipe or overland to discharge at the southern boundary. These features are shown on Figure 2-8.

Downstream of the PCA, the 450 mm pipe conveys runoff for at least 7 m within the neighbouring property before discharging to an open channel. Auckland Council GeoMaps maps a stormwater channel (identified as a private swale) through the property at 91 Gatland Road and partially through

the property at 95 Gatland Road. No stormwater asset or channel is mapped from the end of the swale to Slippery Creek.

Figure 2-8: PCA existing private stormwater drainage (Freshwater Solutions, 2020)

The key findings of the Freshwater Solutions Assessment of Ecological Effects[7] as they relate to the on-site stormwater drainage and hydrological features, are summarised below:

- The open drain within 21 Gatland Road is "*an ephemeral reach in pasture*."
- Watercourse A is classified as an intermittent tributary of Slippery Creek as discussed below:
  - "*Historical aerial imagery shows that Watercourse A was likely to have formerly been an ephemeral flow path which transitioned into a short section of intermittent stream near to (the eastern corner of 520 Great South Road). Modification during the 1980's has redirected runoff from the road into the upper reaches, resulting in the intermittent stream seen today.*"
- Watercourse A "*comprises a uniform straight channel with slow flowing run habitat*." It has been "*influenced and modified by a long history of rural land use practices including grazing, piping stormwater inputs, clearance of riparian vegetation and channelisation, which has resulted in a stream containing very limited natural character*." It has a low overall stream ecological valuation score (0.284) which is indicative of very low ecological values and function.

"*The artificial pond along the watercourse is an entirely unnatural feature that provides poor quality habitat for fish and invertebrates … and is choked with green algae growth. The pond was likely to be negatively influencing water quality downstream through elevated summer temperatures and low dissolved oxygen*."

[7] Freshwater Solutions, April 2020, *520 Great South Road Assessment of Ecological Effects.* Submitted to Barker and Associates Ltd.

2.6.2 Sub-catchment B

An existing private connection is also expected from 522 Great South Road to the public stormwater infrastructure along Great South Road.

2.7 Flooding and flow paths

The FUZ SMP identifies flooding as a major issue for the wider Drury-Opāheke and Slippery Creek catchments. Large runoff volumes, flat terrain, and road and rail crossings within the Slippery Creek catchment in particular, result in an extensive flooded area. According to the Drury Stormwater Management Plan[8], this includes 2.9 km^2 of the 7.35 km^2 of the Slippery Creek catchment that is within the Drury-Opāheke Structure Plan area.

The flood plain and overland flow paths mapped by Auckland Council within and in the vicinity of the PCA are shown in Figure 2-9.

Figure 2-9: Overland flow paths, flood plains and flood prone areas

An overland flow path is mapped generally along Watercourse A, noting that it is not precisely aligned with the surveyed channel. It is fed by contributions from the open drain on 21 Gatland Road, the public pipe from Gatland Road across the Papakura South Cemetery and overland flow paths from the upstream developed residential area to the west, the cemetery to the north and from within 520 Great South Road. In larger storm events, the online pond at 520 Great South Road will be over-topped. An overland flow path that discharges to Slippery Creek is mapped through the properties at 91 and 95 Gatland Road.

As noted above, downstream of the PCA Auckland Council Geomaps indicates a stormwater channel through the property at 91 Gatland Road and partially into the property at 95 Gatland Road. This generally aligns with the mapped overland flow path. At the end of this swale no stormwater asset is indicated, however, the overland flow path extends to Slippery Creek.

There is also an overland flow path mapped along the southern boundary of 522 Great South Road.

[8] AECOM, 2017, *Drury Stormwater Management Plan for Auckland Council.* Prepared for Auckland Council in support of the Drury-Opāheke Structure Plan.

Auckland Council has mapped the 100 year ARI flood plain, including for climate change and Maximum Probable Development (MPD) in the catchment. The flood plain currently extends generally along Watercourse A and partially onto the 21 Gatland Road property. No flood prone or flood sensitive areas are mapped within the PCA.

2.8 Receiving environment

As noted above, the northern sub-catchment flows via Watercourse A, a privately-owned pipe, 'stormwater channel' and overland flow paths to discharge into the Slippery Creek just upstream of its confluence with Waihoihoi Stream, and 400 m downstream of the PCA.

Slippery Creek is considered to be the greatest contributor of sediment and the second greatest contributor of heavy metals to the Pāhurehure Inlet due to the existing rural land use in the catchment[9]. It is likely that this will continue if treatment measures are not incorporated in new stormwater systems, especially as contaminant levels typically increase with urban development. E.coli levels are also elevated and attributed to the grazing of stock within the catchment, though are expected to decrease as the land available for grazing is reduced with future urban development.

The Slippery Creek Watercourse assessment[10] found the condition of the Slippery Creek stream banks in the general vicinity of the PCA overland flow discharge point to have less than 20% erosion scars and fair bank stability. The riparian overhead cover was assessed to be between 30% and 70%. The PCA overland flow discharge point is located within Management Zone 1 – Future Urban, Erosion Risk. Suggested goals and objectives for this zone in the Slippery Creek Watercourse Assessment include to:

- *Futureproof channels through erosion susceptibility mitigation works*
- *Investigate lower reaches of the main channel of Slippery Creek for potential inanga spawning habitat and potential for enhancement*
- *Upgrade and install all required inlets and outlets to appropriate inlet outlet standards including:*
  - *Auckland Council Technical Report 2013/18 - Hydraulic Energy Management Inlet Outlet Design for Treatment devices (TR18)*
  - *Auckland Council Guidance Document 2015/004 - Water Sensitive Design for Stormwater (GD04)*
  - *Auckland Council Stormwater Code of Practice for Land Development and Subdivision 2015 (SWCoP)*
- *Retain existing stream meander patterns and avoid any further channel straightening.*
- *Engage landowners to fence watercourses where moderate to severe stock damage has occurred to reduce further damage and ongoing sediment and faecal pollution downstream.*

Further downstream, Slippery Creek eventually flows into Drury Creek, regarded by Council as the ultimate receiving environment of all streams within the Drury-Opāheke FUZ. Stormwater runoff from the sub-catchment B flows overland and in Great South Road stormwater system to discharge to Drury Creek at the confluence with Slippery Creek and Hingaia Stream

The upper tidal reaches of Drury Creek are classified as a Significant Ecological Area (SEA) – Marine 1 (M1) in the AUP due to the presence of a variety of marshes[11]. The M1 classification covers highly

[9] Green M, 2008, *South-eastern Manukau Harbour / Pāhurehure Inlet Contaminant study. Predictions of Sediment, Zinc and Copper Accumulation under Future Development Scenario 1*. Prepared by NIWA for Auckland Regional Council.
[10] Morphum Environmental Ltd, 2015, *Watercourse Assessment Report: Slippery Creek*
[11] Auckland Council, 30 August 2017, *Ecology Assessment – Drury Structure Plan*

significant areas that, due to their physical form, are considered to be the most vulnerable to any adverse effects of inappropriate subdivision, use and development[12]. The upper reaches of Drury Creek is also a migration path between the marine and freshwater habitats for various native freshwater fish species.

The lower reaches of Drury Creek are classified as SEA – Marine 2 (M2) in the AUP, and comprise various intertidal habitats, ranging from sandy mud intertidal flats, currently exposed rocky reef habitats, and a variety of saline vegetation[11]. The M2 subtype covers similarly significant areas which do not warrant an M1 classification as they are generally considered to be more robust[12].

The PCA is not located above any high-use aquifers or within any significant ecological overlays.

2.9 Coastal inundation

Based on the AUP management layers on Auckland Council GeoMaps, Coastal inundation is not identified as a risk to the PCA.

2.10 Biodiversity

Freshwater Solutions prepared an Assessment of Ecological Effects[7] in support of the Resource Consent application for residential development of 520 Great South Road. This includes details on biodiversity within the PCA, however, the key findings of the report related to the on-site hydrological features are:

- The on-site open drains comprise poor habitat and no freshwater fish were identified during the ecological assessment. It is possible that shortfin eels may use these channels and the small online pond as habitat, though the downstream piped network is likely to limit fish passage.
- It has a very low SEV score (0.17) for biodiversity.

2.11 Cultural and heritage sites

Based on the information provided on the AUP management layers in Auckland Council Geomaps, there are no known natural heritage, historic heritage or places of significance to Mana whenua within the PCA.

2.12 Contaminated land

Resource Consent is required under the provisions of the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS), as described in the report by Williamson Water & Land Advisory Ltd[13] and as summarised below:

- Regulation 9 – Controlled activity consent for the disturbance of soil containing contamination below the standards for residential and high-density residential use whereby the permitted standards for soil disturbance cannot be met because the volume of disturbance will be more than 25 m^3 per 500 m^2, and the duration of the activity is likely to be longer than two months.

[12] Auckland Unitary Plan Operative in Part, 15 November 2016, Chapter L Schedule 4

[13] Williamson Water & Land Advisory Ltd, 28 November 2019), 520 Great South Road, Papakura Ground Contamination Assessment (WWLA0183 | Rev. 1)

3 Development summary and planning context

The requirements for future stormwater management within the PCA have been informed by the initial site appraisal (summarised in Section 2 of this report) along with a review of Auckland Council's regulatory and stormwater-specific guidelines, and are discussed in detail in the following sub-sections.

3.1 Regulatory and design requirements

The relevant regulatory guidelines are listed in Table 3.1 and a summary of each of the listed requirements is presented in the sections that follow.

Table 3.1: Regulatory requirements and design guidelines relevant to the SMP

Requirement	Relevant regulatory / Design guideline
Significant ecological areas	• AUP Chapter D9
Water quality and integrated management	• AUP Chapter E1
Stormwater management devices design	• GD01[14]
Application of principles of water sensitive design	• GD04
Discharge and diversion	• AUP Chapter E8
High contaminant generating areas	• AUP Chapter E9
Hydrological mitigation	• AUP Chapter E10
Natural hazards and flooding	• AUP Chapter E36
Auckland Council regionwide network discharge consent	• NDC Schedule 4
Structure Plan	• Drury- Opāheke Structure Plan (Auckland Council, 2019)
Catchment management plan	• Drury-Opāheke FUZ SMP (Mott MacDonald, DRAFT 2019)

3.1.1 Significant Ecological Areas

Chapter D6 of the AUP sets out policies regarding the management of stormwater runoff to receiving environments within a SEA overlay. The relevant stormwater policy is summarised below.

3.1.1.1 Policy 2 (D9.3.2)

Adverse effects on indigenous biodiversity values in significant ecological areas that are required to be avoided, remedied, mitigated or offset may include, but are not limited to, downstream effects on wetlands, rivers, streams, and lakes from hydrological changes further up the catchment.

3.1.2 Water quality and integrated management requirements

Chapter E1 of the AUP contains the relevant stormwater management policies summarised in the following sections.

3.1.2.1 Policy 2a and 2b (E1.3.2a and E1.3.2b)

Manage discharges, subdivision, use and development that affect freshwater systems to:

- *Maintain or enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is above the relevant thresholds (refer Table E1.3.1 of the AUP)*

OR

- *Enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below the relevant thresholds (refer Table E1.3.1 of the AUP).*

3.1.2.2 Policy 3 (E1.3.3)

Require freshwater systems to be enhanced unless existing intensive land use and development has irreversibly modified them such that it practicably precludes enhancement.

3.1.2.3 Policy 4 (E1.3.4)

Discharges must *avoid contamination that will have an adverse effect on the life supporting capacity of freshwater.*

3.1.2.4 Policy 5 (E1.3.5)

Discharges must *avoid contamination that will have an adverse effect on health of people and communities.*

3.1.2.5 Policy 8 (E1.3.8)

Avoid as far as practicable, or otherwise minimise or mitigate, adverse effects of stormwater runoff from greenfield development on freshwater systems, freshwater and coastal water by:

- *Taking an integrated stormwater management approach (refer to Policy E1.3.10* – Section 3.1.2.6*)*
- *Minimising the generation and discharge of contaminants, particularly from high contaminant generating car parks and high use roads and into sensitive receiving environments*
- *Minimising or mitigating changes in hydrology, including loss of infiltration, to:*
  - *Minimise erosion and associated effects on stream health and values*
  - Maintain stream baseflows
  - Support groundwater recharge
- *Where practicable, minimising or mitigating the effects on freshwater systems arising from changes in water temperature caused by stormwater discharges*
- *Providing for the management of gross stormwater pollutants, such as litter, in areas where the generation of these may be an issue.*

3.1.2.6 Policy 10 (E1.3.10)

An integrated stormwater management approach must have regard to all of the following:

- The nature and scale of the development and practical and cost considerations
- The location and design of site and infrastructure to protect significant site features and minimise effects on receiving environments
- The nature and sensitivity of receiving environments
- Reducing stormwater flows and contaminants at source

- The use and enhancement of natural hydrological features and green infrastructure where practicable.

3.1.2.7 Policy 11 (E1.3.11)

Avoid, minimise or mitigate adverse effects of stormwater diversions and discharges.

3.1.2.8 Policy 12 (E1.3.12)

Manage contaminants in stormwater runoff from high contaminant generating car parks (> 50 cars*) and high use roads* (>5,000 vehicles per day) *to minimise new adverse effects and progressively reduce existing adverse effects on water and sediment quality in freshwater systems and coastal waters.*

3.1.2.9 Policy 13 (E1.3.13)

Require stormwater quality or flow management to be achieved on-site unless there is a downstream communal device.

3.1.2.10 Policy 14 (E1.3.14)

Adopt the best practicable option to minimise the adverse effects of stormwater discharges.

3.1.2.11 Policy 15 (E1.3.15)

Utilise stormwater discharge to ground soakage where it is possible to do so in a safe and effective manner.

3.1.3 Water-sensitive design

Water-sensitive design is a philosophy that is integral to achieving integrated stormwater management, required by Policy 8 (E1.3.8). Water-sensitive design is defined as:

> *"An approach to freshwater management, it is applied to land use planning and development at complementary scales including region, catchment, development and site. Water sensitive design seeks to protect and enhance natural freshwater systems, sustainably manage water resources, and mimic natural processes to achieve enhanced outcomes for ecosystems and our communities."*[14]

Water-sensitive design principles are further detailed in GD04, and the key principles are summarised as follows:

- Promoting inter-disciplinary planning and design
- Protecting and enhancing the values and functions of natural ecosystems
- Addressing stormwater effects as close to source as possible
- Mimicking natural systems and processes for stormwater management.

3.1.4 Discharge and diversion

Chapter E8 of the AUP sets out policies which regulate the diversion and discharge of stormwater runoff from impervious areas into or onto land, or into water, or into the coastal marine area. The objectives are consistent with Chapter E1 and E2 of the AUP. The general standards (E8.6.1) are summarised below:

- *The design of the proposed stormwater management device(s) must be consistent with any relevant precinct plan that addresses or addressed stormwater matters.*

- *The diversion and discharge must not cause or increase scouring or erosion at the point of discharge or downstream.*
- *The diversion and discharge must not result in or increase the following:*
  - *Flooding of other properties in rainfall events up to the 10 year ARI; or*
  - *Inundation of buildings on other properties in events up to the 100 year ARI.*
- *The diversion and discharge must not cause or increase nuisance or damage to other properties.*
- *The diversion and discharge of stormwater runoff must not give rise to the following in any surface water:*
  - *The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials*
  - *Any conspicuous change in colour or visual clarity*
  - *Any emissions of objectionable odour*
  - *The rendering of fresh water unsuitable for consumption by farm animals; or*
  - *Any significant adverse effects on aquatic life*
- Any existing requirements for ground soakage, including devices to manage discharges and soakage, must be complied with.

3.1.5 High contaminant generating areas

Chapter E9 of the AUP outlines the regional land use rules for managing stormwater runoff quality from high contaminant generating areas (HCGAs). Treatment of runoff is required for HCGAs (as defined in the AUP) including:

- High use roads (with greater than 5,000 vehicle movements per day)
- Car park areas with greater than 50 vehicles per day
- High contaminant yielding building and roofing materials
- Industrial/Trade sites listed as high risk in Schedule 3 will require assessment under the Industrial and trade activities rules which may result in treatment being provided.

Treatment of discharges to the Coastal Marine Area will be required due to the receiving environment being identified as a SEA.

Stormwater runoff from the HCGAs is to be treated by stormwater a management device(s) which is sized and design in accordance with Guidance Document 2017/001 - Stormwater Management Devices in the Auckland Region[14] (GD01) or where alternative devices are proposed, the device must demonstrate it is designed to achieve an equivalent level of contaminant or sediment removal performance to that in GD01.

3.1.6 Hydrological mitigation

Hydrological mitigation seeks to minimise the change in hydrology, specifically runoff volumes and flow rate, as a result of development. Chapter E10 of the AUP sets out a hydrological mitigation framework for brownfield sites which discharge to sensitive or high-value stream environments that have been identified as particularly susceptible to the effects of development. This framework must be applied to developments within the AUP Stormwater Management Area Control – Flow 1 and Flow 2 (SMAF) overlay.

[14] Auckland Council, December 2017, Guidance Document 2017/001 (GD01) – Stormwater Management Devices in the Auckland Region

The PCA is a greenfield development and therefore does not fall within the AUP SMAF overlay. However, Schedule 4 of the NDC specifies that all greenfield sites located outside a SMAF zone which discharge to a stream via public stormwater network should "*achieve equivalent hydrology (infiltration, runoff volume, peak flow) to pre-development (grassed state) levels… A method of achieving equivalent hydrology to pre-development (grassed state) is to"* provide retention (volume reduction) and detention (temporary storage) for all impervious areas equivalent to SMAF 1.

Therefore, the general approach of this SMP is to provide hydrological mitigation for all impervious surfaces within the PCA equivalent to the SMAF 1 framework requirements. The SMAF 1 hydrological mitigation requirements in the AUP are:

- Retention (volume reduction) of at least 5 mm of runoff depth from impervious surfaces where possible with limitations set out in Table E10.6.3.1.1.
- Detention (temporary storage) and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from a 95th percentile, 24-hour rainfall event less the achieved retention volume, over the impervious area for which hydrology mitigation is required.

The retention volume may be taken up by detention if:

- a suitably qualified person has confirmed that soil infiltration rates are less than 2 mm/hr or there is no area on the site of sufficient size to accommodate all required infiltration that is free of geotechnical limitations (including slope, setback from infrastructure, building structures or boundaries and water table depth)
- rainwater re-use is not available because:
  - the quality of the stormwater runoff is not suitable for on-site re-use (i.e. for non-potable water supply, garden/crop irrigation or toilet flushing); or
  - there are no activities occurring on the site that can re-use the full 5 mm retention volume of water.

3.1.7 Natural Hazards and flooding

Chapter E36 of the AUP sets out the policies relating to the management of natural hazards and flooding. Flooding is a major natural hazard that could impact the PCA based on the assessment in Section 2 of this report. The relevant policies are summarised briefly below.

3.1.7.1 Policy 1 (E36.3.1)

Identify land subject to natural hazards, taking into account the likely effects of climate change.

3.1.7.2 Policy 17 (E36.3.17)

Avoid locating buildings in the 100 year ARI flood plain unless it can be designed to be resilient to flood-related damage.

3.1.7.3 Policy 20 (E36.3.20)

Earthworks within the 100 year ARI flood plain should not permanently reduce floodplain conveyance or exacerbate flooding experienced by other sites upstream or downstream.

3.1.7.4 Policy 21 (E36.3.21)

Ensure all development in the 100 year ARI flood plain does not increase adverse effects or increased flood depths or velocities to other properties upstream or downstream of the site.

3.1.7.5 Policy 29 and 30 (E36.3.29 and E36.3.30)

Maintain the function and capacity of overland flow paths to convey stormwater runoff safely and without damage to the receiving environment.

3.1.8 Network Discharge Consent

The Auckland region-wide NDC came into effect in October 2019. This allows for the stormwater diversion and discharges from developments to be incorporated under Auckland Council's consent, and for assets to be vested to Auckland Council, provided they comply with the NDC conditions.

The revised requirements and template for an SMP under the NDC are quite different to previous SMP formats and identify either a compliant approach or a BPO approach. The NDC requirements for greenfield developments relevant to the PCA, and as stipulated in the NDC Schedule 4, are:

- Treatment of 100% of impervious areas by a water quality device designed in accordance with GD01 (previously TP10) for the relevant contaminants
- Achieve equivalent hydrology (infiltration, runoff volume, peak flow) to pre-development (grassed state) levels. A method of achieving equivalent hydrology to pre-development (grassed state) is to provide retention (volume reduction) and detention (temporary storage) for all impervious areas equivalent to SMAF 1
- Ensure that there is sufficient capacity within the pipe network downstream of the connection point to cater for the stormwater associated with the development in the 10 year ARI event, including incorporating flows from contributing catchment at MPD
- Buildings must not be flooded in the 100 year ARI event.

The requirement to provide water quality and hydrological mitigation to all impervious surfaces is more stringent than the regulations outlined in AUP, which only require treatment for high contaminant generating car parks and high use roads.

The intention is for this SMP to eventually be adopted into Auckland Council's NDC.

3.1.9 Structure Plan

The Drury-Opāheke Structure Plan[15] sets out key stormwater opportunities and constraints relating to development of the structure plan area, including:

- Flooding
  - There is existing flooding of parts of the structure plan area, and it is particularly extensive in the Slippery Creek catchment.
  - The flood plain extent is primarily determined by the large catchment upstream of the FUZ area rather than the effect of additional impervious area created by anticipated urban development
  - The best way to manage flooding in the future urban areas is to pass flows forward or get the water to Drury Creek as quickly as possible
  - There is opportunity to provide flood mitigation to reduce hazards and unlock development.
- Water-sensitive design
  - A decrease in water quality, aquifer recharge and instream ecological values has been identified as a result of changes in land-use and land development

[15] Auckland Council, 2019, Drury-Opāheke Structure Plan

- Increased erosion (and associated sedimentation) due to increased impervious areas is of particular concern due to the highly sensitive, low energy receiving environment of the Pāhurehure Inlet
- The Structure Plan identifies opportunity to:
  - restore and enhance existing watercourses
  - retain existing and increasing where appropriate the vegetation buffering to natural watercourses to improve water quality and increase numbers and diversity of instream biota
  - improve the water quality of stormwater reaching the Pāhurehure Inlet through reduced contaminant loads (sediment, metals and nutrients)
  - improve ecological functionality in currently degraded areas, along with the ability to set aside areas for public amenity value and stormwater attenuation.

These stormwater opportunities and constraints are discussed in more detail in the FUZ SMP[3].

3.1.10 Future Urban Zone Stormwater Management Plan

The underlying principles of stormwater management for the Drury-Opāheke catchment are summarised in the FUZ SMP, prepared by Mott MacDonald in 2019 to support the Auckland Council Structure Plan for the area.[16] The FUZ SMP recognises the key constraints and opportunities in the catchments and reflects the requirements of the AUP and region-wide NDC. The FUZ SMP seeks to achieve the following outcomes:

- Protecting and enhancing the environment and to connect communities to water
- Ecological values are maintained or enhanced
- Stream health is maintained or enhanced through improved baseflow
- Urban development is facilitated, key infrastructure is protected, and people and the environment protected from significant flooding events
- Stormwater is integrated with land uses and other values (e.g. landscape) so that the amount of land available for development is optimised
- Sediment into sensitive receiving environments is minimised
- Contaminants input into the sensitive receiving environments of the Drury Sands aquifer and Manukau Harbour are minimised.

To achieve these outcomes the FUZ SMP identifies a number of requirements for management of stormwater within the Future Urban Zone. The key requirements for the Slippery Creek catchment are summarised as follows:

- General
  - Development to be carried out using an integrated stormwater management approach (in accordance with E1.3.8 and E1.3.10 of the AUP).
- Water quality
  - Treatment of all impervious areas (excluding non-contaminant generating areas) to be provided at or near source using devices such as swales, rain gardens and tree pits
  - Use of inert building materials
  - Exemplary sediment and erosion control measures to be provided during earthworks and construction

[16] Drury-Opāheke Structure Plan Future Urban Zone – Stormwater Management Plan' prepared by Mott McDonald for Auckland Council. Version 04C Dated 12 April 2019.

  - Integrated green outfalls to be used when discharging to streams.
- Flooding
  - Due to the significant flood plain within Slippery Creek, development should be limited to land outside the flood plain. The flooding issues within this catchment require development of a comprehensive solution to avoid effects of cumulative development
  - All buildings to be outside the 100 year ARI flood plain in accordance with E36.3.17 of the AUP. Avoid locating infrastructure in the 100 year ARI flood plain unless it can be designed to be resilient to flood damage
  - Avoid increasing flood risk and flood extent upstream and downstream for all flood events up to the 100 year ARI
  - Identify overland flow paths and ensure that they remain unobstructed and able to safely convey runoff
  - Use capacity available in riparian margins as part of the water conveyance system and enhance intermittent streams to provide capacity and conveyance as a means to manage flood waters.
- Hydrological mitigation
  - Changes in hydrology to be avoided as far as practicable and any changes in hydrology are minimised or mitigated (in accordance with E1.3.8 of the AUP)
  - The minimum requirement when hydrological mitigation is necessary is SMAF 1 in accordance with Table E10.6.3.1.1 of the AUP. An erosion assessment is to be carried out by Auckland Council17 to determine if additional measures (such as additional detention requirements) are required to mitigate the hydrological impacts of development.
- Streams
  - Protect and enhance all permanent and intermittent streams as directed in the AUP
  - Outfalls should be pulled back from the streams where possible to allow for dispersal of flows and to disconnect impervious surfaces from the receiving environment
  - Provide distributed stormwater outlets into watercourses where possible, rather than single discharge points
  - For essential stream crossings, bank-to-bank bridges with minimal riparian and stream bed disturbance are preferred
  - Address erosion issues, both erosion hotspots and culvert erosion before and/or as urban development occurs.

[17] Auckland Council, August 2019, Drury-Opāheke Structure Plan report. "A Bank Stability and Toe Erosion Model assessment of streams is planned for the future. This assessment will inform hydrology mitigation requirements and works needed to avoid, remedy or mitigate the effects of changes to the hydrological regime due to increases in impervious area."

4 Mana whenua matters

Notwithstanding that the PCA is not identified as a site or place of significance to Mana whenua on the planning maps, the applicant has consulted with Iwi to obtain their views on the Plan Change and the Resource Consent applications for 520 Great South Road. Mana whenua on the Auckland Council's Iwi groups list that have a registered interest in the area and that have been consulted are identified below:

- Ngāti Maru
- Te Ākitai Waiohua
- Te Ahiwaru
- Ngāti Te Ata
- Ngāti Tamaoho
- Ngāi Tai ki Tamaki
- Waikato – Tainui.

4.1 Plan Change from 520 and 522 Great South Road, and 21 Gatland Road

Representatives from the aforementioned Iwi groups were invited on 5 June 2019 to review the proposed zoning plan and a high-level opportunities and constraints analysis. Ngati Te Ata, Ngai Tai Ki Tamaki and Ngati Tamaoho expressed an interest in the Plan Change proposal and took part in an on-site hui on 8 July 2019. The Iwi representatives confirmed that they did not have issues with the re-zoning proposal in principle, but would like to engage further as planning and design for the development progresses.

4.2 Resource Consent for 520 Great South Road

Representatives from the aforementioned Iwi groups were also invited to review a development proposal for the Resource Consent of 520 Great South Road on 16 April 2020. The development proposal package sent included the following commentary (together with supporting information) relevant to stormwater management:

- *"A mitigation package for the proposal has been developed by Freshwater Solutions for mitigation of this stream loss. By way of summary, the mitigation package involves daylighting and restoring 56m of stream that had been culverted which has been calculated as 21.9m over and above what is required as a minimum for ensuring no net loss of ecological values. In total, 166m of intermittent stream will be enhanced as part of the development and is more than that required to ensure no-net-loss of ecological values, so there will be an overall positive outcome for the site.*
- *Included as part of the mitigation package is riparian planting on both sides of the restored stream at the locations. The species will include second-generation diversity forest trees of the former forest type (e.g. pūriri, tōtara, karaka, taraire, kohekohe, etc.) amongst pioneer species (e.g. mānuka and kānuka) to help kick-start natural forest regeneration and appropriate wet-tolerant species along streambanks and floodplains.*
- *For stormwater quality treatment, rain gardens sized and designed in accordance with GD04, will be installed throughout the development to provide at source treatment for the proposed roads to vest and JOALs. The proposed dwellings will also be constructed of inert roofing materials.*

  To summarise, while this proposed residential development will result in the permanent loss of some aquatic habitat, the proposed package of stream enhancement and restoration more than sufficiently mitigates the proposed loss of stream habitat. The total length of restoration

and enhancement proposed will achieve the objective of no-net-loss and, overall, there will be a net gain in ecological values and functions facilitated by the proposal."

Responses were received from Ngāi Tai ki Tāmaki, Ngati Tamaoho, Te Aakitai Waiohua.

Representatives from Ngai Tai Tamaki and Ngati Tamaoho attended an on-site hui on the 3 July 2020.

Te Aakitai Waiohua prepared a formal response to Resource Consent LUC60356793 / LUC60362266 & SUB60356794 for the development of 520 Great South Road confirming that "*Te Aakitai Waiohua do not support or oppose these applications being approved by Council as long as the protocols, recommendations, and the amended planning documents as researched by the Kaitiaki are observed and adhered to."* This included:

- *Stormwater at source treatment for stormwater including on site rainwater storage tanks within individual lots, rain gardens on roads and storm filter & chambermaxx storage on JOAL's or installation of a series of on-site rainwater storage tanks to provide for the retention and detention of stormwater for the Greenhouse Proposal.*
- *In principle, Te Aakitai Waiohua do not support any stream reclamation, however we recognize, appreciate and acknowledge the mitigation proposed that is applicable to the combined subdivision and land use consent application for the residential development applications which will provide the following :*
  - *Daylighting the existing piped stream which incorporates a meandering design to reflect a more natural channel and configuration which will also provide the benefit of additional stream length to mitigate the reclamation proposed.*
  - *Riparian margins to be replanted which has also been increased from original proposal. All riparian planting will be natives.*
  - *The area of riparian proposed together with the daylighted stream mitigates the stream loss proposed and there is an overall net gain in ecological values.*

Ngāti Te Ata prepared a submission against the Resource Consent for the development of 520 Great South Road through the BUN60366792 Public Notification process. It expressed concern that the development "*will result in adverse environmental and cultural effects"* and requested that "*a Cultural Values Assessment is undertaken to ascertain the cultural values and iwi environmental preferences regarding the proposed development*". We understand that consultation with Ngāti Te Ata will continue after this report is submitted.

While we understand from Barkers and Associates that Iwi are supportive of the proposed rezoning, consultation and engagement with Mana whenua is ongoing. Mana whenua will be notified of relevant changes within the PCA as required (refer to the Barker and Associates Section 32 Plan Change report (Appendix 13 of the Plan Change application) for further details on Iwi consultation).

5 Stakeholder engagement and consultation

Table 5.1 below identifies the parties deemed to be potentially affected by or interested in the outcomes of the SMP. As the application for adoption of this SMP under the NDC progresses, it is expected that this list will be populated with detail of ongoing stakeholder consultation.

Refer to the Barker and Associates Section 32 Plan Change report for further details on Stakeholder engagement and consultation.

Table 5.1: Stakeholder engagement and consultation register

Stakeholders	What is the reason for interest?	What engagement has been completed?	Feedback and response
520 GSR Limited	Client/ Applicant	Project commencement meetings and ongoing planning discussions	
Owner of 522 Great South Road	Neighbour included within PCA	Meeting on 11 February 2021 and subsequent e-mail correspondence.	The owner of 522 Great South Road acknowledged: • that the proposed stormwater infrastructure for 520 Great South Road will not service 522 Great South Road. Stormwater runoff from 522 Great South Road could continue to discharge to the existing public stormwater network under Great South Road, which will be confirmed by a capacity assessment at the time of future development. • It is highly unlikely that there will be any increase in stormwater flow from 520 Great South Road to 522 Great South Road attributed to the proposed development. It is therefore accepted that flooding will not be an issue. Currently in support of the Plan Change and Resource Consent.

Stakeholders	What is the reason for interest?	What engagement has been completed?	Feedback and response
Owner of 21 Gatland Road	Neighbour included within PCA		Wainono Investments Ltd of 21 Gatland Road prepared a submission in support of the Plan Change for 520 and 522 Great South Road and 21 Gatland Road through the Public Notification process. Currently in support of the Plan Change and Resource Consent.
Papakura South Cemetery (Auckland Council)	Private drainage currently connects to private drainage on 520 Great South Road.	None	N/A
91 and 95 Gatland Road	Downstream receiving environment	None	N/A

Stakeholders	What is the reason for interest?	What engagement has been completed?	Feedback and response
Auckland Council – Healthy Waters	The SMP will be adopted within Auckland Council's NDC. The public reticulated stormwater network and any communal bioretention devices or similar are intended to be vested to Auckland Council upon completion of construction.	Healthy Waters have reviewed the high-level assessment of stormwater management and flooding issues prepared by T+T in June 2019 for the development of 520 Great South Road. Healthy Waters have reviewed the SMP prepared by T+T in May 2020 to support the Plan Change for the rezoning of 520 and 522 Great South Road and 21 Gatland Road. Meeting with Healthy Waters to discuss the flood management strategy on 20 April 2021	Feedback on high-level assessment of stormwater management and flooding issues assessment provided in Clause 23 RMA Further Information – 520 Great South Road Private Plan Change Request dated 6 April 2020 and latterly in a meeting with representatives of the Applicant, Healthy Waters, T+T and Barker and Associates representatives on 3 April 2020. Refer to Appendix D1 for the meeting minutes, the queries raised by Auckland Council in the Plan Change process and how each of these Items (HW1 – HW15) have been addressed in this SMP. Feedback on SMP (to support Plan Change, May 2020) provided in the Auckland Council in the Section 92 Further Information Requests dated 12 October 2020 and Healthy Waters in the SMP Review Approval Adoption Report dated 30 October 2020. Refer to Appendix D2 for these raised queries and how each of these items (HW16 – HW30) have been addressed in this SMP.

Stakeholders	What is the reason for interest?	What engagement has been completed?	Feedback and response
Auckland Transport	All road-side treatment devices (i.e. rain gardens) will be maintained by Auckland Transport	We understand that Healthy Waters engaged with Auckland Transport during the Plan Change application.	Auckland Transport prepared a submission opposing the Resource Consent application for 520 Great South Road in whole or in part. It cited "*…insufficient detail provided to demonstrate that management and treatment of stormwater runoff from roads meets the requirements of the AUP and that design solutions can be accommodated with other elements within the proposed road reserves.*" It is understood that Auckland Transport was opposed to the proposed stormwater management approach which relied on numerous small rain gardens within road berms to provide water quality treatment for road runoff. It considered "*that there are better options available including use of combined treatment areas*" and requested that the design "*seeks efficient solutions which have regard to the whole of life maintenance costs and the subdivision patterns and road or drainage reserves be altered as required to accommodate the required design solutions*". Maven has subsequently revised the layout for road-side treatment devices to amalgamate treatment into larger devices, in recognition of Auckland Transport's preferences following a meeting with Auckland Transport and Healthy Waters on 18 August 2020.
Ngāti Maru, Te Ākitai Waiohua Te Ahiwaru, Ngāti Te Ata, Ngāti Tamaoho, Ngāi Tai ki Tamaki and Waikato – Tainui	Mana whenua groups with a registered interest	Representatives were invited to review a development proposal for the 520 Great South Road on 16 April 2020.	Refer to Section 4

6 Proposed development

This section of the report summarises the proposals for future development in the PCA, particularly as they relate to stormwater management.

6.1 General development information

The current development status of each property within the PCA is as follows:

- 520 Great South Road: Resource Consent sought for a 102 residential lot development, being a mixture of terrace, duplex, zero lot and apartments (refer to Section 6.2)
- 21 Gatland Road: Resource Consent sought for 20 residential lots

There are currently no development plans for 522 Great South Road. It is expected that following the Plan Change, the re-zoned property at 522 Great South Road will also ultimately be developed in general accordance with the MHU provisions.

6.2 Proposed Land Use

The Typology Plan for 520 Great South Road[18] is shown in Figure 6-1 (refer to Appendix A). As part of the Master Plan for 520 Great South Road, the existing commercial building will be removed. The proposed development comprises a network of public collector roads and local streets to provide access from Great South Road to the 102 residential lots. It allows for future road connection to the sites at on 522 Great South Road and 21 Gatland Road.

The subdivision plan for 21 Gatland Road, prepared by Hall Surveying Limited, is shown in Figure 6-2. The development at 21 Gatland Road will create 20 residential lots accessed from two new public roads.[19] We understand that this subdivision has been lodged with Auckland Council, but the decisions has not been made or issued. We further understand that the Subdivision Consent for 21 Gatland Road will be advanced once the Plan Change application has been processed. Accordingly, the proposed stormwater management approach for 21 Gatland Road will need to be consistent with the requirements of this SMP, or a private stormwater discharge consent would need to be obtained. The property at 522 Great South Road does not have plans or proposed layouts at this stage. Based on the Master Plan for 520 Great South Road and discussions regarding the other two developments, no HCGAs are planned in the PCA.

[18] Avery Associates Team Architects, 28 August 2020, 520 GSR | 520 Great South Road, Drury

[19] Enable, March 2019, Engineering Infrastructure Report: 21 Gatland Road, Drury prepared for Wainono Investments Limited

Figure 6-1: 520 Great South Road Typology Plan (DRAFT, dated 28 August 2020)

Figure 6-2: Subdivision Plan for 21 Gatland Road (dated November 2018)

6.3 Earthworks

Maven Associates has prepared an Infrastructure Assessment Report to support the application for Resource Consent for 520 Great South Road[20], which includes an assessment of earthworks required for the development. The proposed earthworks plan shows that the south-eastern corner of 520 Great South Road will be filled so that runoff from the entire property (and 21 Gatland Road) flows to Watercourse A. The post-development sub-catchments are summarised below:

- Sub-catchment A includes all of 21 Gatland Road and 520 Great South Road, in addition to the upstream developed residential area to the west and Papakura South Cemetery to the north.
- Sub-catchment B comprises all of 522 Great South Road only (i.e. it longer includes contributions from the southern corner of 520 Great South Road).

Additionally, the report states:

> *"Earthworks are proposed over the majority of the site* (with the exception of the section of Watercourse A which is proposed to be retained*) and include removal of existing trees, formation of building platforms, construction of retaining walls, and installation of drainage, and accessways.*
>
> *Earthworks will involve ground disturbance of 30,198 m^2. It is expected that the maximum cut and fill will be approximately 3.2 m and 3.8 m in height respectively. Temporary batter slopes not exceeding 1:3 will be created during construction. Retaining wall details will be finalised during building consent stage.*
>
> *The following is a summary of the proposed works:*
>
> - *Total area of ground disturbance = 30,191 m^2*
> - *Maximum cut and fill depth = 3.8 m Fill 3.2 m Cut*
> - *Total volume of cut to waste off site 12,000 m^3*
> - *Total volume of cut to fill = 12,400 m^3*
> - *Net Volume (import fill) = 9,400 m^3"*

Enable has prepared an Engineering Infrastructure report for the Resource Consent application at 21 Gatland Road[19], which includes an assessment of earthworks required for the development. It states:

> *"The volume of bulk cut (1,858 m^3) will be used where bulk filling (6,325 m^3) is required. The remaining (4,467 m^3) material required to complete the bulk fill operation will be imported to site."*

522 Great South Road does not have a proposed layout at this point, and therefore has no earthworks plans.

[20] Maven Associates, 6 May 2021, *Infrastructure Report – Proposed development 520 Great South Road* (Job number: 135014)

7 Flooding assessment

The Drury- Opāheke Draft SMP identifies existing extensive flooding downstream in the Slippery Creek catchment. This attributes the large flood plain extent primarily to the large catchment upstream of the FUZ area, rather than the effect of additional impervious area created by anticipated urban development. Although the FUZ SMP identifies that urbanisation of the FUZ is expected to have minimal effects on existing flood hazards, flooding was assessed by T+T in June 2019[1] (refer to Appendix A) to confirm the impact of development within the FUZ on the Slippery Creek flood plain.

The T+T assessment compared results from the 2018 Auckland Council Slippery Creek Rapid Flood Hazard Assessment (RFHA) model, which includes effective rainfall and major inflows from Slippery Creek, Hingaia Creek, Waihoihoi Stream, Symonds Creek, Whangapouri Creek, Ngakoroa Creek and Oira Creek, and associated tributaries compiled in Infoworks ICM software[21], for the following scenarios:

- 100 year ARI with existing development (ED) conditions with climate change
- 100 year ARI with MPD conditions, with future development modelled within the upstream FUZ and with climate change.

Neither model includes any specific development of the PCA, however, they incorporate the general nature of future urban development in the Slippery Creek catchment, including the PCA. The ED scenario is based on existing impervious coverage and the MPD scenario assumes an impervious coverage assumption of 60% within the FUZ and an additional 20% impervious coverage in the upper eastern catchment rural areas in the Hunua ranges.

The flooding issues in Slippery Creek catchment require development of a comprehensive total-catchment solution to avoid effects of cumulative development, and so use of the Auckland Council-owned catchment-wide RFHA model was deemed the most appropriate for this assessment, particularly because:

- It is known that this model was built using the latest Auckland Council specification for Rapid Flood Hazard Assessment (RFHA) modelling methodology (2012)
- The model includes survey information for key hydraulic structures in the catchment and utilises inflow boundary conditions from the Auckland Council Hingaia model
- The model showed an acceptable volume balance with a mass balance error of only -0.01% and no instabilities or abnormalities in the result outputs provided.

The assessment demonstrated that the flood extent is not significantly greater than the ED flood extent, with no previously unaffected areas of flooding for the MPD scenario. A comparison in flood extent for the ED and MPD scenarios is presented in Figure 7-1.

[21] Infoworks Integrated all source Catchment Modelling software

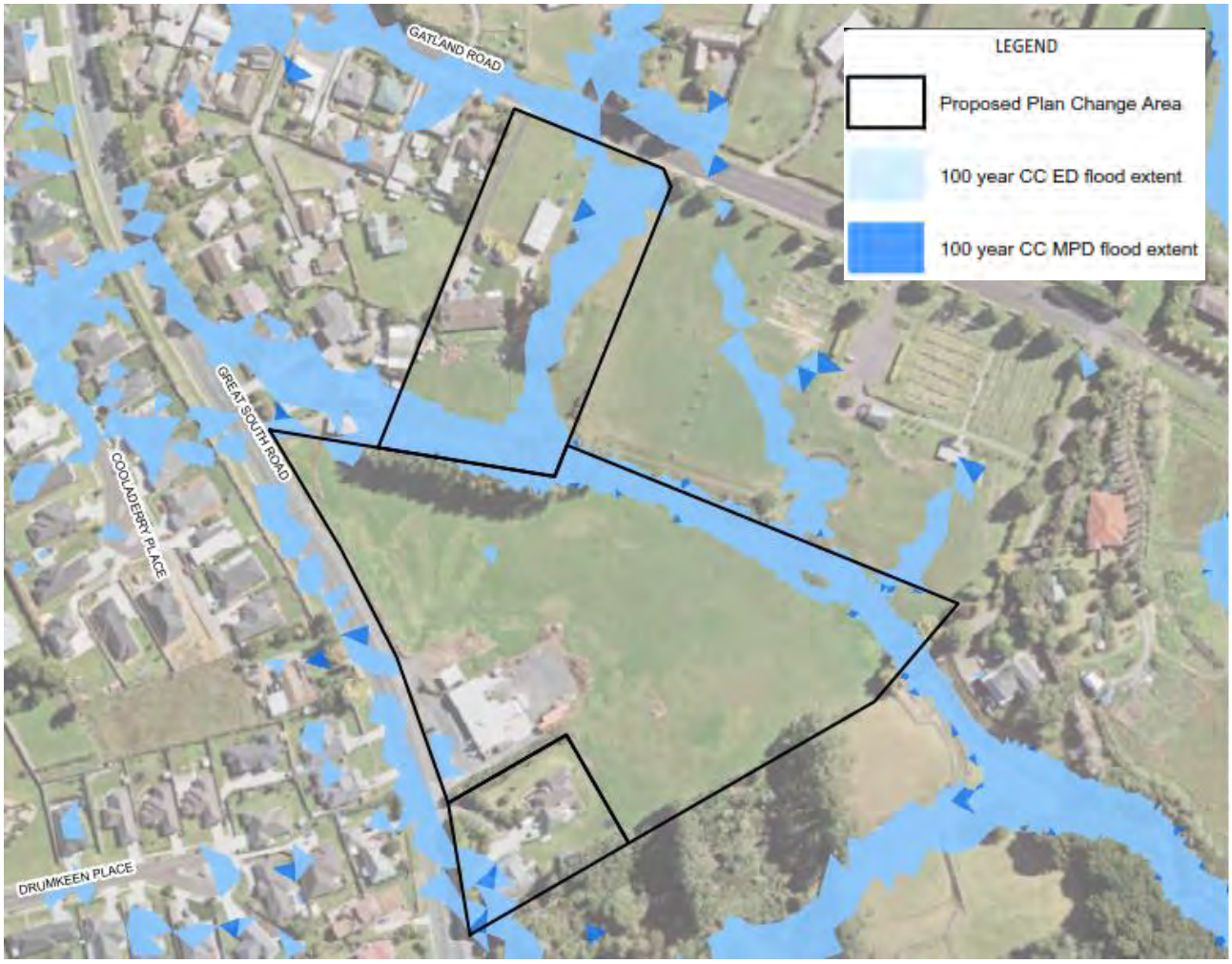


Figure 7-1: Comparison between 100 year ARI CC ED and 100 year ARI CC MPD flood extent

The assessment also demonstrated the peak flows generated as a result of the development at 520 Great South Road only will be negligible in comparison to, and occur earlier than, the peak flows from the upstream catchment. Therefore, it would be appropriate to discharge the stormwater from the PCA in advance of the catchment flood peak so as not to worsen flooding in the Slippery Creek flood plain, i.e. to pass flows forward without onsite flood attenuation.

The earlier T+T hydrological assessment has been modified to account for flow routing. The modified assessment seeks to ascertain whether the additional runoff from sub-catchment A exacerbates the existing flood hazard in the Slippery Creek flood plain downstream, and to identify any significant effects of the pass flows forward flood management approach for the catchment. The following methodology was used:

- Estimate 24 hour rainfall depths for the 2, 10 and 100 year ARI design storms from the TP108 isopleths and use these to prepare hyetographs using TP108 temporal distribution
- Build a HEC-HMS[22] hydrological model for the pre- and post-development 2, 10 and 100 year ARI rainfall events for sub-catchment A and generate flows.
  - Pre-development flows based on existing impervious coverage.

[22] Hydrologic Engineering Center – Hydrologic Modelling System software designed to simulate the complete hydrologic processes of dendritic watershed systems.

- Post-development flows based on the latest Typology Plan[18] for 520 Great South Road. The impervious coverage within in a given Lot ranges from 60% for spacious end sections to 85% for narrow terrace sections. For this calculation, the average lot impervious is assumed to be 75%. For properties within the PCA but not included in the proposed development masterplan, an average imperviousness of 66% has been used. This is based on the total imperviousness percentage of the 520 Great South Road property.

- Compare post-development flows to:
  - Pre-development flows from the site
  - Slippery Creek 100 year ARI ED model flows at the Great South Road Bridge (Location E in the June 2019 assessment included in Figure 7-2 below)
  - Compare the increase in flood volume (and timing) to size/volume of the receiving flood plain.

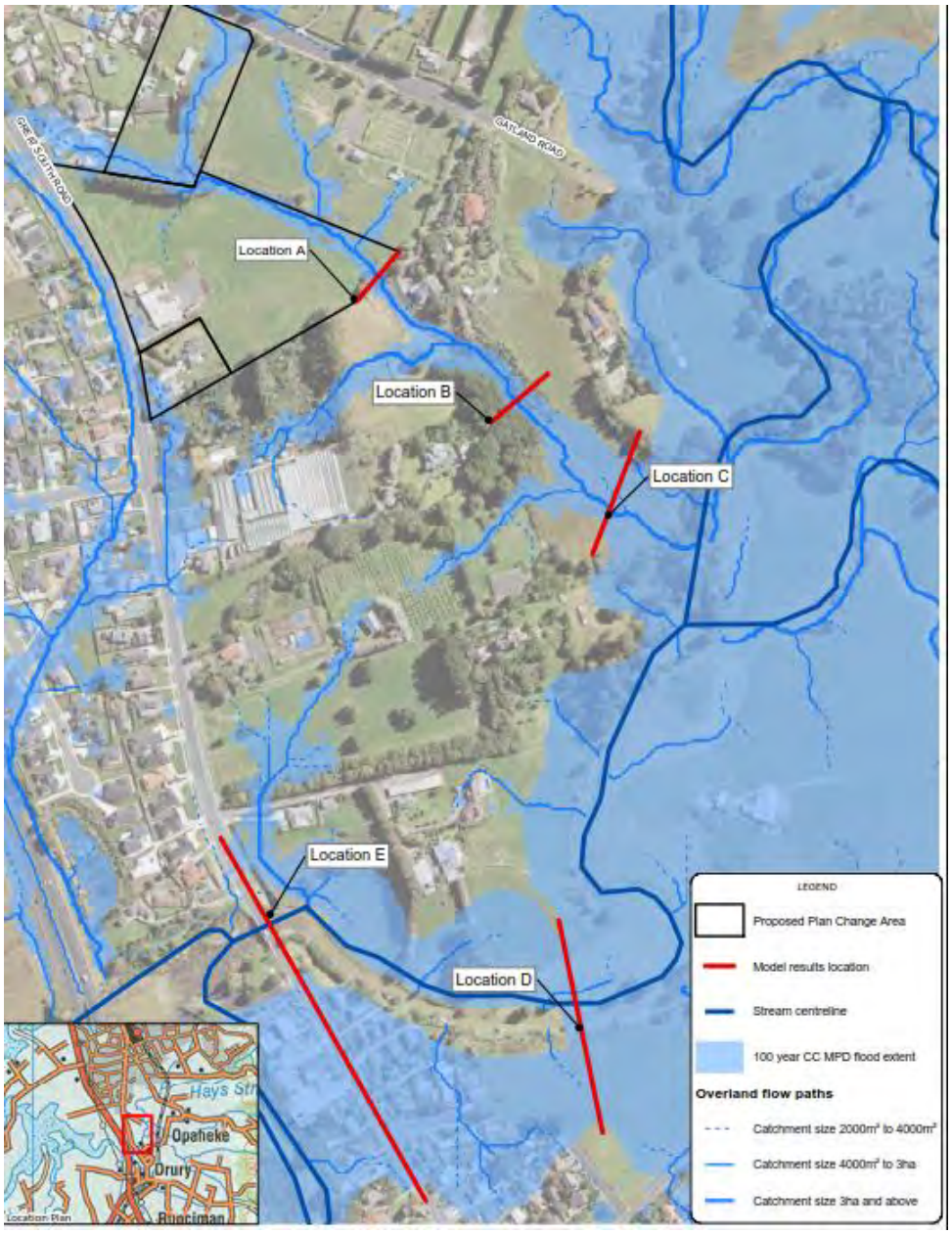


Figure 7-2: Flood model result locations

Figure 7-3 shows the sub-catchment A hydrographs generated in HEC-HMS and Table 7.1 shows the peak flow rates for the pre- and post-development 2, 10 and 100 year ARI rainfall events. The results show that in all rainfall events the post-development flows will be almost twice the pre-development flows.

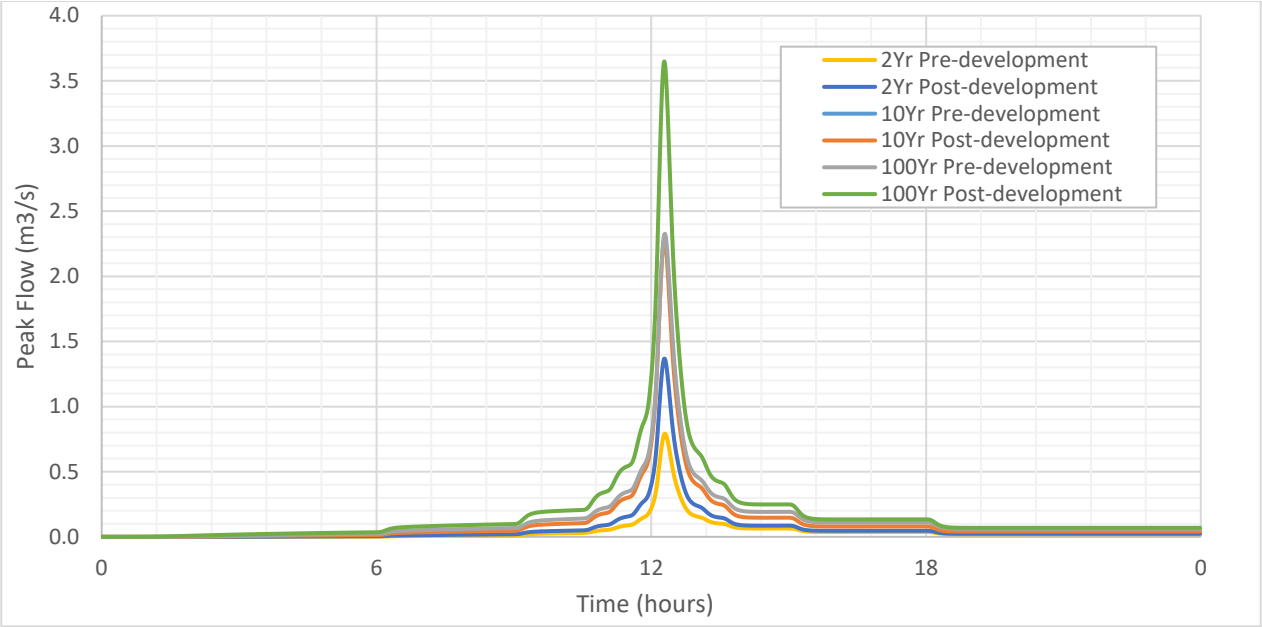


Figure 7-3: Runoff hydrographs from sub-catchment A for the pre- and post-development 2, 10 and 100 year ARI rainfall events

Table 7.1: Peak flow rates from sub-catchment A for the pre- and post-development 2, 10 and 100 year ARI rainfall events

ARI rainfall event	2 Year	10 Year	100 Year
Pre-development (m^3/s)	0.8	1.4	2.3
Post-development (m^3/s)	1.4	2.3	3.6
Difference (m^3/s)	**0.6**	**0.9**	**1.3**

Total catchment flow hydrographs at the Great South Road Bridge are shown in Figure 7-4. The "Pre-development" flow is the output from the Slippery Creek rapid flood hazard assessment model ED scenario. The "Post-development" flow is based on addition of the "extra flow" resulting from development of the PCA (i.e. PCA post-development less the PCA pre-development flows from sub-catchment A) to the "Pre-development" hydrograph. Only "extra flow" from the development has been added because the "Pre-development" case already accounts for the greenfield runoff from sub-catchment A.

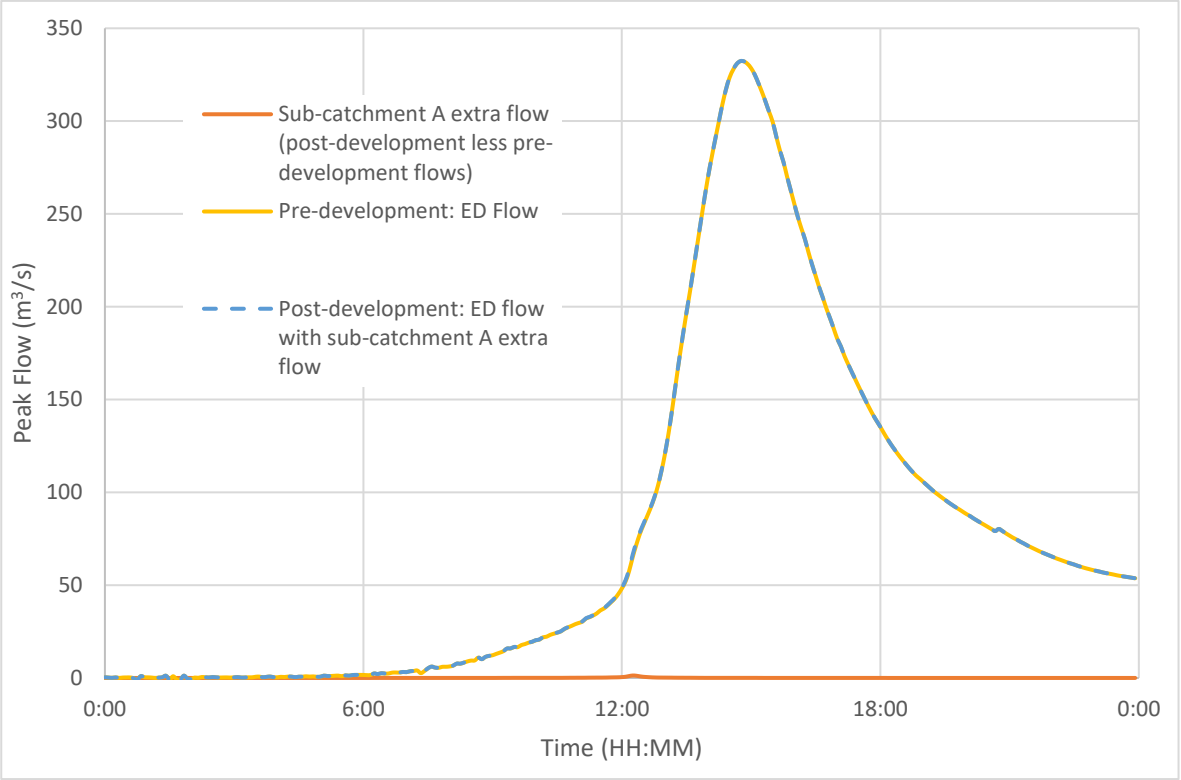


Figure 7-4: Slippery Creek flood plain 100 year flood hydrographs at the Great South Road Bridge

At the Great South Road Bridge, the extra flow from development within sub-catchment A is negligible in comparison to the large volume of flow from the upstream Slippery Creek catchment. Thus, the "Pre-development" and "Post-development" hydrographs look identical. The PCA peak flow occurs at approximate model time 12:20 pm, more than two hours prior to the catchment peak at 2:45 pm.

The volume of additional flow from sub-catchment A of the development is 5,177 m^3 and surface area of the Slippery Creek 100 year flood plain between the development and the flow constraint at Great South Road Bridge is approximately 209,000 m^2. This suggests that the theoretical maximum effect that the development extra flow could have on the 100 year flood level is 25 mm if the peaks coincided, which could be mitigated to a great extent if a pass forward flow approach is adopted.

Given the small contribution to Slippery Creek from the development of the PCA, although one of many areas to be developed in the FUZ, this flooding assessment demonstrates it is suitable to pass forward flows without attenuation. This is consistent with the general recommendation of the FUZ SMP for the four Drury Opāheke sub-catchments.

As a result of development, all runoff within 520 Great South Road will be directed to sub-catchment A so that sub-catchment B comprises only the overland flow from the entirety of 522 Great South Road. This means the land discharging to sub-catchment B is reduced in the post-development scenario and, as shown in Table 7.2, the peak flow rates and volumes conveyed down Great South Road will be less too. Stormwater runoff from sub-catchment B can also be discharged without flood attenuation.

Table 7.2: Peak flow rates and volumes from sub-catchment B

ARI rainfall event	2 Year	10 Year	100 Year
Pre-development			
Peak flow (m^3/s)	0.069	0.127	0.220
Volume (m^3)	446	797	1,389
Post-development			
Peak flow (m^3/s)	0.039	0.066	0.110
Volume (m^3)	246	416	695

This flooding assessment has demonstrated that the pass forward flow flood management approach would be suitable for both sub-catchments. The flood management strategy is discussed in Section 8.2.4.2.

8 Stormwater management

This section presents guidance on how stormwater will be managed in the future within the PCA. This guidance is consistent with regulatory and stormwater-specific guidelines and based on conventional stormwater management techniques to meet AUP provisions and to integrate with existing and future stormwater systems in the Slippery Creek catchment. It provides a framework for stormwater management which has been considered as part of an interdisciplinary planning process to enable implementation of an integrated stormwater management approach.

8.1 Principles of stormwater management

The stormwater management principles described below have been developed in line with the site-specific constraints and opportunities identified and presented in Section 2, and the AUP policies on integrated stormwater management, the region-wide NDC, and the draft FUZ SMP as outlined in Section 3.

The stormwater management approach seeks to:

- Recognise the key constraints and opportunities on site and in the Slippery Creek catchment
- Devise an integrated stormwater management approach to facilitate urban development
- Develop a set of BPO for stormwater that can be incorporated into the development
- Emphasise a water-sensitive design approach that:
  - manages the impact of land use change from rural to urban
  - protect and enhance stream systems and natural hydrology
  - mitigates for hydrological changes and manages flooding effects
- Minimise the generation and discharge of contaminants/sediments into sensitive receiving environment of the Manukau Harbour
- Protect key infrastructure, people and the environment from significant flooding events

To achieve these outcomes, the proposed stormwater management approach identifies various requirements for management of stormwater within the PCA.

8.1.1 Updated principles

*****Not applicable within this SMP*****

8.2 Proposed stormwater management

This section of the SMP presents the detail of the proposed stormwater management approach. The approach generally meets the NDC requirements, and where it does not, this section demonstrates why the preferred option is the BPO for the development.

8.2.1 General

The proposed stormwater strategy to achieve water quality, hydrological mitigation and water-sensitive design outcomes for the PCA is to use a treatment train approach. A BPO treatment train toolbox is presented in Table 8.1. It has been prepared to assist in selecting appropriate devices to achieve at-source, close-to-source or communal stormwater management outcomes for corresponding land-use. All devices should be designed in accordance with the guidelines in GD01[14].

The proposed stormwater management approach and performance outcomes for this strategy are discussed further in the following sections.

The design of the proposed stormwater infrastructure for 520 Great South Road has been advanced as part of the Resource Consent process. The preferred device selection is indicated by the red boxes on the Table 8.1 and the device sizing and location is presented in the supporting Infrastructure Report prepared by Maven Associates[20] and included in Appendix C2.

As stated previously, the PCA includes three properties that will be developed separately, viz. 522 Great South Road, 520 Great South and 21 Gatland Road. The additional detail presented in Sections 8.2.7, 8.3 and 8.7 is presented for 520 Great South Road in relation to the Resource Consent application to develop only this property. Development staging, Hydraulic connectivity and dependencies will need to be developed in more detail to support Resource Consent applications and Engineering Plan Approvals for any development of the other two properties.

Table 8.1: Stormwater management requirements and toolbox of BPO for stormwater management within the PCA

Activity	Component	Performance standard	At-source	Close-to-source	Communal
Residential lots – Roof Area	Water quality	Eliminate the generation of contaminants at the source where possible, otherwise minimise	• Use of inert building materials	• Additional treatment may be provided by downstream stormwater conveyance (i.e. vegetated swales, where adopted)	
	Hydrological mitigation	Equivalent of SMAF1 hydrological mitigation	Retention and detention provided by: • Re-use of roof runoff through above or below ground rainwater storage tanks • Infiltration through soakage pits or trench drains • Rain gardens/planter boxes		
Residential lots – Hardstand and jointly owned access lanes	Water quality	Stormwater management of runoff from all impervious surfaces before discharging into the receiving environment. Minimise the generation of contaminants as much as possible. Where contaminants are generated, the preferred approach is to use green infrastructure to treat runoff at-source or as close to the source as practicable.	• Isolation of hazardous substances by providing roofs for communal waste storage areas • Gross Pollutant Traps downstream of communal waste storage areas in apartments or multi-unit developments	• Wetlands • Bioretention devices - Rain gardens - Tree pits - Filter strips/ swales • Proprietary treatment devices (i.e. storm filter and Chambermaxx storage) • Additional treatment may be provided by downstream stormwater conveyance (i.e. vegetated swales, where adopted)	

Activity	Component	Performance standard	At-source	Close-to-source	Communal
	Hydrological mitigation	Equivalent of SMAF1 hydrological mitigation	• Permeable pavement and porous concrete (private application only)	• Infiltration through soakage pits and trench drains. • Wetlands • Bioretention devices - Rain gardens - Tree Pits - Filter strips/ swales • Proprietary treatment devices (i.e. storm filter and Chambermaxx storage)	
Roads, Carparking and HCGA Carriageway	Water quality	Stormwater management of runoff from all impervious surfaces before discharging into the receiving environment. Minimise the generation of contaminants as much as possible. Where contaminants are generated, the preferred approach is to use green infrastructure to treat runoff at-source or as close to the source as practicable.	• Grated catchpits and inlets to stormwater infrastructure • Gross Pollutant Trap	• Wetlands • Bioretention devices - Rain gardens - Tree Pits - Filter strips/ swales • Proprietary treatment devices (i.e. storm filter and Chambermaxx storage)	

Activity	Component	Performance standard	At-source	Close-to-source	Communal
	Hydrological mitigation	Equivalent of SMAF1 hydrological mitigation		• Infiltration through soakage pits and trench drains. • Wetlands • Bioretention devices - Rain gardens - Tree Pits - Filter strips/ swales • Proprietary treatment devices (i.e. storm filter and Chambermaxx storage)	
Public spaces only i.e. Roads, Carparking, HCGA Carriageway, Open Spaces and Riparian Margins	Stormwater conveyance	Convey runoff generated from the 10 year ARI through a public piped stormwater network. Allowance for runoff flows greater than the 10 year ARI should be made in overland flow paths. Existing overland flow paths should be protected.	**Primary Conveyance** • Retain and enhance intermittent streams • Vegetated swales • Open channels • Pipe network **Secondary Conveyance** • Retain and enhance intermittent streams • Vegetated swales • Open channels • Road corridor • Piped (not preferred)		

Activity	Component	Performance standard	At-source	Close-to-source	Communal
Watercourse A	Stream hydrology and erosion protection	Enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below the relevant thresholds.	• Green outfall from stormwater network into Watercourse A • Riparian margin and channel enhancement and planting, where necessary to mitigate identified adverse effects • Daylight and meandering of Watercourse A to naturalise form • With reference to the Assessment of Ecological Effects (by Freshwater Solutions)		

8.2.2 Water-sensitive design

The key water-sensitive design principles and how they are incorporated in the stormwater management approach for the PCA are summarised in Table 8.2.

Table 8.2: Application of water sensitive design principles within the PCA

Water-sensitive design principles	Application within PCA
Promote interdisciplinary planning and design	• The Stormwater Management and Flooding Assessment report for 520 Great South Road was prepared by Tonkin + Taylor in 28 June 2019 to enable early multi-disciplinary engagement and to ensure an integrated stormwater management approach. • The Assessment of Ecological Effects for 520 Great South Road was prepared by Freshwater Solutions in April 2020 (issued in draft in March 2020) and provided specialist Ecological input to development of the stormwater management approach. • The Infrastructure Report prepared by Maven Associates for the proposed development at 520 Great South Road (issued 6 May 2021) and the Engineering Infrastructure Report prepared by Enable for 21 Gatland Road (issued March 2019) provided insight to the design solutions being considered.
Protect and enhance the values and functions of natural ecosystem	• Through the Resource Consent at 520 Great South Road, riparian margins are proposed that will provide protection and enhancement of intermittent streams (i.e. Watercourse A) • "*Overall, with the proposed planting, pond removal and daylighting of the piped section of Watercourse A, there will be a positive increase in both freshwater and terrestrial values within the site post the proposed development from that seen currently.*"[7]
Address stormwater effects as close to source as possible	• Generation of contaminants will be prevented through the use of inert building materials, and where contaminants are generated, green infrastructure (e.g. rain gardens, swales and wetlands) will be used to treat runoff as close to the source as practicable.
Mimic natural systems and processes for stormwater management	• The use and enhancement of natural hydrological features (i.e. Watercourse A) and green infrastructure where practicable.

8.2.3 Water quality

The development of the PCA into a MHU zone could result in increased contamination of stormwater runoff due to the land-use changes and increased impervious area. Stormwater quality could, therefore, be potentially adversely affected and may negatively impact the sensitive receiving environments if not managed.

The water quality management approach seeks to minimise the generation of contaminants. Where contaminants will be generated, the preferred approach is to use green infrastructure to treat runoff at-source, or as close to the source as practicable. Specifically, this approach seeks to:

- Eliminate or minimise the generation and discharge of contaminants
- Treat all contaminant generating impervious areas at or near source by a water quality device designed in accordance with GD01[14] to target sediment, metals and gross pollutants.

These water quality objectives can be met through the following measures and stormwater management devices:

- Use of inert building materials to prevent generation of contaminant-laden runoff within residential lots, i.e. avoid use of high contaminant yielding *building roofing, spouting, external wall cladding and architectural features using materials with an:*
  - *Exposed surface or surface coating of metallic zinc of any alloy containing greater than 10% zinc*
  - *Exposed surface or surface coating of metallic copper or any alloy containing greater than 10% copper*
  - *Exposed treated timber surface or any roof material with a copper-containing or zinc-containing algaecide*[23]

  It is noted that the region-wide NDC is not only focused on targeting those high contaminant generating surfaces, but also has a preference for wider applications of water quality treatment for all impervious surfaces. However, if inert roofing materials are used, these impervious surfaces will not generate contaminants and therefore will not require quality treatment. Elimination of contamination generation is considered the BPO option.

  If building materials that generate contaminants are used, site-specific water quality treatment will be required.
- Use of grated catchpits and inlets to the stormwater network for capturing of gross contaminants, solids, sediment, and gravels
- Provide roofs for communal waste storage areas in apartments or multi-unit developments to reduce the volume of contaminated runoff. In cases where this is not practical, use of gross pollutant traps to pre-treat runoff prior to discharging to communal bio-retention devices
- Based on the Traffic Impact Assessment[24] for 520 Great South Road and discussions regarding the other two properties within the PCA, no HCGAs are anticipated in the PCA. However, the public roads and carparks should still be treated using vegetated bio-retention devices such as swales, rain gardens and tree pits. Vegetated devices provide the multiple benefits of green infrastructure along road corridors as well as water quality treatment close to the runoff source. Bio-retention devices can also be designed to provide hydrological mitigation alongside water quality treatment
- Riparian margins that provide protection and enhancement to Watercourse A and provide a secondary benefit to stormwater management through the disconnection of impervious areas from the receiving environment. The Assessment of Ecological Effects[7] in support of the Resource Consent application for 520 Great South Road proposes the following riparian planting:

[23] Auckland Council, August 2013, Auckland Unitary Plan stormwater management provisions: technical basis of contaminant and volume management requirements, Prepare by Auckland Council. Auckland Council technical report TR2013/035

[24] TPC Ltd, May 2020, *Proposed Residential Development - 520 Great South Road Papakura Traffic Impact Assessment.* Submitted to Barker and Associates Ltd.

- The section of Watercourse A that will be maintained upstream of the existing online pond will include a 6 m wide riparian margin (average) on the true right stream bank only
- The new section of Watercourse A (downstream of the existing online pond) will include a 10 m wide riparian margin, with additional planting for enhancement of ecological values.

The Infrastructure Report prepared to support the Resource Consent application for 520 Great South Road[20] adopts the following water quality treatment approach:

- *Consented dwellings to be roofed with inert roofing materials (e.g. Colorsteel roofs) which will not generate contaminants and therefore will not require quality treatment.*
- *All future trafficable surfaces including roading networks, accessways, manoeuvring and carparking areas proposed as part of the development entail stormwater quality treatment via the utilisation of rain gardens to achieve the best practical stormwater management outcome.*

8.2.4 Water quantity

Development of the PCA will result in an increase in impervious area, which in turn will generate more stormwater runoff (peak magnitude and volume). Impervious cover within the PCA will increase from approximately 13% to 67%. The change in coverage for the two sub-catchments is presented in Table 8.3. This takes into account the change in sub-catchment areas as a result of the proposed earthworks in the south-eastern corner of 520 Great South Road.

Table 8.3: Existing and proposed coverage within sub-catchments A and B

Sub-catchment		Existing area (m^3)		Proposed area (m^3)	
		Pervious	Impervious	Pervious	Impervious
Sub-catchment A	Within PCA	34,715	2,869	14,440	27,865
	Outside PCA	33,457	27,085	33,457	27,085
Sub-catchment B	Within PCA	5,633	3,088	1,360	2,640
	Outside PCA	-	-	-	-
Total area (m^3)		**73,805**	**33,042**	**49,258**	**57,589**

The existing coverage both within and outside of the PCA has been derived from aerial photography. Proposed coverage within 520 Great South Road was determined from the Typology Plan[18]. For the purposes of the SMP, the future impervious coverage of 22 Gatland Rd and 522 Great South Road was assumed to be the same as for the proposed development at 520 Great South Road.

It is assumed all runoff within 520 Great South Road and 21 Gatland Road will discharge to Watercourse A in the post-development case. This means an additional 4,721 m^2 of 520 Great South Road will be included in sub-catchment A. Sub-catchment B will comprise only the property at 522 Great South Road.

8.2.4.1 Hydrological mitigation

This section considers the smaller but more frequent storm events. Larger storm events are discussed in Section 8.2.4.2. The hydrological mitigation measures identified here, to offset the

effects of development, will have the most effect during smaller events but will mitigate (to some extent) the increased runoff in all storm events.

Retention is the process of storing and using stormwater on-site, thus reducing the volume of runoff discharging to the receiving environment. Detention is the temporary storage and slower release of stormwater to reduce peak runoff discharging from the site.

The general approach to water quantity management is to provide a minimum of SMAF 1 hydrological mitigation for all impervious surfaces within the PCA. The SMAF 1 hydrological mitigation objectives are outlined in Section 3.1.6. The following management options are suitable to meet the SMAF 1 hydrological mitigation objectives:

For retention:

- By infiltration. This may be provided in soakage pits, trench drains, or through appropriately designed bio-retention devices. Pervious pavements or porous concrete can be included as part of the driveways / access to the dwellings within the PCA
- At source for residential and buildings, through the use of rainwater tanks for collection of roof runoff where there is re-use demand.

The hydrological mitigation outcome is not fully achieved unless both retention and detention can be provided. However, exceptions for providing retention can be made in cases where infiltration rates preclude disposal to ground and/or rainwater re-use is not possible. In these cases the retention volume can be made up by detention. Providing more detention volume to offset retention requirements may be the BPO approach if on-site infiltration is not feasible and noting that there may be only so much application for water re-use.

For detention:

- Above-ground rainwater storage tanks or underground attenuation tanks can be used within residential lots to provide detention volumes, with the latter devices minimising land take
- Rain gardens, planter boxes, swales and tree pits are treatment devices which can provide some hydrological mitigation (e.g. within private residential property or along road corridors and within public impervious spaces) while adding to the landscape value of the PCA.

The Infrastructure Report for the Resource Consent for 520 Great South Road[20] specifies the following devices to provide at-source and close-to-source retention and detention devices to mitigate the effects of increased imperviousness:

- On-site rainwater storage tanks on lots
- Rain gardens for “all future trafficable surfaces including roading networks, accessways, manoeuvring and carparking areas”
- Storm filter and Chambermaxx storage on jointly owned access lanes.

The Engineering Infrastructure Report for the Resource Consent for 21 Gatland Road[19] also specifies rain gardens for hydrological mitigation to meet SMAF1 requirements.

8.2.4.2 Flood management

The flooding assessment in Section 7 demonstrates that the pass forward flood management approach would be suitable for both sub-catchments.

Thus, to ensure that there are no adverse flooding impacts within the PCA, the following are proposed to manage flood risk:

- Adoption of the pass forward flows approach, with runoff from the site discharged without attenuation so that flows arrive downstream in the Slippery Creek watercourse before peak

flooding from the upper reaches of the catchment, i.e. flows from 520 Great South Road and 21 Gatland Road will be discharged directly into Watercourse A and then Slippery Creek, and flows from 522 Great South Road (i.e. a reduced sub-catchment B) will continue to flow in the existing Great South Road stormwater system and overland to discharge to Drury Creek at the confluence with Slippery Creek and Hingaia Stream

- Location of all building platforms outside of and set above the 100 year ARI MPD flood plain, with a suitable allowance for freeboard. It is also recommended that infrastructure is located outside this extent, unless it can be designed to be resilient to flood damage. The flooding assessment[1] by T+T in 2019 mapped the MPD 100 year ARI flood plain (refer to Appendix C1).
- Use capacity available in riparian margins as part of the water conveyance system and enhance intermittent streams to provide capacity and conveyance as a means to manage flood waters.

8.2.5 Conveyance

Primary flows (i.e. runoff from storms up to a 1 in 10 year ARI frequency) and secondary flows (i.e. from storms greater than 1 in 10 year ARI frequency and less than 1 in 100 year ARI frequency) will be conveyed in drainage systems, through a suite of treatment devices, to the point of discharge from the PCA. These drainage systems will comprise built assets (i.e. road-side channels, vegetated swales and piped networks) and natural systems (i.e. incorporating existing intermittent and permanent streams and open watercourses and overland flow paths). Stormwater systems will be designed in accordance with the Stormwater Code of Practice and all secondary flow paths will be located within public areas (roads and parks) and not across private properties.

8.2.5.1 520 Great South Road and 21 Gatland Road

The design of the primary stormwater systems for 520 Great South Road and 21 Gatland Road have been advanced as part of the Resource Consent process, and are presented in the respective Infrastructure Plans[19, 20].

Watercourse A is mapped by Council as an overland flow path, and the proposed development within 520 Great South Road will maintain it as the primary and secondary conveyance route for runoff from sub-catchment A, albeit with some minor modifications:

- The upstream end of Watercourse A (approximately 52 m length)) will be reclaimed to enable development of the proposed roads and building platforms.
- The online pond and private pipe downstream of Watercourse A will be removed and rehabilitated into a natural, meandering stream channel, i.e. an approximately 61 m extension of Watercourse A, which will be rehabilitated with riparian planting.

Figure 8-1 shows the proposed stormwater drainage plan included in the Ecological Response to Request for Further Information[25] and reference should be made to the Infrastructure Report[20] for further details of the proposed drainage to service the development at 520 Great South Road.

[25] Freshwater Solutions, 18 August 2020, Response to Request for Further Information – 520 Great South Road

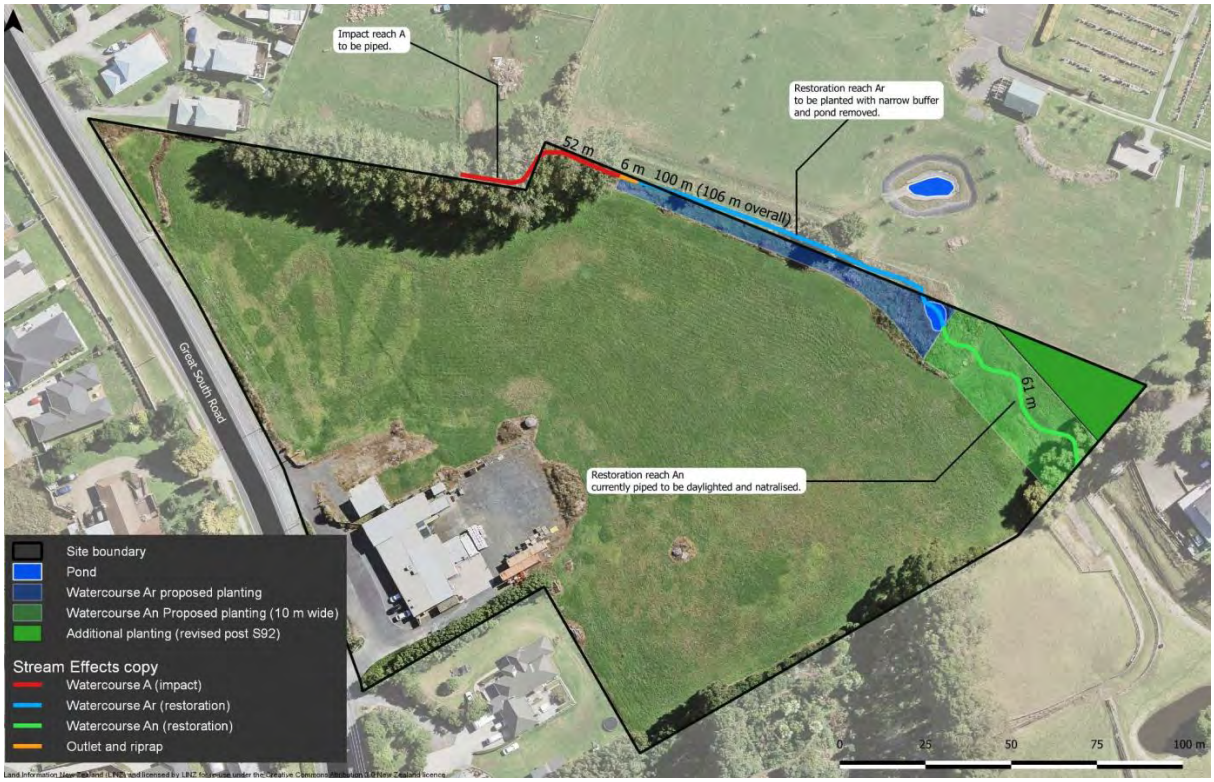


Figure 8-1: Proposed stormwater drainage (Freshwater Solutions, 2020)

Primary flows will be conveyed through a piped network within the 520 Great South Road and 21 Gatland Road developments:

- Lots 10, 12, 14 16 and 18 at 21 Gatland Road will discharge into the existing Gatland Road public stormwater system before discharging into Watercourse A
- Lots 7, 8 and 9 at 21 Gatland Road will discharge directly into the drainage system along the southern boundary of 21 Gatland Road (see below)
- The lots on the western side of the 21 Gatland Road will discharge via the existing buried outlet directly to Watercourse A
- The piped network at 520 Great South Road will follow the road network and discharge at two locations to Watercourse A.

The existing private stormwater pipes that currently convey flows from the Papakura South Cemetery pond will continue to discharge into the extended Watercourse A channel.

Secondary flows will generally be conveyed along road corridors, existing overland flow paths (where they are maintained), or along dedicated overland flow channels to Watercourse A, as shown in Figure 8-2.

The upstream end of Watercourse A along the southern boundary of 21 Gatland Road will be piped in a 750 mm diameter pipe along the same alignment to enable the development of building platforms and Road 1 on both 520 Great South Road and 21 Gatland Road. Primary and secondary flows will be piped under the proposed public collector road on 520 Great South Road to discharge into Watercourse A. The benefits of this option, as well as alternative options considered, are discussed in the Infrastructure report[20].

The Infrastructure assessment also identified that the proposed overland flow path on Road 2 in the eastern corner of the 520 Great South Road would create adverse flooding on the road corridor. Therefore, it is proposed to convey secondary flows in a 750 mm diameter pipe from the road berm,

under Lot 9 to discharge into Watercourse A. It is proposed to provide an alternative overland flow path between the buildings on Lots 8 and 9 for secondary flows to discharge into the stream if the pipe system were blocked or compromised during a 100 year storm event.

Figure 8-2: Proposed secondary flow paths (Maven, 2021)

8.2.5.2 522 Great South Road

Primary flows from future development of 522 Great South Road will continue to discharge into the existing public network on the western side of Great South Road. A preliminary assessment indicates there is sufficient capacity in the existing public infrastructure to convey the future flows. The current connection point, and capacity and condition of the existing downstream infrastructure should be confirmed as part of future planning for a Resource Consent application to develop 522 Great South Road.

Secondary flows from 522 Great South Road will continue to flow within the mapped overland flow path along the southern boundary of 522 Great South Road to discharge to Drury Creek at the confluence with Slippery Creek and Hingaia Stream Runoff to this will be reduced as part of the existing 520 Great South Road catchment will be diverted to Watercourse A.

8.2.6 Receiving streams

Unless carefully managed, urbanisation can significantly exacerbate stream bank erosion due to the increased runoff rates and volume. This section considers the sensitivity of both the immediate receiving environment (between Watercourse A and Slippery Creek) and the discharge point into Slippery Creek to the changes in runoff attributed to development of the PCA.

8.2.6.1 Immediate receiving environment

In its current condition, Watercourse A is described in the Assessment of Ecological Effects[7] as a highly modified intermittent tributary of the Slippery Creek It manifests very little natural character due to clearance of riparian vegetation, grazing, realignment and artificial straightening and channelisation, as shown in Figure 8-3.

Figure 8-3: Watercourse A (Freshwater Solutions, 2020)

The Resource Consent application for 520 Great South Road seeks consent for a development layout that includes reclamation of an intermittent section of Watercourse A. However, to ensure 'no-net loss' of stream ecological values and function the remainder of the existing channel will be restored, protected and enhanced with the watercourse also extended downstream. The following stream protection works and on-site measures are recommended as part of the Resource Consent application to enable the rehabilitation and enhancement of Watercourse A:

- Minimise the generation and discharge of contaminants into the receiving environment using measures outlined in Section 8.2.3
- Use of retention and detention devices upstream to meet the minimum hydrological mitigation requirements outlined in Section 8.2.4.1
- Provision of riparian margins to protect and enhance the existing watercourse:
  - By minimising or mitigating the effects on freshwater systems arising from changes in water temperature caused by stormwater discharges
  - Through the disconnection of impervious areas from the receiving environment
  - By providing additional erosion protection.
- Planting of riparian margins
  - The Assessment of Ecological Effects[7] proposes the following riparian planting:

- The section of Watercourse A that will be maintained upstream of the existing on-site pond will include a 6 m wide riparian margin (average) on the true right stream bank only
- The new section of Watercourse A (downstream of the existing on-site pond) will include a 10 m wide riparian margin.

- Provide erosion protection at stormwater outfalls into streams in accordance with Auckland Council Technical Report 2018/35 – Auckland Unitary Plan stormwater management provisions: Technical basis of contaminant and volume management requirements (TR35). Consider using multiple stormwater outfalls into Watercourse A to minimise the peak flows at the discharge points and therefore disturbance to the stream.

Further downstream, Watercourse A discharges into a channel on 91 Gatland Road which becomes a wide, flat, and grassed swale-like feature across a paddock in 95 Gatland Road. It is noted that the properties and 91 and 95 Gatland Road are also in the FUZ and are likely to be developed, which may provide opportunity to reinstate the stream to convey upstream runoff safely to Slippery Creek.

In summary, there is a very small erosion risk to the immediate receiving environment given the existing features, i.e. a highly modified open channel (Watercourse A) with very limited natural character becoming a wide, flat grassed swale. The proposed enhancement and mitigation measures (i.e. green outfalls or energy dissipation structures at all discharge points to provide erosion protection) will also mitigate further any residual erosion risk.

8.2.6.2 Slippery Creek erosion risk

The increased PCA development flows could have the following effects on Slippery Creek:

- Deterioration of stream banks at the discharge point caused by increased stormwater flows and volumes, which may result in ongoing bank instability due to increased stream erosion potential
- Change in stream morphology caused by changes to overland flow paths and increased peak flows within streams
- Change in stream ecology due to erosion and also protection at stormwater outfalls.

In order to assess the potential impact of the PCA development on Slippery Creek, the erosion risk at the discharge point has been assessed by comparing the estimated shear stresses in the stream channel from pre- and post-development flows from the PCA only (without any hydrological mitigation). The assessment has compared flows in the 2 year, 10 year and 100 year ARI, 24 hour duration design storms. Some input parameters have been determined from available contour information and aerial photography, and from typical values for similar streams. The erosion risk assessment calculations and assumptions are included in Appendix FE1.

The erosion threshold bands in the Auckland Council Stream Erosion Risk Tool for the magnitude of predicted erosion (and used in this analysis) are shown in Table 8.4. Each threshold is based on the excess shear (i.e. the ratio of the hydraulic shear stress exerted by the driving force of water in the stream channel to critical shear stress). Potentially erosion is initiated in the channel when the excess shear is greater than unity. When excess shear is greater than 2, there is potential for active erosion and for the channel bed to mobilise. Anything greater than 10 indicates a very rapid rate of erosion.

Table 8.4: Erosion threshold bands

Threshold	Excess Shear	Description
Green	<1.0	Indicates no erosion predicted to occur
Yellow	>1.0 <2.0	Indicates the potential for some erosion of the channel
Orange	>2.0 <10.0	Indicates the potential for channel to be mobile, (likely active erosion)
Red	>10.0	Indicates potential rapid rates of erosion and incision of channel

The excess shear for each of the design storm events is presented in normalised bar chart form in Figure 8-4. This shows that erosion potential (duration of excess shear greater than unity) is only triggered in the post-development 100 year scenario. The analysis indicates that:

- The existing PCA flow regime presents low or no erosion risk at the discharge point into Slippery Creek
- There will only be a small increase in erosion risk due to development of the PCA during low frequency storm events.

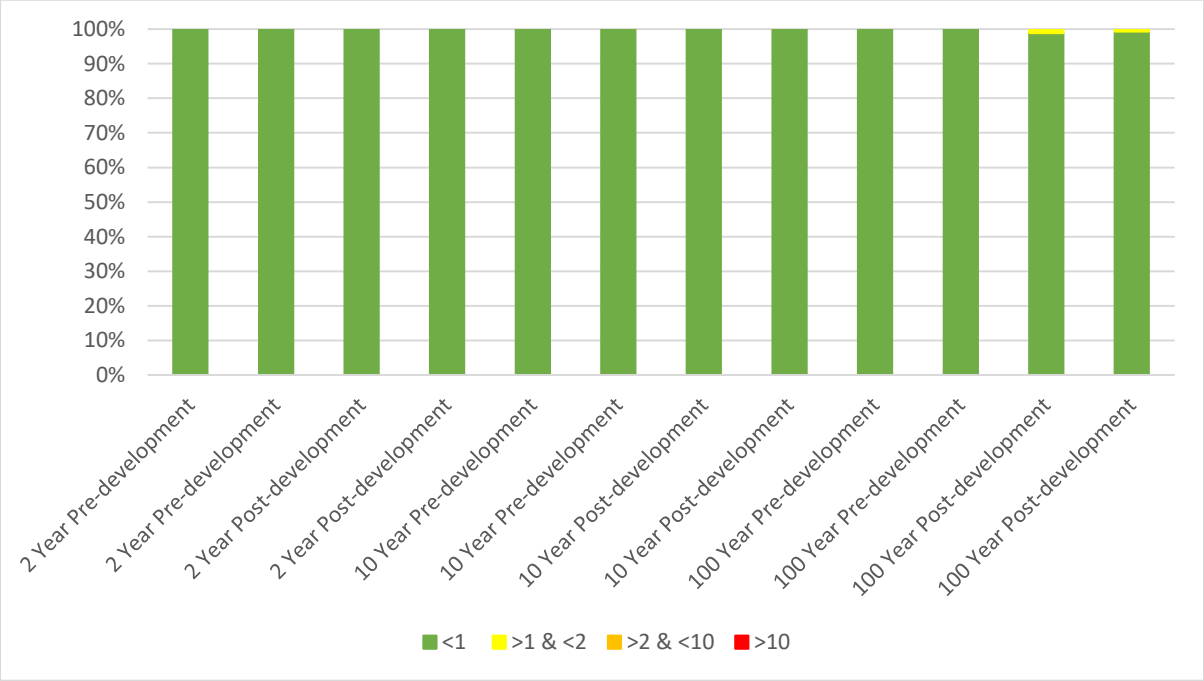


Figure 8-4: Excess shear at the discharge point into Slippery Creek

Furthermore, application of SMAF 1 hydrological mitigation will reduce flows and thus result in an even smaller increase to the erosion risk.

8.2.7 Development staging

The development staging and earthworks methodology for 520 Great South Road has been advanced as part of the Resource Consent process. This will be confirmed as part of detailed construction planning, however, in summary the development staging is likely to comprise:

- Erosion and sediment control measures (shown on plans C200A and C200B in the Infrastructure Report[19] to be installed before reshaping earthworks and removal of the existing pond can commence.

- The online pond to be removed, and the downstream length of Watercourse A re-established and daylighted. The area for the stream works is relatively small and will be stabilised progressively with hay and aggregate to minimise dirty water runoff. This work should happen during the earthworks season and within periods of dry weather. The stream diversion and channel reshaping works should be completed prior to the roads and building platform earthworks to remove flow constraints for runoff from the site.
- Erosion and sediment control measures to be installed before construction of the proposed roads and building platforms can commence. This includes temporary sediment control pond upstream of Watercourse A. Dirty water runoff bunds to be installed along the southeast boundary to eliminate risk of sediment runoff to the adjoining property.
- Piping of the overland flow path in 21 Gatland Road to enable earthworks to create building platforms on both 520 Great South Road and 21 Gatland Road.
- Earthworks to be staged to progress from the northwest corner to the southeast corner of 520 Great South Road, with exposed areas draining to the sediment control pond. Completed areas or remaining area to remain undisturbed and/or stabilised.
- Stormwater devices and stormwater network pipes and culverts to be installed as part of the earthworks.

Further details of the proposed earthworks methodology and erosion and sediment controls are described in the Infrastructure Report[20]. A detailed Construction Management Plan, including the Erosion and Sediment Control Plan provided by Maven, will be prepared before works commence on site.

8.3 Hydraulic connectivity

The hydraulic connectivity of the 520 Great South Road development with the receiving environment has been developed in the design, and is presented on the Engineering Plans which accompany the Infrastructure Report[19] (included in Appendix C2). Refer to:

- Drawing C400 to C402 and C430 for the layout of the primary stormwater network, and the location of the two outlets from the primary and secondary stormwater networks into Watercourse A
- Drawing C420 for the location of the road-side rain gardens, and C451 for the stormwater treatment catchment plan
- Drawing C440 for post-development flow paths through the development.

Presently, runoff from the site drains as sheet flow into Watercourse A. This natural flow path will be severed by the proposed development along the watercourse banks. Instead, the secondary flows from the north-western corner of the 520 Great South Road will be conveyed in a 750 mm diameter pipe from the road berm, under Lot 9 to discharge into Watercourse A.

8.4 Asset ownership

The stormwater management approach has been developed in accordance with the requirements of the NDC, including the design of the stormwater infrastructure assets, flood attenuation measures within the Watercourse A footprint, and treatment devices. These assets will be vested to Healthy Waters upon completion of construction, who, as the consent holder will ultimately be responsible for compliance with the consent, the discharge from the stormwater network and the ongoing operation and maintenance of the assets.

8.5 Ongoing maintenance requirements

Maintenance for stormwater treatment devices on private lots will be the sole responsibility of the future lot owners.

In general, the piped stormwater assets will be vested as public infrastructure to Healthy Waters, which will assume ownership and be responsible for all ongoing maintenance of the system. Rain gardens and other treatment devices within public areas (roads and reserves) will also be vested to Healthy Waters, however, road-side treatment devices are expected to be maintained by Auckland Transport. Land to be vested with stormwater management devices, or which contain the stream network (up to the 100-year flow) will be vested to Healthy Waters at no cost.

Draft operations and maintenance manuals for proposed devices will be provided as part of the Engineering Plan Approvals for the proposed developments.

8.6 Implementation of stormwater network

*****Not applicable within this SMP*****

8.7 Dependencies

The proposed piping of the overland flow path in 21 Gatland Road will enable earthworks to create building platforms on both 520 Great South Road and 21 Gatland Road.

8.8 Risks

Table 8.5 presents the risks identified for stormwater management within the PCA, and addresses how these risks might be mitigated or managed. As the application for adoption of this SMP under the NDC progresses, it is expected that this list will be updated as risks are addressed or new risks are identified.

Table 8.5: Risk Register

What is the risk to the proposed stormwater management?	How can this be mitigated / managed?	What other management / mitigation could be used?	When does this risk need to be addressed?	What is the resultant level of risk?
Sub-catchment B - Unknown downstream network for discharge of primary flows	Survey to determine existing connection point to Great South Road public stormwater network. Capacity assessment to understand if there are any existing downstream constraints		During the Resource Consent phase for 522 Great South Road	Moderate
Auckland Council overland flow mapping doesn't align with natural drainage features on the properties	Confirmed through survey	N/A	Updated Council mapping	Low

9 Departures from regulatory or design codes

The stormwater management approach for development with the PCA meets the minimum regulatory or design codes standards and is considered the BPO approach.

10 Conclusions and recommendations from future work

Guidance on how stormwater will be managed at the PCA is summarised in this section, along with recommendations for further investigation to support of the next phases of development within the PCA.

10.1 Conclusions

This SMP for the PCA comprising 520 and 522 Great South Road and 21 Gatland Road has been developed based on AUP regulatory policies, Auckland Council stormwater-specific guidelines and NDC requirements and the FUZ SMP.

The overarching principles of the SMP are to:

- Recognise the key constraints and opportunities on site and in the Slippery Creek catchment.
- Devise an integrated stormwater management approach to facilitate urban development.
- Develop a set of BPO for stormwater that can be incorporated into the development.
- Emphasise a water sensitive design approach that manages the impact of land use change from rural to urban and protects and enhances stream systems and natural hydrology, while mitigating for hydrological changes and managing flooding effects.
- Minimise the generation and discharge of contaminants/sediments into sensitive receiving environment of the Manukau Harbour.
- Protect key infrastructure, people, and the environment from significant flooding events.

To achieve these outcomes, the proposed stormwater management approach is to:

- Provide a minimum of Stormwater Management Area – Flow (SMAF) 1 hydrological mitigation for all impervious surfaces within the PCA. Any additional mitigation for stream erosion can be developed as the SMP progresses based on site observations of erosion and/or improved erosion modelling
- Limit the generation of contaminants through selection of green building materials and providing green infrastructure to treat runoff at-source or as close to the source as practicable
- Protect, restore and enhance the on-site intermittent stream (Watercourse A). Daylight the downstream piped section, restoring stream ecological values and function.
- Pass forward flows without on-site flood attenuation so that runoff flows into the Slippery Creek watercourse downstream before peak flooding from the upper reaches of the catchment, i.e. flows from 520 Great South Road and 21 Gatland Road will be discharged directly into Watercourse A and Slippery Creek, and runoff from 522 Great South Road will continue to flow in the Great South Road stormwater system and overland to discharge to Drury Creek at the confluence with Slippery Creek and Hingaia Stream.

The stormwater management requirements for development within the PCA are summarised in Table 8.1. It provides the toolbox of BPO for selecting devices to achieve at-source, close-to-source or communal water quality treatment, hydrological mitigation, flood attenuation (where applicable) and water-sensitive design outcomes for corresponding land-use.

The design of the stormwater infrastructure for 520 Great South Road has been advanced as part of the Resource Consent process. The preferred device selection is indicated by the red boxes on the Table 8.1 and the device sizing and location are presented in the supporting Infrastructure Report prepared by Maven Associates[20] and included in Appendix C2. More detailed design of the proposed

stormwater management approach, including device selection, sizing and location for 522 Great South Road will be addressed at later stages of development.

Based on the investigations already completed, it is expected that stormwater effects from the PCA can be managed safely and without damage to the receiving environment. Therefore, the Plan Change development can proceed and the Resource Consent for 520 Great South Road can be granted without any major concerns relating to stormwater management.

10.2 Recommendations

Recommendations for further investigation to support of the next phases of development within the PCA are listed below:

- Survey to determine existing connection point from 522 Great South Road into the public stormwater network. Capacity assessment to understand if there are any existing downstream constraints at the time of future development for this site
- Site-specific soakage/percolation testing is recommended for 21 Gatland Road and 522 Great South Road to confirm the retention strategy (i.e. is infiltration viable) and inform conceptual or detailed design of devices which rely on infiltration for retention.
- Advance design of the proposed stormwater infrastructure for 522 Great South Road, including device selection, sizing and location, to meet the requirements set out in this SMP for the Plan Change application.

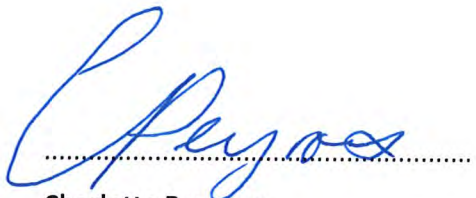
11 Applicability

This report has been prepared for the exclusive use of our client 520 GSR Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for Plan Change and that Auckland Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd

Report prepared by:



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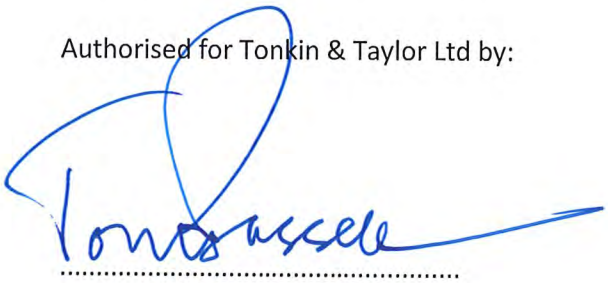
Charlotte Peyroux

WATER ENGINEER / PROJECT MANAGER

Authorised for Tonkin & Taylor Ltd by:



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Tom Bassett

PROJECT DIRECTOR

cemp
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Appendix A1: Existing features

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Notes: Aerials sourced from Auckland Council.

A3 SCALE 1:2,000

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520 GSR

520 Great South Road, Papakura
Location plan

FIGURE No. Figure A1

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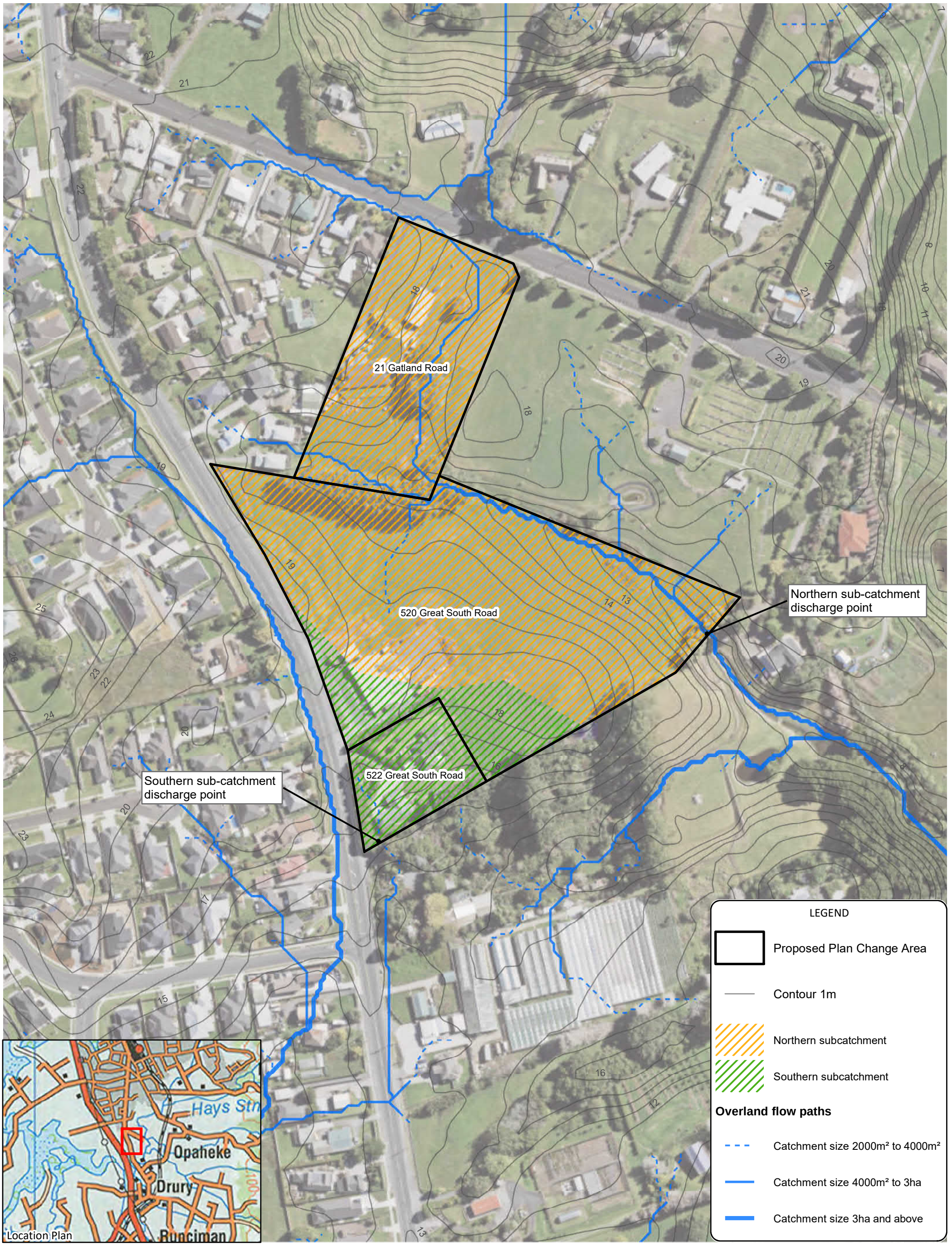

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520 GSR

520 Great South Road, Papakura

Catchment setting

FIGURE No. Figure A2

Rev. 0

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GATLAND ROAD

GREAT SOUTH ROAD

COOLADERRY PLACE

DRUMKEEN PLACE

Embankment

1.5m diameter riser

LEGEND

Proposed Plan Change Area

Stormwater manholes

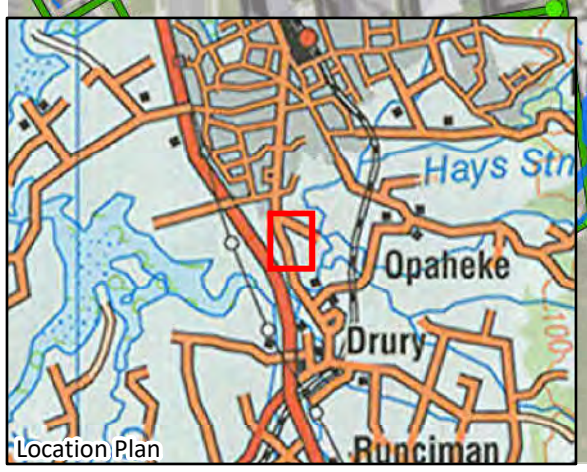
Stormwater pipes

Overland flow paths

Catchment size 2000m² to 4000m²

Catchment size 4000m² to 3ha

Catchment size 3ha and above



Notes: Aerials sourced from Auckland Council.

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520 GSR

520 Great South Road, Papakura

Existing stormwater infrastructure

FIGURE No. Figure A2

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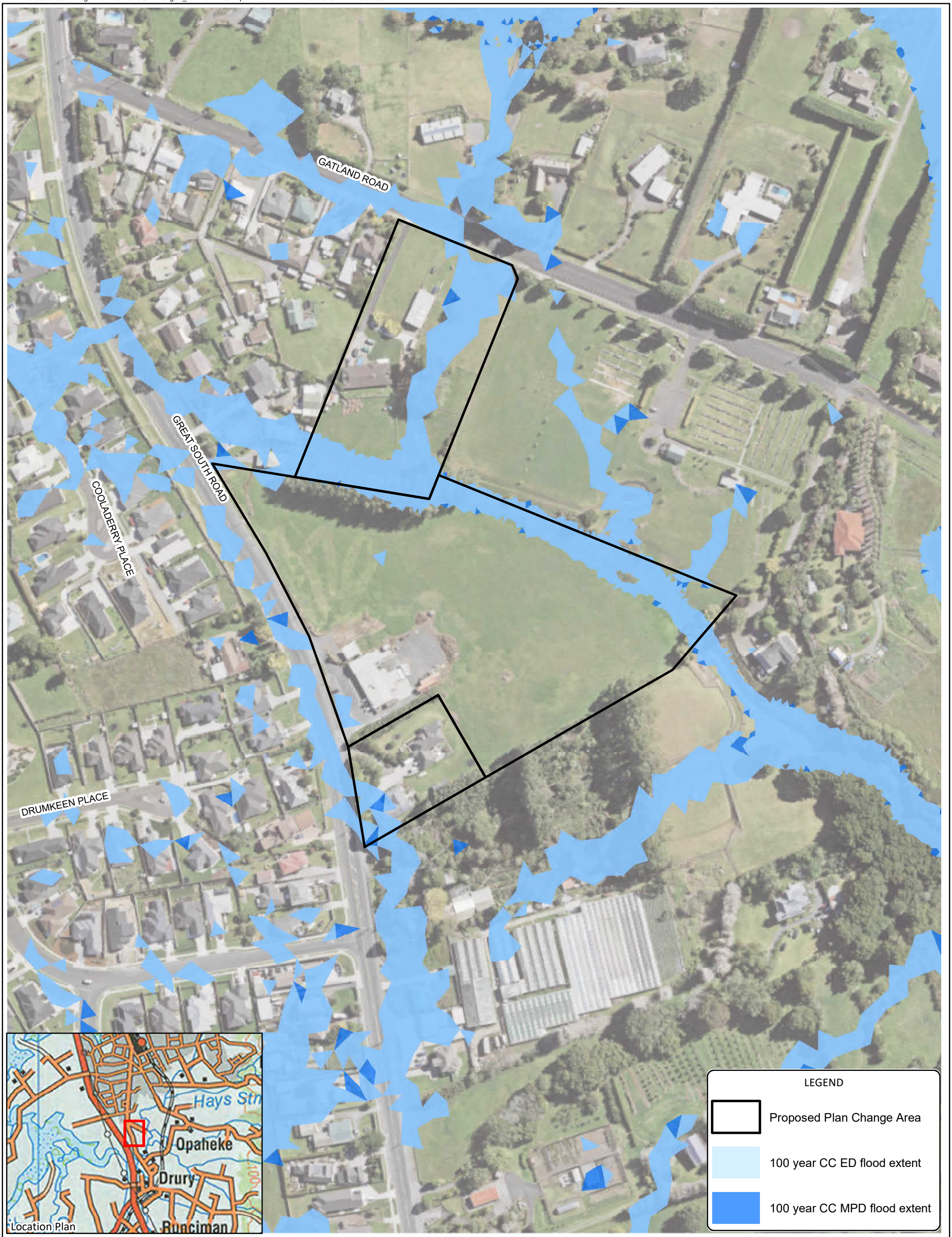

Notes: Aerials sourced from Auckland Council.
Flood depths less than 0.05m removed.

A3 SCALE 1:2,000

0 20 40 60 80 100 Meters

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APPROVED		Apr.19

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SCALE (AT A3 SIZE) 1:2,000

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520 GSR

520 Great South Road, Papakura
Flood extent comparison
100 year CC ED and 100 year CC MPD

FIGURE No. Figure A4

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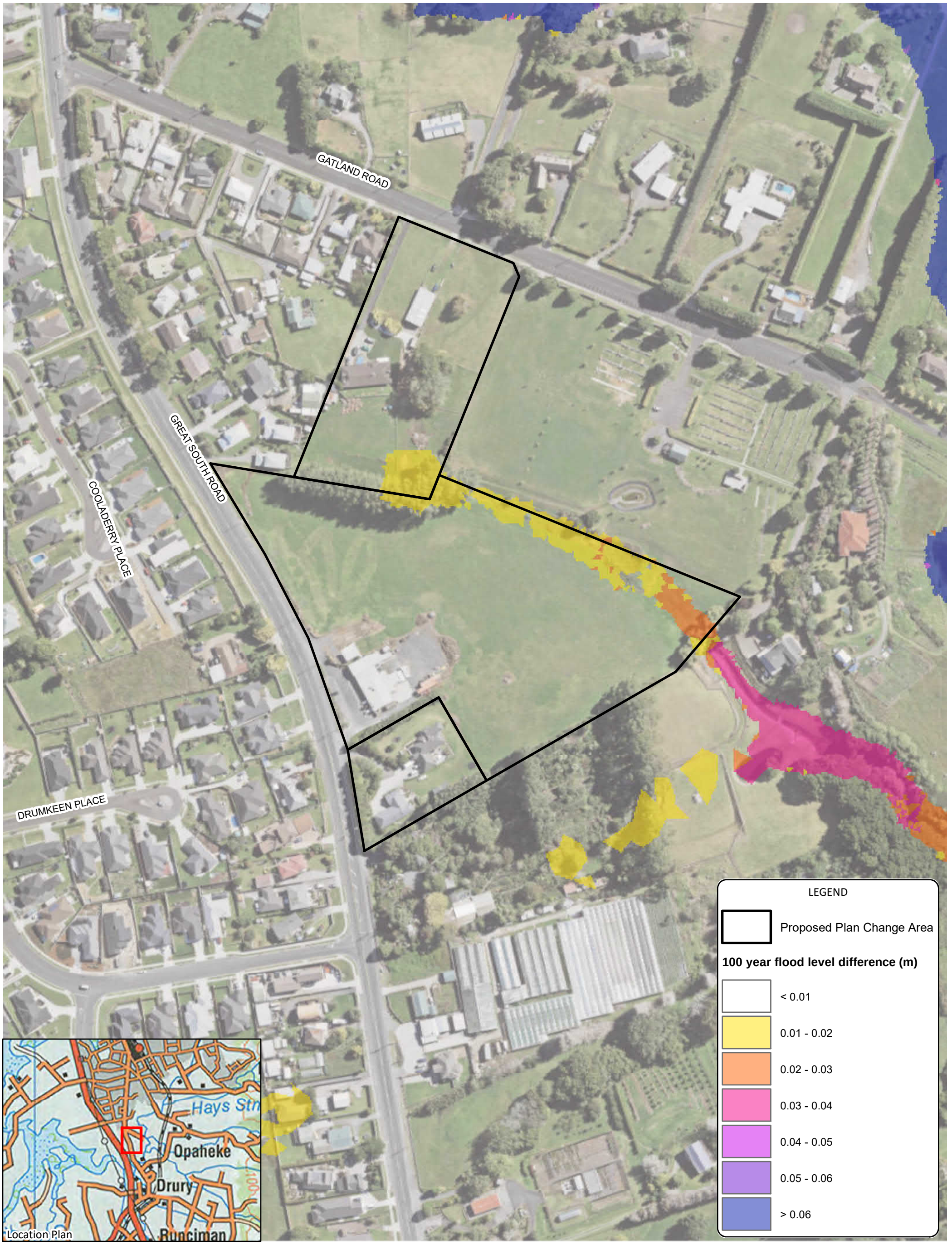

Notes: Aerials sourced from Auckland Council.

A3 SCALE 1:2,000

0 20 40 60 80 100 Meters

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105 Carlton Gore Rd, Newmarket, Auckland
www.tonkintaylor.co.nz

DRAWN	JOPA	Apr.19
CHECKED		Apr.19
APPROVED		Apr.19

ARCFILE FigA5_FloodLevelDifference.mxd

SCALE (AT A3 SIZE) 1:2,000

PROJECT No. 1009613.000

520 GSR

520 Great South Road, Papakura

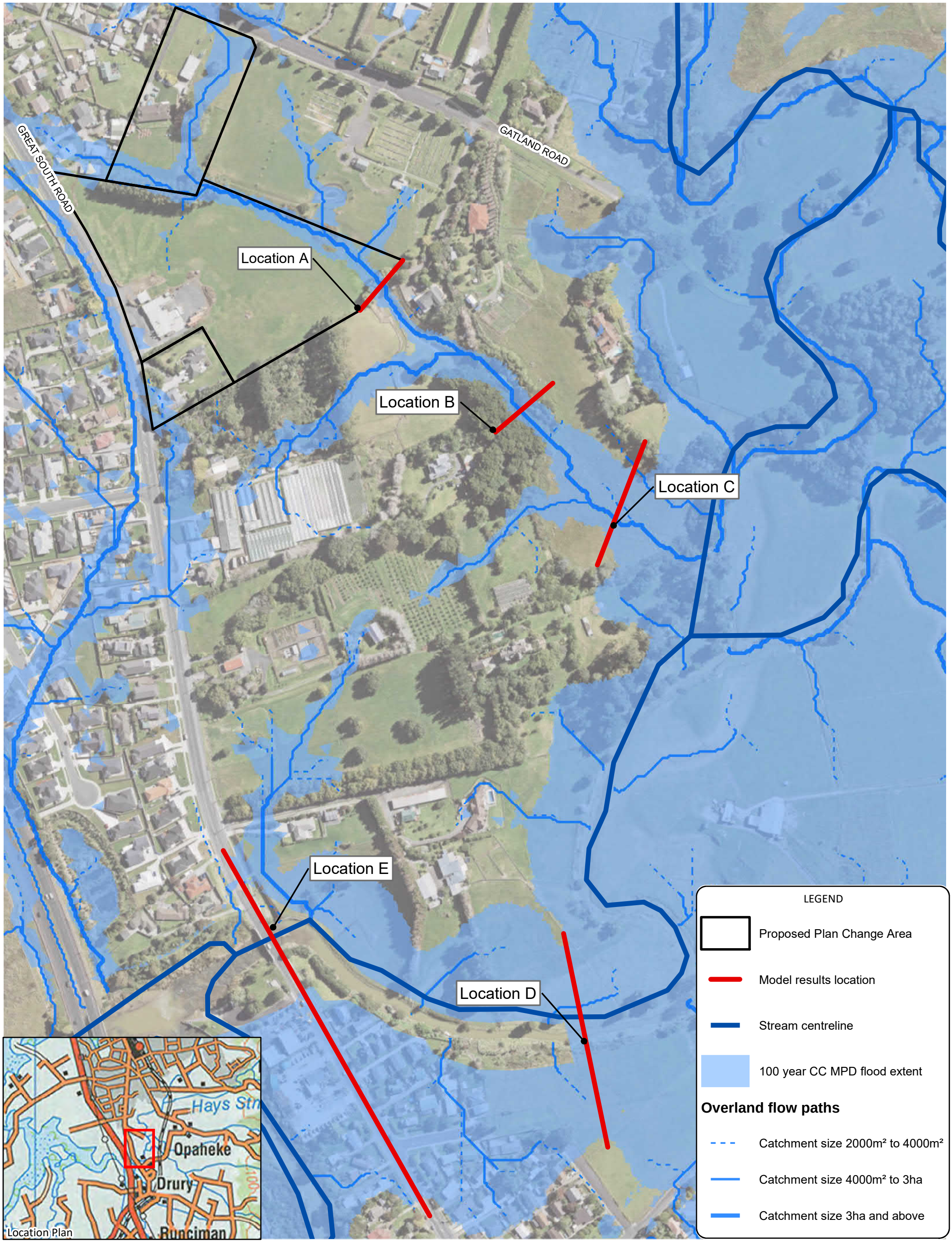
Flood level difference

100 year CC MPD MINUS 100 year CC ED

FIGURE No. Figure A5

Rev. 0

Path: P:\1009613\WorkingMaterial\GIS\FIGURES\FigA6_ResultsExtractionLocations.mxd Date: 12/04/2019 Time: 11:00:13 AM



Notes: Aerials sourced from Auckland Council.

A3 SCALE 1:3,000

0 25 50 75 100 Meters

N

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DRAWN	JOPA	Apr.19
CHECKED		Apr.19
APPROVED		Apr.19

ARCFILE FigA6_ResultsExtractionLocations.mxd

SCALE (AT A3 SIZE) 1:3,000

PROJECT No. 1009613.000

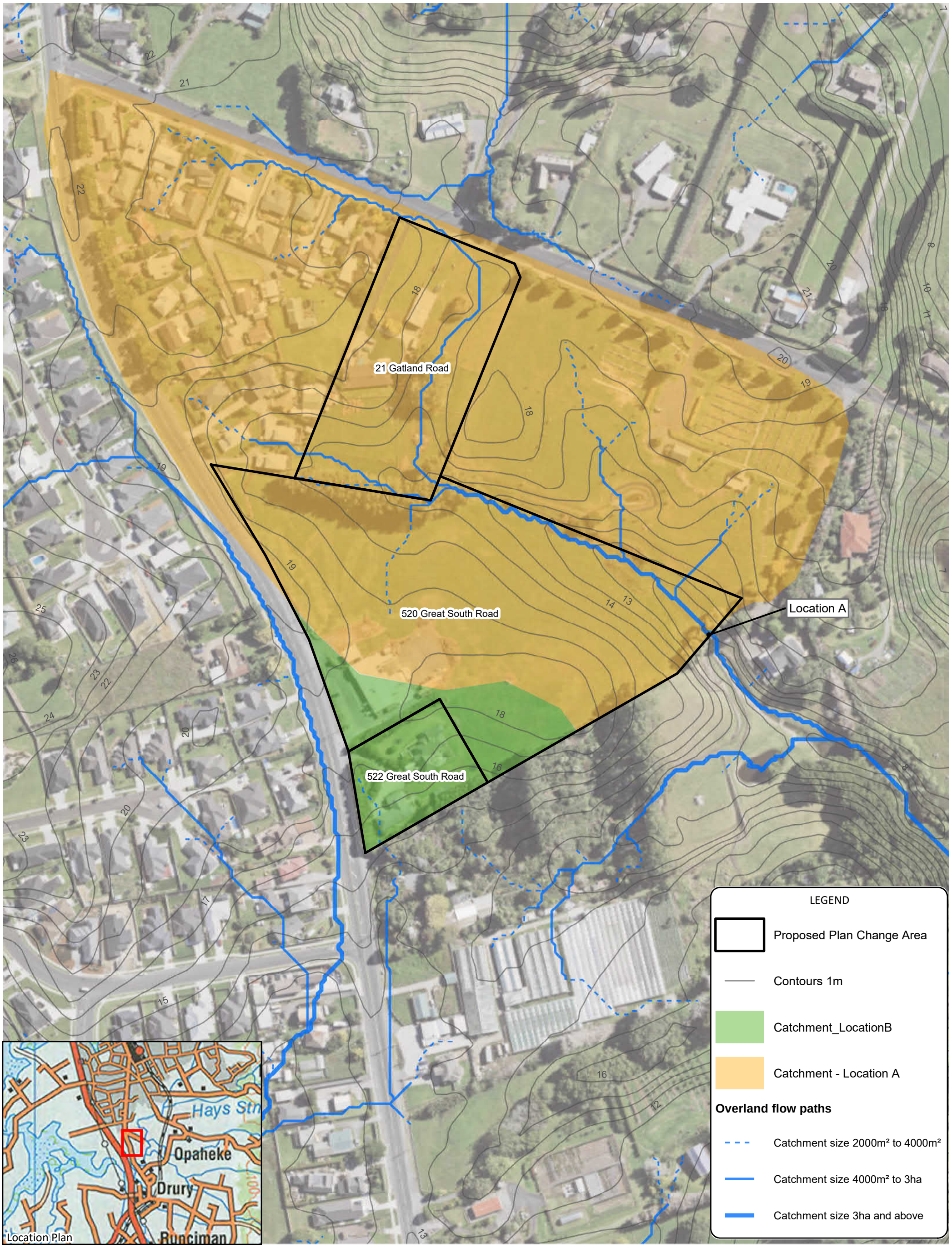
520 GSR

520 Great South Road, Papakura
Flood model result locations

FIGURE No. Figure A6

Rev. 0

Path: P:\1009613\WorkingMaterial\GIS\FIGURES\FigA7_TP108Catchment.mxd Date: 12/04/2019 Time: 11:03:25 AM



Notes: Aerials sourced from Auckland Council.

A3 SCALE 1:2,000

0 20 40 60 80 100 Meters

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CHECKED		Apr.19
APPROVED		Apr.19

ARCFILE FigA7_TP108Catchment.mxd

SCALE (AT A3 SIZE) 1:2,000

PROJECT No. 1009613.000

520 GSR

520 Great South Road, Papakura
TP108 catchments

FIGURE No. Figure A7

Rev. 0

Appendix A2: Percolation testing

22 February 2021

520 GSR Limited
12A Craig Road
Milford
Auckland 0620

Attn. Mr Fraser Heaven

Dear Fraser

RE: Soakage Testing - 520 Great South Road, Drury, Auckland

(Our Reference: 15392.000.000_06)

1 Introduction

ENGEO Ltd was requested by Mr Fraser Heaven to undertake soakage testing within the property at 520 Great South Road, Drury, Auckland. This work has been undertaken in response to a request for further information from Auckland Council in which Council requested that soakage testing be undertaken. This testing was required to confirm that the soil infiltration rate of 2 mm/hr used by the civil engineer in their raingarden design is appropriate.

2 Infiltration Testing

2.1 Hand Auger Borehole

One hand auger borehole with associated soil strength testing (shear vane) was drilled on 20 January 2021 to a depth of 3.0 m bgl (below ground level) in the location shown in Appendix 1.

This borehole was drilled in the location of a proposed raingarden. The borehole log is presented in Appendix 2.

Soils encountered in this borehole were noted to be in accordance with the mapped geology. The site is underlain by stiff to very stiff alluvial clays and silt deposits of the Puketoka Formation.

2.2 Test Methodology

One falling head soakage test was conducted at the site in accordance with Auckland Council's guidance document 'Stormwater Disposal via Soakage in the Auckland Region' (Technical Report 2013/040, dated October 2013). This test was conducted in the vicinity of a proposed raingarden soakage device as shown on Figure 1 (Appendix 1).

One hand auger borehole was progressed through the soil profile using a 100 mm diameter auger to a depth of 3 m bgl. The hand auger borehole was then pre-soaked, and a falling head test conducted in accordance with the methodology presented in the guidance document.

2.3 Infiltration Test Results

The percolation test was conducted within the clay / silt soils of the Puketoka Formation material over a depth of 3.0 m. The results of this testing returned sufficient infiltration rates (>2 mm/hr) for on-site soakage in accordance with our previous advice and in accordance with the soil infiltration rate of 2 mm/hr utilised by the civil engineer in their design.

Test results for our percolation testing are summarised in Table 1.

Table 1: Summary of Infiltration Test Results

Test ID	Borehole Depth (m)	Pre-soak Duration (hh:mm)	Test Duration (hh:mm)	Percolation Rate ($L/m^2/min$)	Soil Infiltration Rate (mm/hr)
HA01 – Test 1	3.0	17:00	1:20	0.07	4.2

3 Limitations

i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, 520 GSR Limited, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.

ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. This report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.

iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.

iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.

v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (09) 972 2205 if you require any further information.

Report prepared by

Luke Agnew

Geologist

Report reviewed by

Paul Fletcher, CMEngNZ (CPEng)

Associate Geotechnical Engineer

Attachments:

Investigation Location Plan

Hand Auger Borehole Log

Soakage Test Sheet

APPENDIX 1

Investigation Location Plan

Legend

- Site Boundary
- Hand Auger

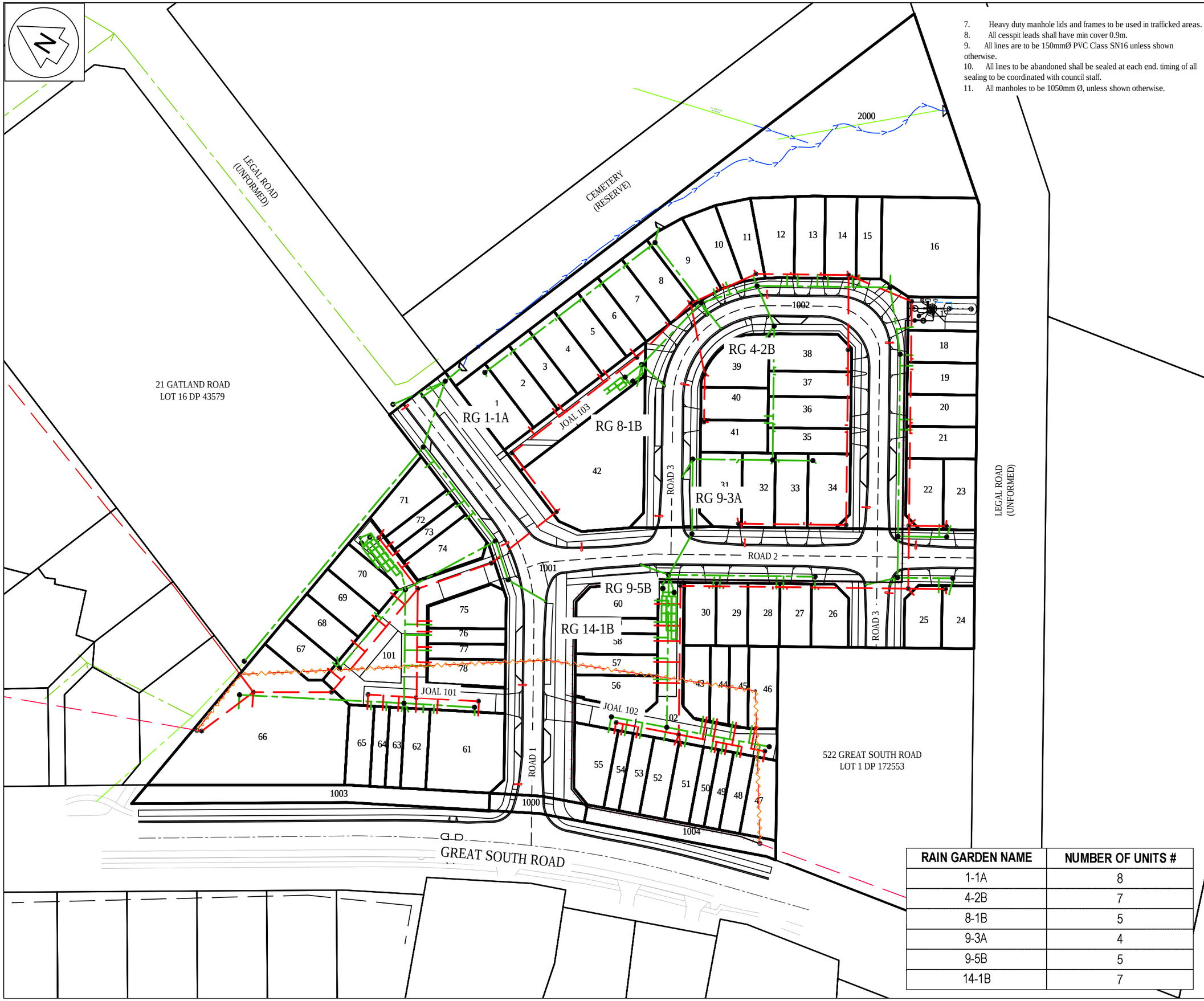
0 30 50m

ENGEO

Produced by **Evalu8.earth**

Title: Investigation Location Plan

Client: 520 GSR Limited		Figure No: 1
Project: 520 GSR	Drawn: LA	Size: A4
Date: 18-02-2021	Checked: PF	
Proj No: 15932.000.000		Version: 1.0



7. Heavy duty manhole lids and frames to be used in trafficked areas.
8. All cesspit leads shall have min cover 0.9m.
9. All lines are to be 150mmØ PVC Class SN16 unless shown otherwise.
10. All lines to be abandoned shall be sealed at each end. timing of all sealing to be coordinated with council staff.
11. All manholes to be 1050mm Ø, unless shown otherwise.

RAIN GARDEN NAME	NUMBER OF UNITS #
1-1A	8
4-2B	7
8-1B	5
9-3A	4
9-5B	5
14-1B	7

Notes

1. All works to be in accordance with Auckland council standards.
2. Co-ordinates in terms of NZ Geodetic Datum Mt Eden 2000. Levels in terms of the Auckland Vertical Datum 1946.
   Origin of Levels = RM 7760 SO 68697
   776 664.21mN
   416 012.88mE
   17.11mH
3. It is the contractors responsibility to locate all services that may be affected by his operations.
4. Pipe bedding: 0 - 10% granular bedding,10 - 20% weak concrete bedding.greater than 20% weak concrete bedding (7mpa plus anti scour blocks at 6m crs).
5. Each connection shall be marked by a 50mmx50mm treated pine stake extending 600mm above ground level with the top painted. This marker post shall be placed alongside a timber marker installed at the time of pipelaying and extending from the connection to 150mm below finished ground level. Connections shall be accurately indicated on "as built" plans.
6. Approved hardfill is to be used in backfilling of all road crossings and vehicle crossings to council standards.

Legend

- EX BDY
- PROP BDY
- EX SW
- PROP SW
- EX/PROP SWMH
- PROP SWCP SINGLE
- PROP SWCP DOUBLE
- EX/ PROP WW
- EX/PROP WWMH
- EX ABANDONED WW
- PROP RISING MAIN
- PROP RAINGARDEN

Rev	Description	By	Date
C	RESOURCE CONSENT	AS	08/20
B	RESOURCE CONSENT	AS	05/20
A	RESOURCE CONSENT	AS	02/20

	By	Date
Survey	YSS	09/19
Design	AS	01/20
Drawn	AS	02/20
Checked	JP	02/20

Maven Associates
09 571 0050
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www.maven.co.nz
12-14 Walls Road, Penrose

Project
520 GREAT SOUTH ROAD
DRURY
AUCKLAND
FOR
520 GSR LIMITED

Title
STORMWATER
RAINGARDEN LOCATION
PLAN

Project no.	135014
Scale	1:1000 @ A3
Cad file	C400 - C500 DRAINAGE.DWG
Drawing no.	C420
Rev	C

APPENDIX 2

Hand Auger Logs

LOG OF HAND AUGER Suppl. HA01

Soakge Testing
520 Great South Road
Drury, Auckland

Client : 520 GSR Limited
Client Ref. : 15932.000.000
Date : 20/01/2021
Hole Depth : 3 m
Hole Diameter : 100 mm

Shear Vane No : 2524
Logged By : DO
Reviewed By : GC
Latitude : -37.088897
Longitude : 174.944574

Depth (m BGL)	Material	USCS Symbol	DESCRIPTION	Graphic Symbol	Elevation (mRL)	Water Level	Moisture Cond.	Consistency/ Density Index	Shear Vane Undrained Shear Strength (kPa) Peak/Remolded	Notes/Remarks
	T	OL	TOPSOIL.				D	N/A		
	PUKETOKA FORMATION	ML	Clayey SILT with trace fine to medium sand; dark orange brown with dark brown, dark grey and dark orange mottles. Low plasticity.					VSt	156/55	
0.5		CH	Silty CLAY with trace fine sand; light orange with occasional dark brown and light grey mottles. High plasticity.					VSt	161/78	
									171/88	
1.0		CH	Silty CLAY; light grey with light brownish grey and light orange mottles, and occasional pink streaks. High plasticity.		16		M	VSt	166/70	
1.5									138/82	
									109/67	
2.0					15			St	78/49	
		CH	CLAY; light brownish grey with light orange and reddish pink mottles. High plasticity.						92/42	
2.5								St	74/29	
3.0			End of Hole Depth: 3 m Termination Condition: Target depth		14				65/29	

Hand auger met target depth at 3 m.
Standing groundwater was not encountered.
N/A = Not Assessed; T = Topsoil.
Surface elevation data from Auckland Council Geomaps.

GEOTECH HAND AUGER - NO SCALA 20210121_SUPPLEMENTARYHA01_DO.GPJ NZ DATA TEMPLATE 2.GDT 2/18/21

APPENDIX 3

Soakage Test Results

W1

WORKSHEET 1. FALLING-HEAD PERCOLATION TEST

Site Address: 520 Great South Road, Papakura

Completed by: DO

Date of test: 20/01/2021 - 21/01/2021 Signature:

Attach the following:

- [✓] Log of hole showing depth, soil type and moisture content
- [✓] Site-plan showing the location of the hole
- [ ] Graph of water level against time (tick when attached)

- [ ] Civil Engineer
- [ ] Engineering Technician
- [✓] Engineering Geologist (tick one)

Ensure the following procedures are followed:

- [✓] Hole is kept full for 17 hours prior to test (for pre-soaking)
- [✓] Drop in water level is recorded at intervals of 30 minutes or less
- [ ] Test is continued for 4 hours or until hole is empty
- [X] Stop test or refill hole when water level is 0.25m above the base of the bore
- [✓] Percolation rate is determined from the minimum slope of the curve (tick when complete)

1. Test Details

a) diameter of bore = D = 0.1 m (below gr. level)

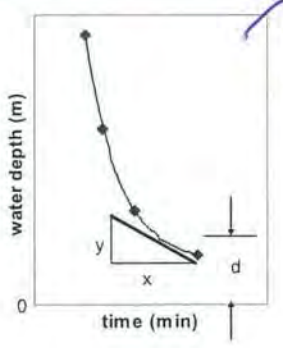
(b) Water Depth(m)	Time (min)	Water Depth(m)	Time (min)
0.69	30		
0.99	60		
1.15	90		
1.22	120		

~5mm, but adjust if ↑ drainage

2. Calculate minimum gradient

(a) Minimum gradient** = $\frac{y}{x}$ = 0.0033 m/min

**a straight line interpolation between the last two points on the graph



3. Calculate percolation rate

(a) Percolation rate = $P_1 = \frac{D \times gradient \times 1000}{4 \times d^*}$ = 0.0703 L/m²/min

* d =distance between the midpoint of the last two readings and the base of the borehole.

Appendix B1: Proposed development plans

520 GSR

520 Great South Road, Drury

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Job No.	Sheet no.	DATE
4167	**0.00**	28/08/20

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avery associates
teamarchitects

Sheet Name	Sheet Number	Sheet Issue Date
0-COVER		
Cover Page	0.00	28/08/20
Sheet List	0.01	28/08/20
Sheet List	0.02	28/08/20
1-SITE CONTEXT		
Location	1.01	28/08/20
Neighbourhood Context	1.02	28/08/20
Site Analysis	1.03	28/08/20
Site Plan - Neighbourhood Context	1.04	28/08/20
2-SITE PLAN		
Site Plan - Ground Floor	2.02	28/08/20
Site Plan - Upper Floor	2.03	28/08/20
Site Plan - Roof Plan	2.04	28/08/20
Typology Plan	2.05	28/08/20
Street Elevations	2.06	28/08/20
Street Elevations	2.07	28/08/20
Street Elevations	2.08	28/08/20
Overview	2.09	28/08/20
Perspectives	2.10	28/08/20
Perspectives	2.11	28/08/20
Perspectives	2.12	28/08/20
Perspectives	2.13	28/08/20
Perspectives	2.14	28/08/20
Hardscape Plan Z1	2.15	28/08/20
Hardscape Plan Z2	2.16	28/08/20
Hardscape Plan Z3	2.17	28/08/20
3-BLOCK PLANS		
Lots 1-8 Ground Floor Plan	3.01A	28/08/20
Lots 1-8 Upper Floor Plan	3.01B	28/08/20
Lots 1-8 Roof Plan	3.01C	28/08/20
Lots 1-8 Elevations	3.01D	28/08/20
Lots 1-8 Perspectives	3.01E	28/08/20
Lots 9-15 Ground Floor	3.02A	28/08/20
Lots 9-15 Upper Floor	3.02B	28/08/20
Lots 9-15 Roof Plan	3.02C	28/08/20
Lots 9-15 Elevations	3.02D	28/08/20
Lots 9-15 Perspectives	3.02E	28/08/20
Lot 16 Ground Floor	3.03A	28/08/20
Lot 16 Upper Floors	3.03B	28/08/20
Lot 16 Roof Plan	3.03C	28/08/20
Lot 16 Elevations	3.03D	28/08/20
Lot 16 Perspectives	3.03E	28/08/20
Lots 17-23 Ground Floor	3.04A	28/08/20
Lots 17-23 Upper Floor	3.04B	28/08/20
Lots 17-23 Roof Plan	3.04C	28/08/20
Lots 17-23 Elevations	3.04D	28/08/20
Lots 17-23 Perspectives	3.04E	28/08/20
Lots 24-25 Floor Plans	3.05A	28/08/20
Lots 24-25 Roof Plan	3.05B	28/08/20
Lots 24-25 Elevations	3.05C	28/08/20
Lots 24-25 Perspectives	3.05D	28/08/20
Lots 26-30 Ground Floor	3.06A	28/08/20
Lots 26-30 Upper Floor	3.06B	28/08/20
Lots 26-30 Roof Plan	3.06C	28/08/20
Lots 26-30 Elevations	3.06D	28/08/20
Lots 26-30 Perspectives	3.06E	28/08/20
Lots 31-34 Ground Floor	3.07A	28/08/20
Lots 31-34 Upper Floor	3.07B	28/08/20
Lots 31-34 Roof Plan	3.07C	28/08/20
Lots 31-34 Elevations	3.07D	28/08/20
Lots 31-34 Perspectives	3.07E	28/08/20
Lots 35-38 Ground Floor	3.08A	28/08/20
Lots 35-38 Upper Floor	3.08B	28/08/20
Lots 35-38 Roof Plan	3.08C	28/08/20
Lots 35-38 Elevations	3.08D	28/08/20
Lots 35-38 Perspectives	3.08E	28/08/20
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Lots 39-41 Upper Floor	3.09B	28/08/20
Lots 39-41 Roof Plan	3.09C	28/08/20
Lots 39-41 Elevations	3.09D	28/08/20
Lots 39-41 Perspectives	3.09E	28/08/20
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Lot 42 Roof Plan	3.10C	28/08/20
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Lots 43-46 Upper Floor	3.11B	28/08/20
Lots 43-46 Roof Plan	3.11C	28/08/20
Lots 43-46 Elevations	3.11D	28/08/20
Lots 43-46 Perspectives	3.11E	28/08/20
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Lots 47-55 Upper Floor	3.12B	28/08/20
Lots 47-55 Roof Plan	3.12C	28/08/20
Lots 47-55 Elevations	3.12D	28/08/20
Lots 47-55 Perspectives	3.12E	28/08/20
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Lots 56-60 Upper Floor	3.13B	28/08/20
Lots 56-60 Roof Plan	3.13C	28/08/20
Lots 56-60 Elevations	3.13D	28/08/20
Lots 56-60 Perspectives	3.13E	28/08/20
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Lot 61 Ground Floor	3.14B	28/08/20
Lot 61 Upper Floors	3.14C	28/08/20
Lot 61 Roof Plan	3.14D	28/08/20
Lot 61 Elevations	3.14E	28/08/20
Lot 61 Perspectives	3.14F	28/08/20
Lots 62-65 Basement Plan	3.15A	28/08/20
Lots 62-65 Ground Floor	3.15B	28/08/20
Lots 62-65 Upper Floor	3.15C	28/08/20
Lots 62-65 Roof Plan	3.15D	28/08/20
Lots 62-65 Elevations	3.15E	28/08/20
Lots 62-65 Perspectives	3.15F	28/08/20
Lot 66 Basement Plan	3.16A	28/08/20
Lot 66 Upper Floor	3.16C	28/08/20
Lot 66 Roof Plan	3.16D	28/08/20
Lot 66 Elevations	3.16E	28/08/20
Lot 66 Perspectives	3.16F	28/08/20
Lots 67-70 Ground Floor	3.17A	28/08/20
Lots 67-70 Upper Floor	3.17B	28/08/20
Lots 67-70 Roof Plan	3.17C	28/08/20
Lots 67-70 Elevations	3.17D	28/08/20
Lots 67-70 Perspectives	3.17E	28/08/20
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Lots 71-74 Upper Floor	3.18B	28/08/20
Lots 71-74 Roof Plan	3.18C	28/08/20
Lots 71-74 Elevations	3.18D	28/08/20
Lots 71-74 Perspectives	3.18E	28/08/20
Lots 75-78 Ground Floor	3.19A	28/08/20
Lots 75-78 Upper Floor	3.19B	28/08/20
Lots 75-78 Roof Plan	3.19C	28/08/20
Lots 75-78 Elevations	3.19D	28/08/20
Lots 75-78 Perspectives	3.19E	28/08/20
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Type A1 Elevations	4.01	28/08/20
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Type A2 Elevations	4.11	28/08/20
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Type B1 Elevations	4.21	28/08/20
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Type C2 Elevations	4.32	28/08/20
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Type D Plans Ground	4.40	28/08/20
Type D Plans Upper	4.41	28/08/20
Type D Elevations	4.42	28/08/20
Type E1/E2 Plans Ground	4.50	28/08/20
Type E1/E2 Plans Upper	4.51	28/08/20
Type E1 Elevations	4.52	28/08/20
Type E2 Elevations	4.53	28/08/20
Type E3/E4 Plans Ground	4.54	28/08/20
Type E3/E4 Plans Upper	4.55	28/08/20
Type E3 Elevations	4.56	28/08/20
Type E4 Elevations	4.57	28/08/20
Type E5 Plans	4.58	28/08/20
Type E5 Elevations	4.59	28/08/20
Type F1 Plans	4.60	28/08/20
Type F1 Elevations	4.61	28/08/20
Type G1 Plans	4.70	28/08/20
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Type G3 Elevations	4.75	28/08/20
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Type H1 Elevations	4.81	28/08/20
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Type H2 Elevations	4.83	28/08/20
Type H3 Plans	4.84	28/08/20
Type H3 Elevations	4.85	28/08/20
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Type I1 Elevations	4.91	28/08/20
Type I2 Plans	4.100	28/08/20
Type I2 Elevations	4.101	28/08/20
Type J1 Plans	4.110	28/08/20
Type J1 Elevations	4.111	28/08/20
Type K Plans	4.120	28/08/20
Type K Elevations	4.121	28/08/20
Type K Garage Plans	4.130	28/08/20
Type K Garage Elevations	4.131	28/08/20
Type Lot 16 Apartments - Ground Floor Plan	4.140	28/08/20
Type Lot 16 Apartments - Mid Floor Plan	4.141	28/08/20
Type Lot 16 Apartments - Upper Floor Plan	4.142	28/08/20
Type Lot 16 Apartments - Elevations	4.143	28/08/20
Type Lot 16 Apartments - Elevations	4.144	28/08/20
Type Lot 42 Apartments - Ground Floor Plan	4.150	28/08/20

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520 GSR

520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.	Sheet List	DATE
4167		**0.01**		28/08/20

Avery Associates Team Architects Ltd PO Box 37701, Parnell, Auckland 1151, New Zealand **t** 09 6384449 **e** www.averyarchitects.co.nz

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Sheet Name	Sheet Number	Sheet Issue Date
4-TYPOLOGY		
Type Lot 42 Apartments - Mid Floor Plan	4.151	28/08/20
Type Lot 42 Apartments - Upper Floor Plan	4.152	28/08/20
Type Lot 42 Apartments - Elevations	4.153	28/08/20
Type Lot 42 Apartments - Elevations	4.154	28/08/20
Type Lot 42 Apartments - Elevations	4.155	28/08/20
Type Lot 42 Apartments - Elevations	4.156	28/08/20
Type Lot 61 Apartments - Basement Floor Plan	4.160	28/08/20
Type Lot 61 Apartments - Ground Floor Plan	4.161	28/08/20
Type Lot 61 Apartments - Mid Floor Plan	4.162	28/08/20
Type Lot 61 Apartments - Upper Floor Plan	4.163	28/08/20
Type Lot 61 Apartments - Elevations	4.164	28/08/20
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Type Lot 66 Apartments - Basement Floor Plan	4.170	28/08/20
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Type Lot 66 Apartments - Elevations	4.174	28/08/20
Type Lot 66 Apartments - Elevations	4.175	28/08/20
5-COMPLIANCE		
Compliance Table	5.01	28/08/20
Compliance Table	5.02	28/08/20
HIRTB Key Plan	5.11	28/08/20
HIRTB Elevations	5.12	28/08/20
HIRTB Elevations	5.13	28/08/20
HIRTB Elevations	5.14	28/08/20
Yards Z1 - Ground	5.21	28/08/20
Yards Z1 - Upper	5.22	28/08/20
Yards Z2 - Ground	5.23	28/08/20
Yards Z2 - Upper	5.24	28/08/20
Yards Z3 - Ground	5.25	28/08/20
Yards Z3 - Upper	5.26	28/08/20
Outlook Z1 - Ground	5.30	28/08/20
Outlook Z1 - Upper	5.31	28/08/20
Outlook Z2 - Ground	5.32	28/08/20
Outlook Z2 - Upper	5.33	28/08/20
Outlook Z3 - Ground	5.34	28/08/20
Outlook Z3 - Upper	5.35	28/08/20
Outdoor Space Z1 - Ground	5.36	28/08/20
Outdoor Space Z1 - Upper	5.37	28/08/20
Outdoor Space Z2	5.38	28/08/20
Outdoor Space Z3	5.39	28/08/20
Retaining Plan Z1	5.40	28/08/20
Retaining Plan Z2	5.41	28/08/20
Retaining Plan Z3	5.42	28/08/20
Fencing Plan Z1	5.43	28/08/20
Fencing Plan Z2	5.44	28/08/20
Fencing Plan Z3	5.45	28/08/20
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Impervious Area Schedule	5.53	28/08/20
Impervious Area Schedule	5.54	28/08/20

Sheet Name	Sheet Number	Sheet Issue Date
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Impervious Area Plan Z1	5.56	28/08/20
Impervious Area Plan Z2	5.57	28/08/20
Impervious Area Plan Z3	5.58	28/08/20
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Building Schedule	5.61B	28/08/20
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Landscaped Schedule	5.71A	28/08/20
Landscaped Schedule	5.71B	28/08/20
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Landscaped Area Plan Z2	5.73	28/08/20
Landscaped Area Plan Z3	5.74	28/08/20
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50% Min. Landscaping within Front Yard Z2	5.76	28/08/20
50% Min. Landscaping within Front Yard Z3	5.77	28/08/20
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Solar Studies - Spring Z3	5.83A	28/08/20
Reserve Boundary Treatment	5.100	28/08/20
Reserve Boundary Treatment	5.101	28/08/20
Reserve Boundary Treatment	5.102	28/08/20
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S92 Landscape Sections	5.104	28/08/20
S92 Landscape Sections	5.105	28/08/20
S92 Overshadowing Studies	5.107	28/08/20
S92 Overshadowing Studies	5.108	28/08/20
S92 Overshadowing Studies	5.109	28/08/20
S92 Overshadowing Studies	5.110	28/08/20
S92 Streetscape Quality	5.111	28/08/20
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S92 Streetscape Quality	5.115	28/08/20
S92 Streetscape Quality	5.116	28/08/20
S92 Streetscape Quality	5.117	28/08/20
S92 Streetscape Quality	5.118	28/08/20

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Job No.	Scale (A3):	Sheet no.	Sheet List	DATE
4167		**0.02**		28/08/20

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Job No.	Scale (A3):	Sheet no.	Location	DATE
4167	As indicated	**1.01**		28/08/20

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**1.02**	Neighbourhood Context	28/08/20

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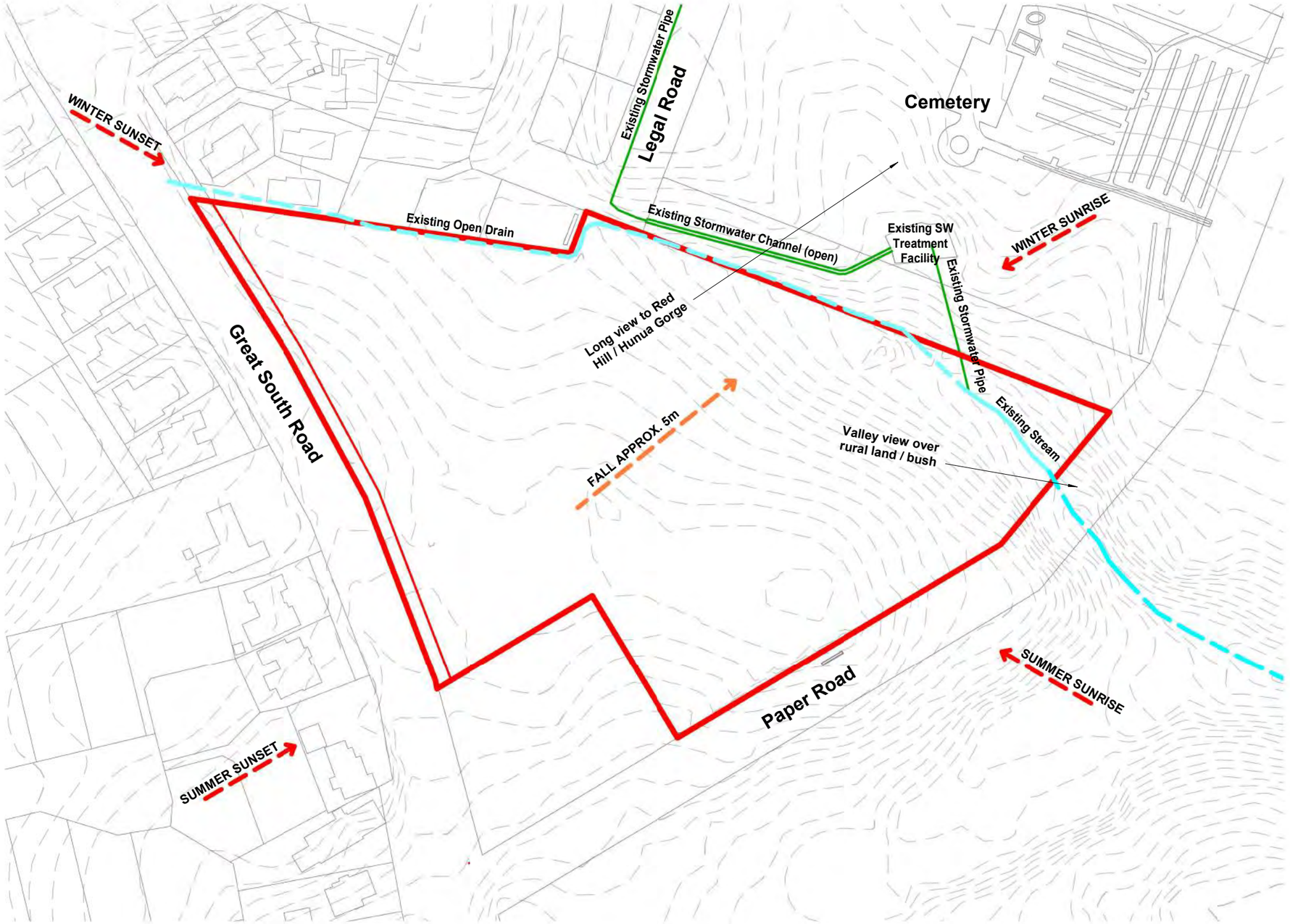

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 1500	**1.03**	Site Analysis	28/08/20

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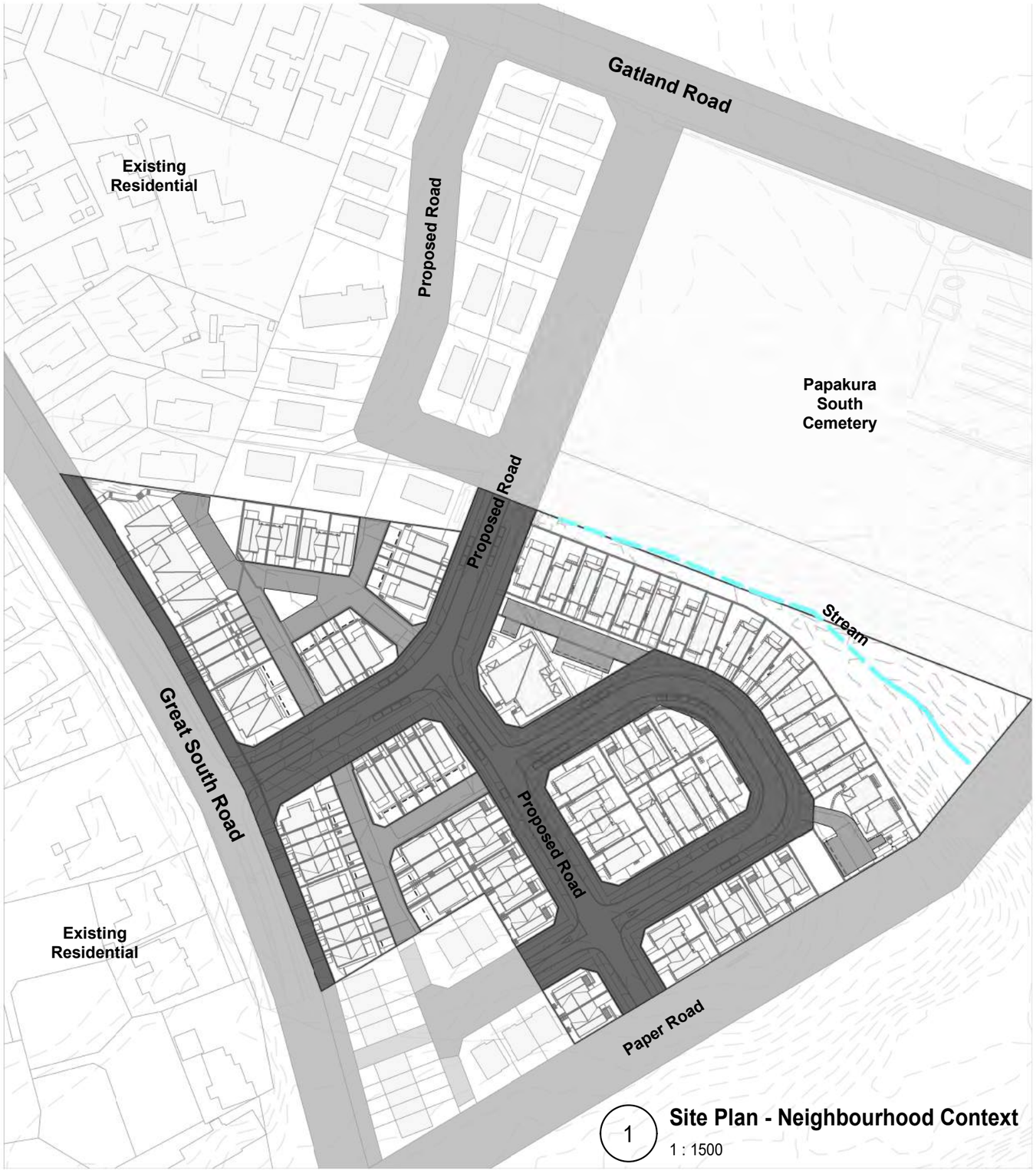
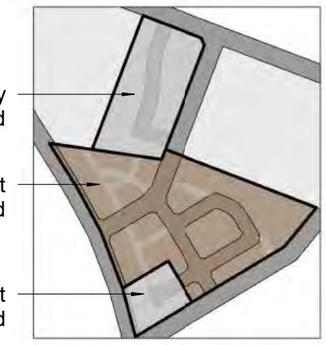


1 **Site Plan - Neighbourhood Context**
1 : 1500



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**1.04**	Site Plan - Neighbourhood Context	28/08/20

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1 **Site Plan - Ground Floor**

1 : 750

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 750	**2.02**	Site Plan - Ground Floor	28/08/20

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1 **Site Plan - Upper Floor**

1 : 750

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 750	**2.03**	Site Plan - Upper Floor	28/08/20

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1 **Site Plan - Roof Plan**

1 : 750

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 750	**2.04**	Site Plan - Roof Plan	28/08/20

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Typology Key

	Type	Beds	Parking	Count
A1	Zero-lot	4	1 Ext / 1 Gge	4
A2	Zero-lot	4	1 Ext / 1 Gge	5
B1	Zero-lot	3	1 Ext / 1 Gge	4
C1/C2/C3	Zero-lot	3	1 Ext / 1 Gge	8
D	Duplex	3	1 Ext / 1 Gge	8
E1/E2	Duplex	3	1 Ext / 1 Gge	6
E3/E4	Duplex	3	1 Ext / 1 Gge	6
E5	Zero-lot	3	1 Ext / 1 Gge	1
F1	Standalone	3	1 Ext / 1 Gge	1
G1	Terrace	3	1 Ext / 1 Carport	6
G2	Duplex	3	1 Ext / 1 Carport	2
G3	Terrace	3	1 Ext / 1 Carport	3
G4	Terrace	3	1 Carport	2

	Type	Beds	Parking	Count
H1	Terrace	2	1 Ext	6
H2	Duplex	2	1 Ext	2
H3	Terrace	2	1 Ext	3
I1	Terrace	3	2 Ext	2
I2	Terrace	3	2 Ext	2
J1	Terrace	2	1 Ext	1
K	Terrace	3+1	1 Ext / 1 Gge	1
Lot 16	Apartments	2	1 Ext	6
Lot 42	Apartments	1/2	1 Ext	9
Lot 61	Apartments	2	1 Ext / 1 Gge	6
Lot 66	Apartments	2	1 Ext / 1 Gge	8
			Total:	**102**

Notes Apartment Types - Walk-Up, common stair / breezeway
Type K - studio / bedroom above garage

1 **Typology Plan**
1 : 1000

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 1000	**2.05**	Typology Plan	28/08/20

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1 **Lots 1-16 South Elevation**

1 : 500

2 **Lots 16-25 West Elevation**

1 : 500

3 **Lots 24-30, 60, 76 North Elevation**

1 : 500

4 **Lots 22, 23, 31-34, 42 South Elevation**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**2.06**	Street Elevations	28/08/20

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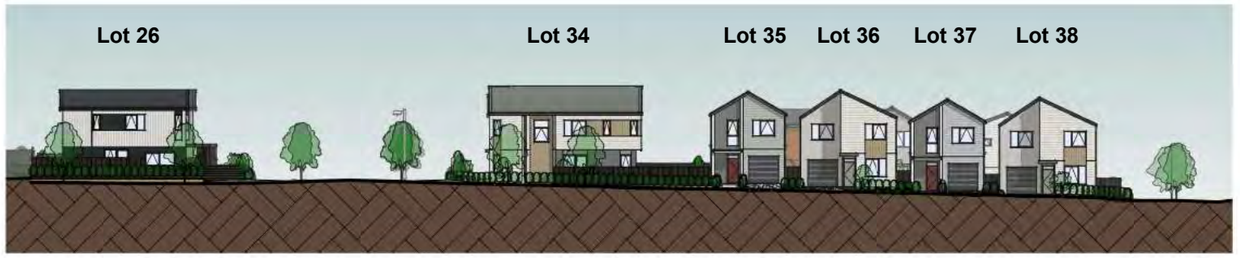

5 **Lots 26, 34-38, 46, 47 East Elevation**

1 : 500

6 **Lots 30, 31, 39-41, 43 West Elevation**

1 : 500

7 **Lots 43-46, 56, 78 North Elevation**

1 : 500

8 **Lots 47-55, 61-66 South Elevation**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**2.07**	Street Elevations	28/08/20

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9 **Lots 67-70, 74 South Elevation**

1 : 500

10 **Lots 61, 71-78 West Elevation**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**2.08**	Street Elevations	28/08/20

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Job No.	Scale (A3):	Sheet no.	Overview	DATE
4167		**2.09**		28/08/20

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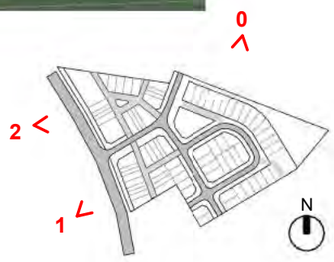
0 **Perspective 0**

1 **Perspective 1**

2 **Perspective 2**



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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 7000	**2.10**	Perspectives	28/08/20

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3 **Perspective 3**

4 **Perspective 4**

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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**2.11**	Perspectives	28/08/20

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5 **Perspective 5**

6 **Perspective 6**

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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**2.12**	Perspectives	28/08/20

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7 **Perspective 7**

8 **Perspective 8**

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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**2.13**	Perspectives	28/08/20

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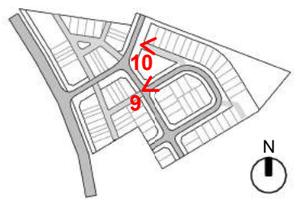
9 **Perspective 9**

10 **Perspective 10**



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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**2.14**	Perspectives	28/08/20

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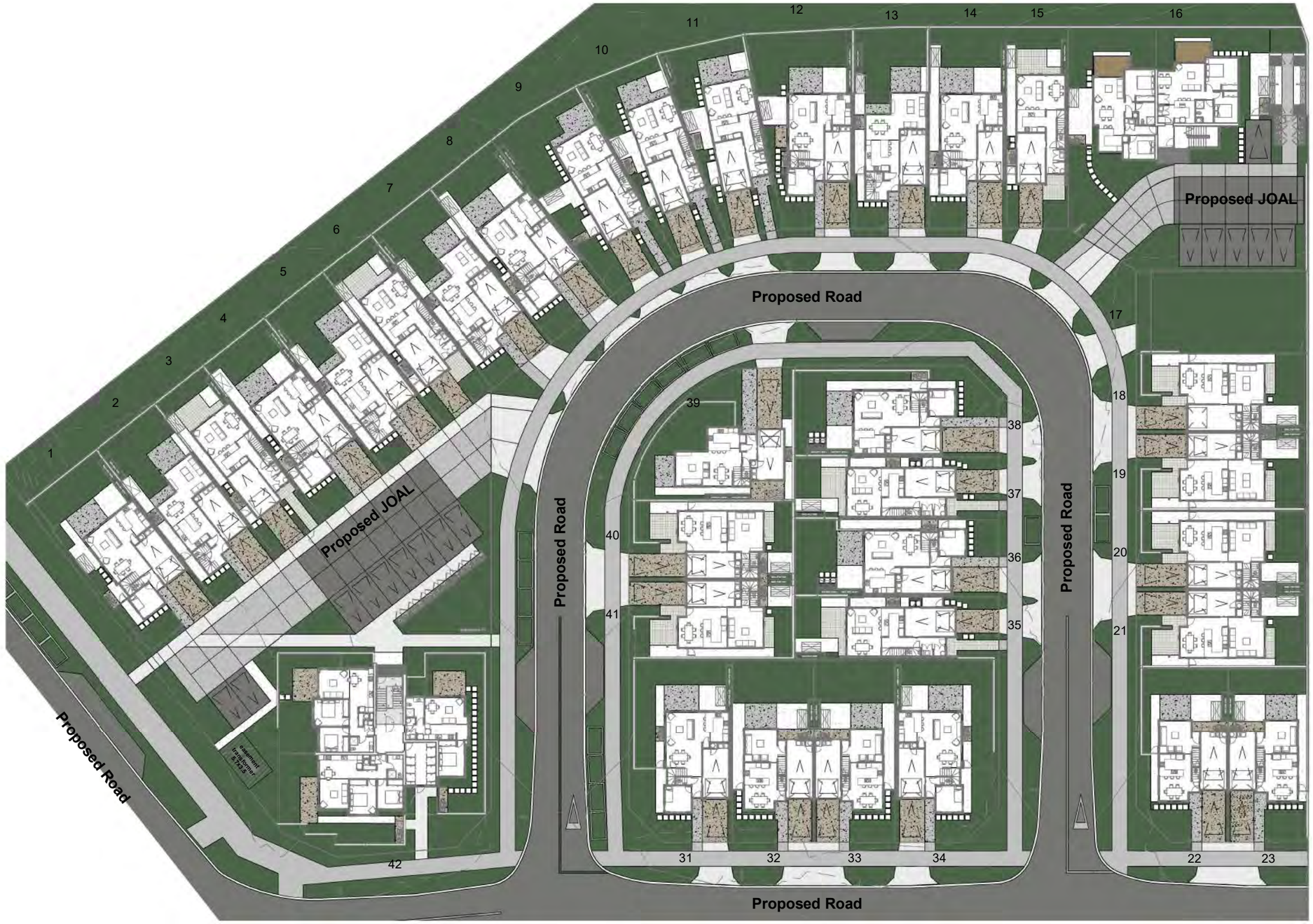

Hardscape legend:

Pebbles
Permeable paths / patios

Backyard path
Pavers over lawn

Lawn
Hardwearing lawn seed

Concrete Type #1
JOAL main finish
8kg black oxide, light broom finish

Concrete Type #2
JOAL features, private patios and private footpaths (where impervious)
8kg black oxide with exposed aggregate, sponge finish

Concrete Type #3
JOAL footpaths
4kg black oxide with exposed aggregate

Concrete Type #4
Driveways and bin pads
4kg black oxide, sponge finish

Permeable Paving
Patios and private footpaths (where permeable)
300x300mm Jagas ceramic Hydropaver permeable pavers

Timber Deck
Patios (where in apartments)
Timber deck

Concrete Type #1

Concrete Type #2

Concrete Type #3

Concrete Type #4

Permeable Paving

1 **Hardscape Plan Z1**
1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**2.15**	Hardscape Plan Z1	28/08/20

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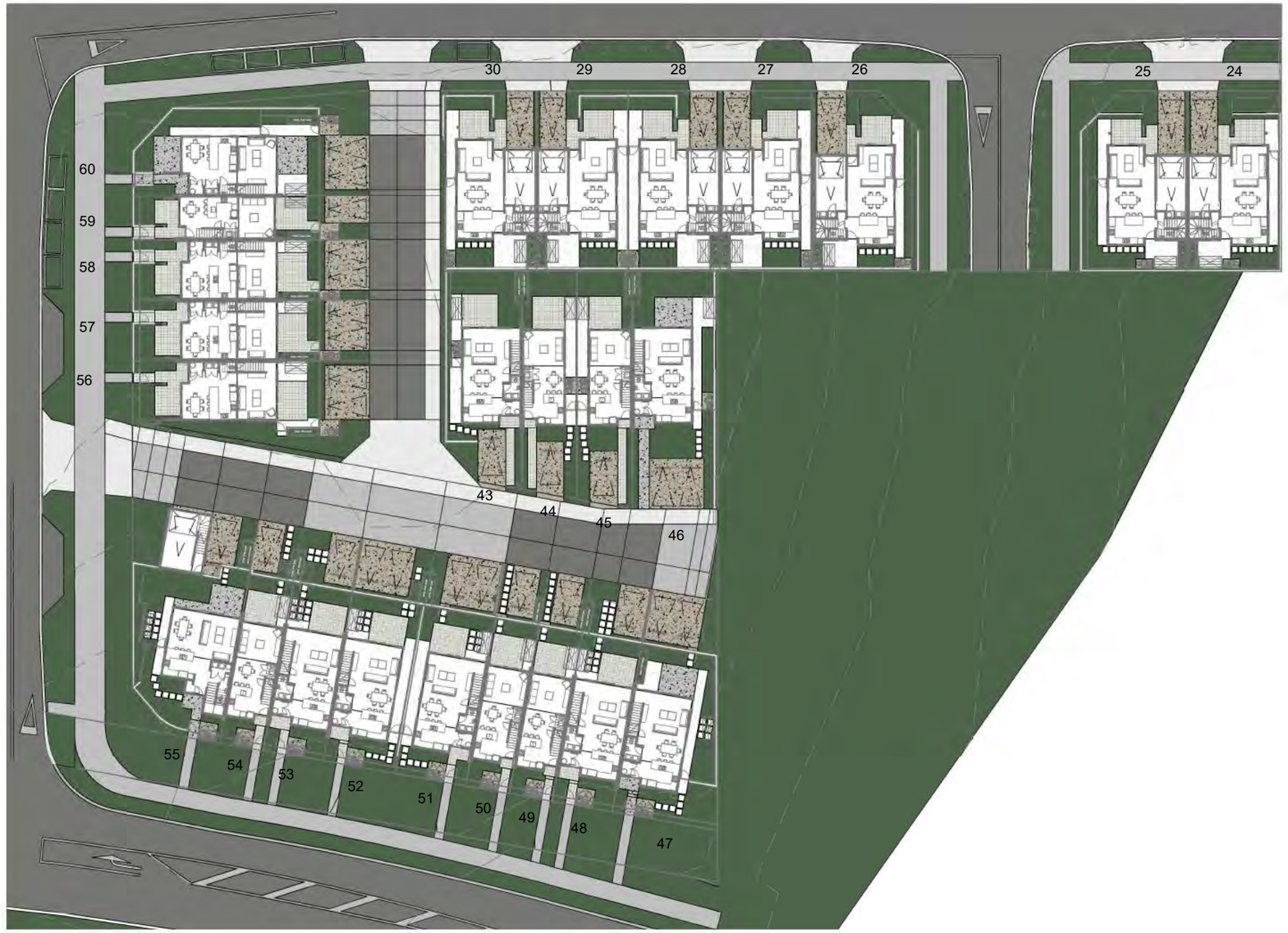

Hardscape legend:

Pebbles
Permeable paths / patios

Backyard path
Pavers over lawn

Lawn
Hardwearing lawn seed

Concrete Type #1
JOAL main finish
8kg black oxide, light broom finish

Concrete Type #2
JOAL features, private patios and private footpaths (where impervious)
8kg black oxide with exposed aggregate, sponge finish

Concrete Type #3
JOAL footpaths
4kg black oxide with exposed aggregate

Concrete Type #4
Driveways and bin pads
4kg black oxide, sponge finish

Permeable Paving
Patios and private footpaths (where permeable)
300x300mm Jagas ceramic Hydropaver permeable pavers

Timber Deck
Patios (where in apartments)
Timber deck

Concrete Type #1

Concrete Type #2

Concrete Type #3

Concrete Type #4

Permeable Paving

1 **Hardscape Plan Z2**
1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**2.16**	Hardscape Plan Z2	28/08/20

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Hardscape legend:

Pebbles
Permeable paths / patios

Backyard path
Pavers over lawn

Lawn
Hardwearing lawn seed

Concrete Type #1
JOAL main finish
8kg black oxide, light broom finish

Concrete Type #2
JOAL features, private patios and private footpaths (where impervious)
8kg black oxide with exposed aggregate, sponge finish

Concrete Type #3
JOAL footpaths
4kg black oxide with exposed aggregate

Concrete Type #4
Driveways and bin pads
4kg black oxide, sponge finish

Permeable Paving
Patios and private footpaths (where permeable)
300x300mm Jagas ceramic Hydropaver permeable pavers

Timber Deck
Patios (where in apartments)
Timber deck

Concrete Type #1

Concrete Type #2

Concrete Type #3

Concrete Type #4

Permeable Paving

1 **Hardscape Plan Z3**
1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**2.17**	Hardscape Plan Z3	28/08/20

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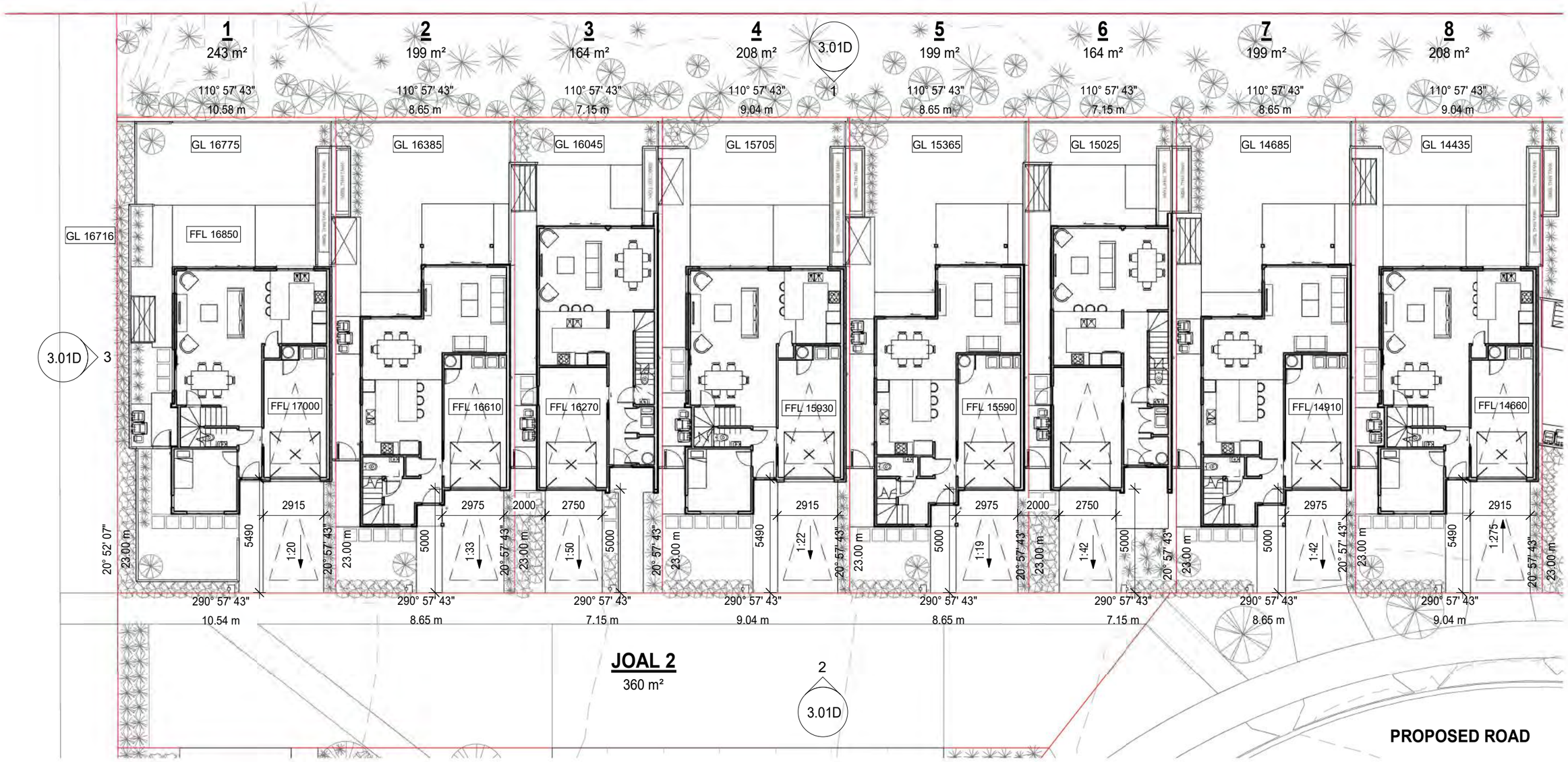

1 **Block Plan - Lots 1-8 Ground Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.01A**	Lots 1-8 Ground Floor Plan	28/08/20

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1 Block Plan - Lots 1-8 Upper Floor

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.01B**	Lots 1-8 Upper Floor Plan	28/08/20

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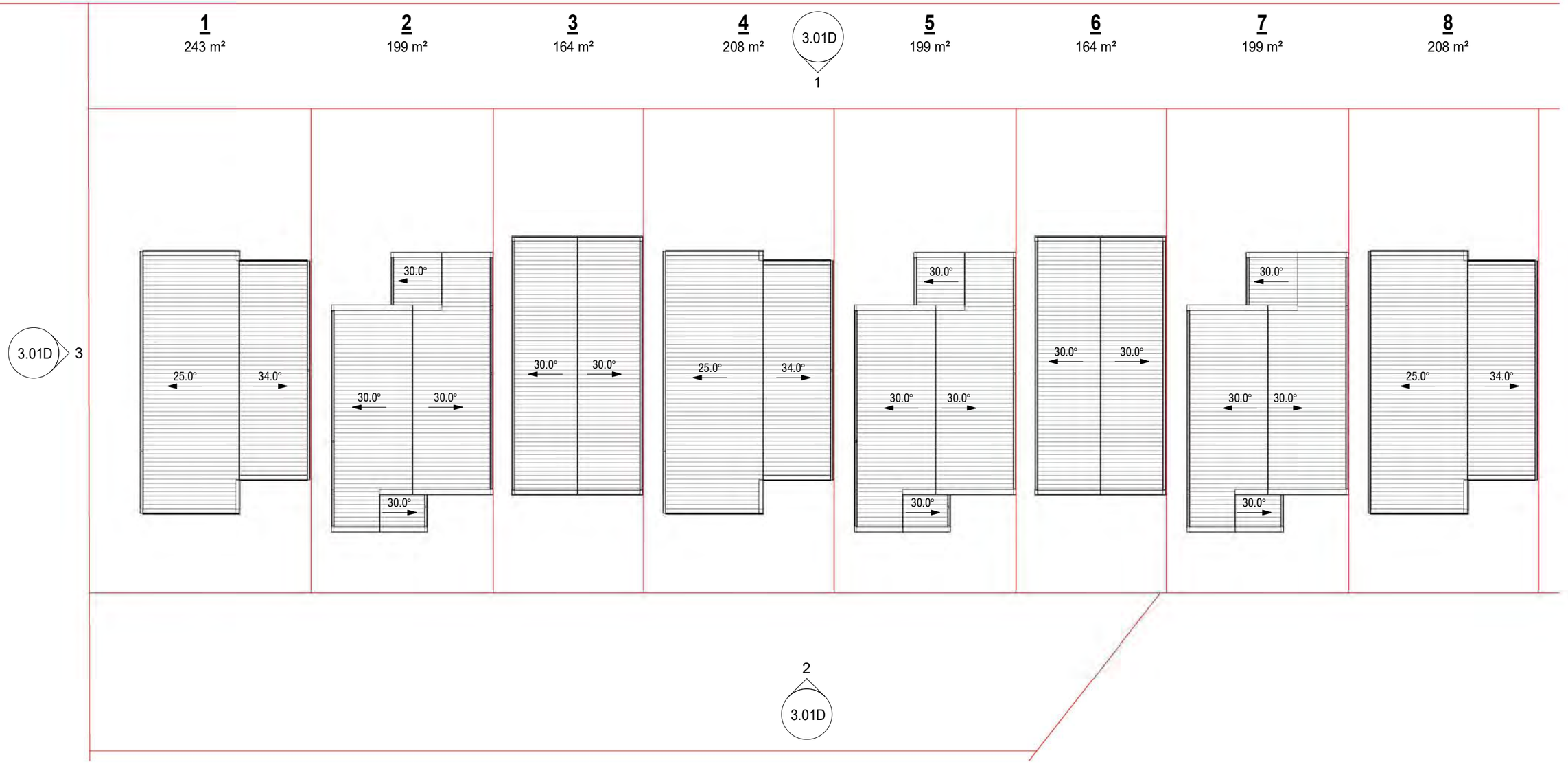
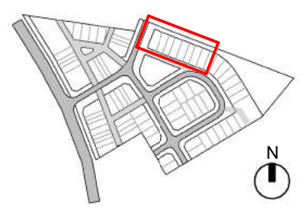


1 **Block Plan - Lots 1-8 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.01C**	Lots 1-8 Roof Plan	28/08/20

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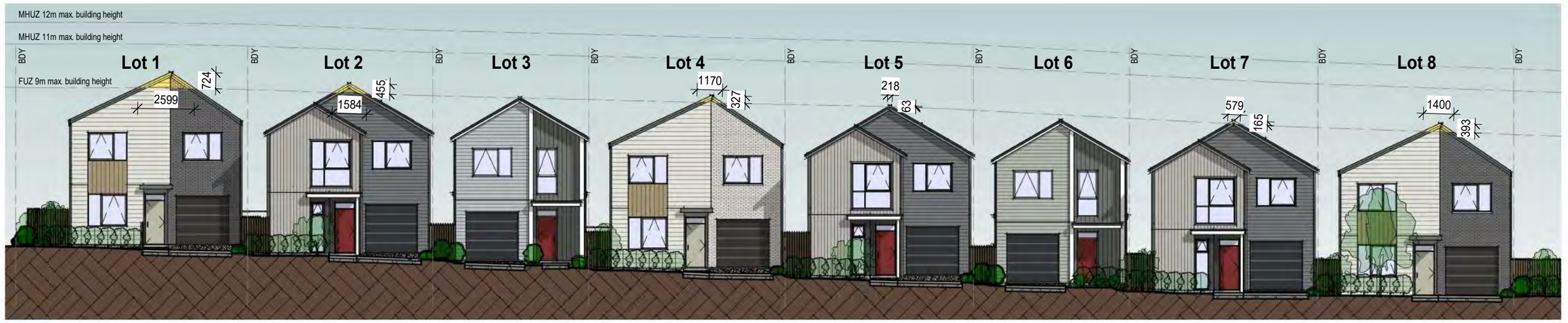
1 / 3.01A **Lots 1-8 North Elevation**

1 : 200



2 / 3.01A **Lots 1-8 South Elevation**

1 : 200

3 / 3.01A **Lots 1-8 West Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.01D**	Lots 1-8 Elevations	28/08/20

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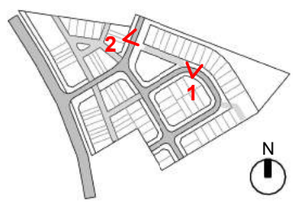
1 **Lots 1-8 Perspective 1**

2 **Lots 1-8 Perspective 2**



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Job No.	Scale (A3):	Sheet no.	Lots 1-8 Perspectives	DATE
4167	NTS	**3.01E**		28/08/20

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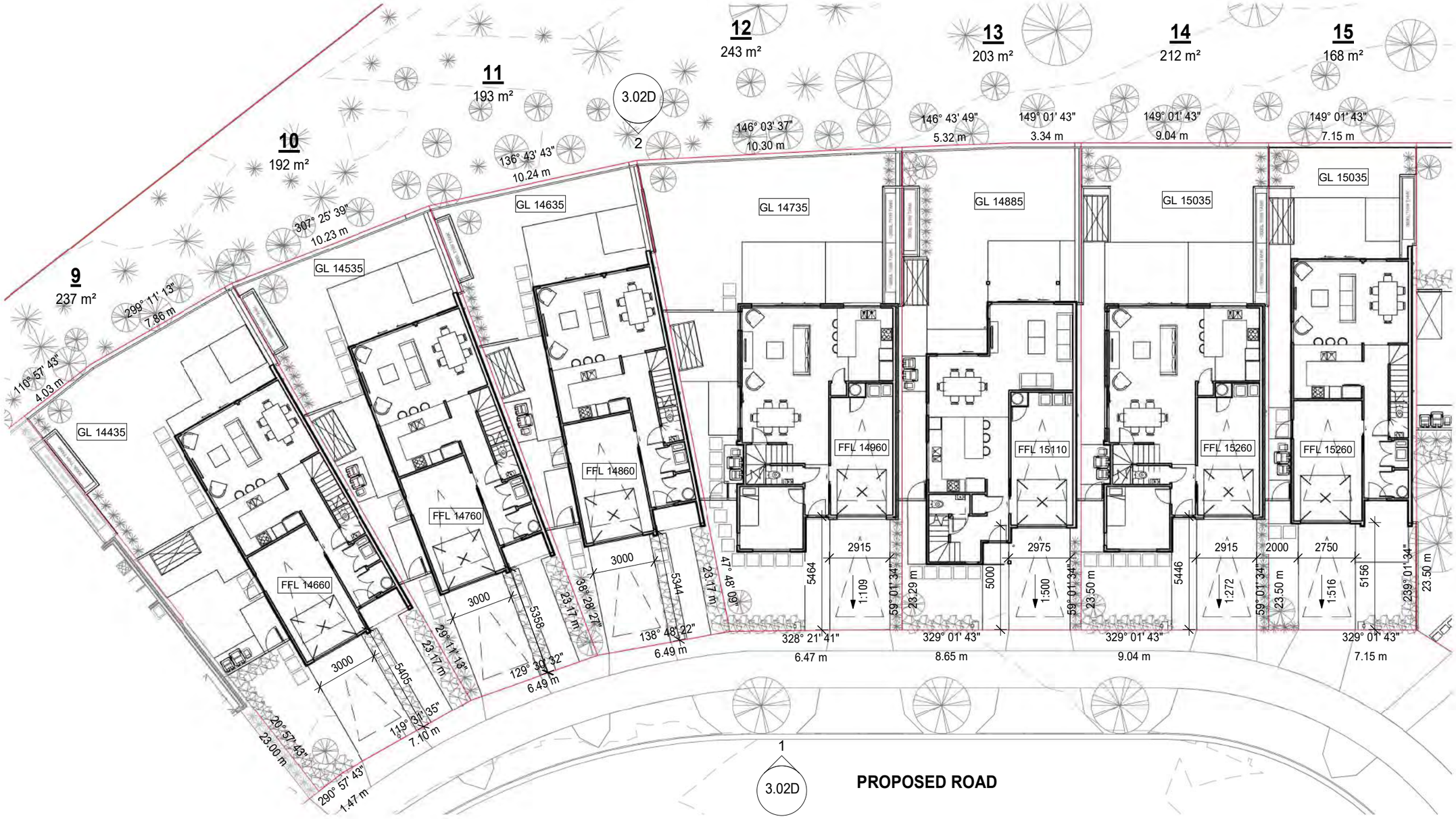

1 **Block Plan - Lots 9-15 Ground Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.02A**	Lots 9-15 Ground Floor	28/08/20

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1 **Block Plan - Lots 9-15 Upper Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.02B**	Lots 9-15 Upper Floor	28/08/20

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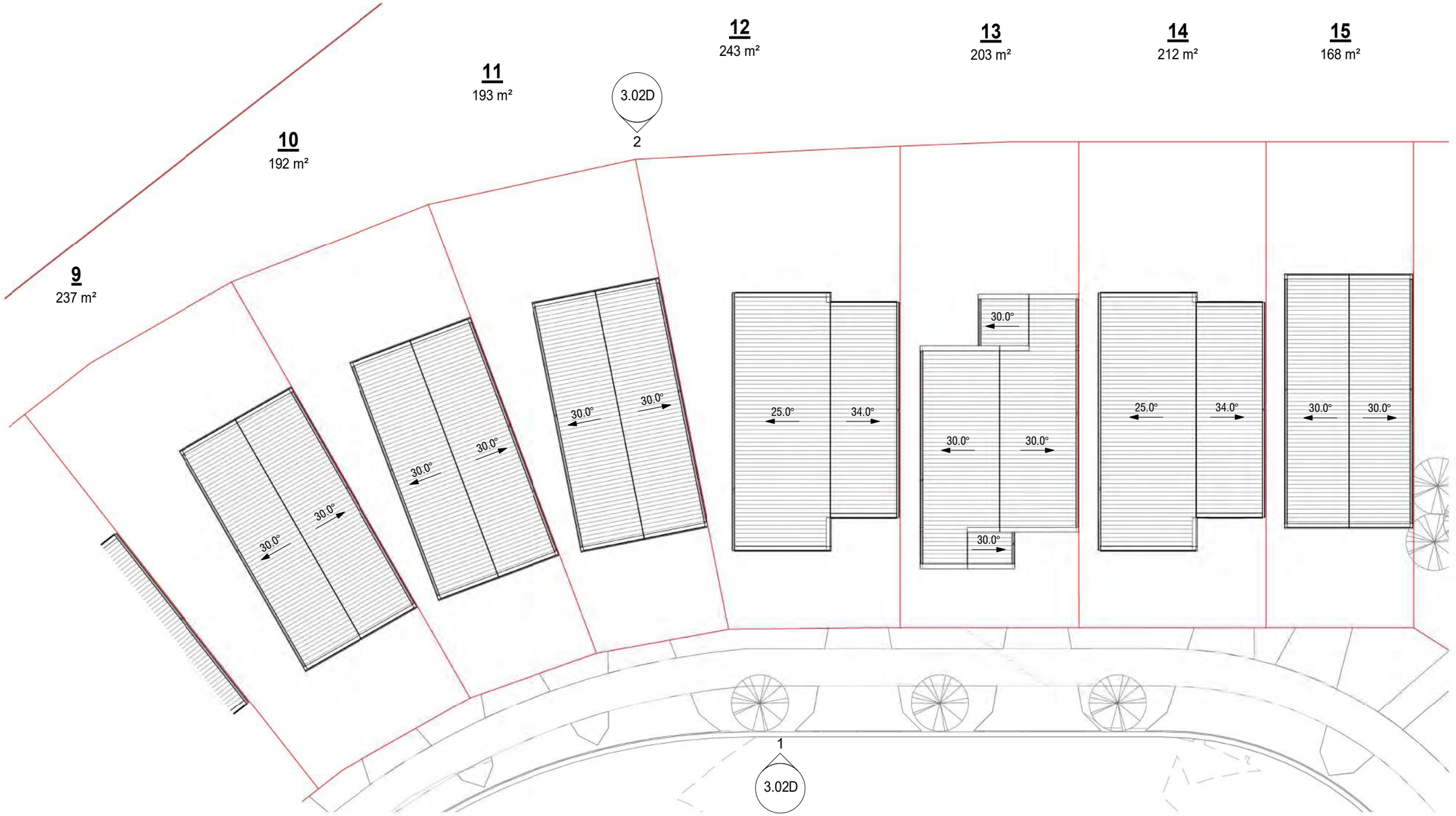
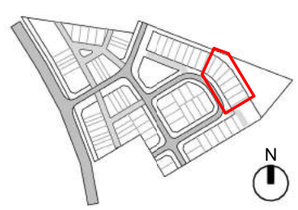


1 **Block Plan - Lots 9-15 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.02C**	Lots 9-15 Roof Plan	28/08/20

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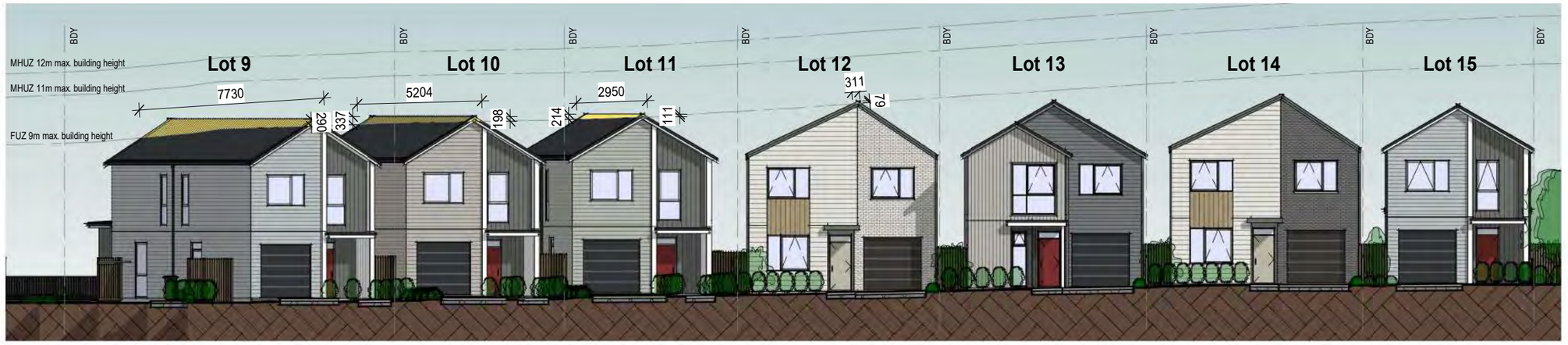
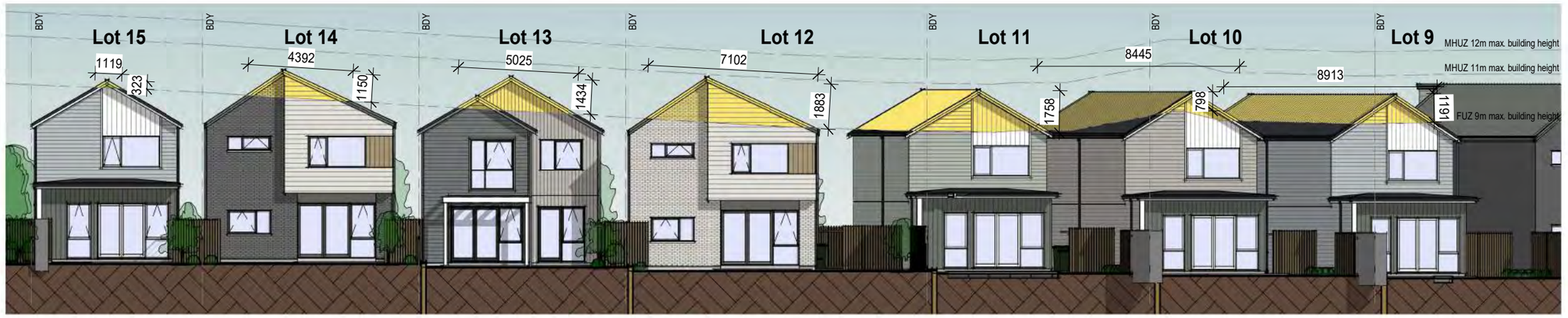


1
3.02A

Lots 9-15 West Elevation

1 : 200



2
3.02A

Lots 9-15 East Elevation

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.02D**	Lots 9-15 Elevations	28/08/20

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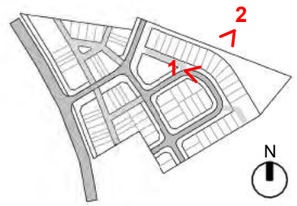
1 **Lots 9-15 Perspective 1**

2 **Lots 9-15 Perspective 2**



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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**3.02E**	Lots 9-15 Perspectives	28/08/20

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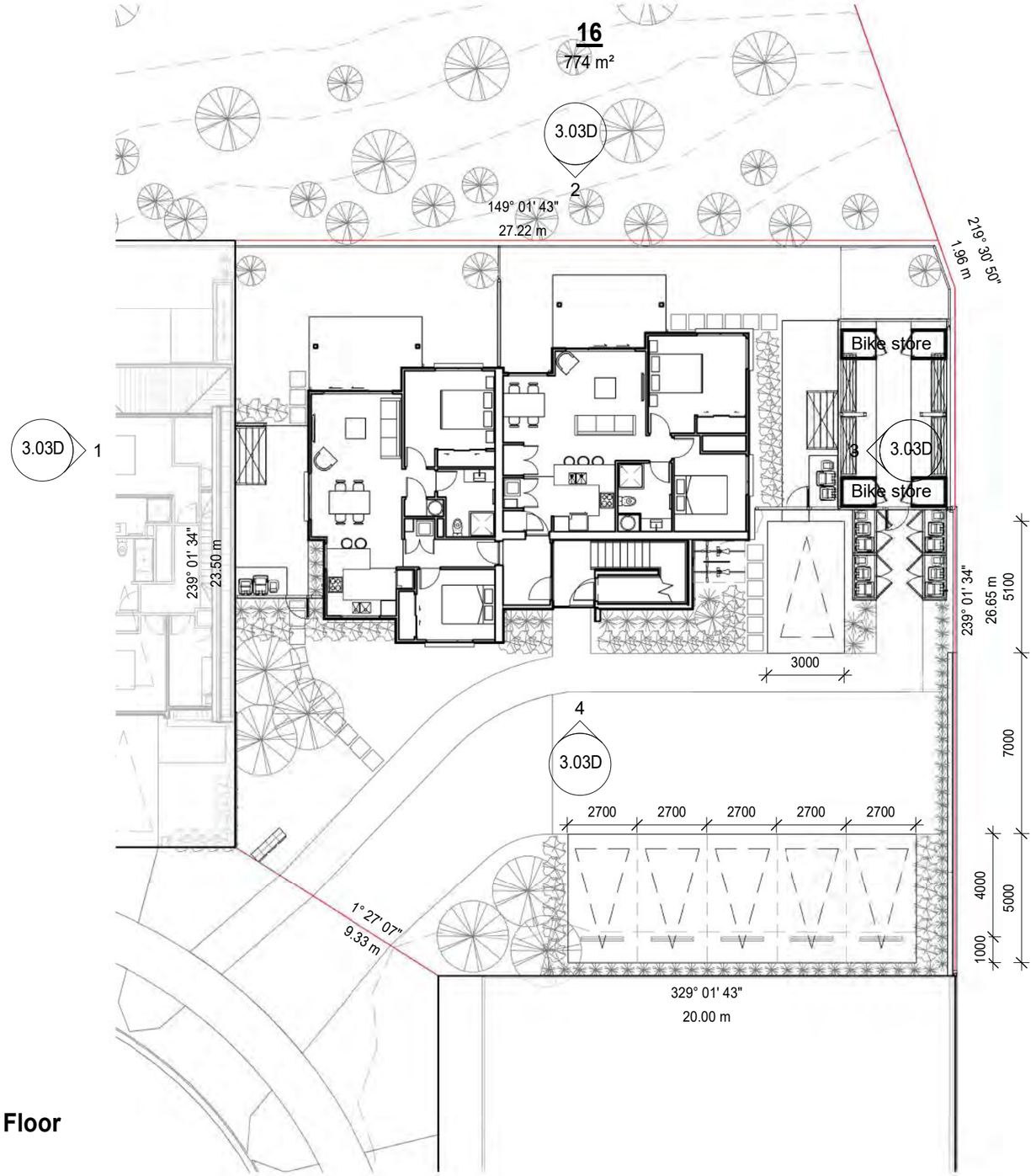
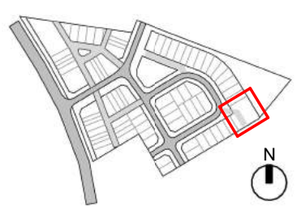


1 **Block Plan - Lot 16 Ground Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.03A**	Lot 16 Ground Floor	28/08/20

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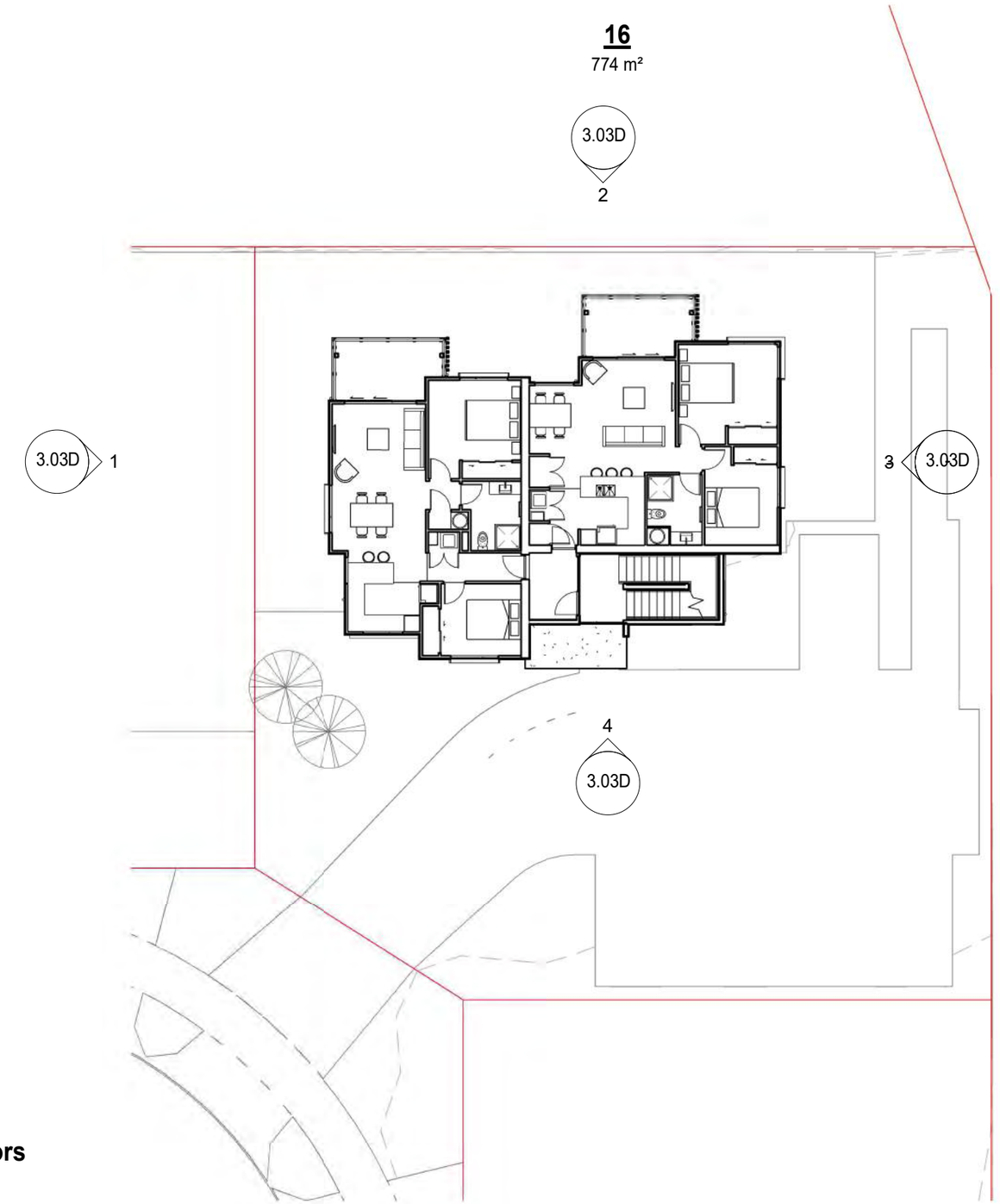
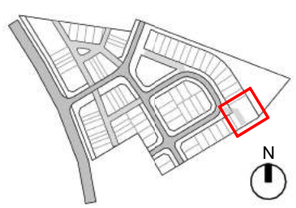


1 **Block Plan - Lot 16 Upper Floors**
1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.03B**	Lot 16 Upper Floors	28/08/20

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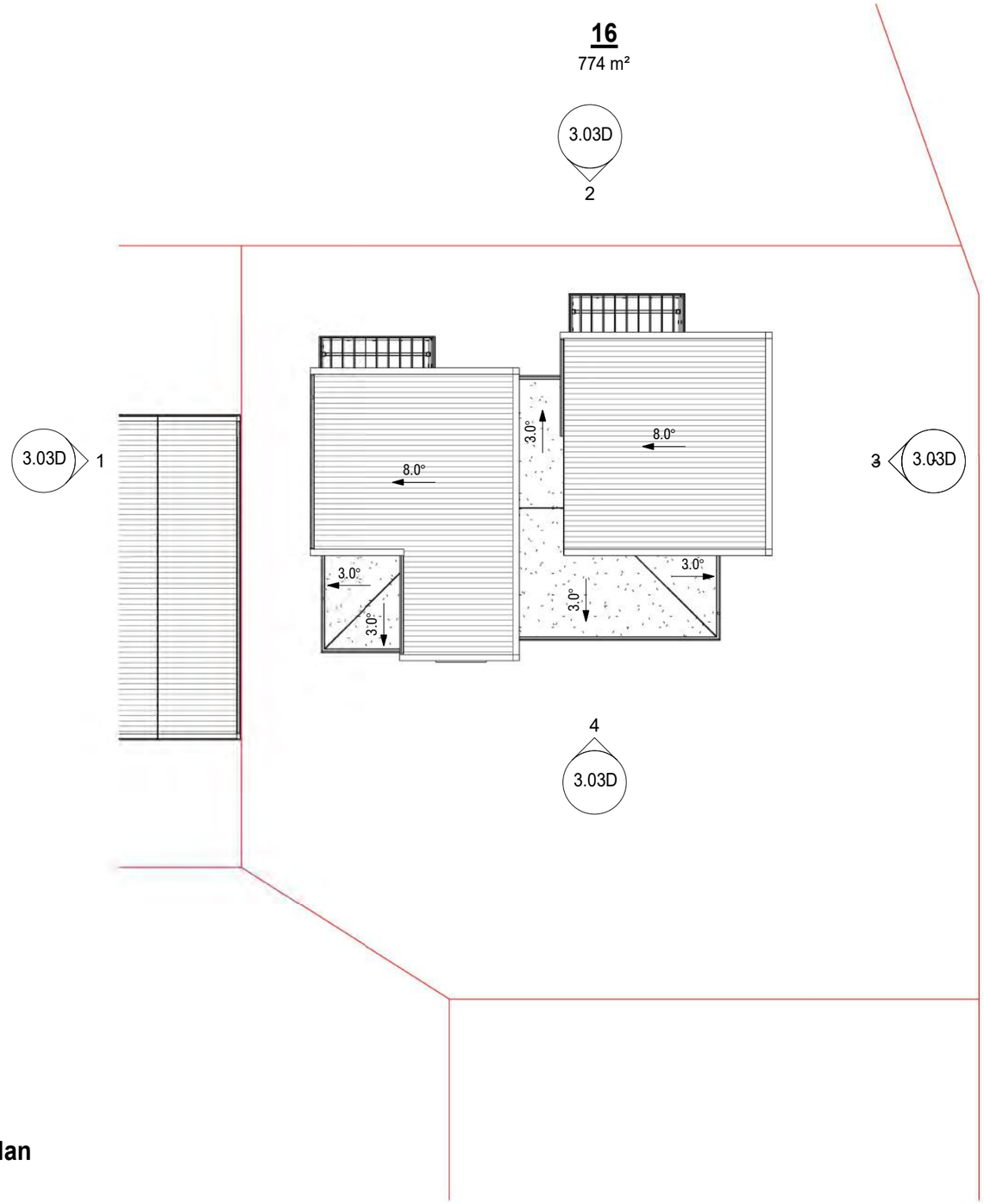
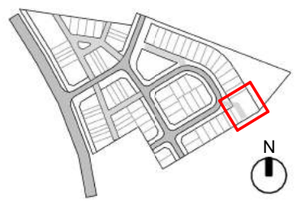


1 **Block Plan - Lot 16 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.03C**	Lot 16 Roof Plan	28/08/20

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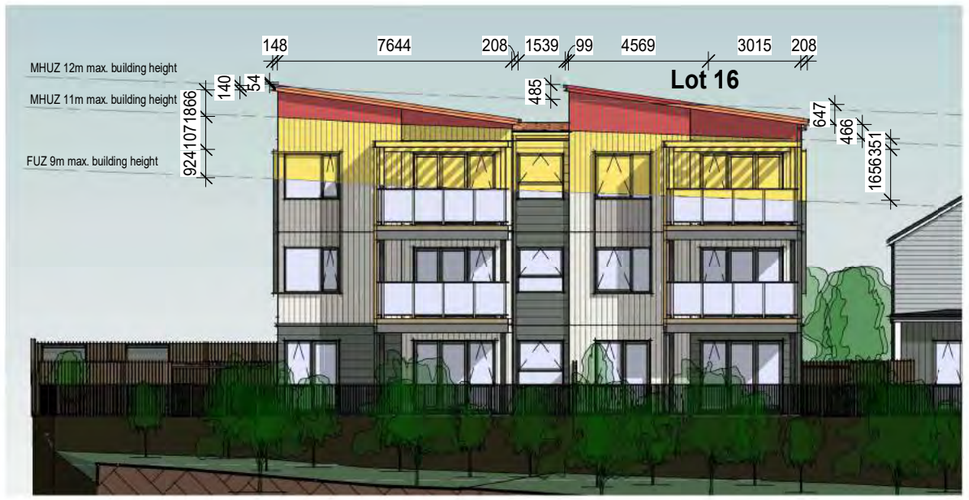
1 / 3.03A **Lot 16 North Elevation**

1 : 200



2 / 3.03A **Lot 16 East Elevation**

1 : 200

3 / 3.03A **Lot 16 South Elevation**

1 : 200

4 / 3.03A **Lot 16 West Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.03D**	Lot 16 Elevations	28/08/20

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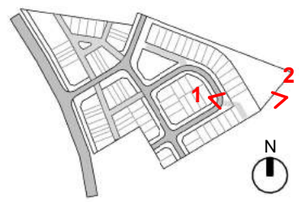
1 **Lot 16 Perspective 1**

2 **Lot 16 Perspective 2**



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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**3.03E**	Lot 16 Perspectives	28/08/20

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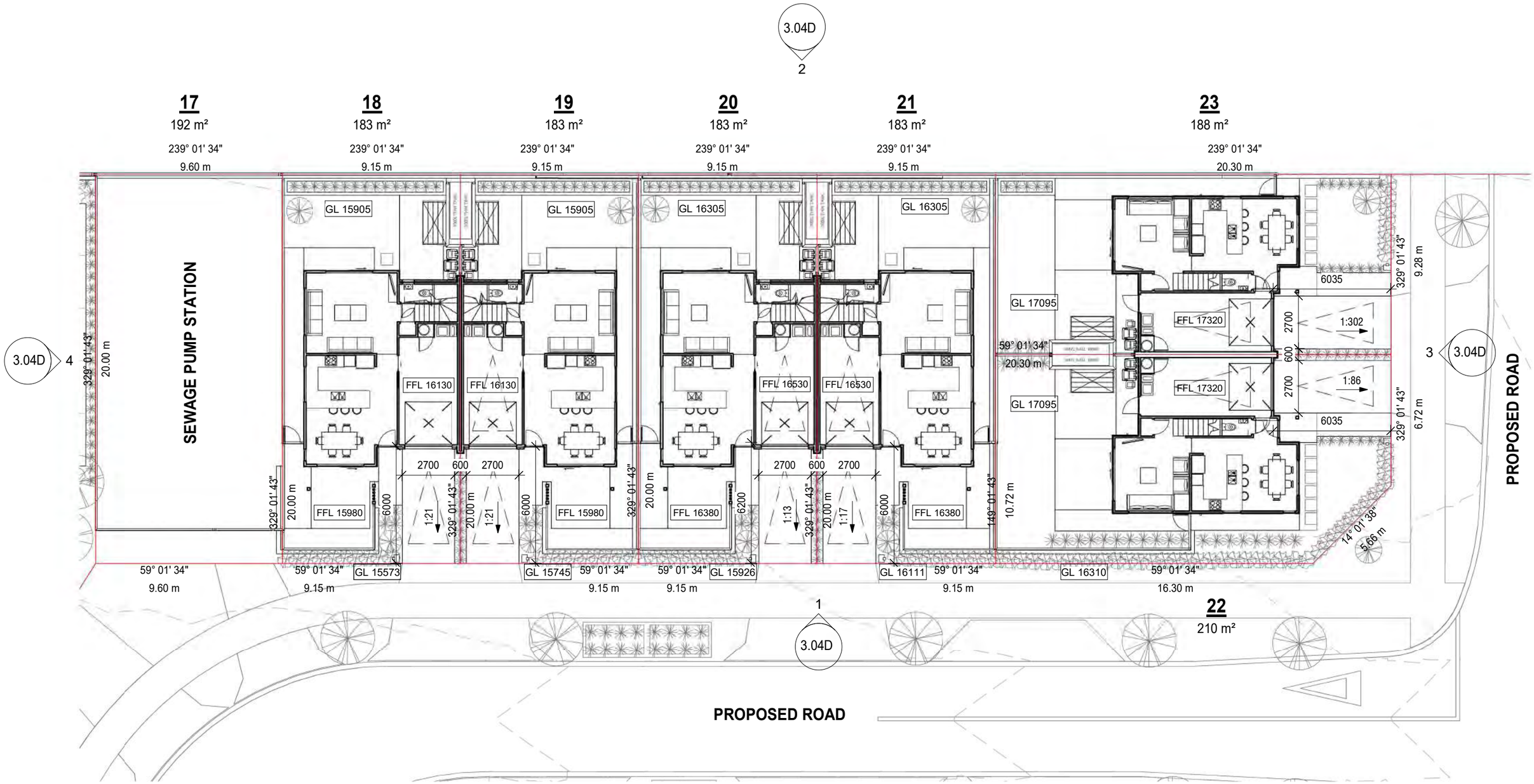

1 Block Plan - Lots 17-23 Ground Floor

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.04A**	Lots 17-23 Ground Floor	28/08/20

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3.04D
2

17
192 m²

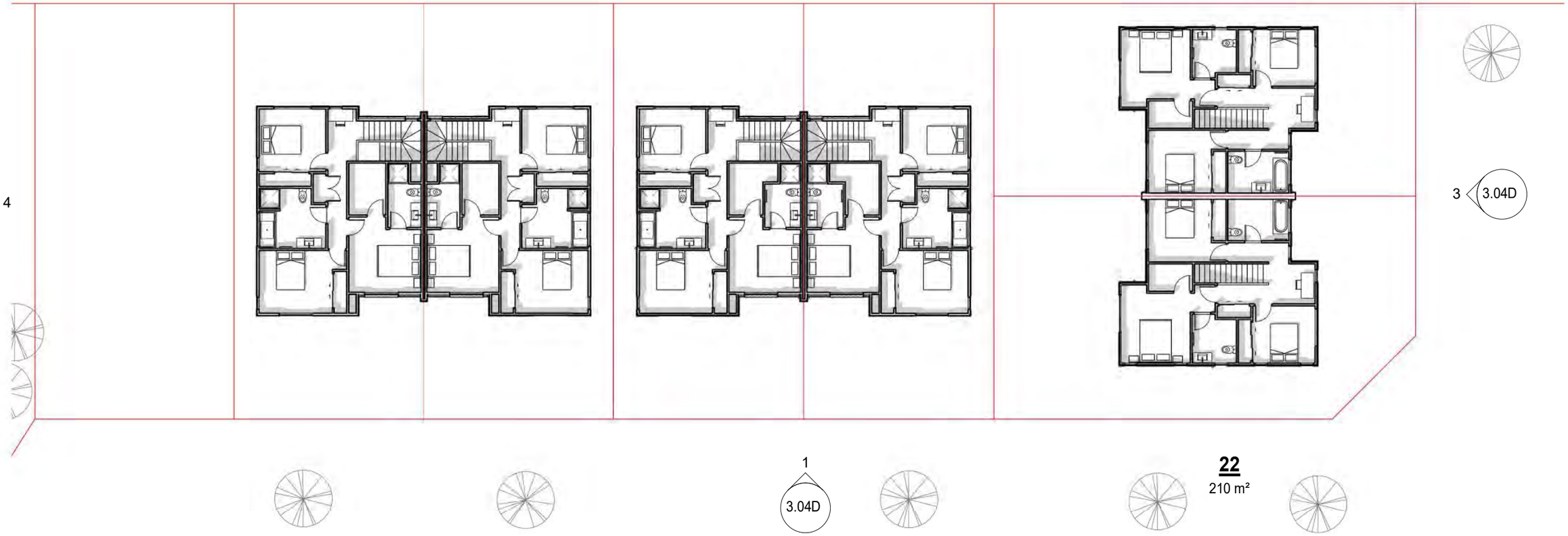
18
183 m²

19
183 m²

20
183 m²

21
183 m²

23
188 m²



3.04D 4

3 3.04D

1
3.04D

22
210 m²

1 Block Plan - Lots 17-23 Upper Floor

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.04B**	Lots 17-23 Upper Floor	28/08/20

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3.04D
2

17
192 m²

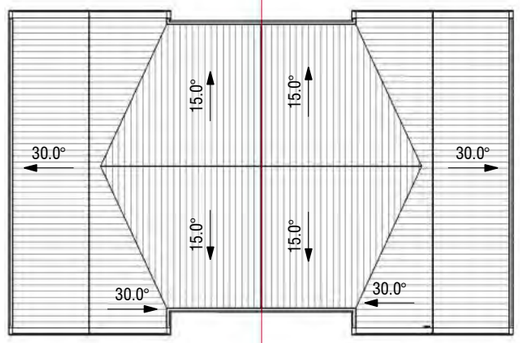
18
183 m²

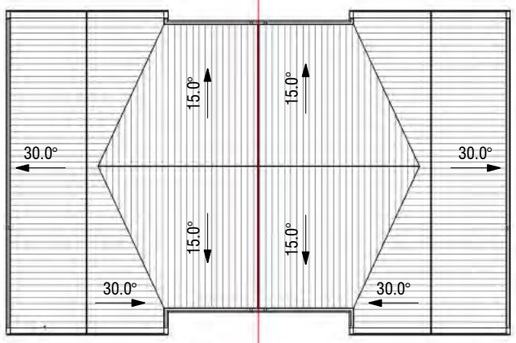
19
183 m²

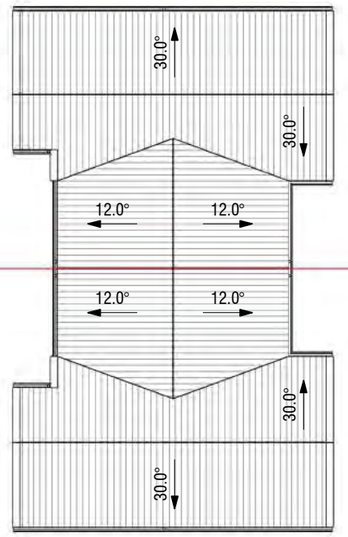
20
183 m²

21
183 m²

23
188 m²







3.04D 4

3 3.04D

1
3.04D

22
210 m²

1 **Block Plan - Lots 17-23 Roof Plan**
1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.04C**	Lots 17-23 Roof Plan	28/08/20

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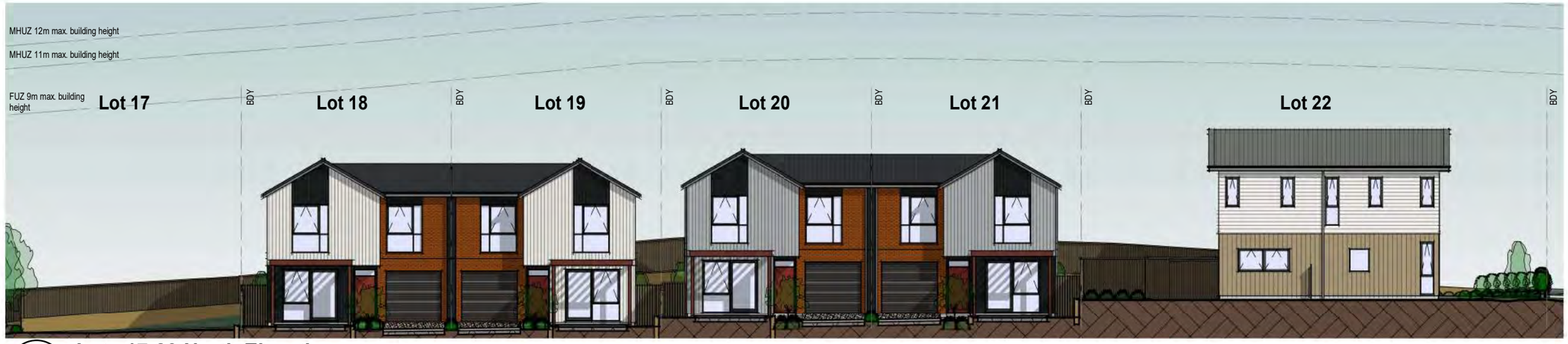
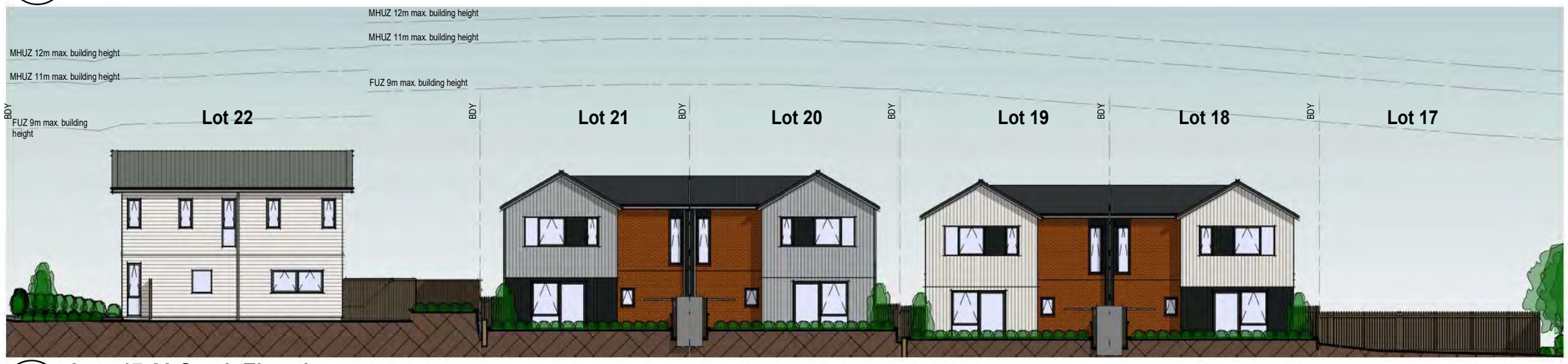


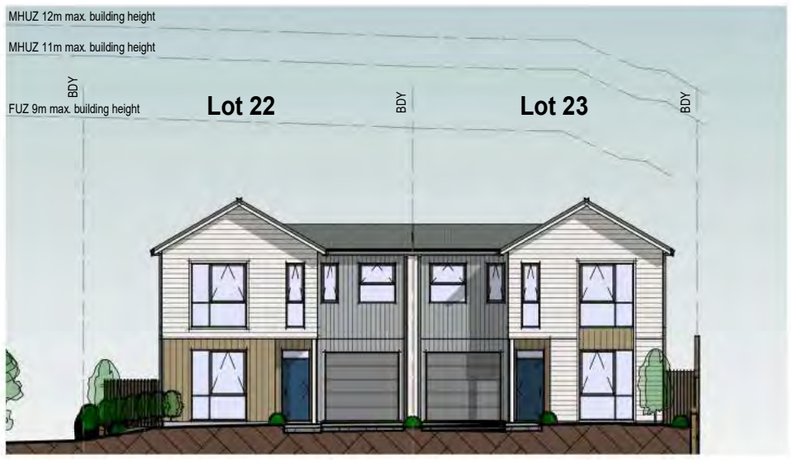
1 / 3.04A **Lots 17-23 North Elevation**

1 : 200



2 / 3.04A **Lots 17-23 South Elevation**

1 : 200



3 / 3.04A **Lots 17-23 West Elevation**

1 : 200

4 / 3.04A **Lots 17-23 East Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.04D**	Lots 17-23 Elevations	28/08/20

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1 **Lots 17-23 Perspective 1**

2 **Lots 17-23 Perspective 2**

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Job No.	Scale (A3):	Sheet no.	Lots 17-23 Perspectives	DATE
4167	NTS	**3.04E**		28/08/20

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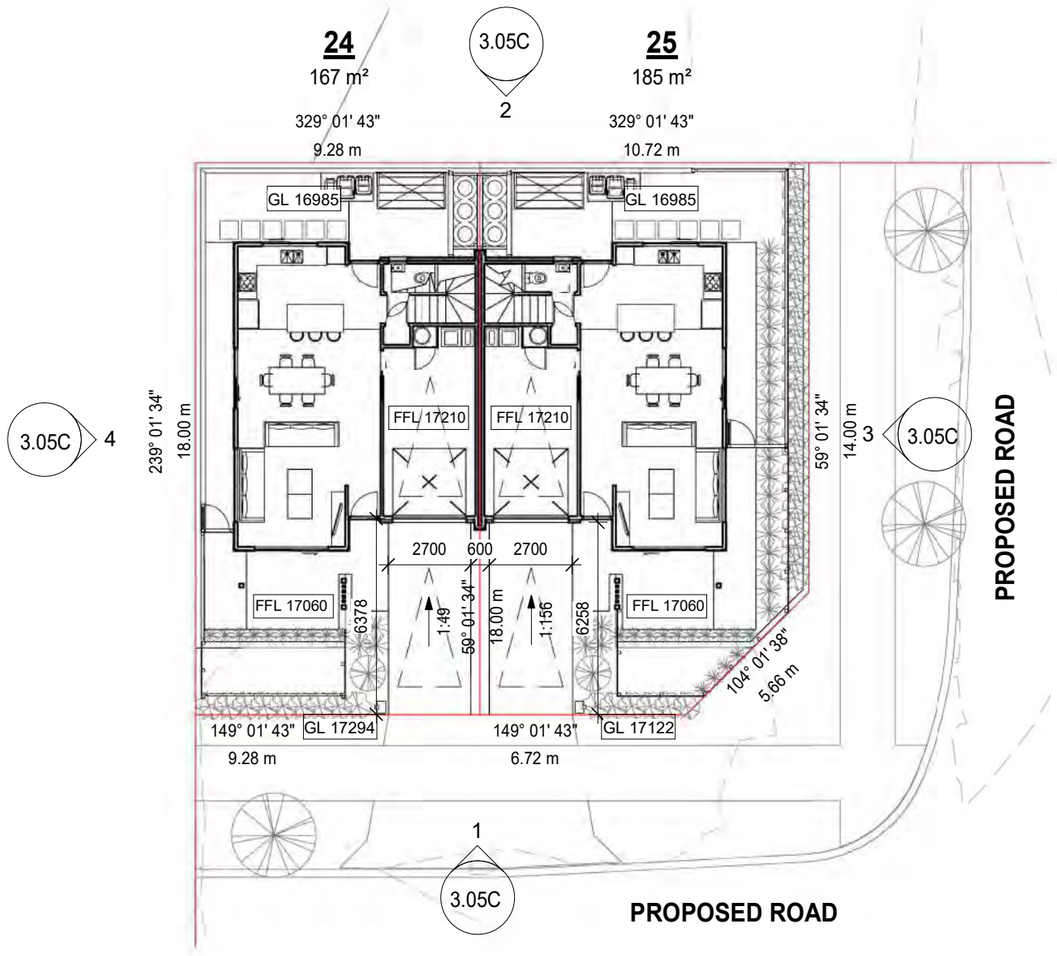
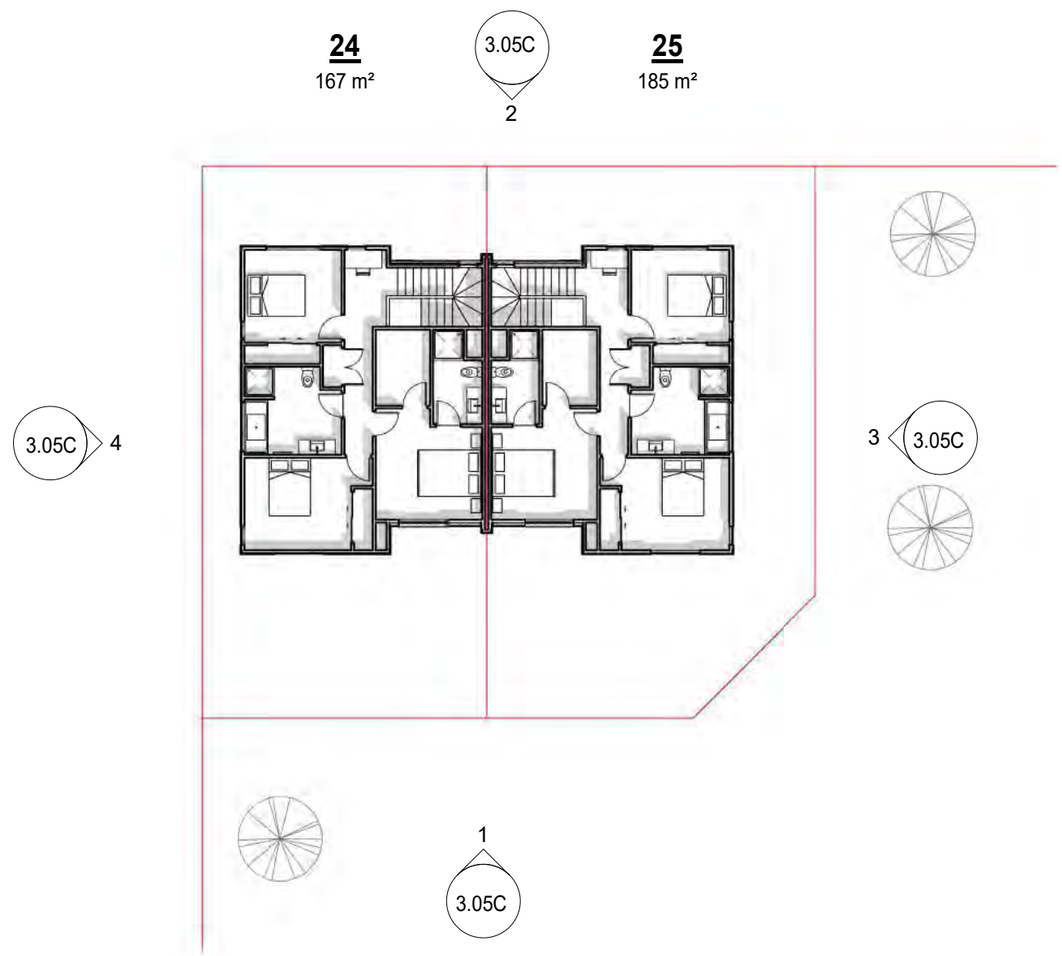


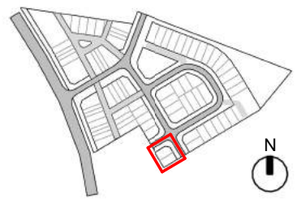
1 **Block Plan - Lots 24-25 Ground Floor**

1 : 200



2 **Block Plan - Lots 24-25 Upper Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.05A**	Lots 24-25 Floor Plans	28/08/20

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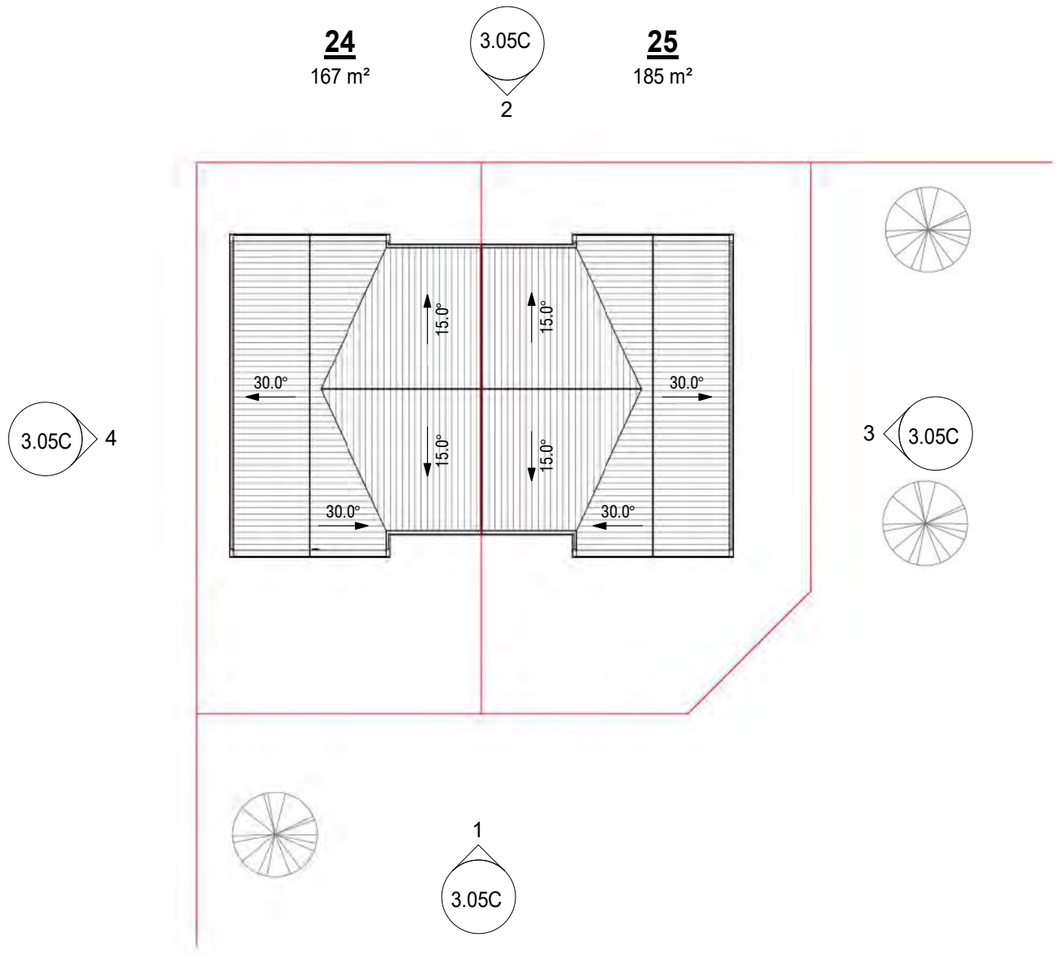

1 Block Plan - Lots 24-25 Roof Plan

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.05B**	Lots 24-25 Roof Plan	28/08/20

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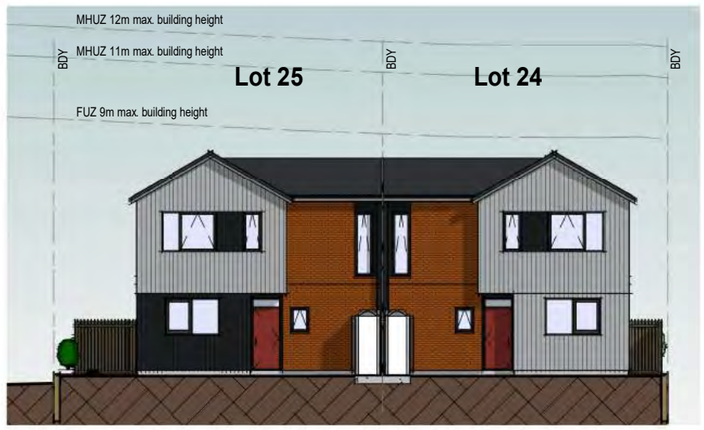
1 / 3.05A **Lots 24-25 East Elevation**

1 : 200

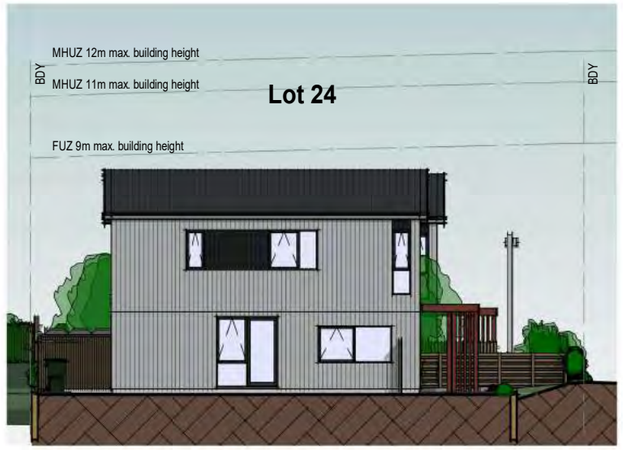


2 / 3.05A **Lots 24-25 West Elevation**

1 : 200

3 / 3.05A **Lots 24-25 South Elevation**

1 : 200



4 / 3.05A **Lots 24-25 North Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.05C**	Lots 24-25 Elevations	28/08/20

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1 **Lots 24-25 Perspective 1**

2 **Lots 24-25 Perspective 2**

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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**3.05D**	Lots 24-25 Perspectives	28/08/20

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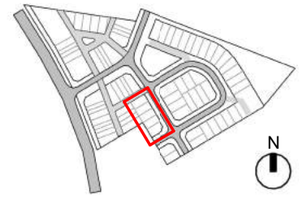
1 **Block Plan - Lots 26-30 Ground Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.06A**	Lots 26-30 Ground Floor	28/08/20

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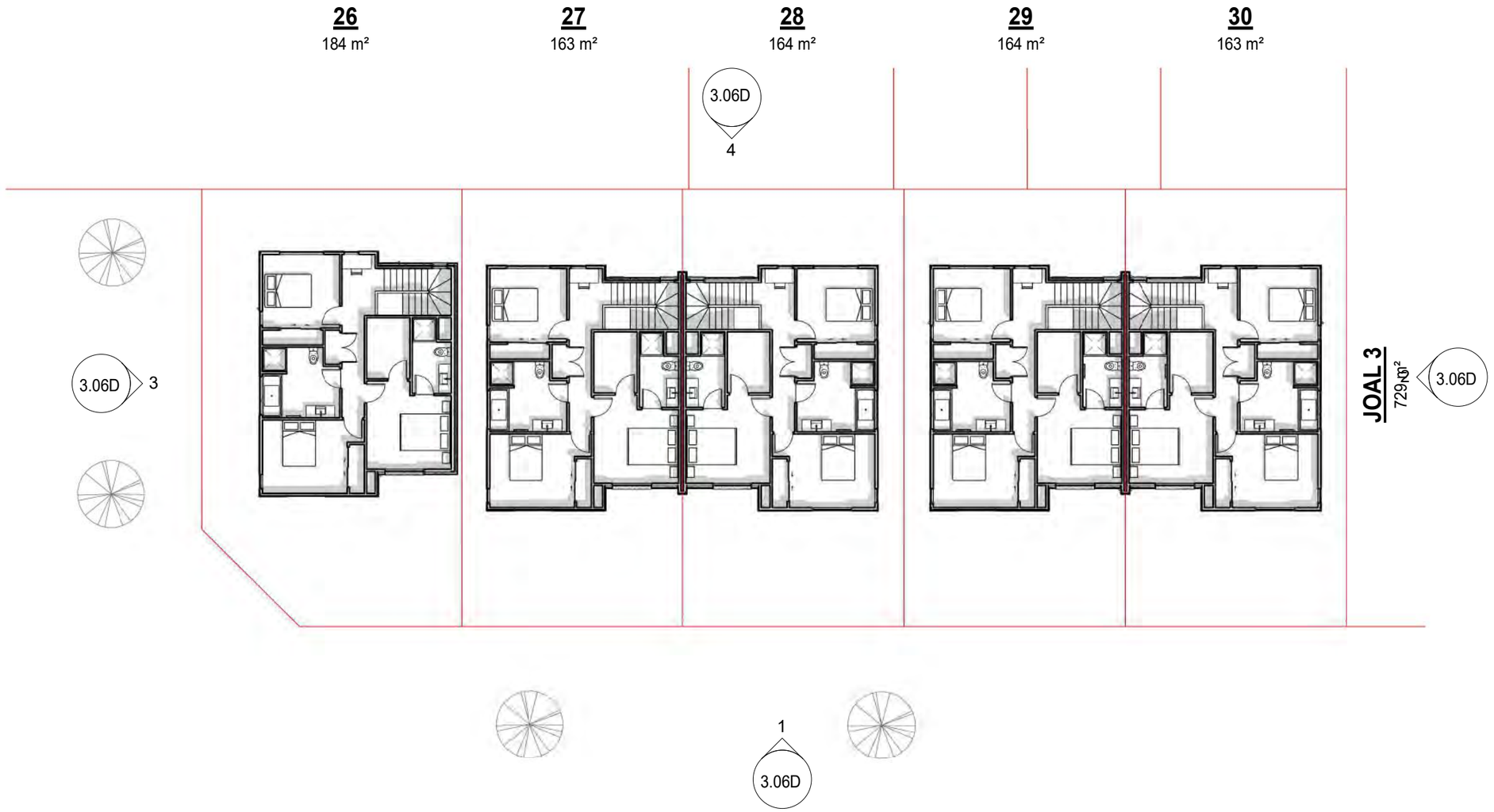

1 **Block Plan - Lots 26-30 Upper Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.06B**	Lots 26-30 Upper Floor	28/08/20

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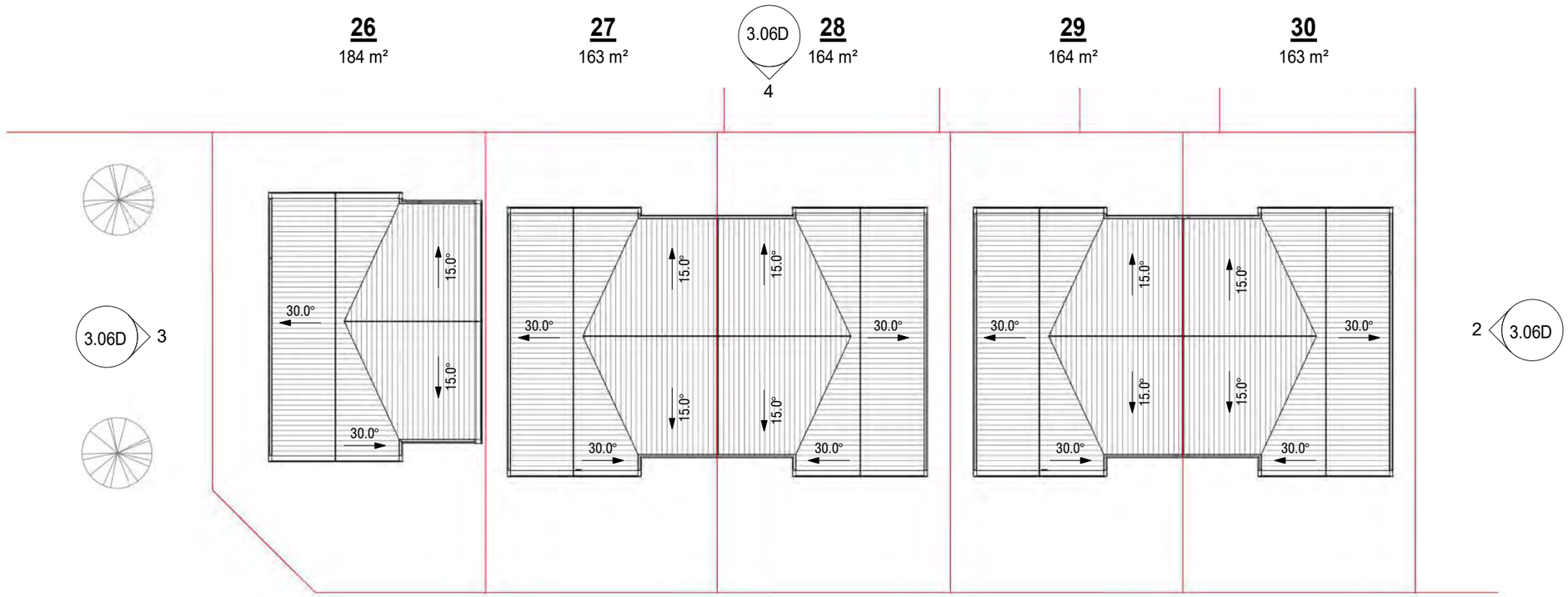
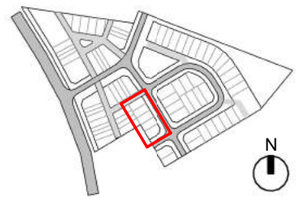


1 **Block Plan - Lots 26-30 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.06C**	Lots 26-30 Roof Plan	28/08/20

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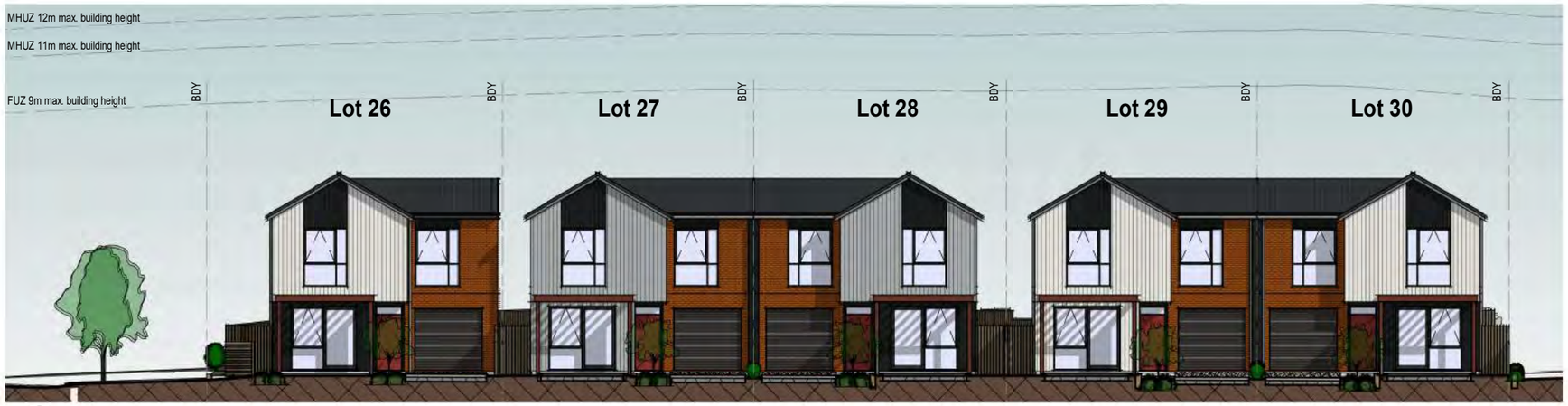


1 / 3.06A **Lots 26-30 West Elevation**

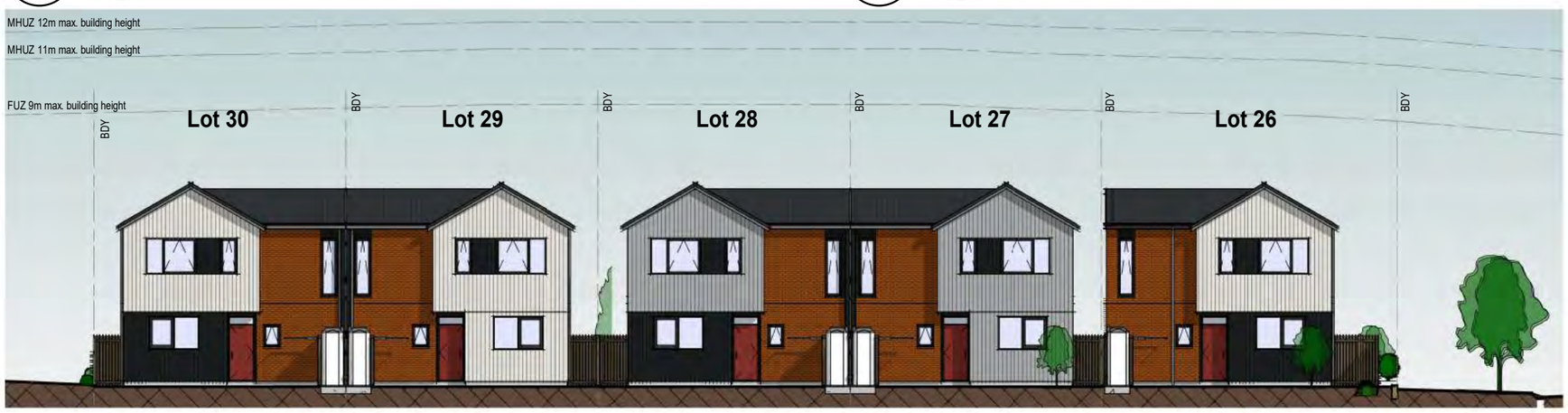
1 : 200

2 / 3.06A **Lots 26-30 North Elevation**

1 : 200

3 / 3.06A **Lots 26-30 South Elevation**

1 : 200



4 / 3.06A **Lots 26-30 East Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.06D**	Lots 26-30 Elevations	28/08/20

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1 **Lots 26-30 Perspective 1**

2 **Lots 26-30 Perspective 2**

3 **Lots 26-30 Perspective 3**

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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**3.06E**	Lots 26-30 Perspectives	28/08/20

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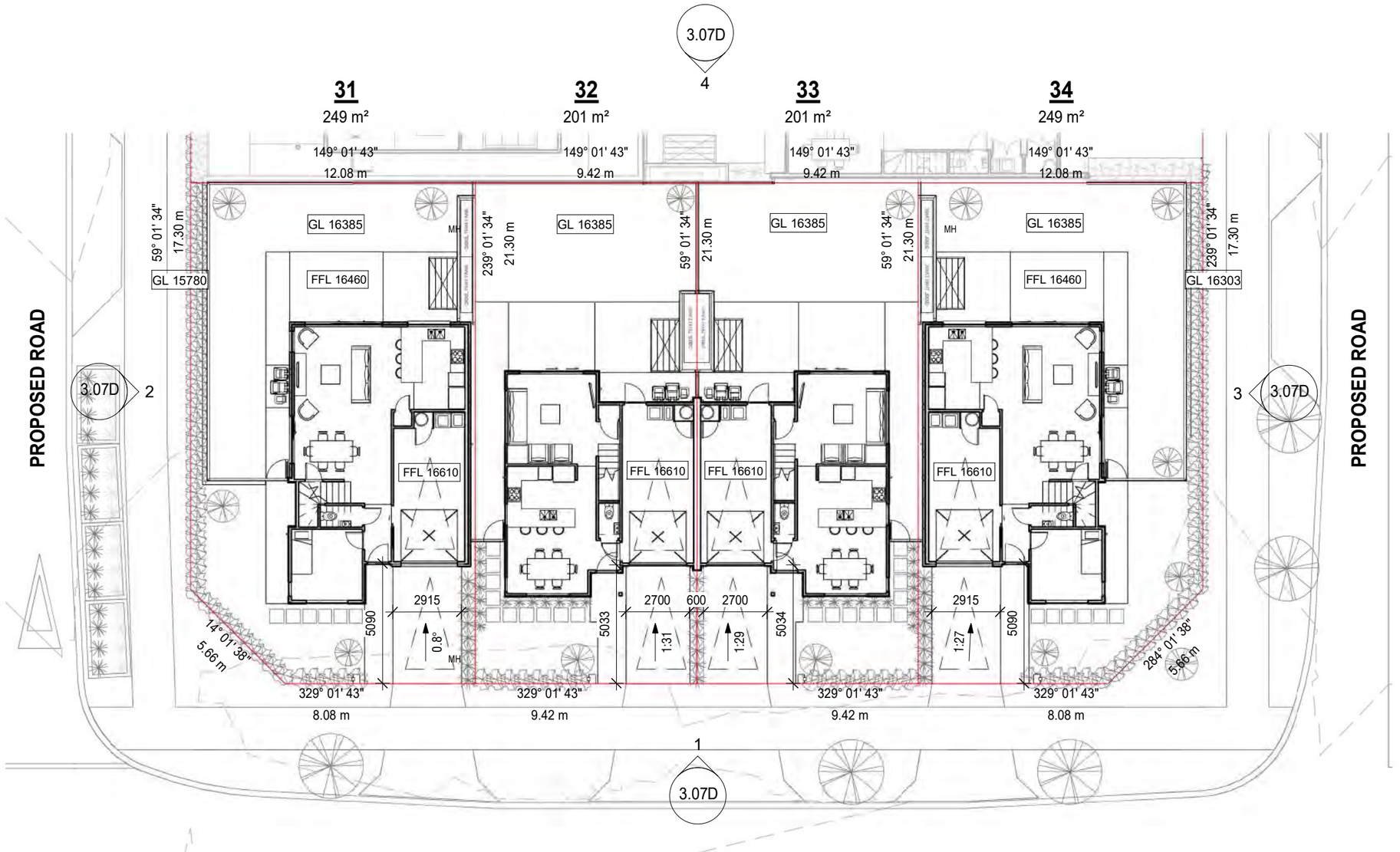
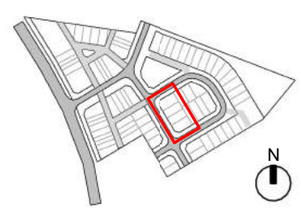


1 Block Plan - Lots 31-34 Ground Floor

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.07A**	Lots 31-34 Ground Floor	28/08/20

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1 **Block Plan - Lots 31-34 Upper Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.07B**	Lots 31-34 Upper Floor	28/08/20

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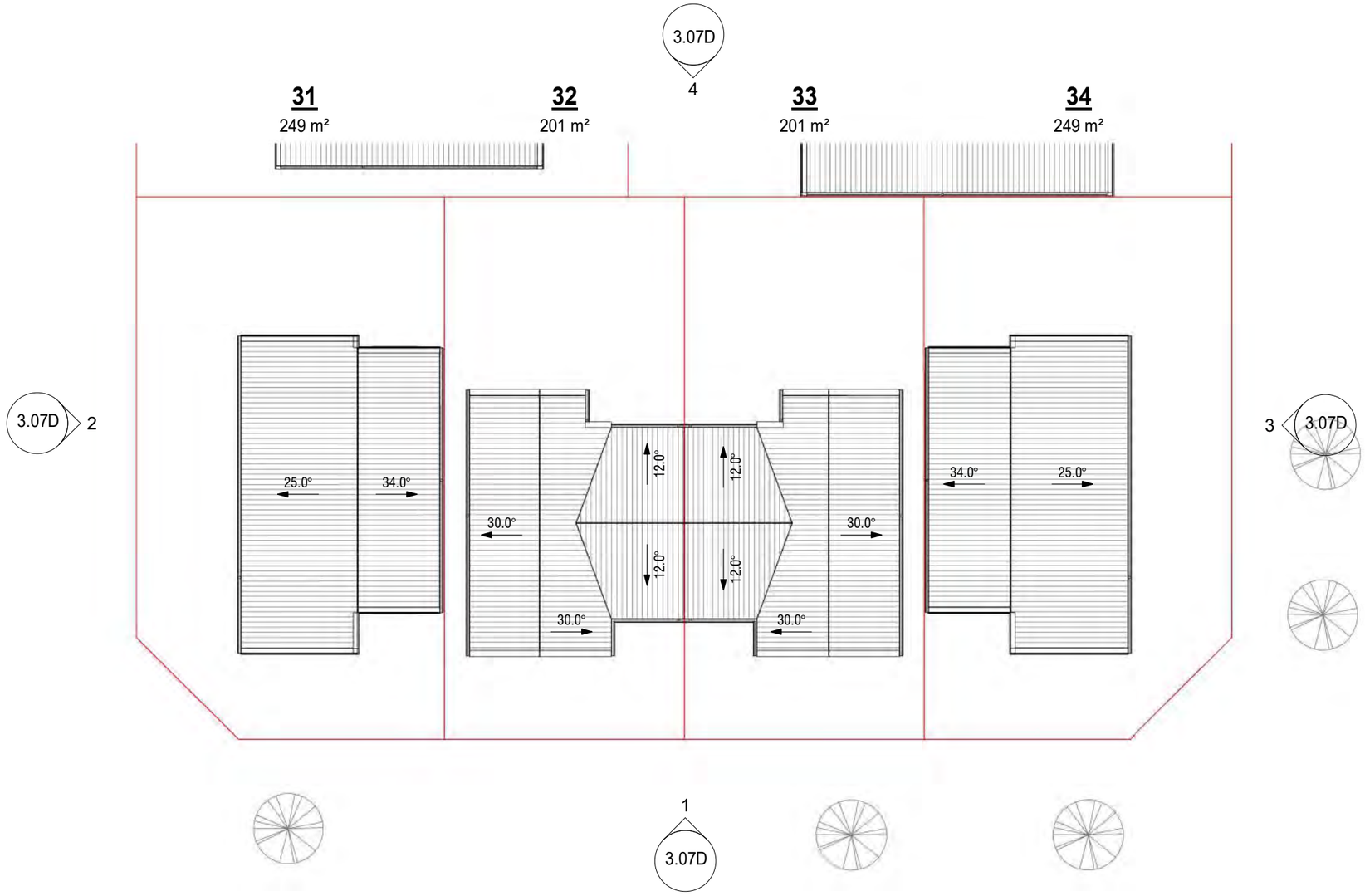

1 **Block Plan - Lots 31-34 Roof Plan**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.07C**	Lots 31-34 Roof Plan	28/08/20

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1 / 3.07A **Lots 31-34 East Elevation**

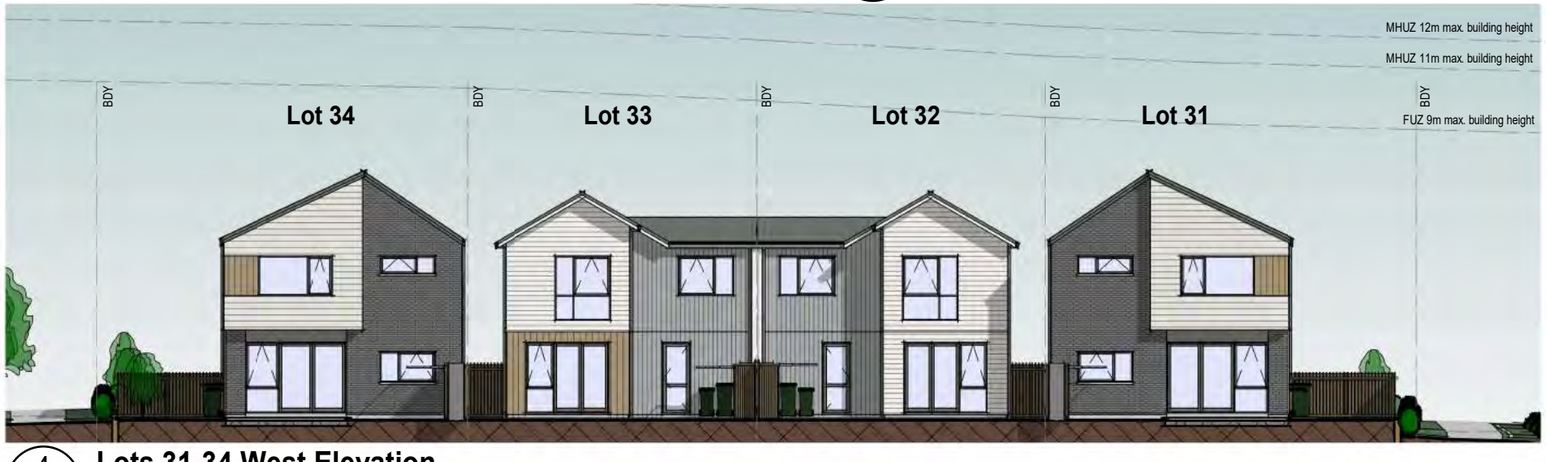
1 : 200

2 / 3.07A **Lots 31-34 North Elevation**

1 : 200

3 / 3.07A **Lots 31-34 South Elevation**

1 : 200



4 / 3.07A **Lots 31-34 West Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.	Lots 31-34 Elevations	DATE
4167	1 : 200	**3.07D**		28/08/20

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1 **Lots 31-34 Perspective 1**

2 **Lots 31-34 Perspective 2**

3 **Lots 31-34 Perspective 3**

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Job No.	Scale (A3):	Sheet no.	Lots 31-34 Perspectives	DATE
4167	NTS	**3.07E**		28/08/20

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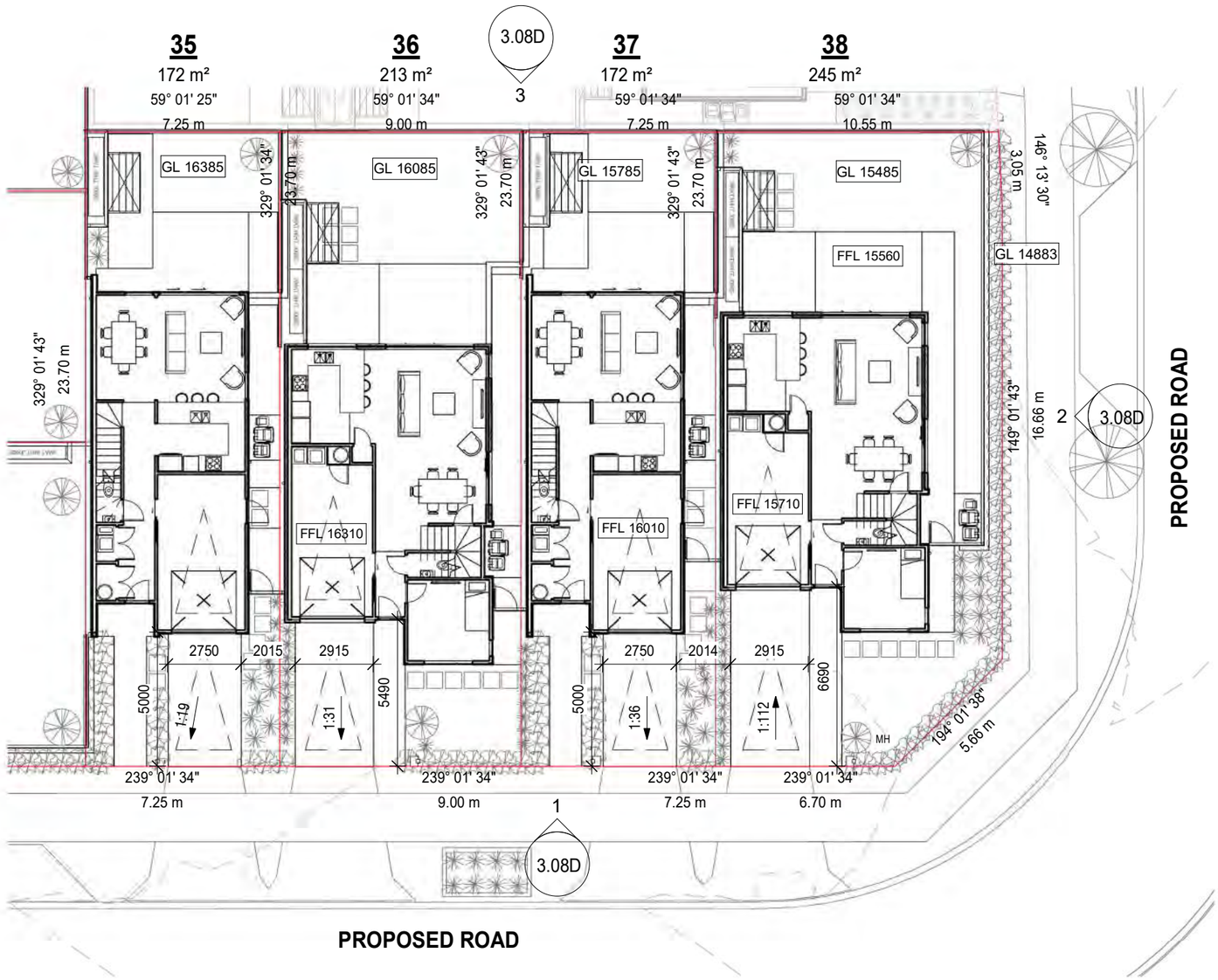
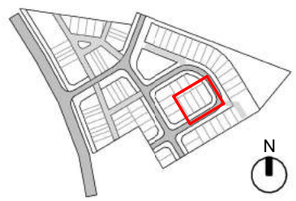


1 Block Plan - Lots 35-38 Ground Floor

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.08A**	Lots 35-38 Ground Floor	28/08/20

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1 **Block Plan - Lots 35-38 Upper Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.08B**	Lots 35-38 Upper Floor	28/08/20

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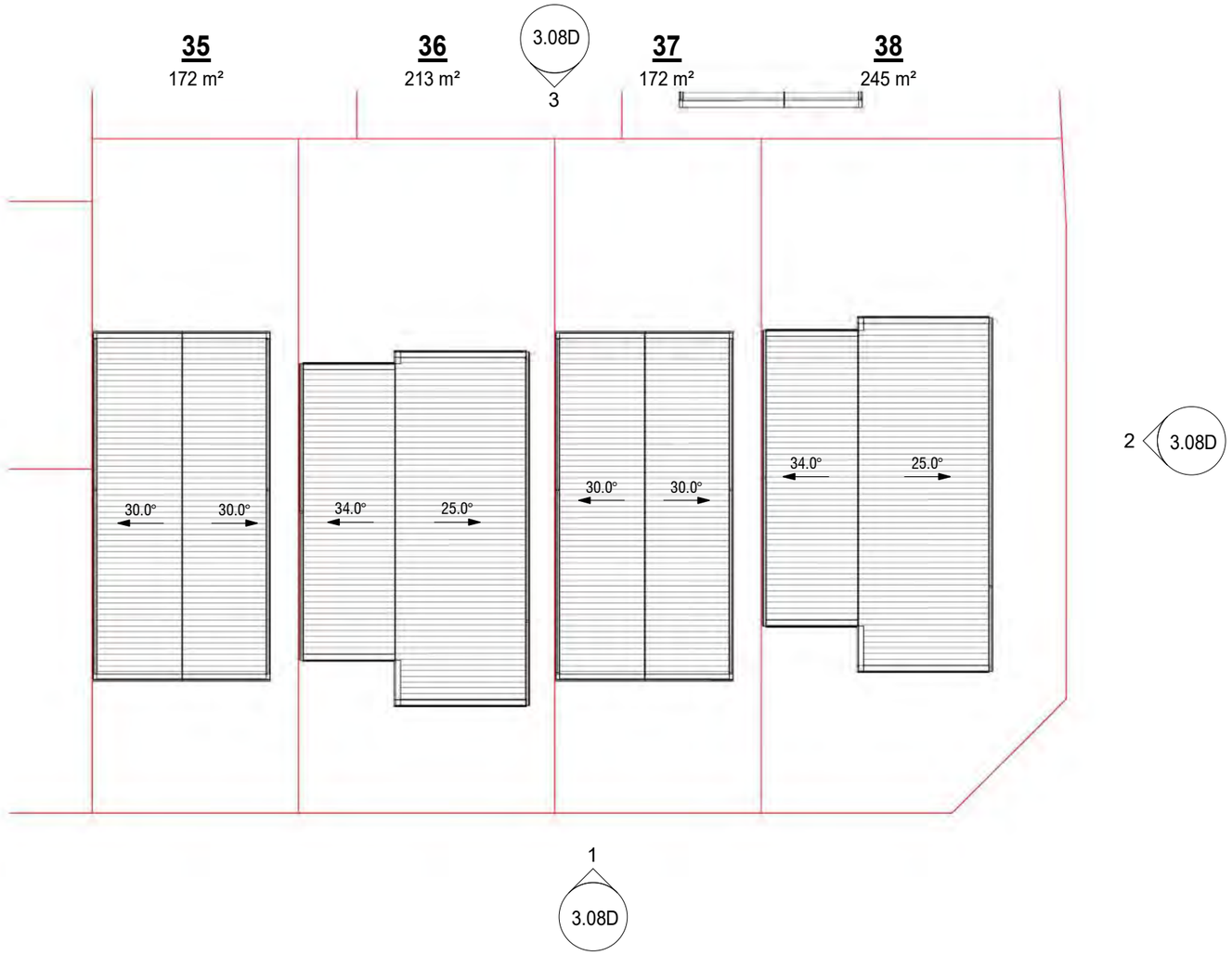
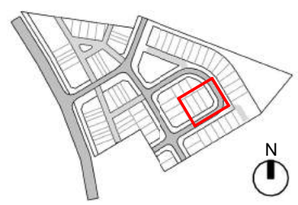


1 **Block Plan - Lots 35-38 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.08C**	Lots 35-38 Roof Plan	28/08/20

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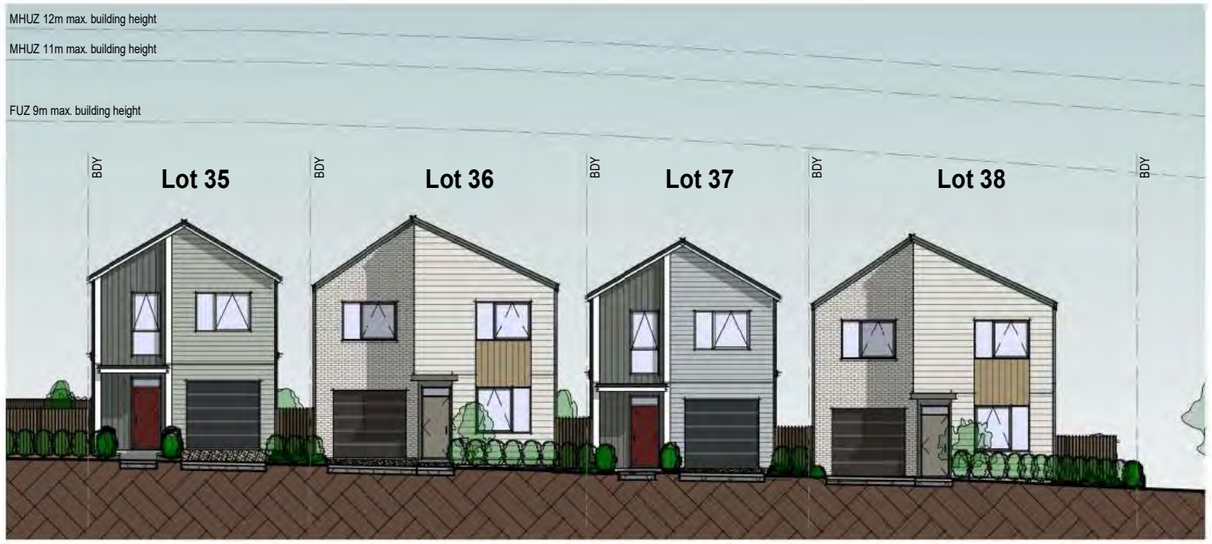
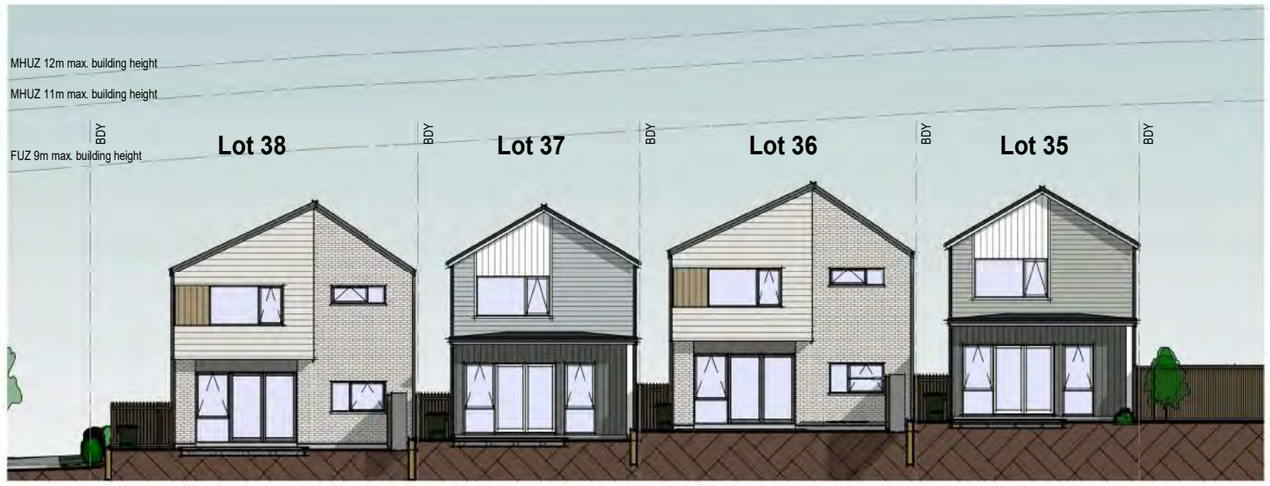


1 / 3.08A **Lots 35-38 South Elevation**

1 : 200

2 / 3.08A **Lots 35-38 West Elevation**

1 : 200



3 / 3.08A **Lots 35-38 North Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.08D**	Lots 35-38 Elevations	28/08/20

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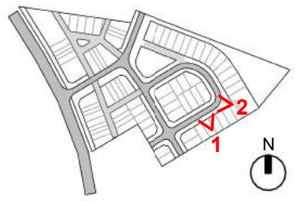
1 **Lots 35-38 Perspective 1**

2 **Lots 35-38 Perspective 2**



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Job No.	Scale (A3):	Sheet no.	Lots 35-38 Perspectives	DATE
4167	NTS	**3.08E**		28/08/20

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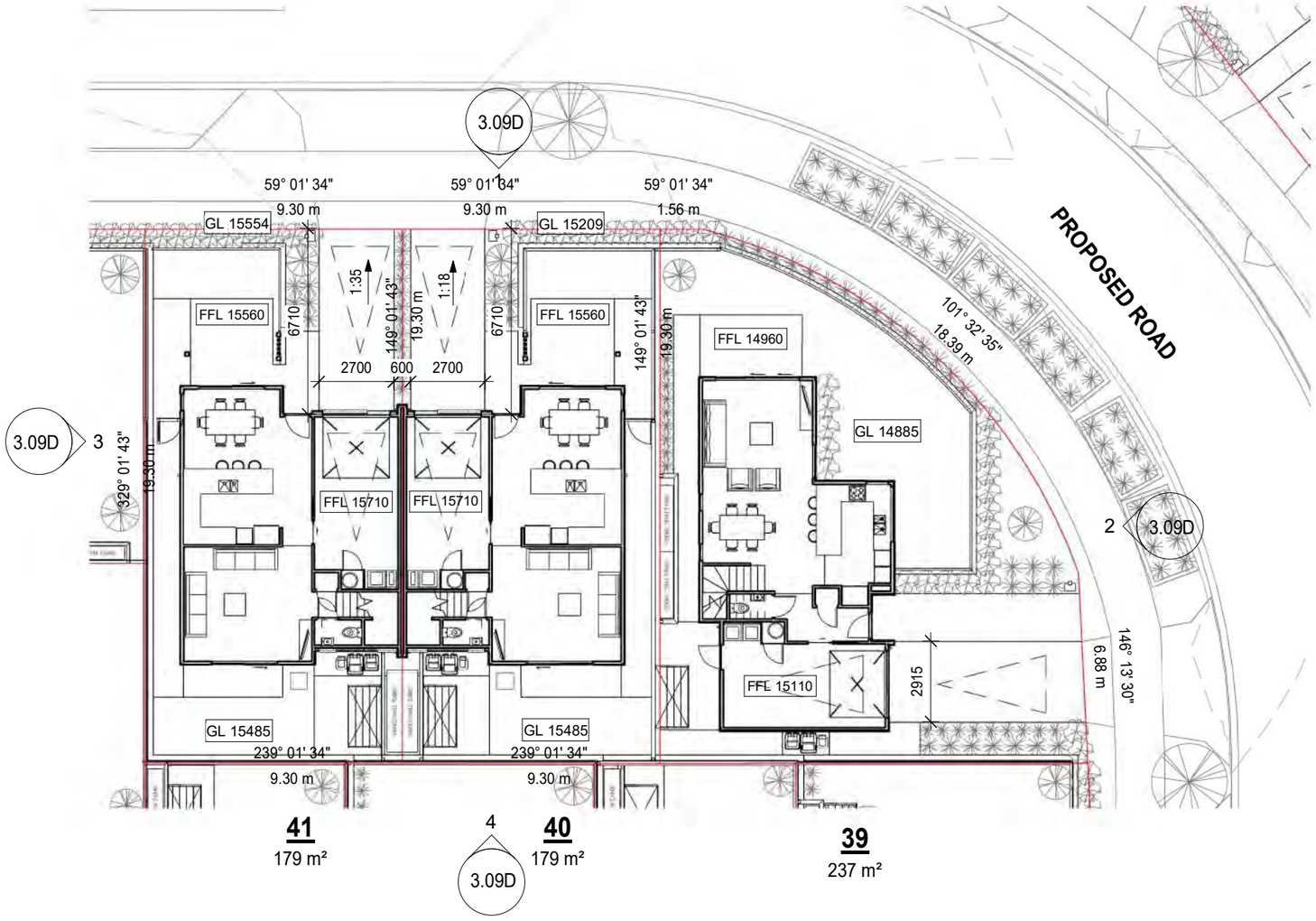

1 Block Plan - Lots 39-41 Ground Floor

1 : 200

520 GSR
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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.09A**	Lots 39-41 Ground Floor	28/08/20

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1 **Block Plan - Lots 39-41 Upper Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.09B**	Lots 39-41 Upper Floor	28/08/20

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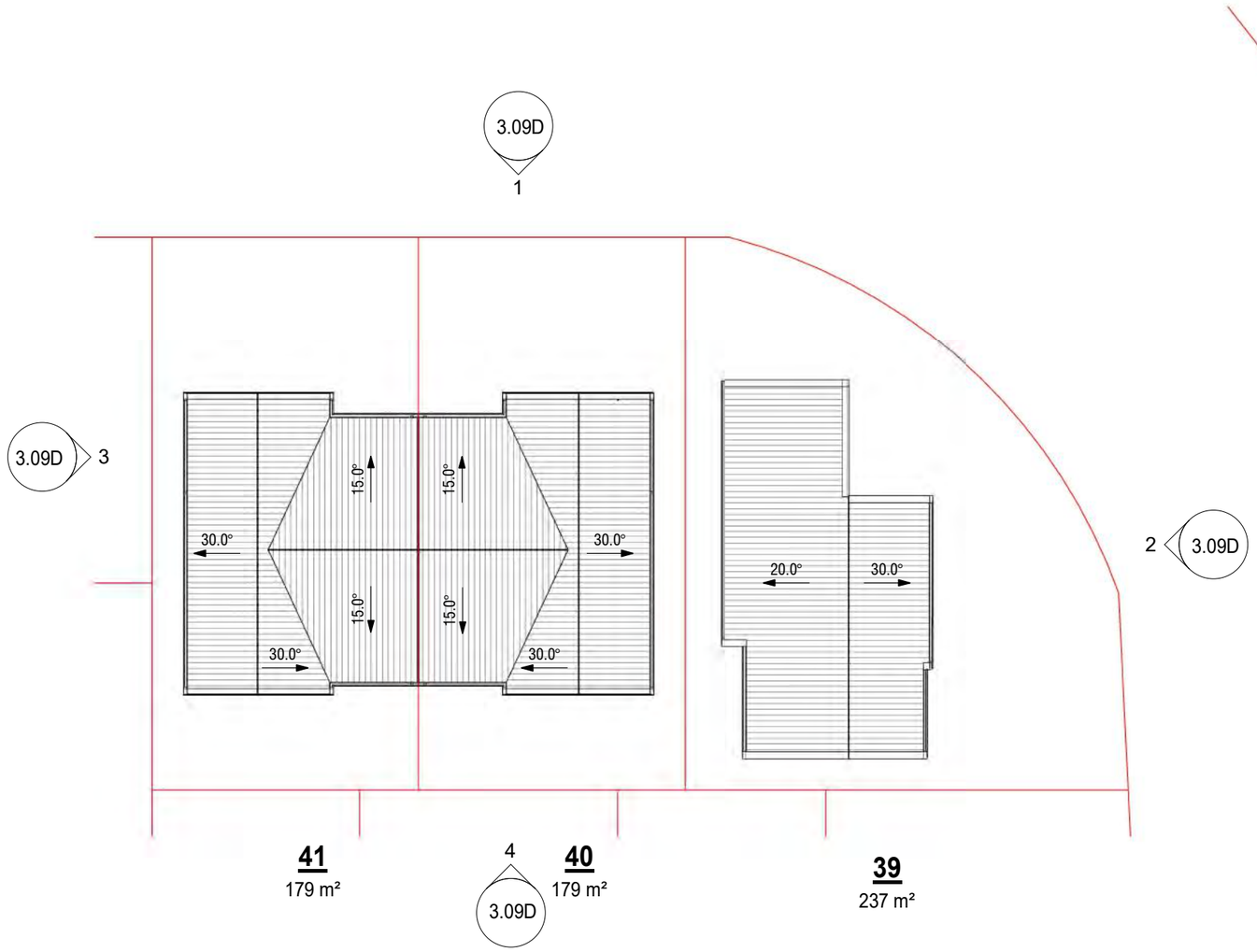
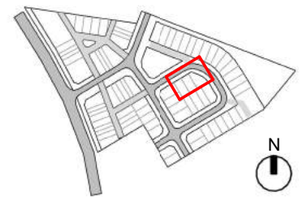


1 Block Plan - Lots 39-41 Roof Plan

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.09C**	Lots 39-41 Roof Plan	28/08/20

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1 / 3.09A **Lots 39-41 North Elevation**

1 : 200

2 / 3.09A **Lots 39-41 East Elevation**

1 : 200

3 / 3.09A **Lots 39-41 West Elevation**

1 : 200

4 / 3.09A **Lots 39-41 South Elevation**

1 : 200

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4167	1 : 200	**3.09D**	Lots 39-41 Elevations	28/08/20

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1 **Lots 39-41 Perspective 1**

2 **Lots 39-41 Perspective 2**

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Job No.	Scale (A3):	Sheet no.	Lots 39-41 Perspectives	DATE
4167	NTS	**3.09E**		28/08/20

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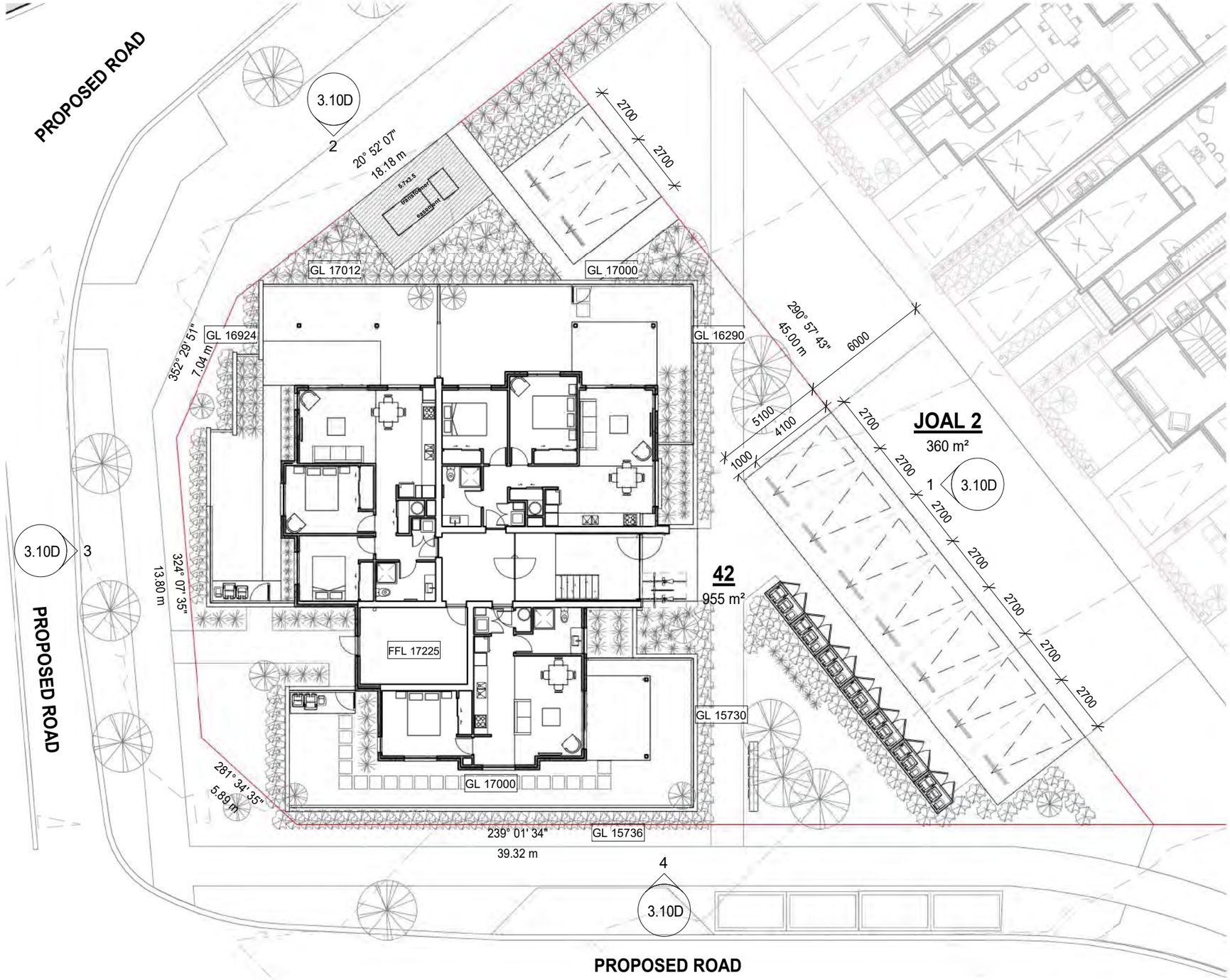

1 **Block Plan - Lot 42 Ground Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.10A**	Lot 42 Ground Floor	28/08/20

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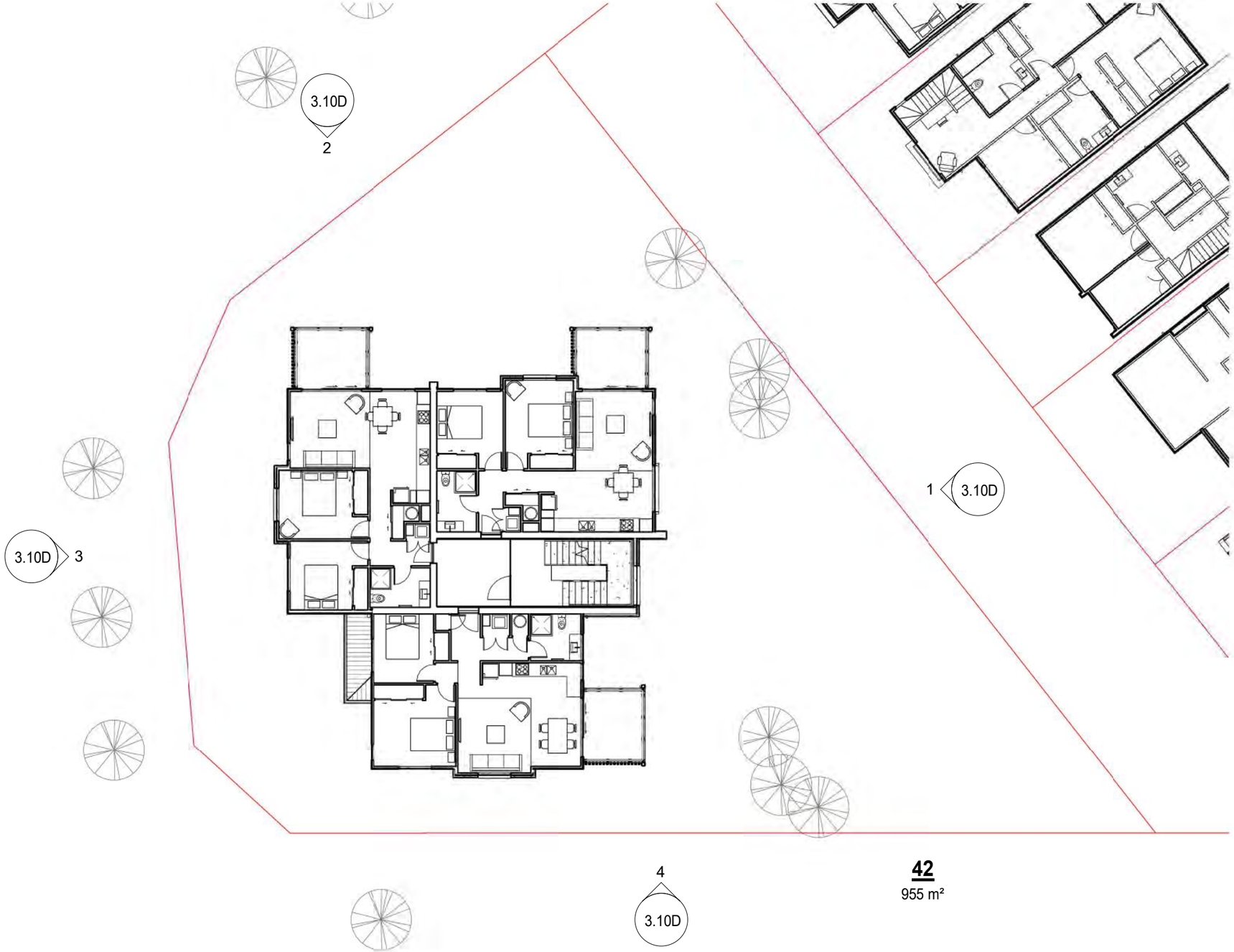
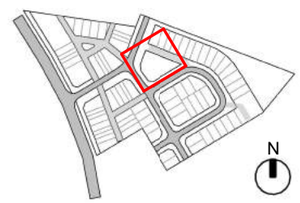


1 **Block Plan - Lot 42 Upper Floors**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.10B**	Lot 42 Upper Floors	28/08/20

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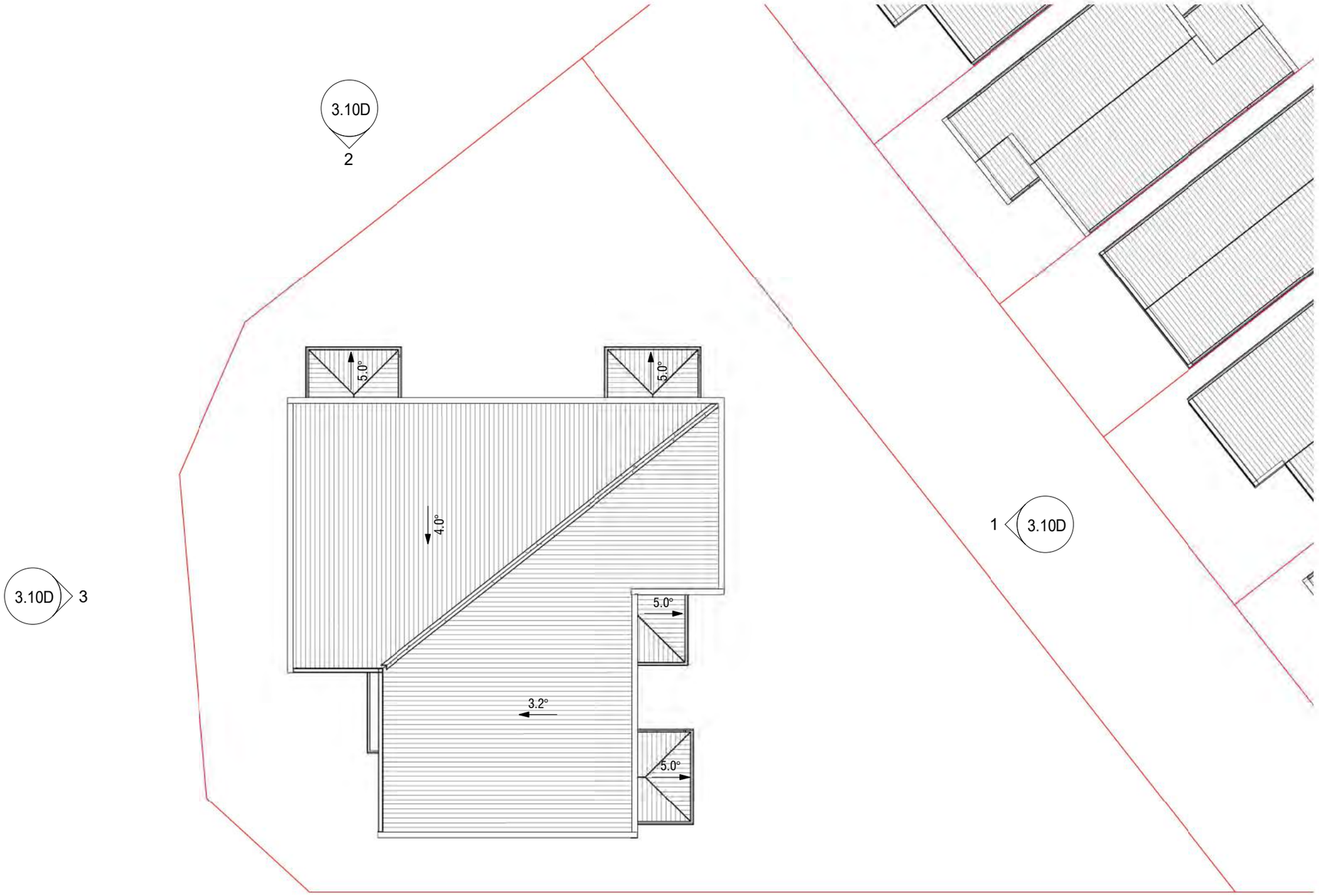

1 Block Plan - Lot 42 Roof Plan

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.10C**	Lot 42 Roof Plan	28/08/20

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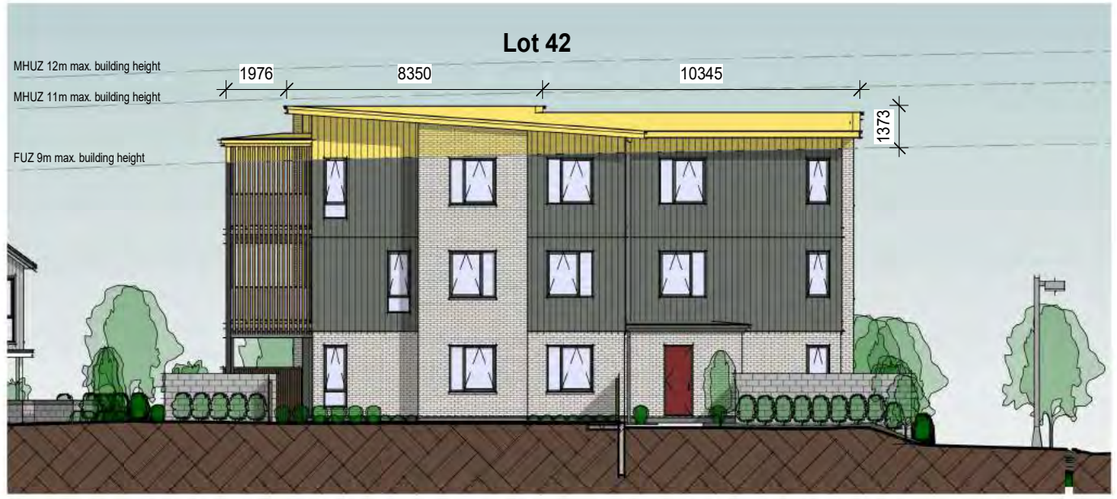
1 / 3.10A **Lot 42 East Elevation**

1 : 200

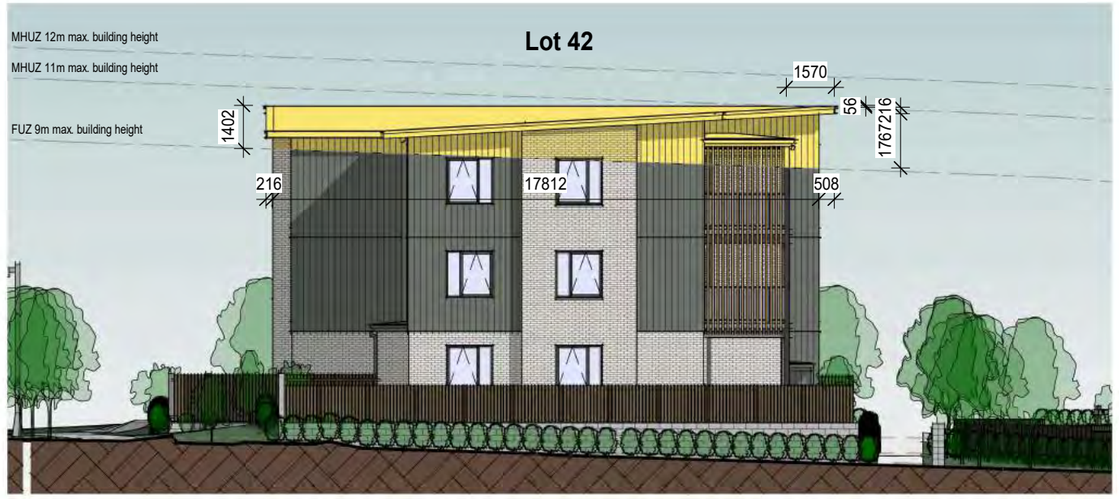
2 / 3.10A **Lot 42 North Elevation**

1 : 200



3 / 3.10A **Lot 42 West Elevation**

1 : 200



4 / 3.10A **Lot 42 South Elevation**

1 : 200

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4167	1 : 200	**3.10D**	Lot 42 Elevations	28/08/20

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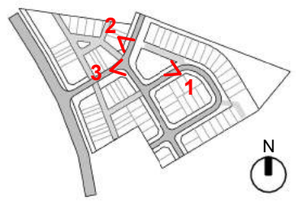
1 **Lot 42 Perspective 1**

2 **Lot 42 Perspective 2**

3 **Lot 42 Perspective 3**



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4167	NTS	**3.10E**		28/08/20

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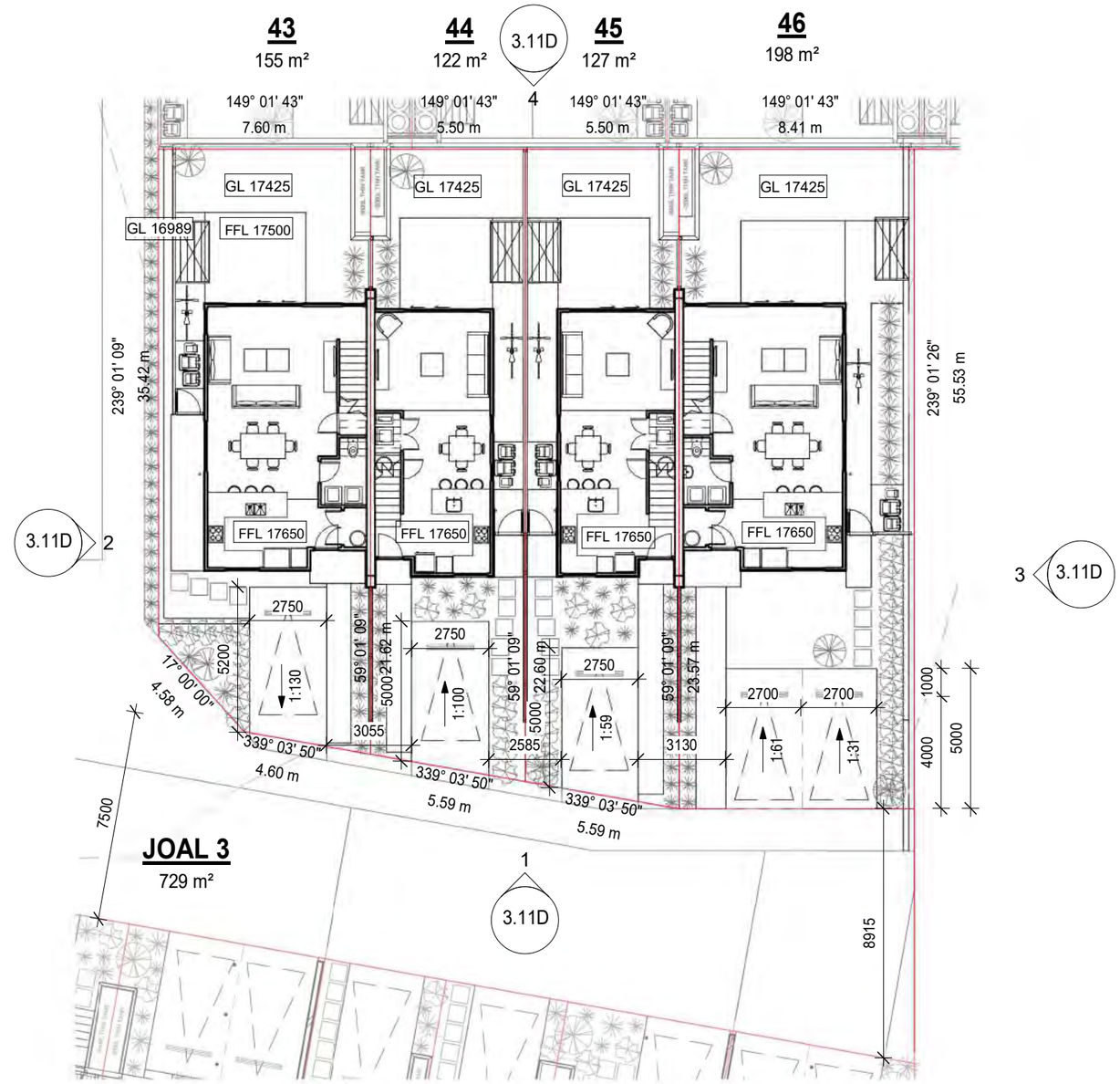
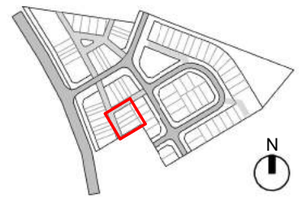


1 Block Plan - Lots 43-46 Ground Floor

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.11A**	Lots 43-46 Ground Floor	28/08/20

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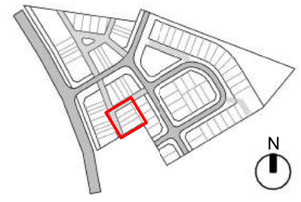
1 Block Plan - Lots 43-46 Upper Floor

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.11B**	Lots 43-46 Upper Floor	28/08/20

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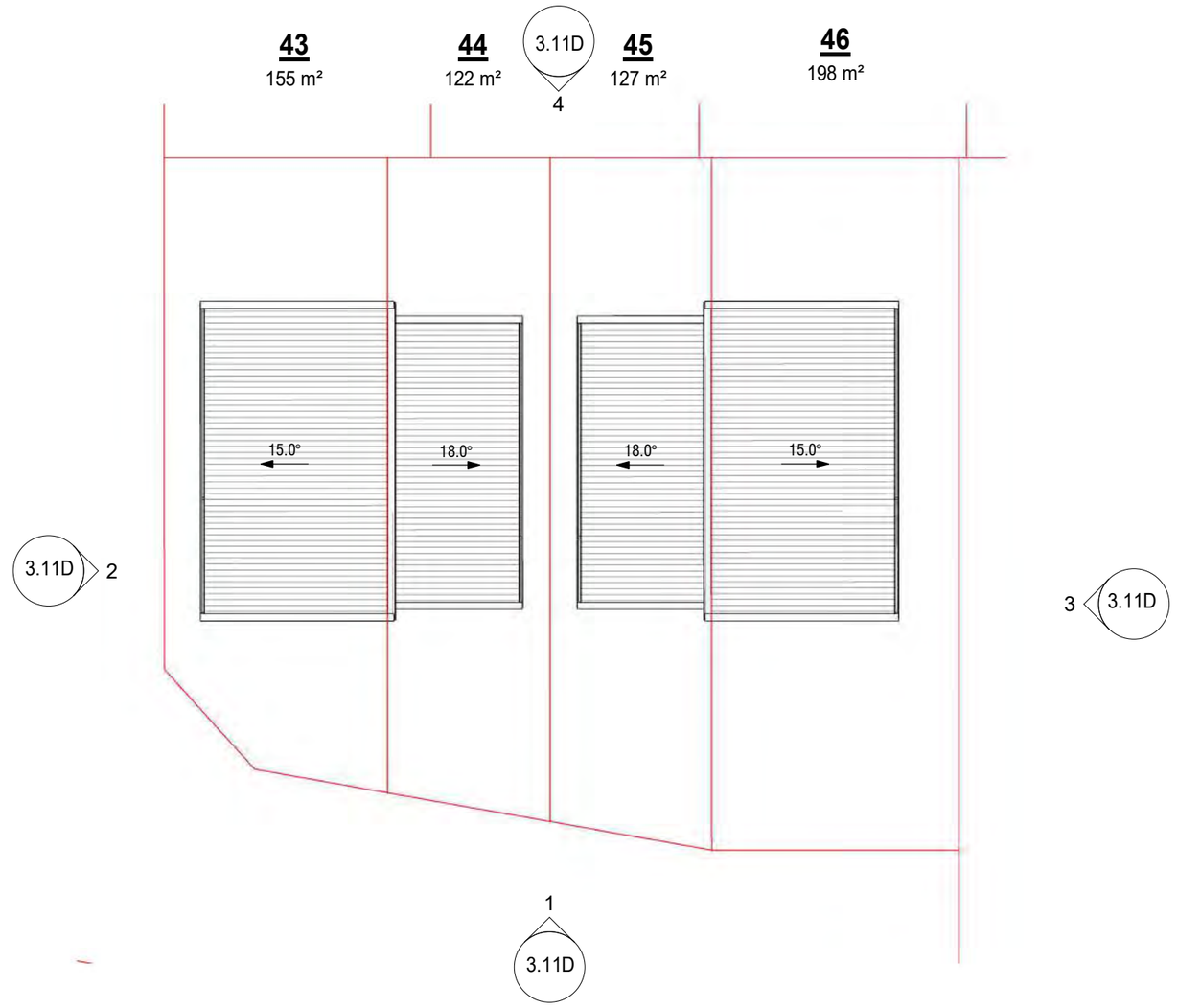
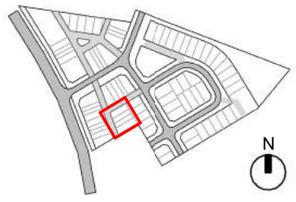


1 **Block Plan - Lots 43-46 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.11C**	Lots 43-46 Roof Plan	28/08/20

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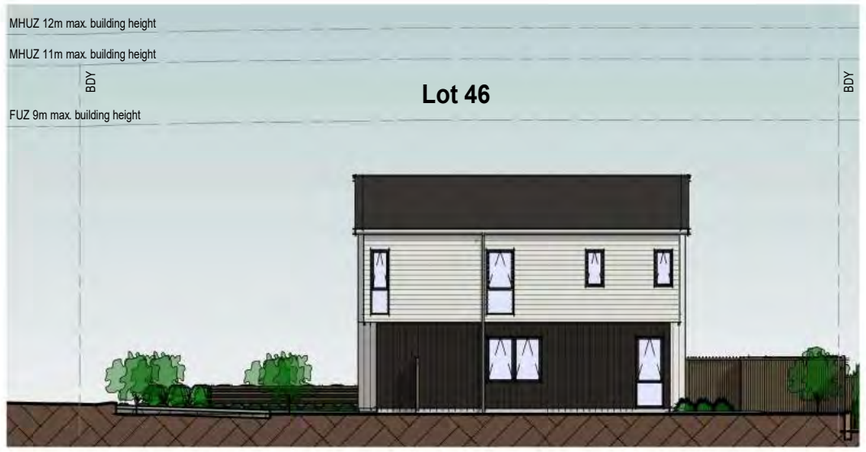
1 / 3.11A **Lots 43-46 West Elevation**

1 : 200

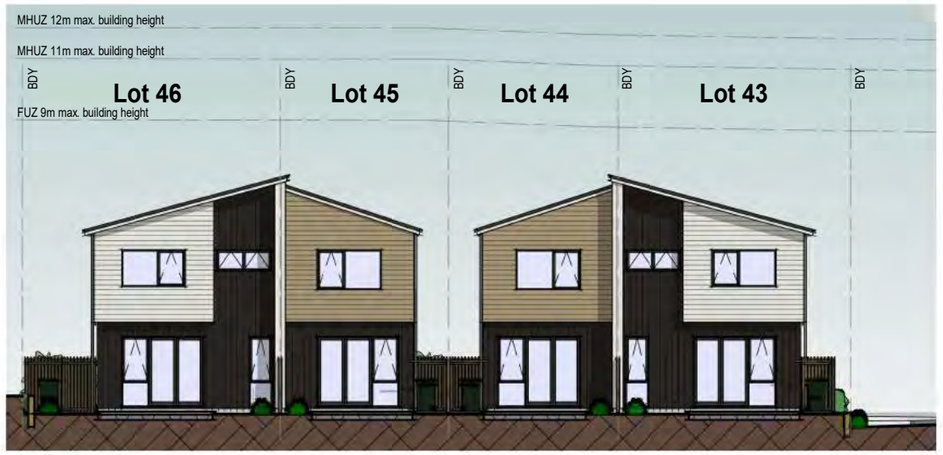
2 / 3.11A **Lots 43-46 North Elevation**

1 : 200



3 / 3.11A **Lots 43-46 South Elevation**

1 : 200



4 / 3.11A **Lots 43-46 East Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.11D**	Lots 43-46 Elevations	28/08/20

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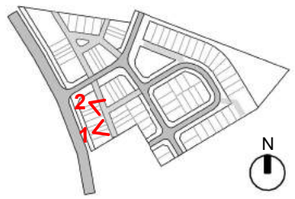
1 **Lots 43-46 Perspective 1**

2 **Lots 43-46 Perspective 2**



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Job No.	Scale (A3):	Sheet no.	Lots 43-46 Perspectives	DATE
4167	NTS	**3.11E**		28/08/20

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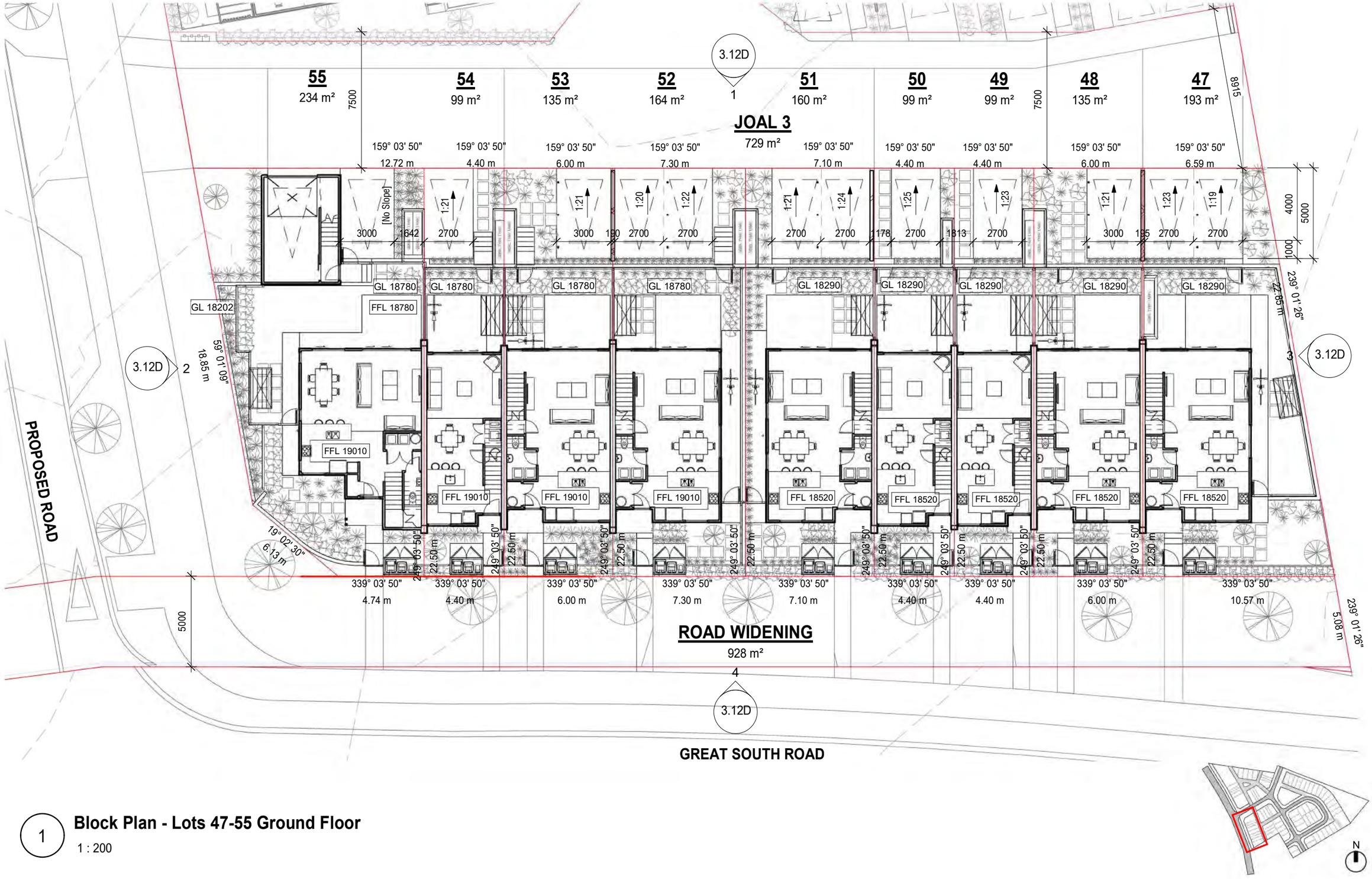

1 **Block Plan - Lots 47-55 Ground Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.12A**	Lots 47-55 Ground Floor	28/08/20

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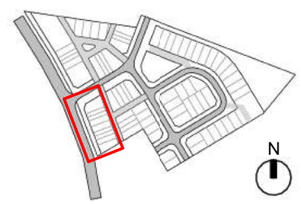
1 **Block Plan - Lots 47-55 Upper Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.12B**	Lots 47-55 Upper Floor	28/08/20

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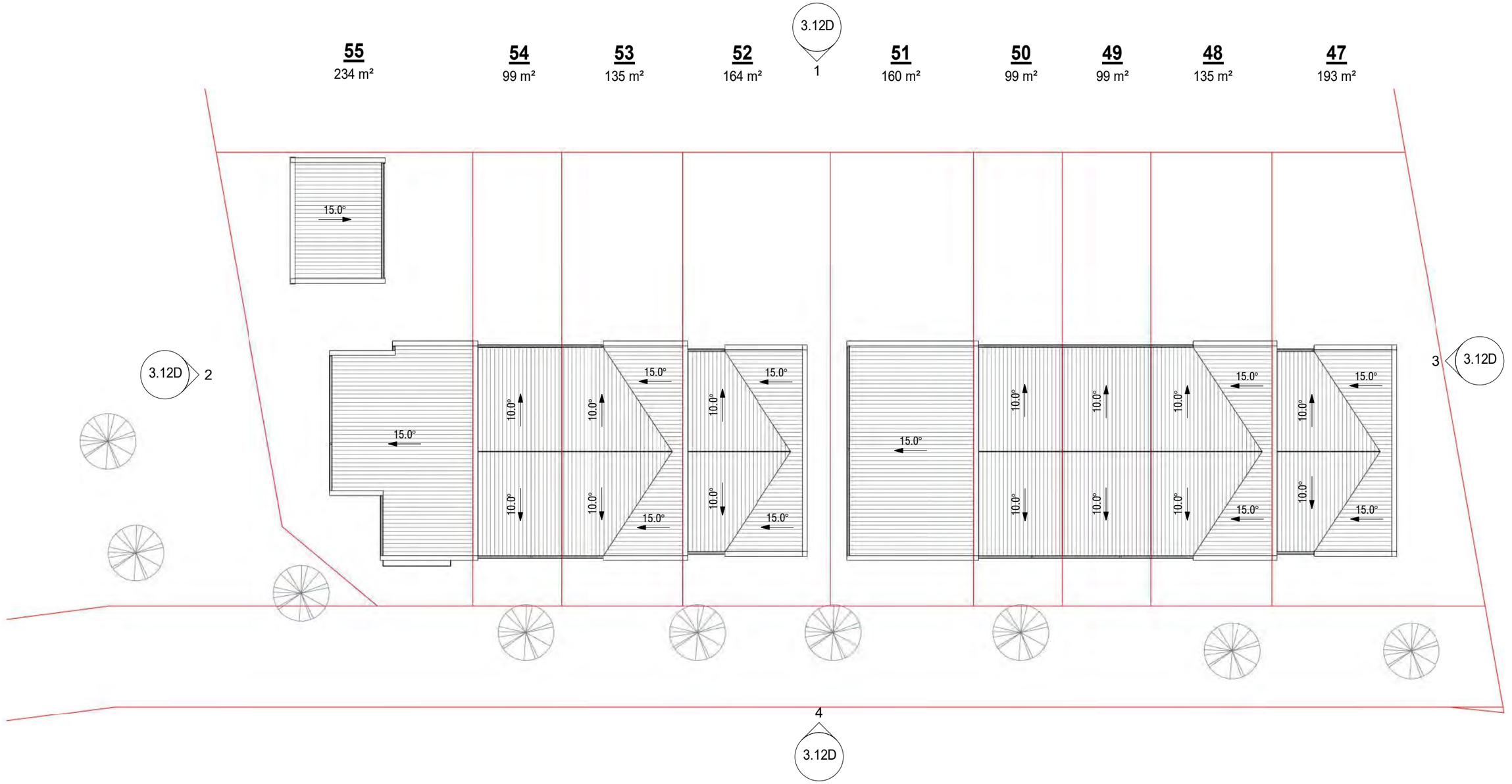
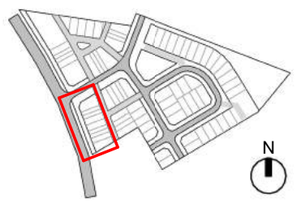


1 **Block Plan - Lots 47-55 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.12C**	Lots 47-55 Roof Plan	28/08/20

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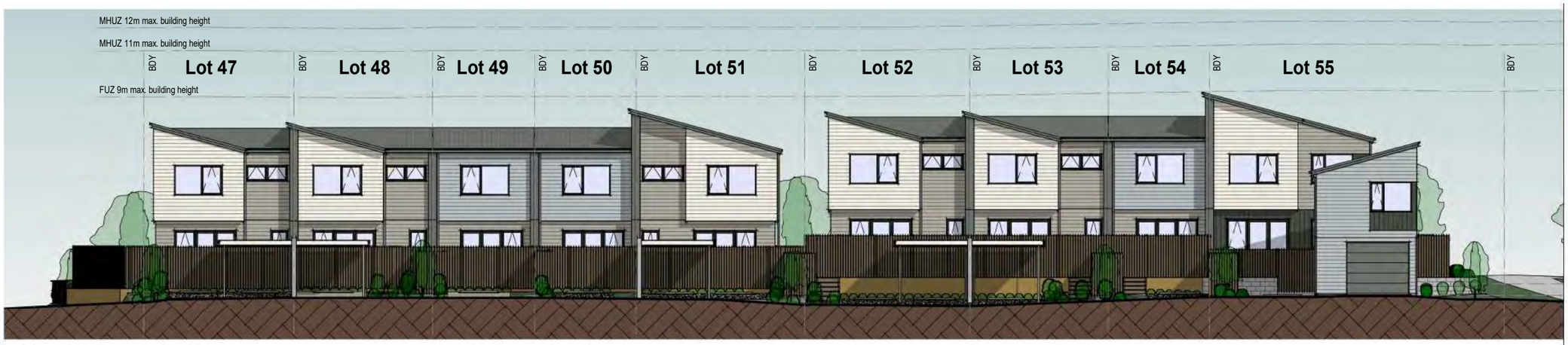


1 / 3.12A **Lots 47-55 East Elevation**

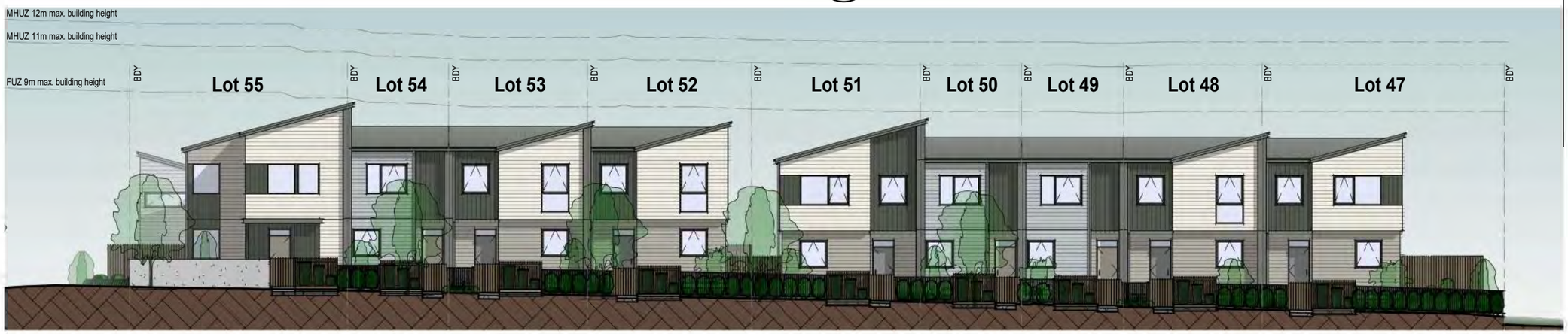
1 : 200

2 / 3.12A **Lots 47-55 North Elevation**

1 : 200

3 / 3.12A **Lots 47-55 South Elevation**

1 : 200



4 / 3.12A **Lots 47-55 West Elevation**

1 : 200

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4167	1 : 200	**3.12D**	Lots 47-55 Elevations	28/08/20

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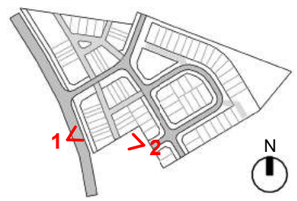
1 **Lots 47-55 Perspective 1**

2 **Lots 47-55 Perspective 2**



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Job No.	Scale (A3):	Sheet no.	Lots 47-55 Perspectives	DATE
4167	NTS	**3.12E**		28/08/20

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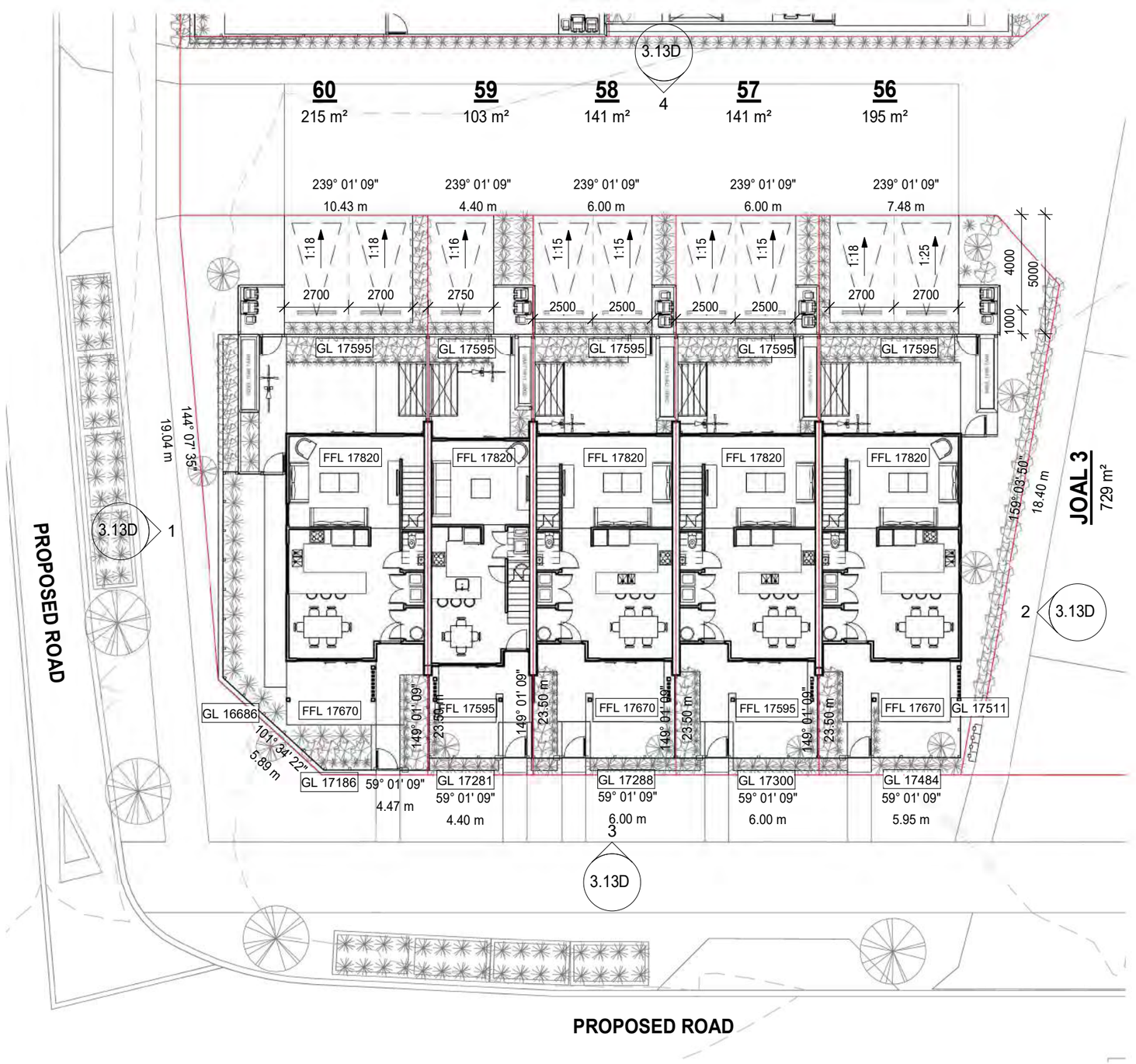
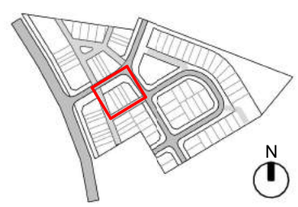


1 **Block Plan - Lots 56-60 Ground Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.13A**	Lots 56-60 Ground Floor	28/08/20

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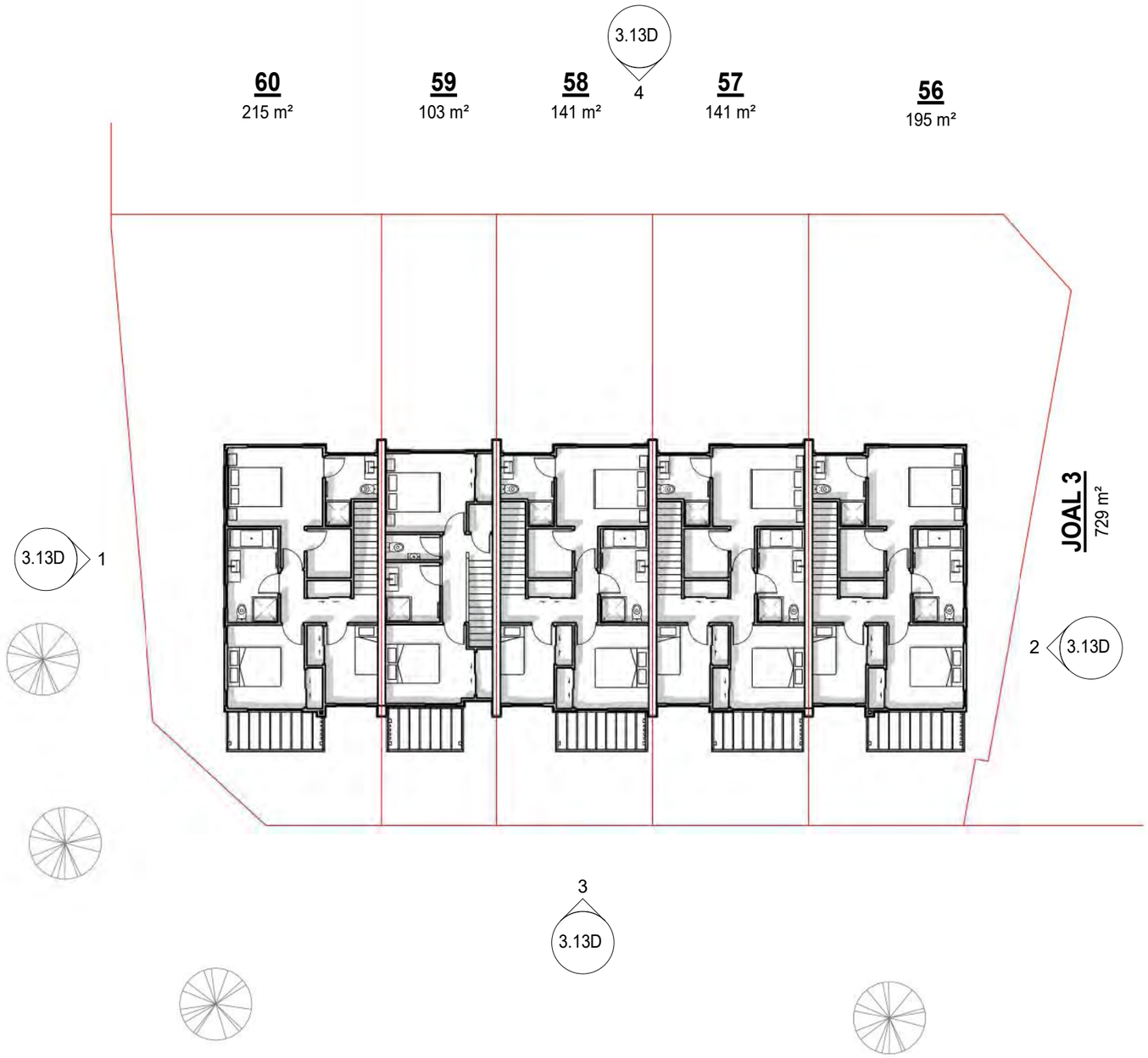

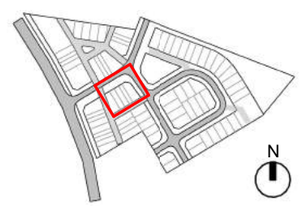

1 **Block Plan - Lots 56-60 Upper Floor**

1 : 200

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4167	As indicated	**3.13B**	Lots 56-60 Upper Floor	28/08/20

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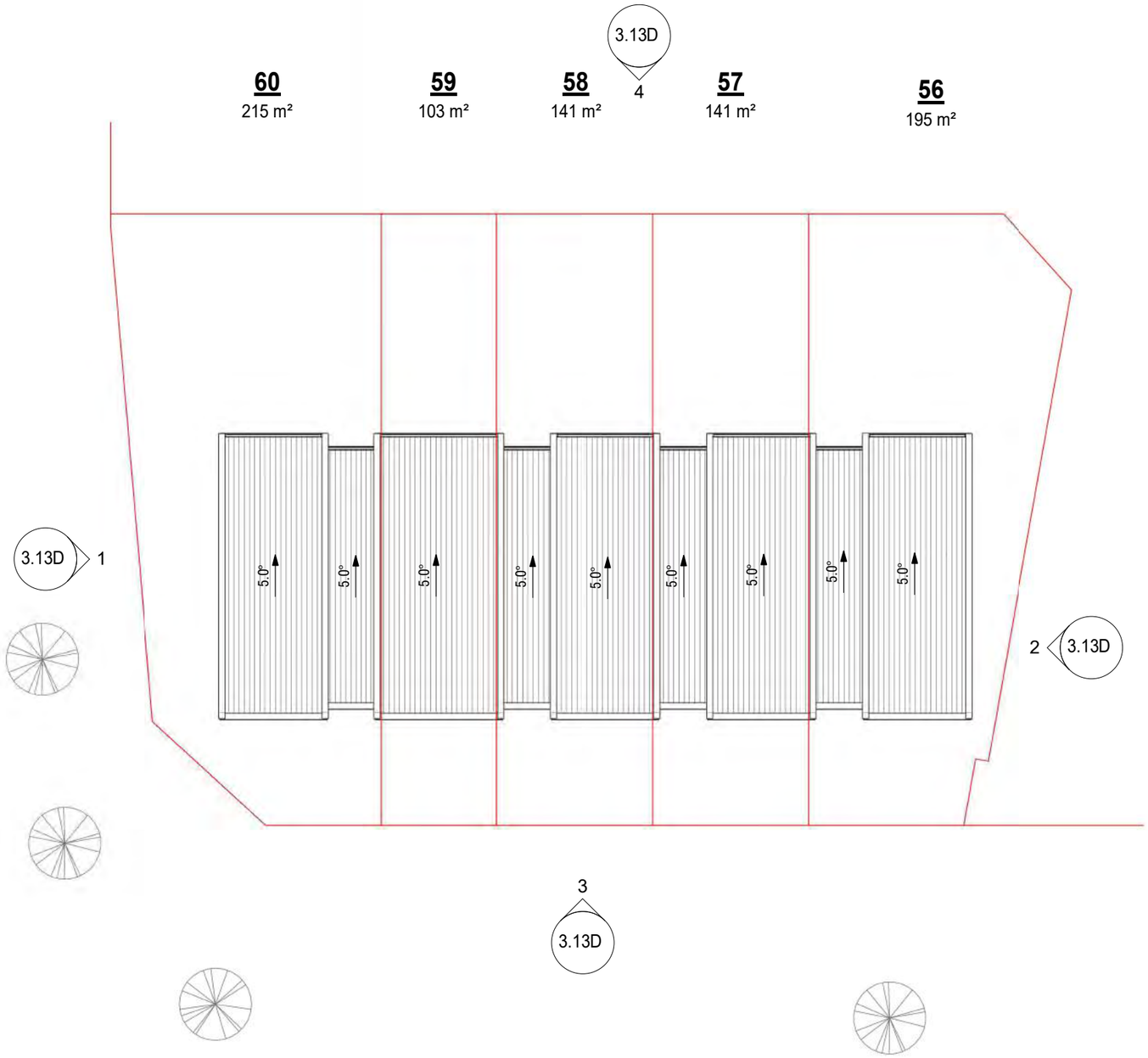

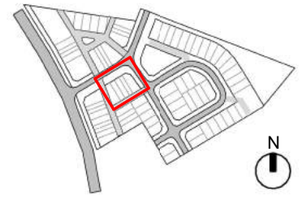

1 **Block Plan - Lots 56-60 Roof Plan**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.13C**	Lots 56-60 Roof Plan	28/08/20

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1 / 3.13A **Lots 56-60 East Elevation**

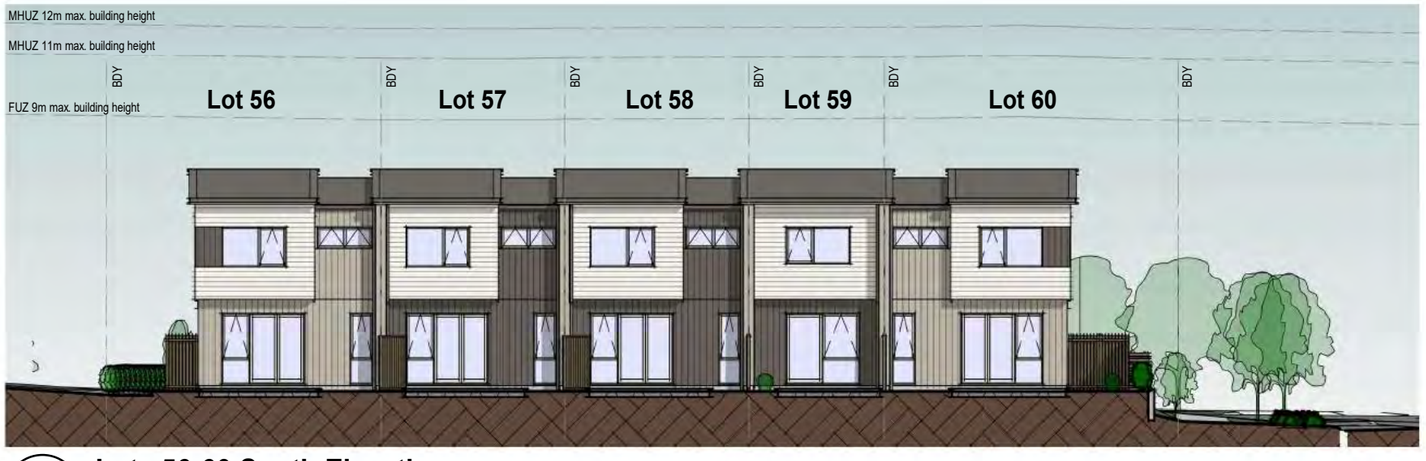
1 : 200

2 / 3.13A **Lots 56-60 West Elevation**

1 : 200

3 / 3.13A **Lots 56-60 North Elevation**

1 : 200



4 / 3.13A **Lots 56-60 South Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.13D**	Lots 56-60 Elevations	28/08/20

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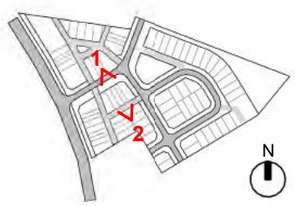
1 **Lots 56-60 Perspective 1**

2 **Lots 56-60 Perspective 2**



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Job No.	Scale (A3):	Sheet no.	Lots 56-60 Perspectives	DATE
4167	NTS	**3.13E**		28/08/20

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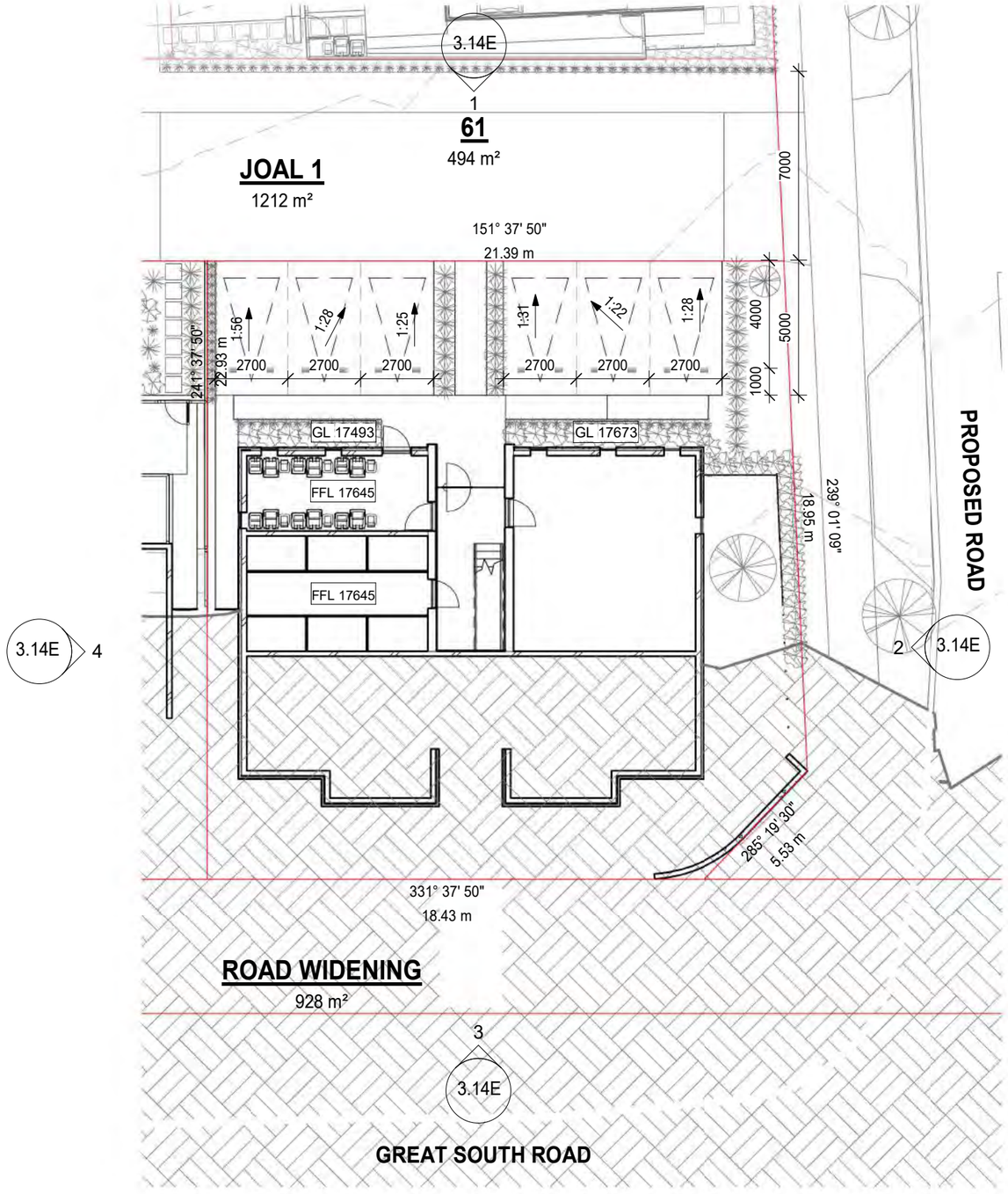
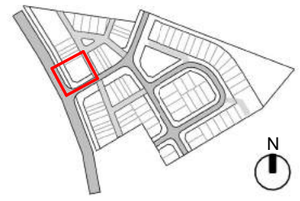


1 **Block Plan - Lot 61 Basement Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.14A**	Lot 61 Basement Plan	28/08/20

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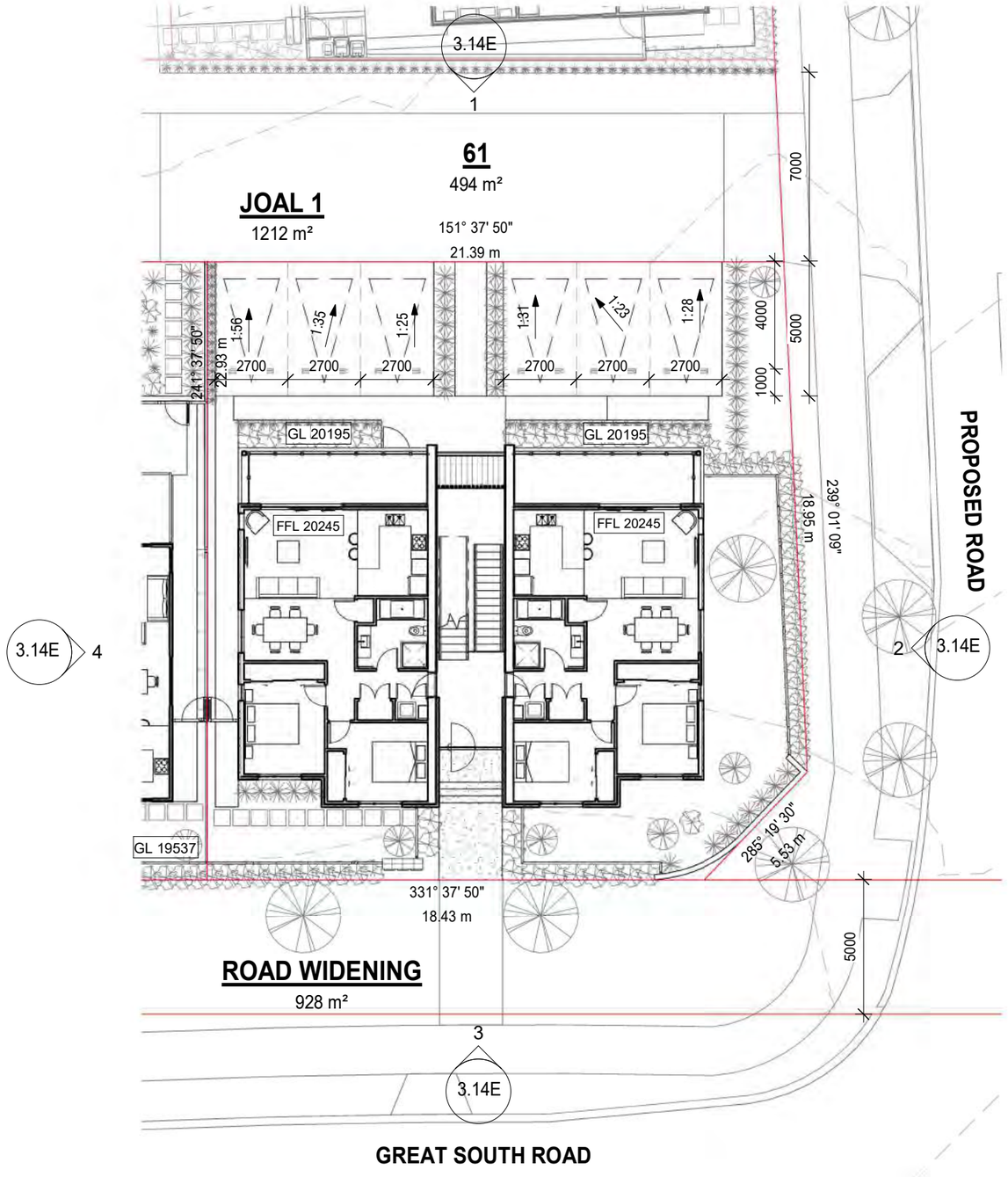
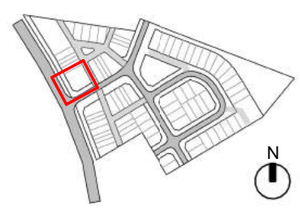


1 **Block Plan - Lot 61 Ground Floor**

1 : 200



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4167	As indicated	**3.14B**	Lot 61 Ground Floor	28/08/20

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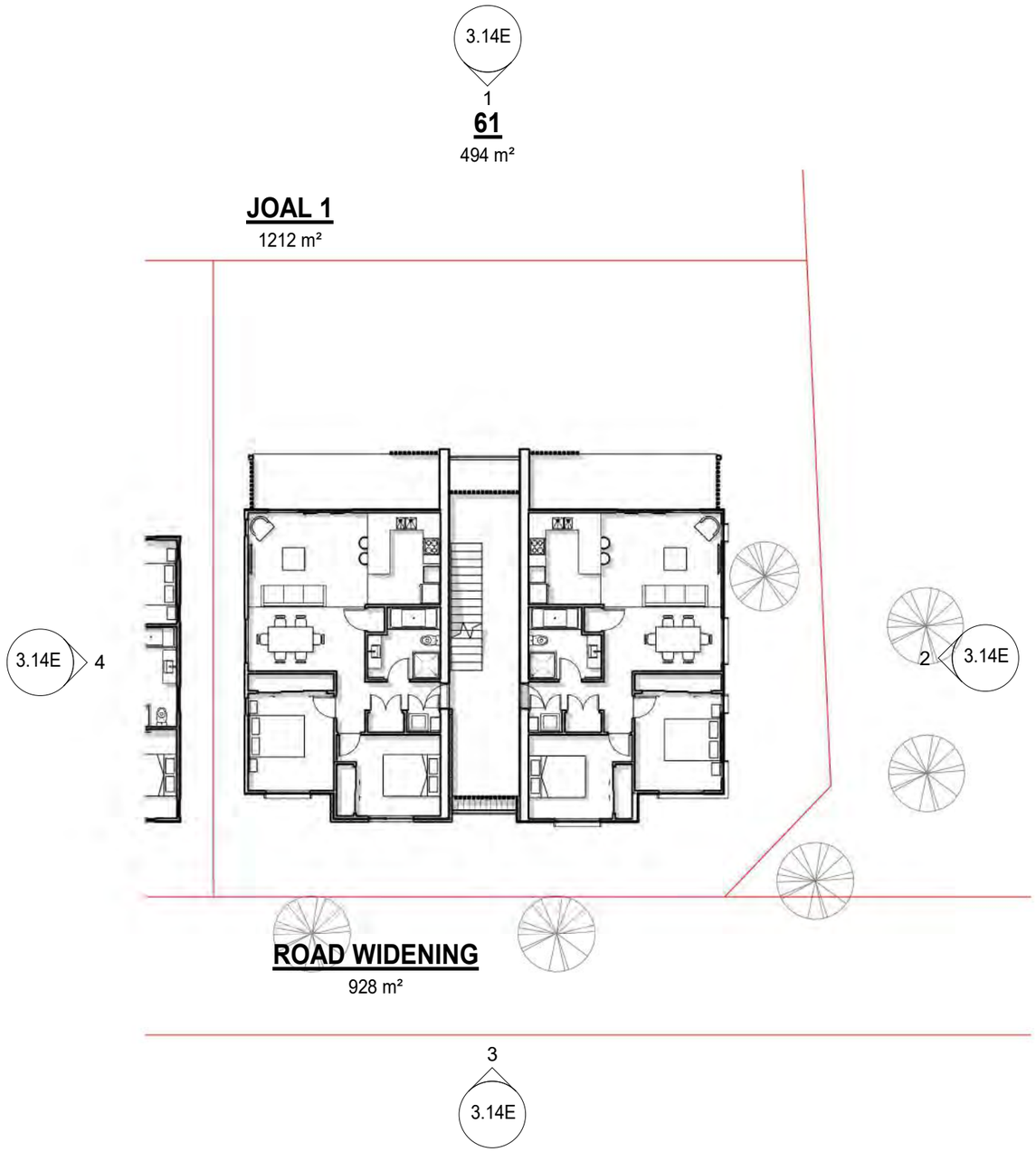

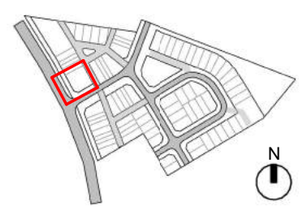

1 **Block Plan - Lot 61 Upper Floors**

1 : 200

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4167	As indicated	**3.14C**	Lot 61 Upper Floors	28/08/20

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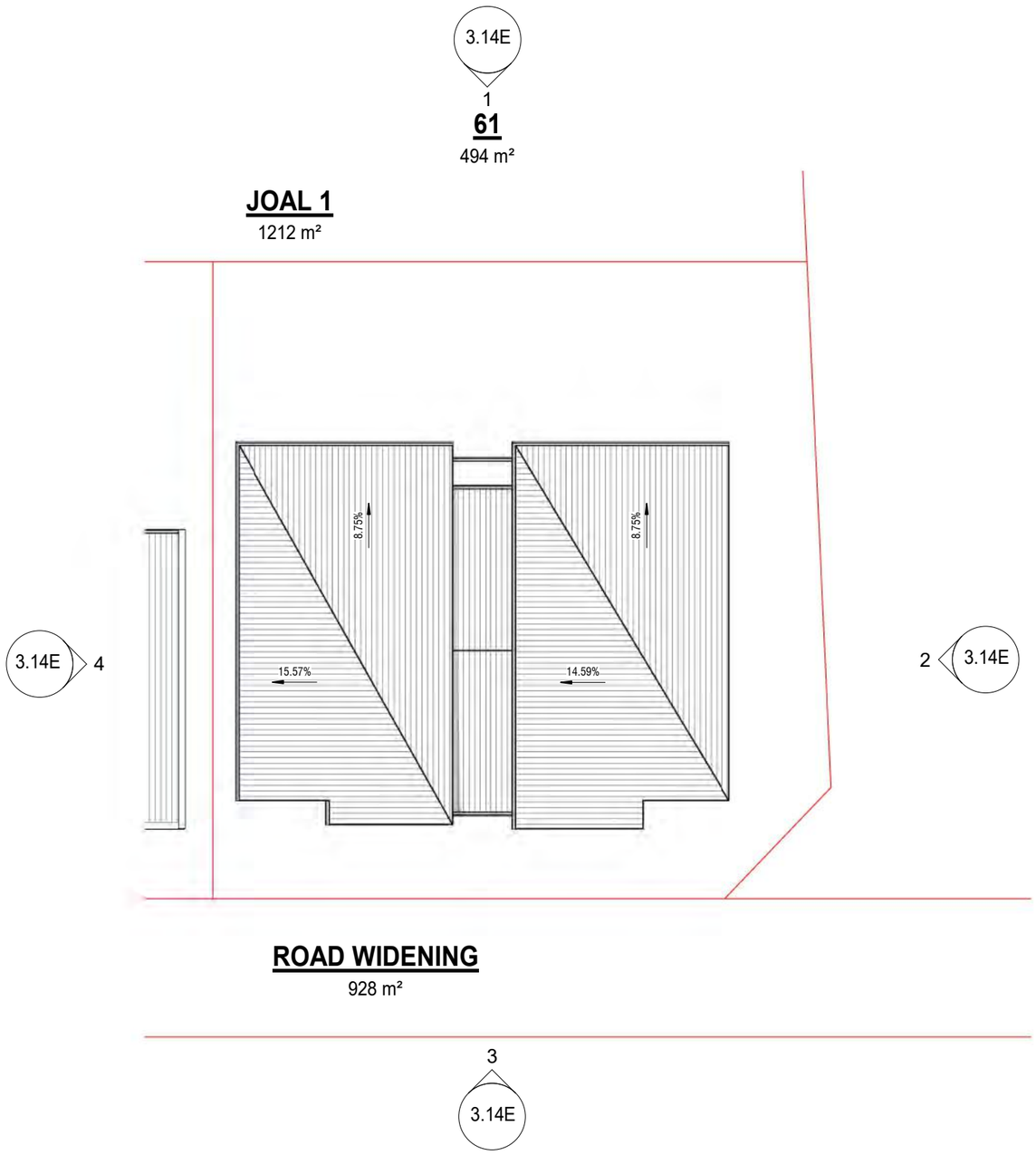
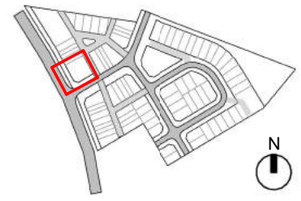


1 Block Plan - Lot 61 Roof Plan

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.14D**	Lot 61 Roof Plan	28/08/20

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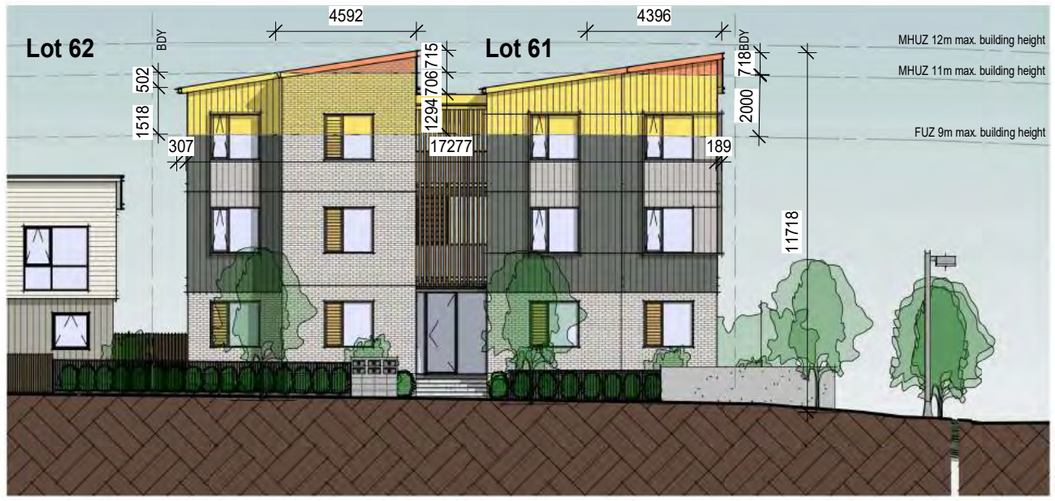
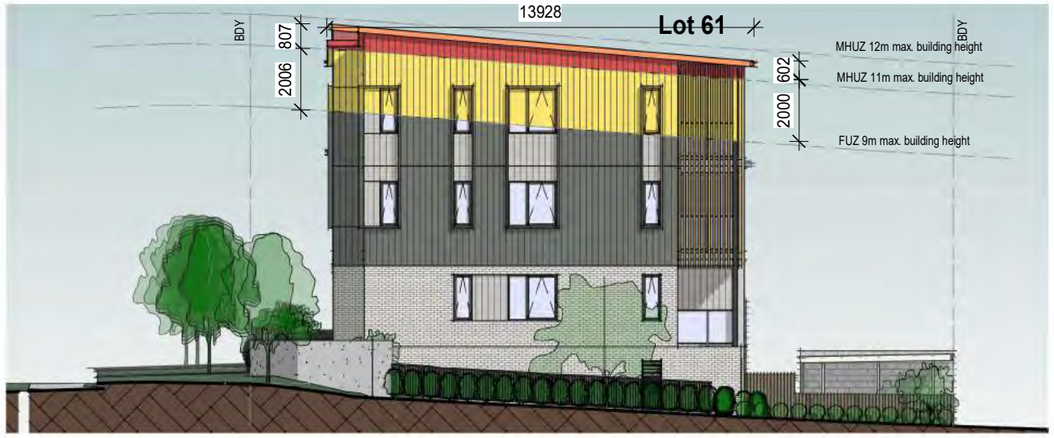
1 / 3.14A **Lot 61 East Elevation**

1 : 200



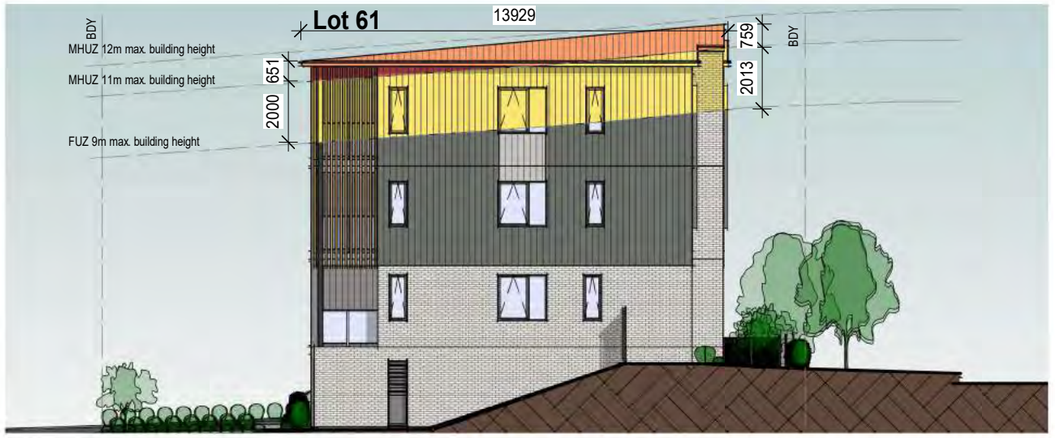
3 / 3.14A **Lot 61 West Elevation**

1 : 200



2 / 3.14A **Lot 61 South Elevation**

1 : 200



4 / 3.14A **Lot 61 North Elevation**

1 : 200

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4167	1 : 200	**3.14E**	Lot 61 Elevations	28/08/20

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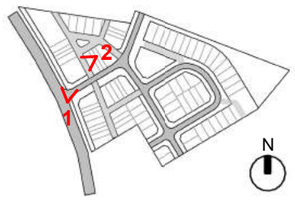
1 **Lot 61 Perspective 1**

2 **Lot 61 Perspective 2**



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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**3.14F**	Lot 61 Perspectives	28/08/20

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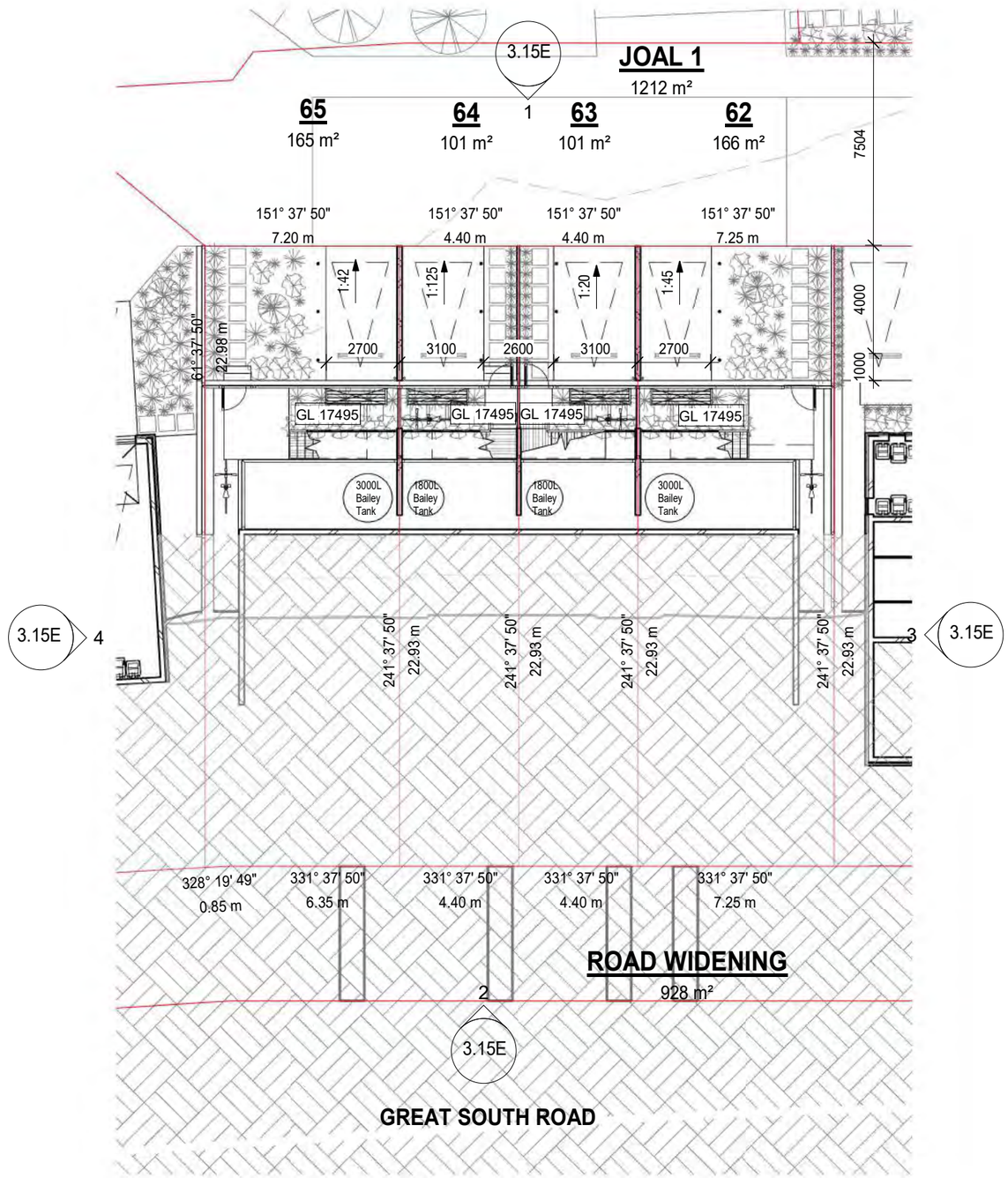
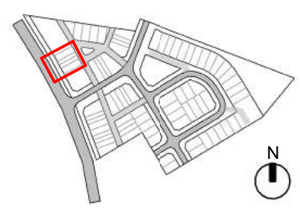


1 **Block Plan - Lots 62-65 Basement Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.15A**	Lots 62-65 Basement Plan	28/08/20

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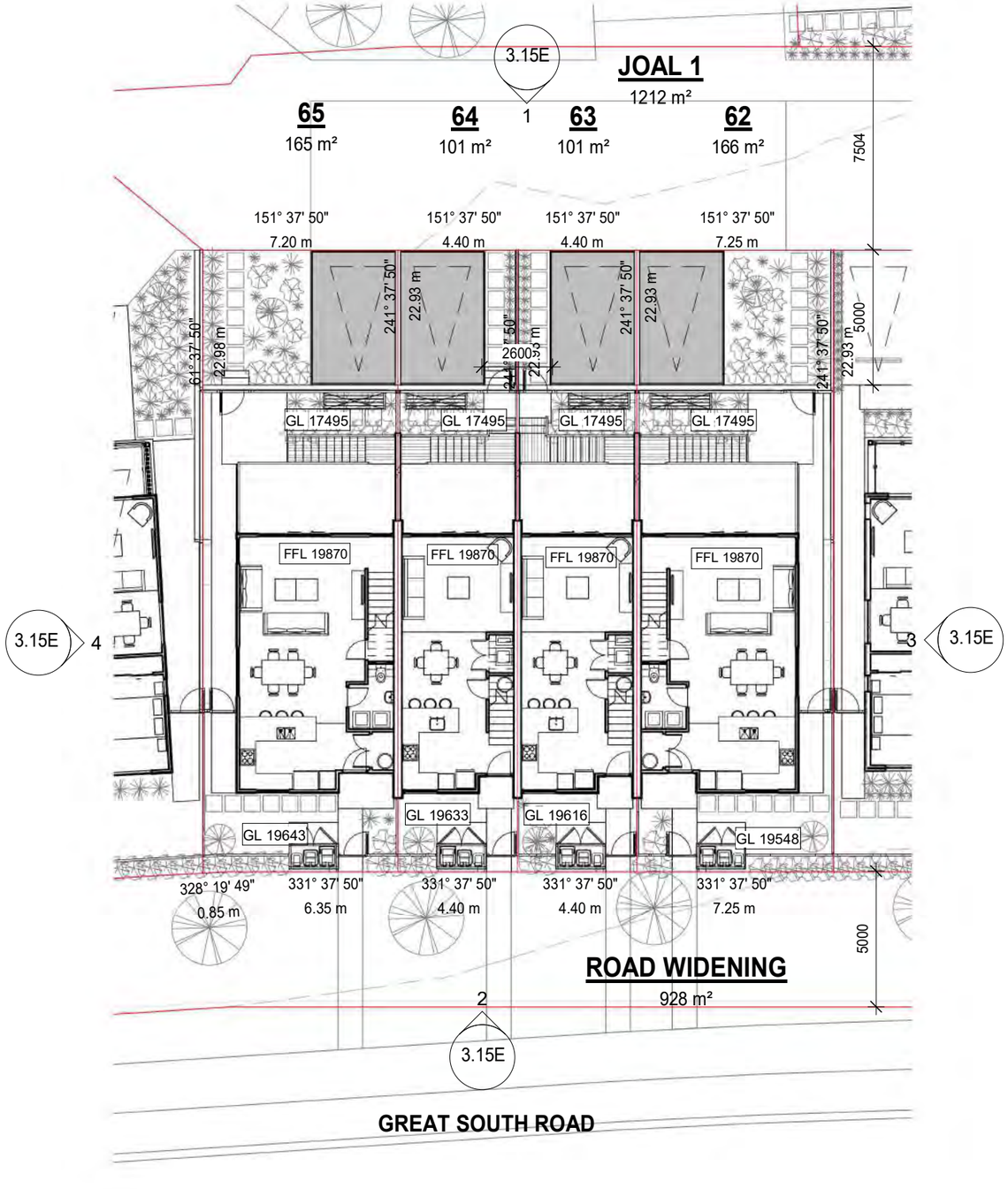
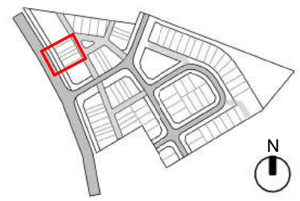


1 **Block Plan - Lots 62-65 Ground Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.15B**	Lots 62-65 Ground Floor	28/08/20

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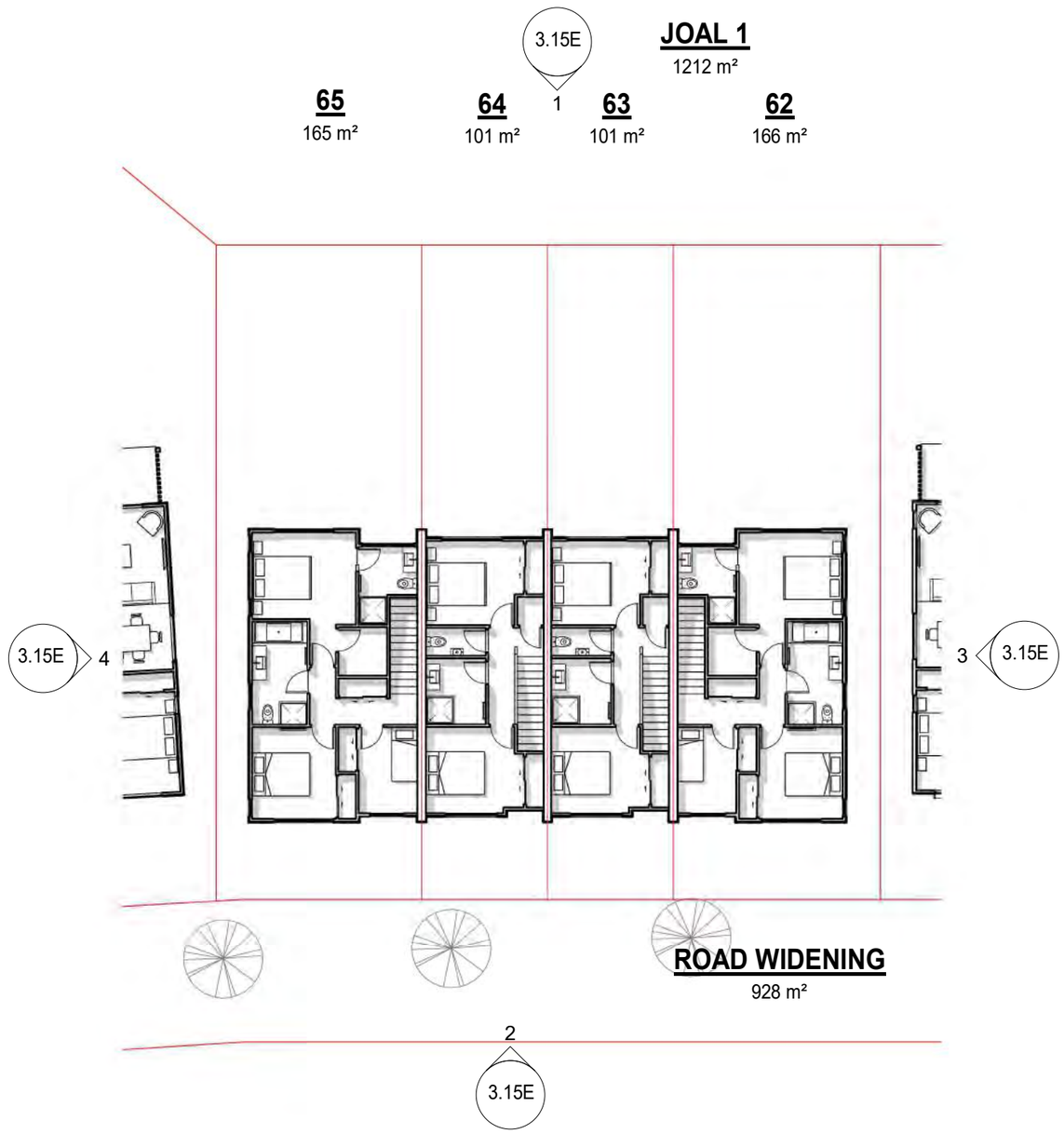
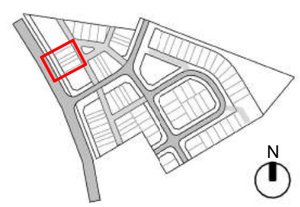


1 **Block Plan - Lots 62-65 Upper Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.15C**	Lots 62-65 Upper Floor	28/08/20

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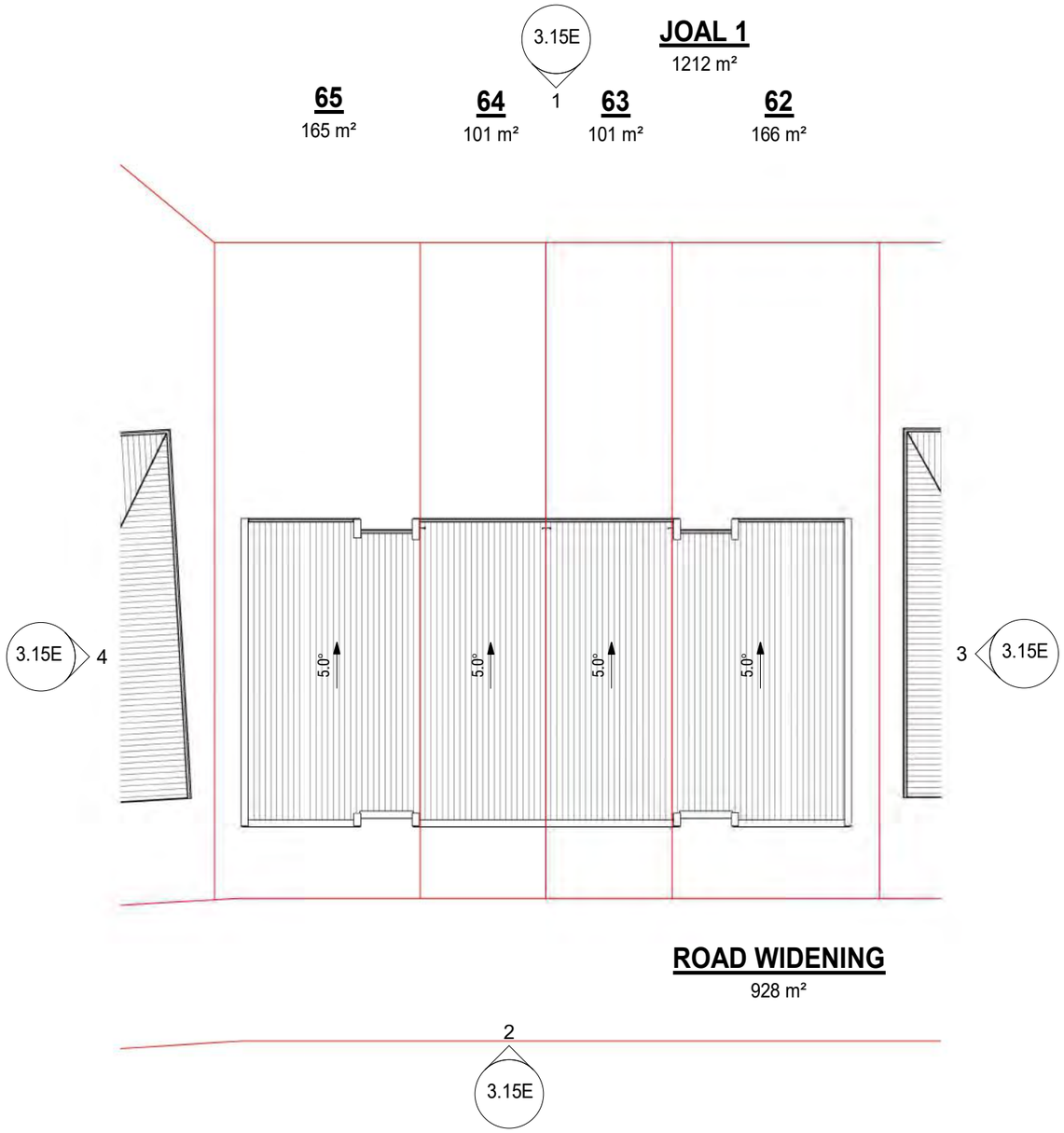

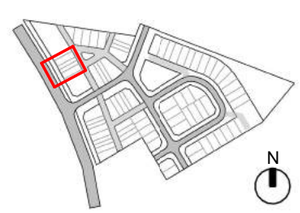

1 Block Plan - Lots 62-65 Roof Plan

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.15D**	Lots 62-65 Roof Plan	28/08/20

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1 / 3.15A **Lots 62-65 East Elevation**

1 : 200

2 / 3.15A **Lots 62-65 West Elevation**

1 : 200

3 / 3.15A **Lots 62-65 South Elevation**

1 : 200

4 / 3.15A **Lots 62-65 North Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.15E**	Lots 62-65 Elevations	28/08/20

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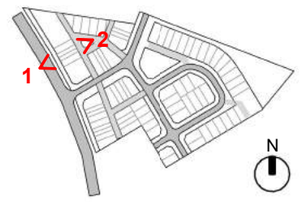
1 **Lots 62-65 Perspective 1**

2 **Lots 62-65 Perspective 2**



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Job No.	Scale (A3):	Sheet no.	Lots 62-65 Perspectives	DATE
4167	NTS	**3.15F**		28/08/20

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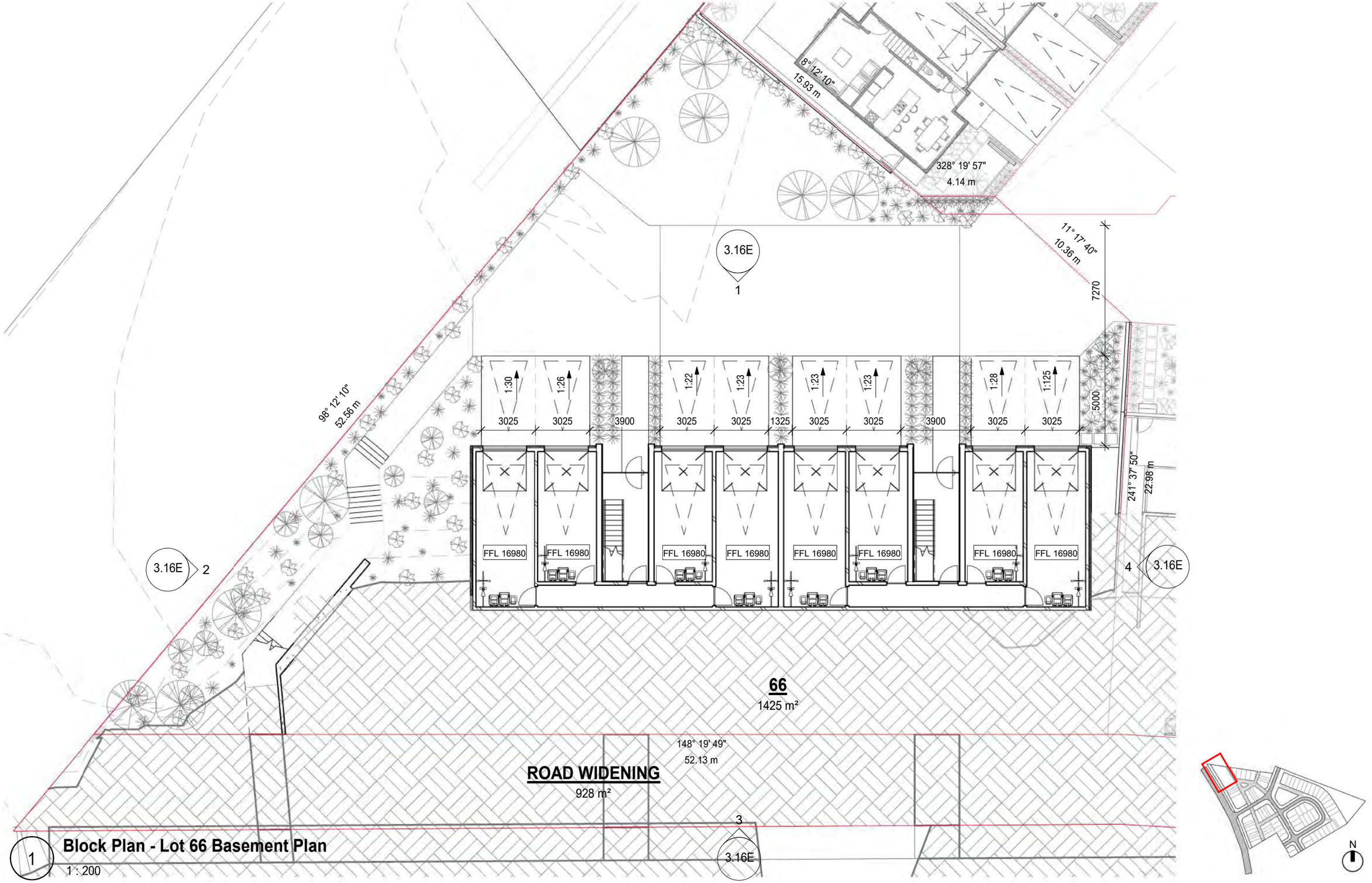

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.16A**	Lot 66 Basement Plan	28/08/20

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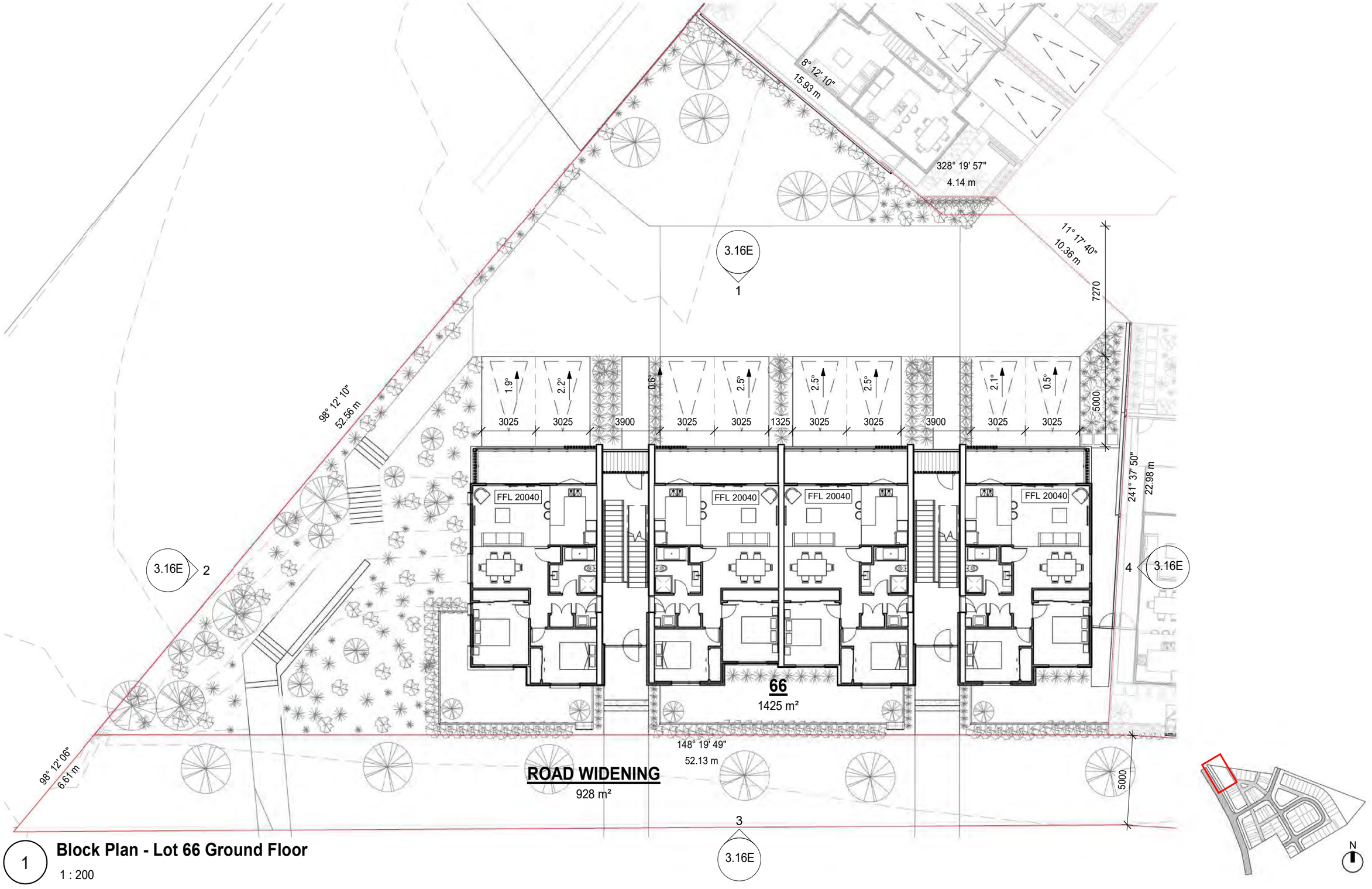

1 **Block Plan - Lot 66 Ground Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.16B**	Lot 66 Ground Floor	28/07/2020

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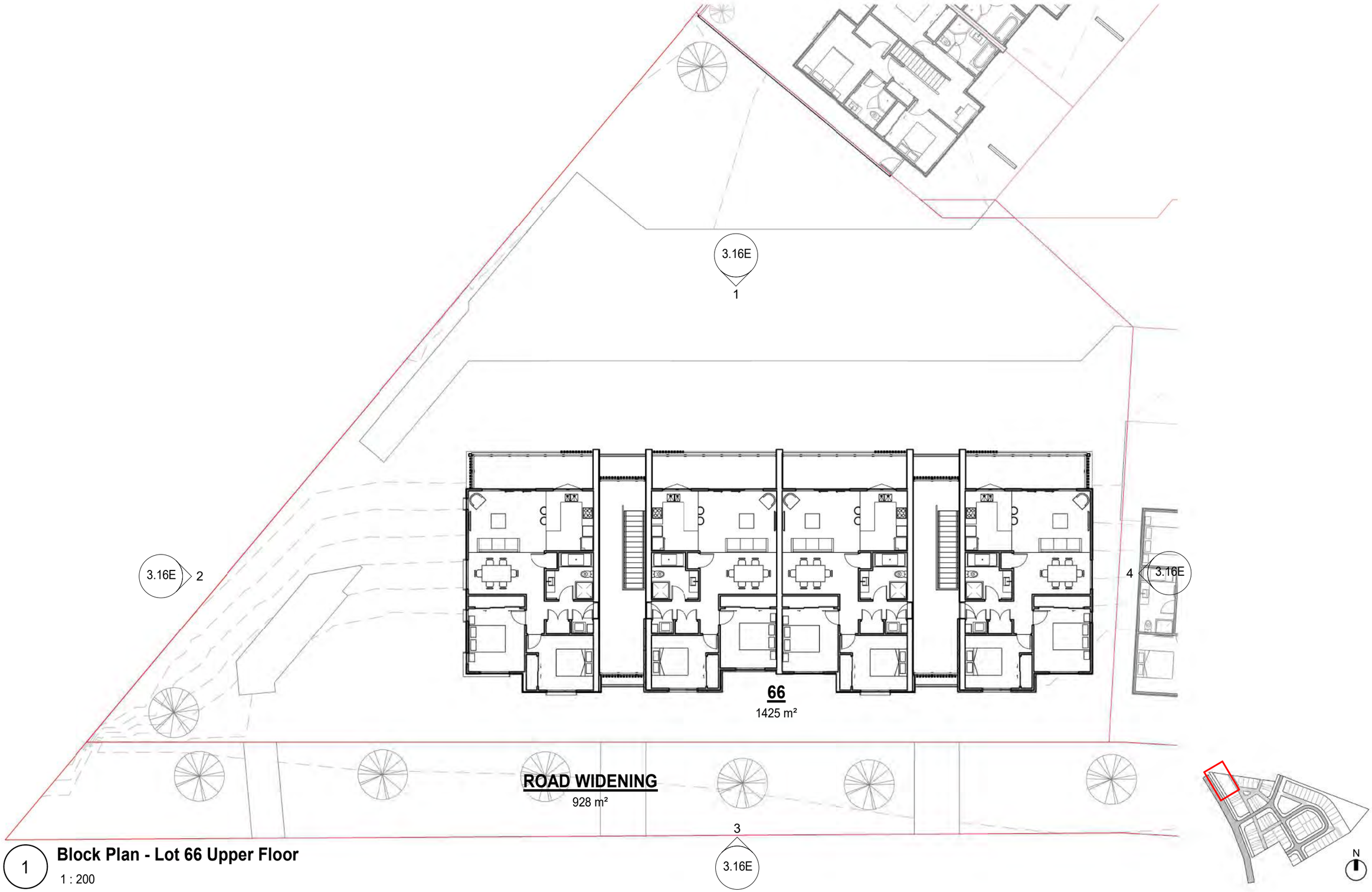

1 **Block Plan - Lot 66 Upper Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.16C**	Lot 66 Upper Floor	28/08/20

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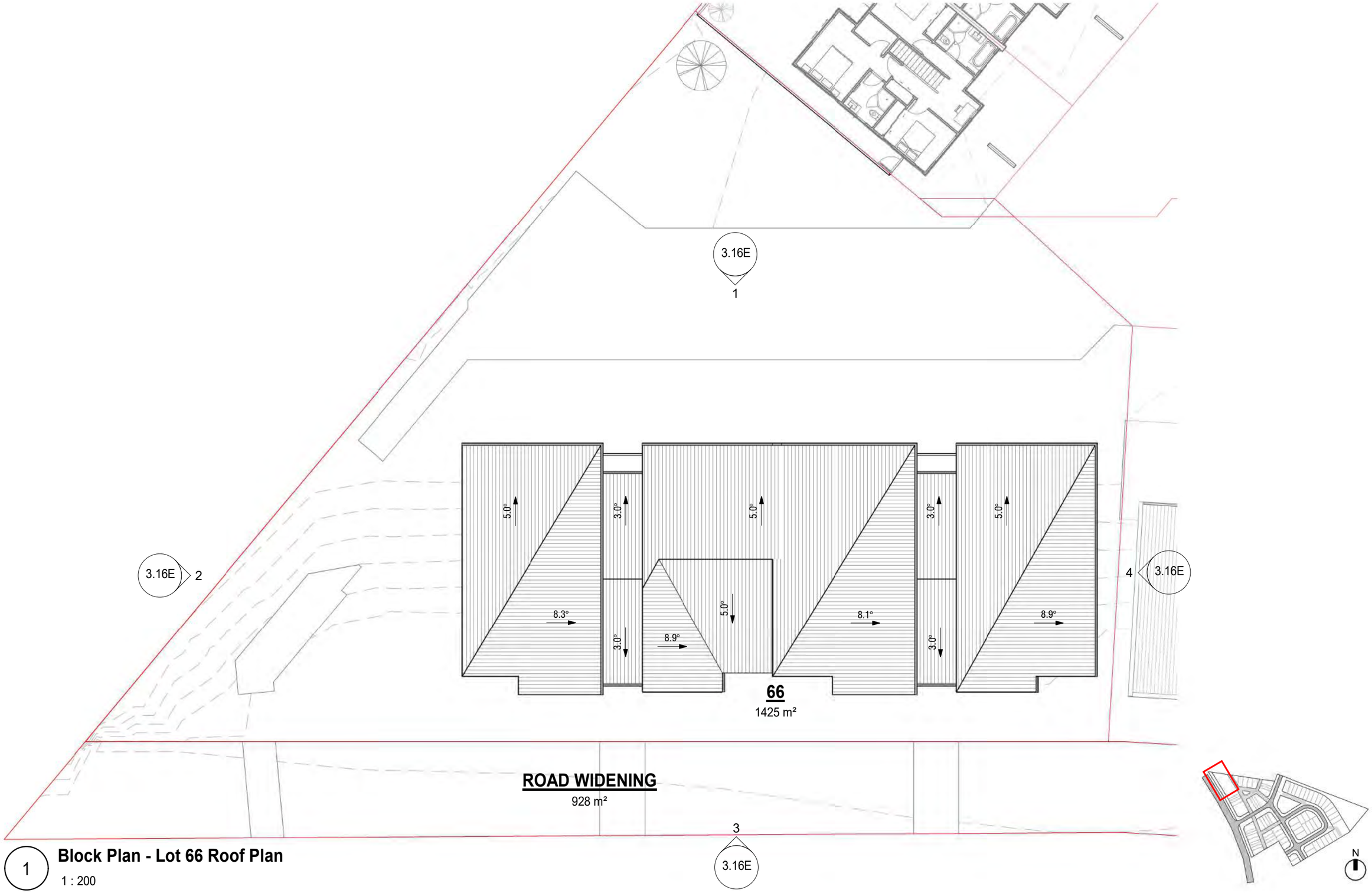

1 **Block Plan - Lot 66 Roof Plan**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.16D**	Lot 66 Roof Plan	28/08/20

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1 / 3.16A **Lot 66 East Elevation**

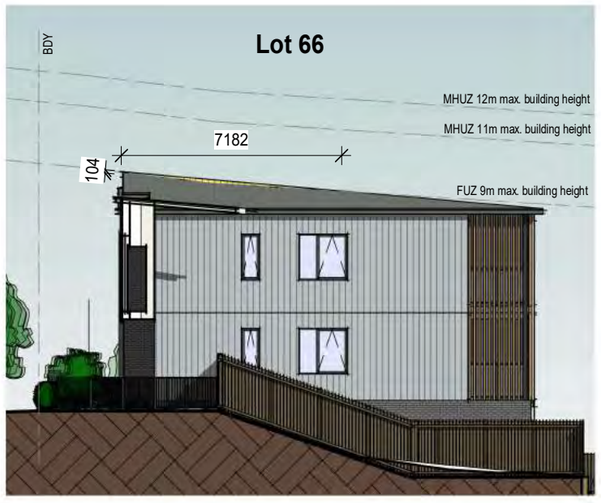
1 : 200

2 / 3.16A **Lot 66 North Elevation**

1 : 200

3 / 3.16A **Lot 66 West Elevation**

1 : 200



4 / 3.16A **Lot 66 South Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.16E**	Lot 66 Elevations	28/08/20

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1 **Lot 66 Perspective 1**

2 **Lot 66 Perspective 2**

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Job No.	Scale (A3):	Sheet no.	Lot 66 Perspectives	DATE
4167	NTS	**3.16F**		28/08/20

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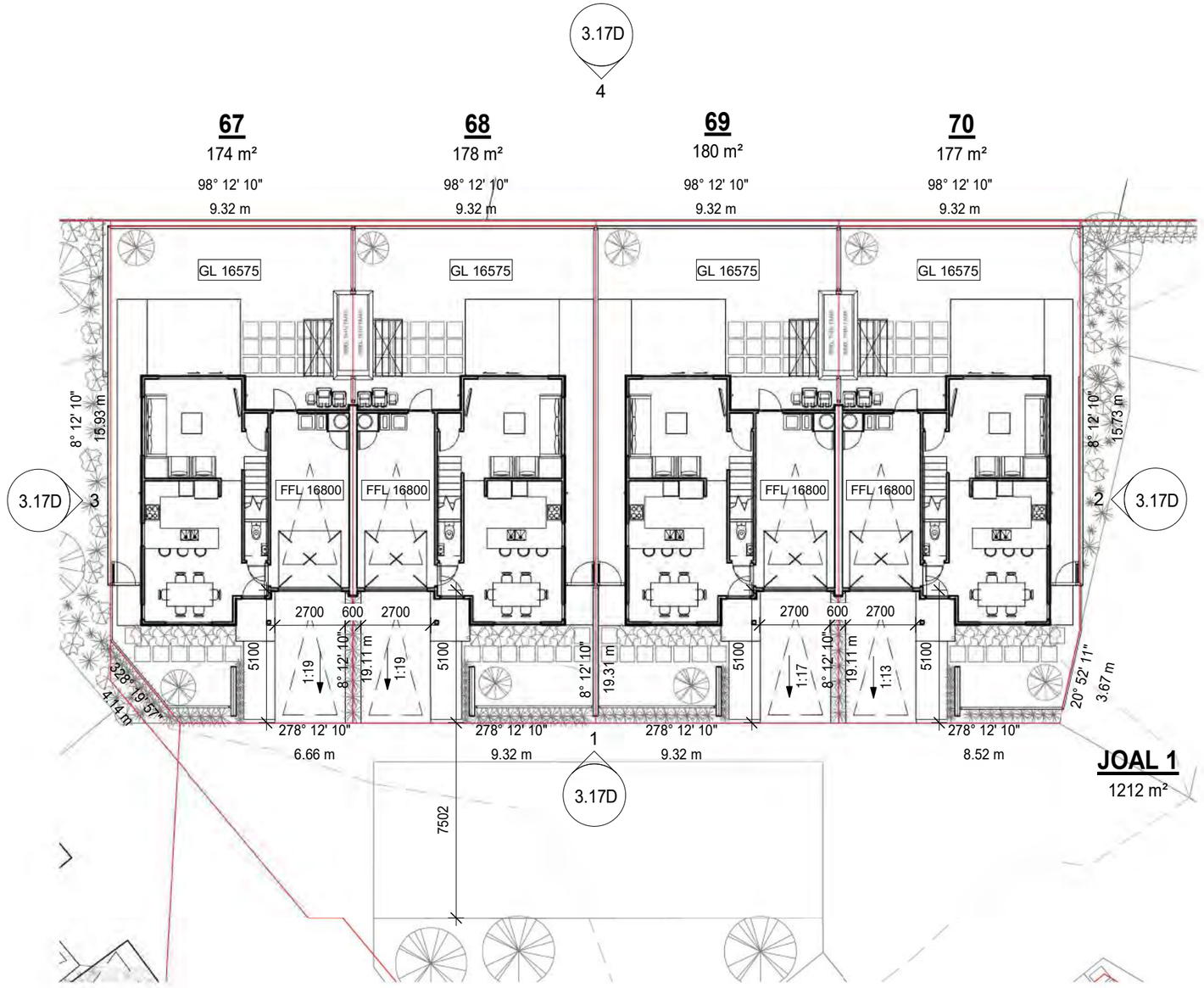

1 **Block Plan - Lots 67-70 Ground Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.17A**	Lots 67-70 Ground Floor	28/08/20

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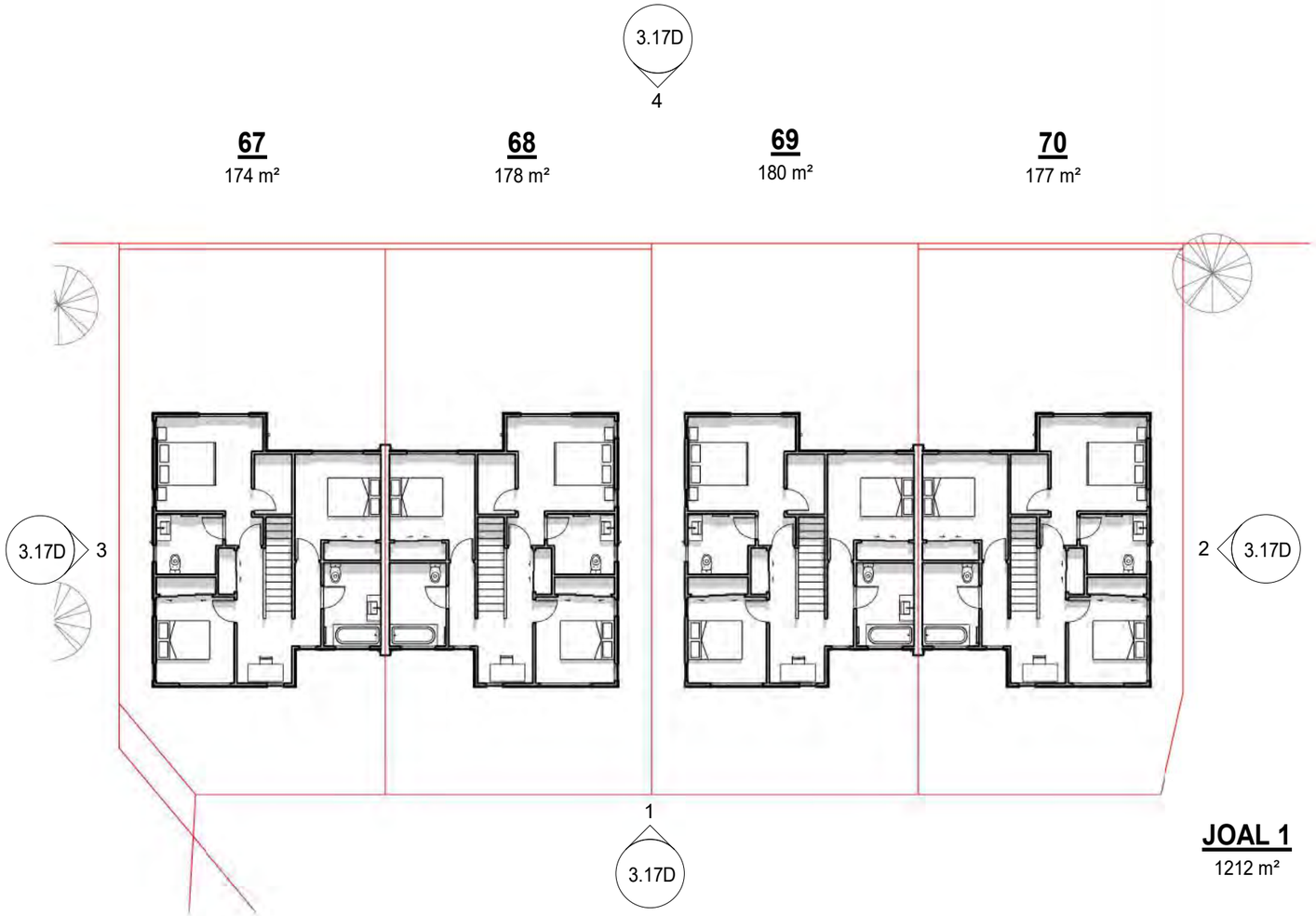

1 **Block Plan - Lots 67-70 Upper Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.17B**	Lots 67-70 Upper Floor	28/08/20

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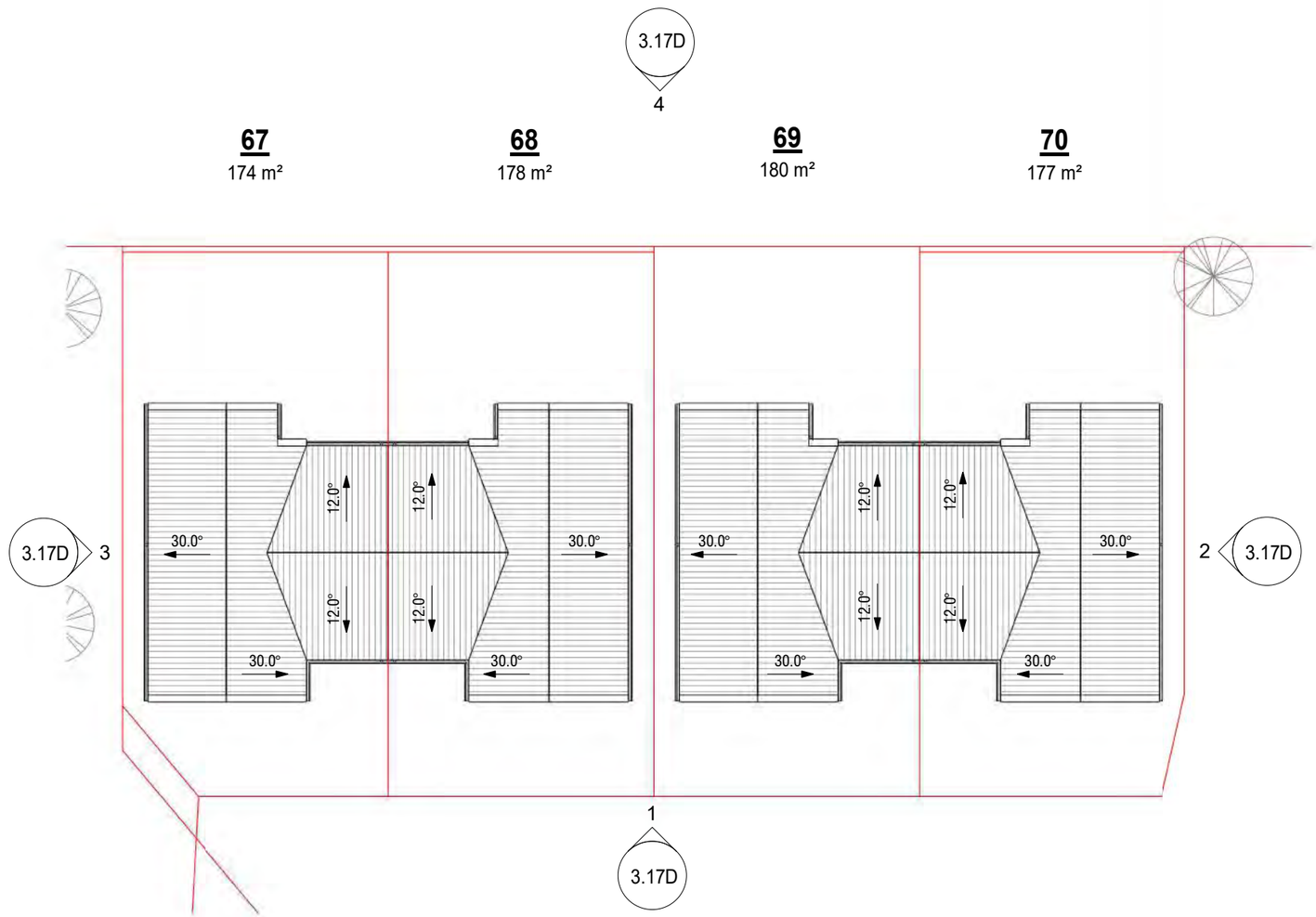
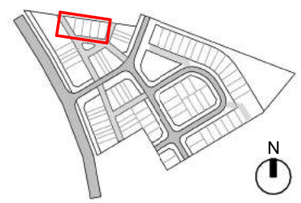


1 Block Plan - Lots 67-70 Roof Plan

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.17C**	Lots 67-70 Roof Plan	28/08/20

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1 / 3.17A **Lots 67-70 South Elevation**

1 : 200

2 / 3.17A **Lots 67-70 East Elevation**

1 : 200

3 / 3.17A **Lots 67-70 West Elevation**

1 : 200

4 / 3.17A **Lots 67-70 North Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.17D**	Lots 67-70 Elevations	28/08/20

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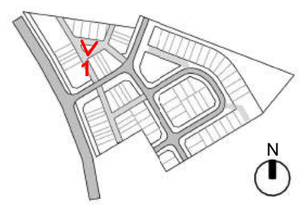
1 **Lots 67-70 Perspective 1**



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Job No.	Scale (A3):	Sheet no.		DATE
4167	NTS	**3.17E**	Lots 67-70 Perspectives	28/08/20

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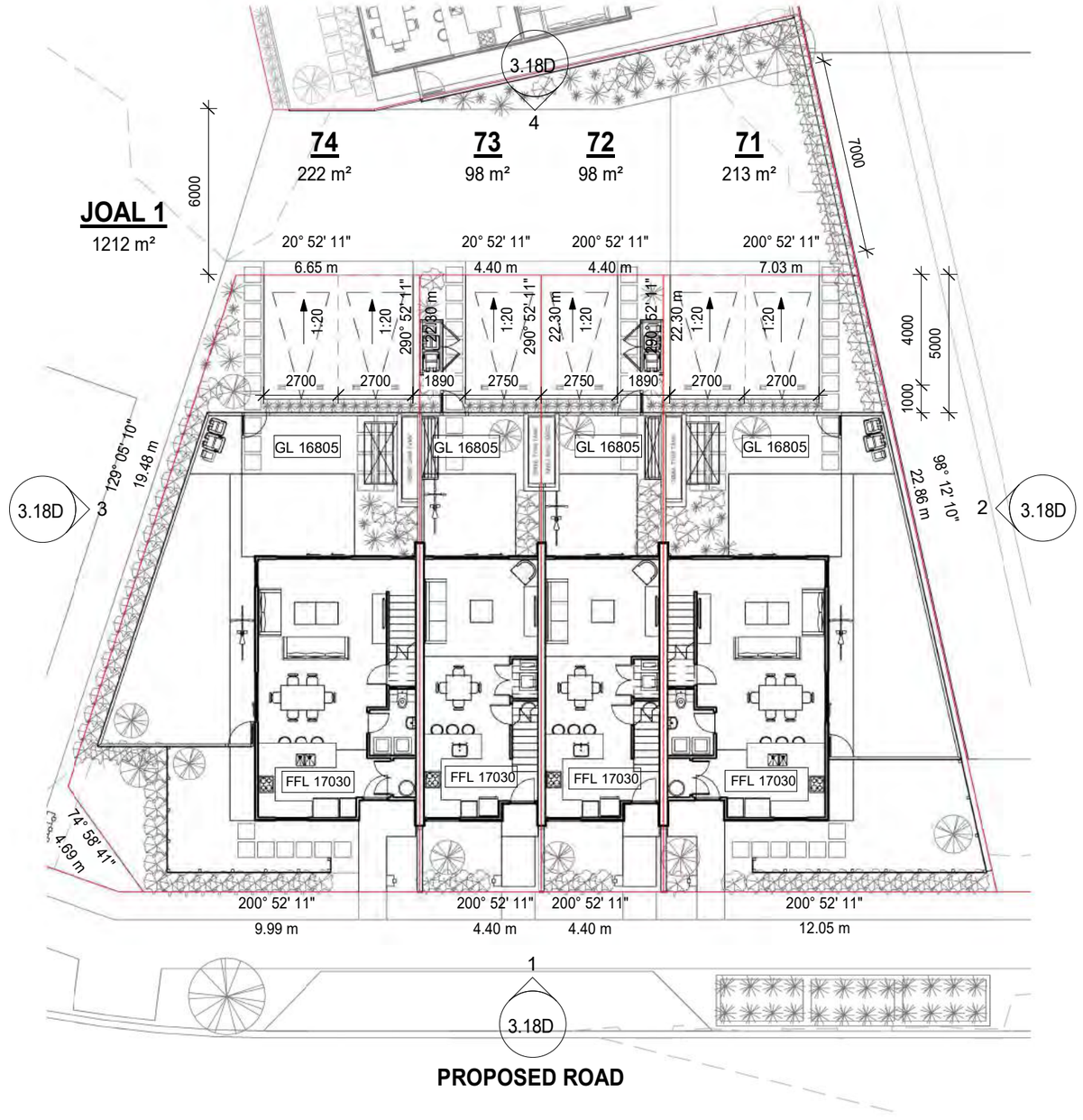

1 **Block Plan - Lots 71-74 Ground Floor**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.18A**	Lots 71-74 Ground Floor	28/08/20

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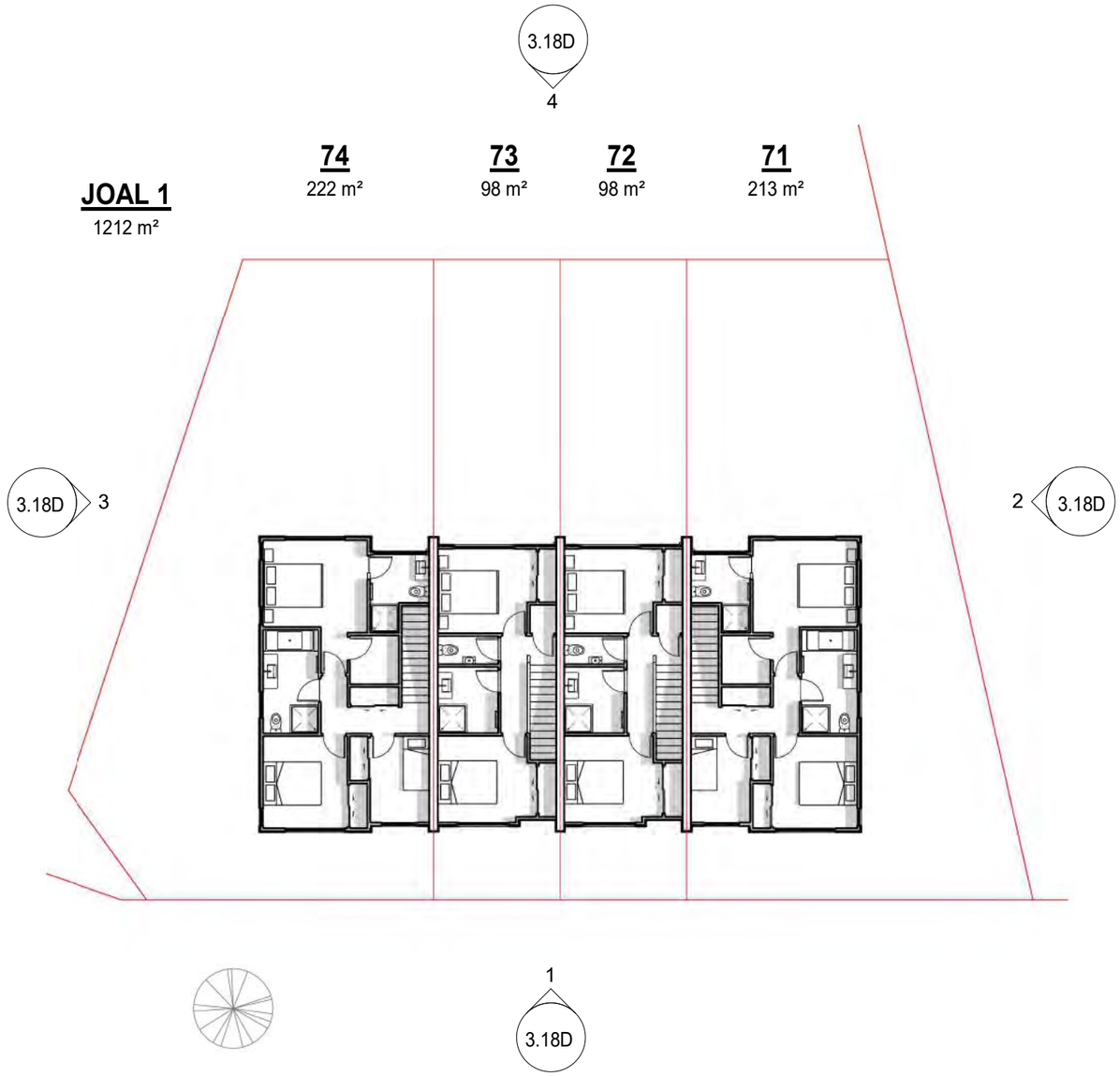
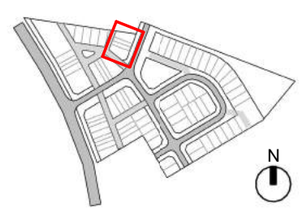


1 **Block Plan - Lots 71-74 Upper Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.18B**	Lots 71-74 Upper Floor	28/08/20

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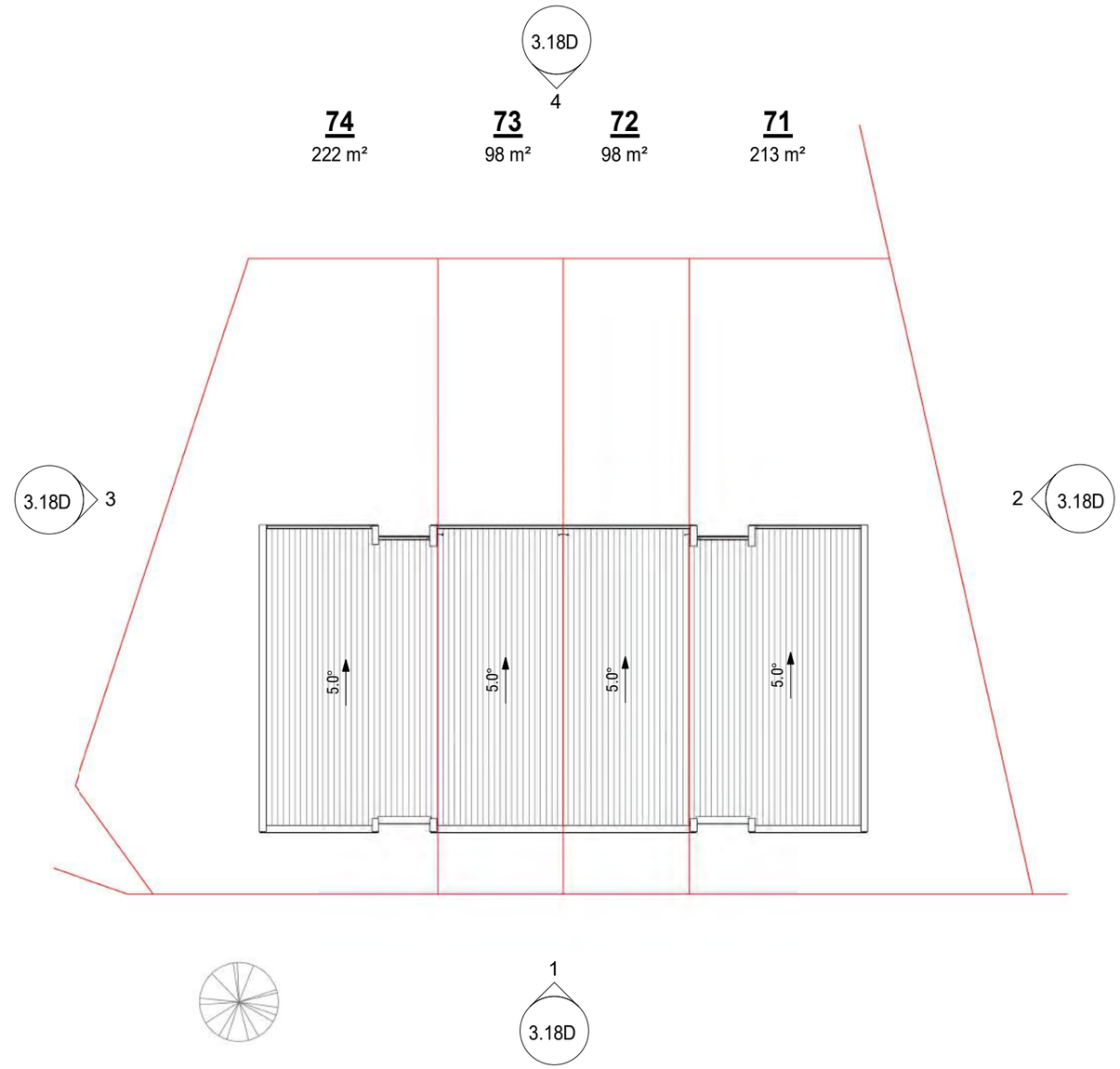
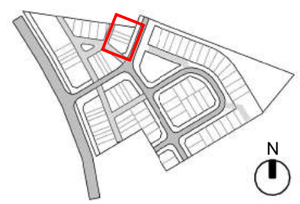


1 **Block Plan - Lots 71-74 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.18C**	Lots 71-74 Roof Plan	28/08/20

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1 / 3.18A **Lots 71-74 East Elevation**

1 : 200

2 / 3.18A **Lots 71-74 North Elevation**

1 : 200

3 / 3.18A **Lots 71-74 South Elevation**

1 : 200

4 / 3.18A **Lots 71-74 West Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.18D**	Lots 71-74 Elevations	28/08/20

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1 **Lots 71-74 Perspectives 1**

2 **Lots 71-74 Perspectives 2**

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Job No.	Scale (A3):	Sheet no.	Lots 71-74 Perspectives	DATE
4167	NTS	**3.18E**		28/08/20

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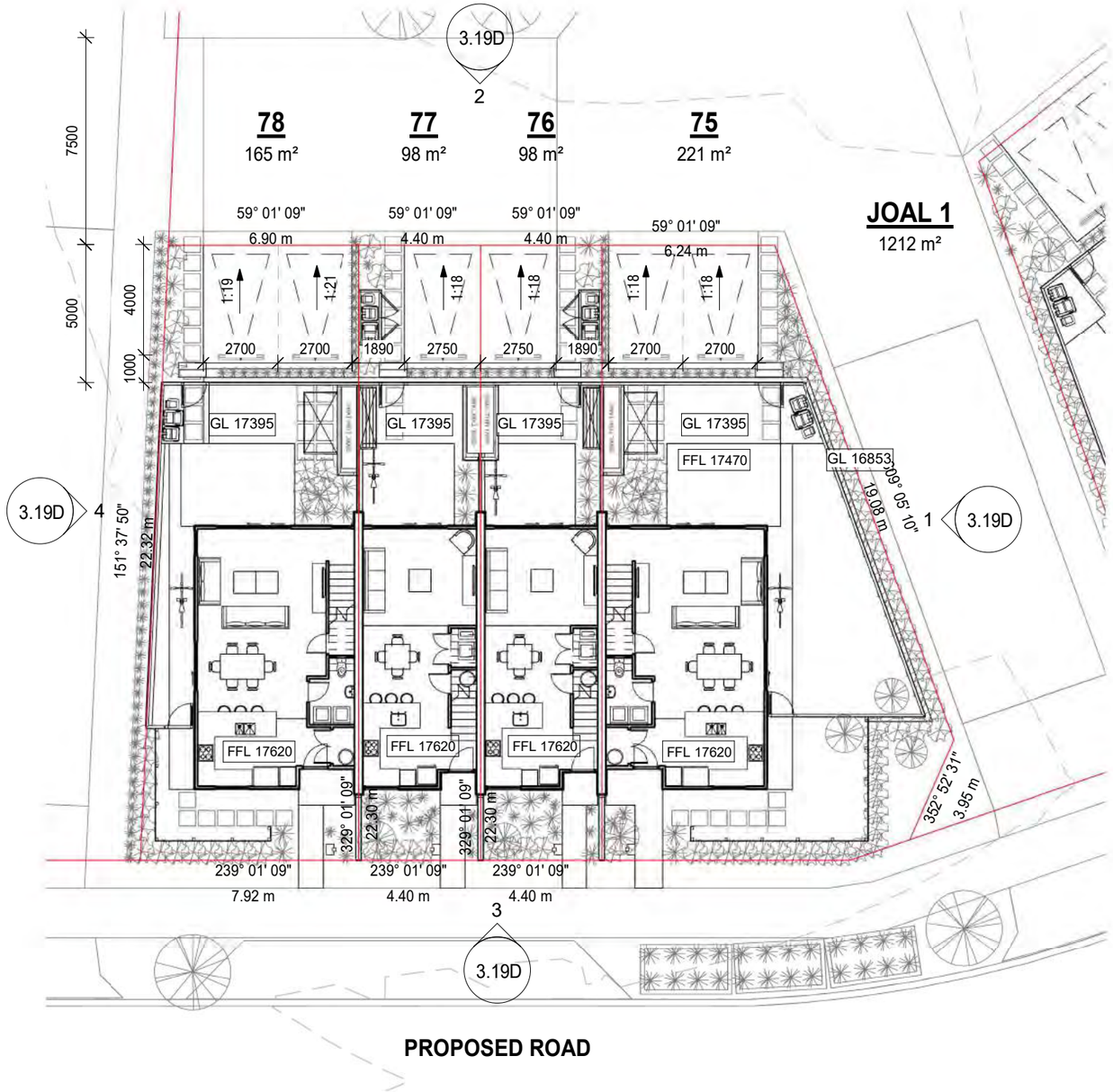
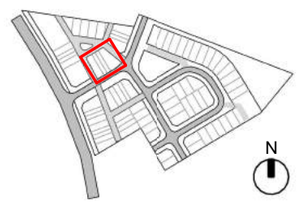


PROPOSED ROAD

1 **Block Plan - Lots 75-78 Ground Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.19A**	Lots 75-78 Ground Floor	28/08/20

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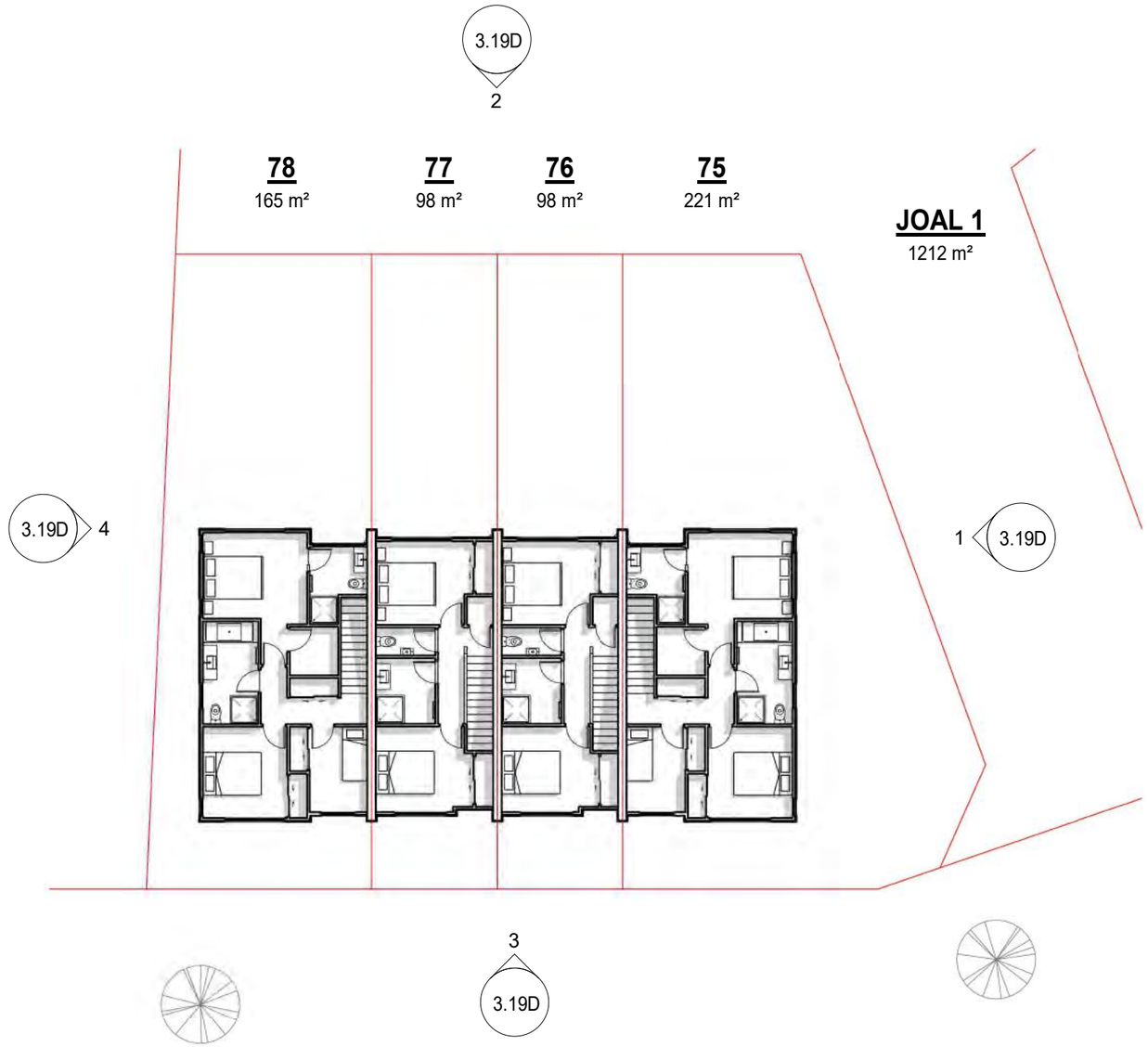
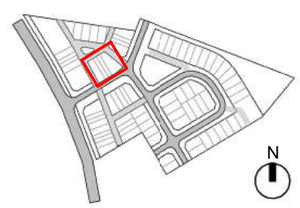


1 **Block Plan - Lots 75-78 Upper Floor**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.19B**	Lots 75-78 Upper Floor	28/08/20

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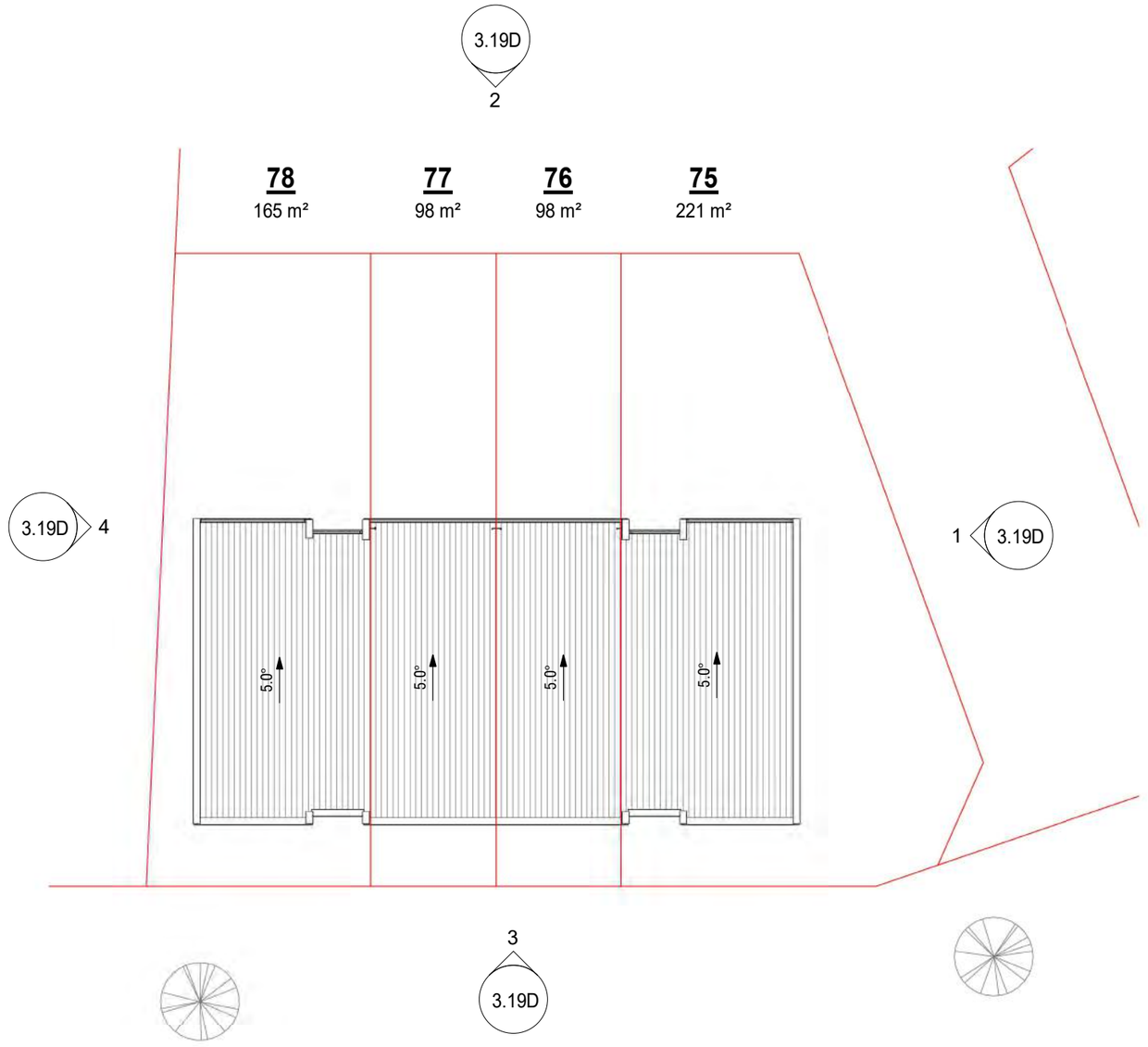
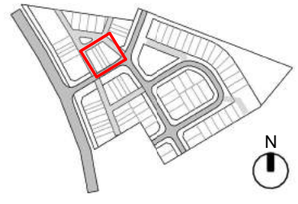


1 **Block Plan - Lots 75-78 Roof Plan**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**3.19C**	Lots 75-78 Roof Plan	28/08/20

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1 / 3.19A **Lots 75-78 East Elevation**

1 : 200

2 / 3.19A **Lots 75-78 North Elevation**

1 : 200

3 / 3.19A **Lots 75-78 South Elevation**

1 : 200

4 / 3.19A **Lots 75-78 West Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 200	**3.19D**	Lots 75-78 Elevations	28/08/20

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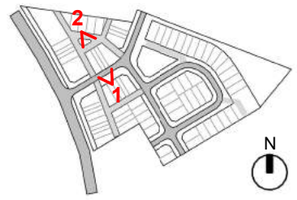
1 **Lots 75-78 Perspective 1**

2 **Lots 75-78 Perspective 2**



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Job No.	Scale (A3):	Sheet no.	Lots 75-78 Perspectives	DATE
4167	NTS	**3.19E**		28/08/20

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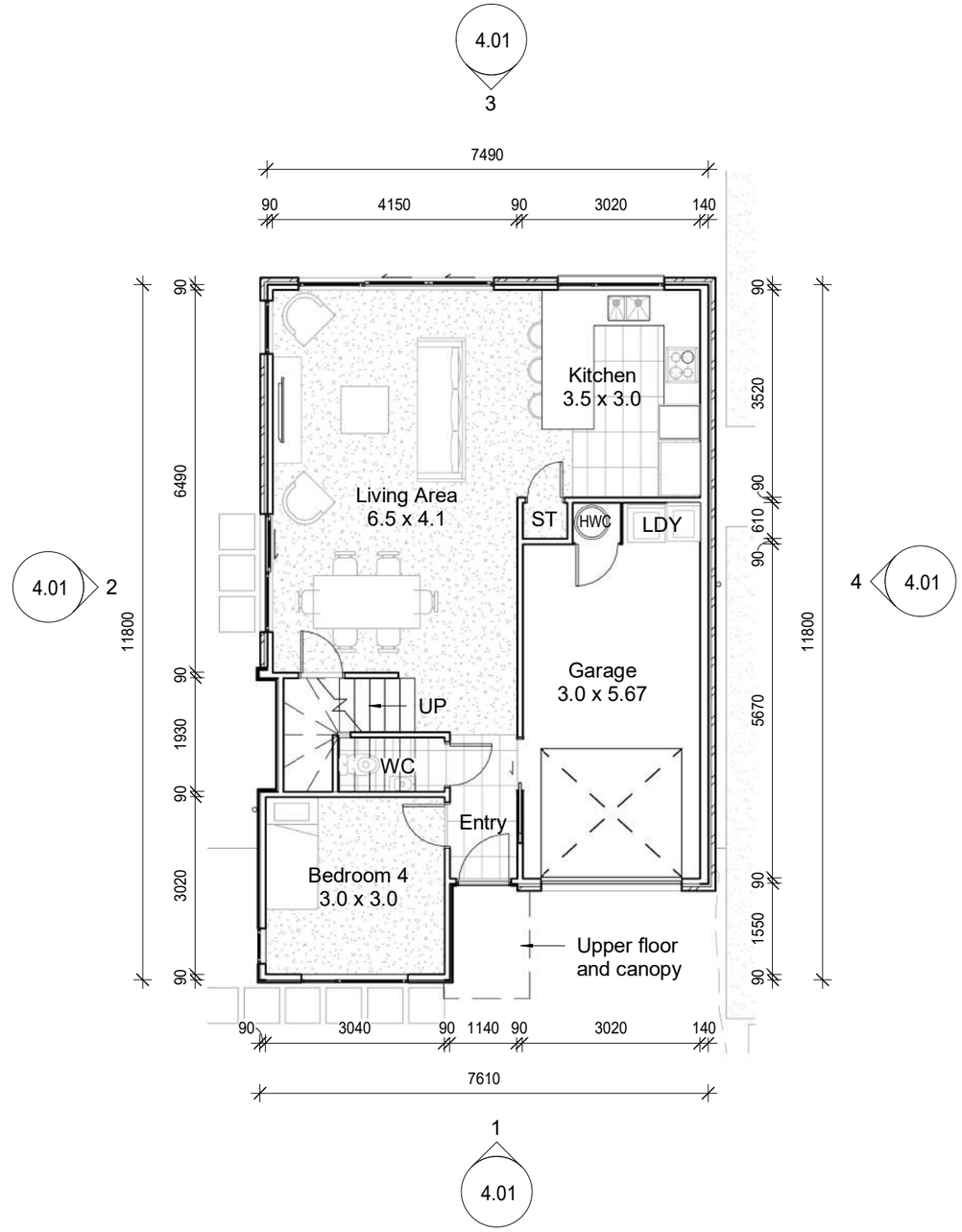
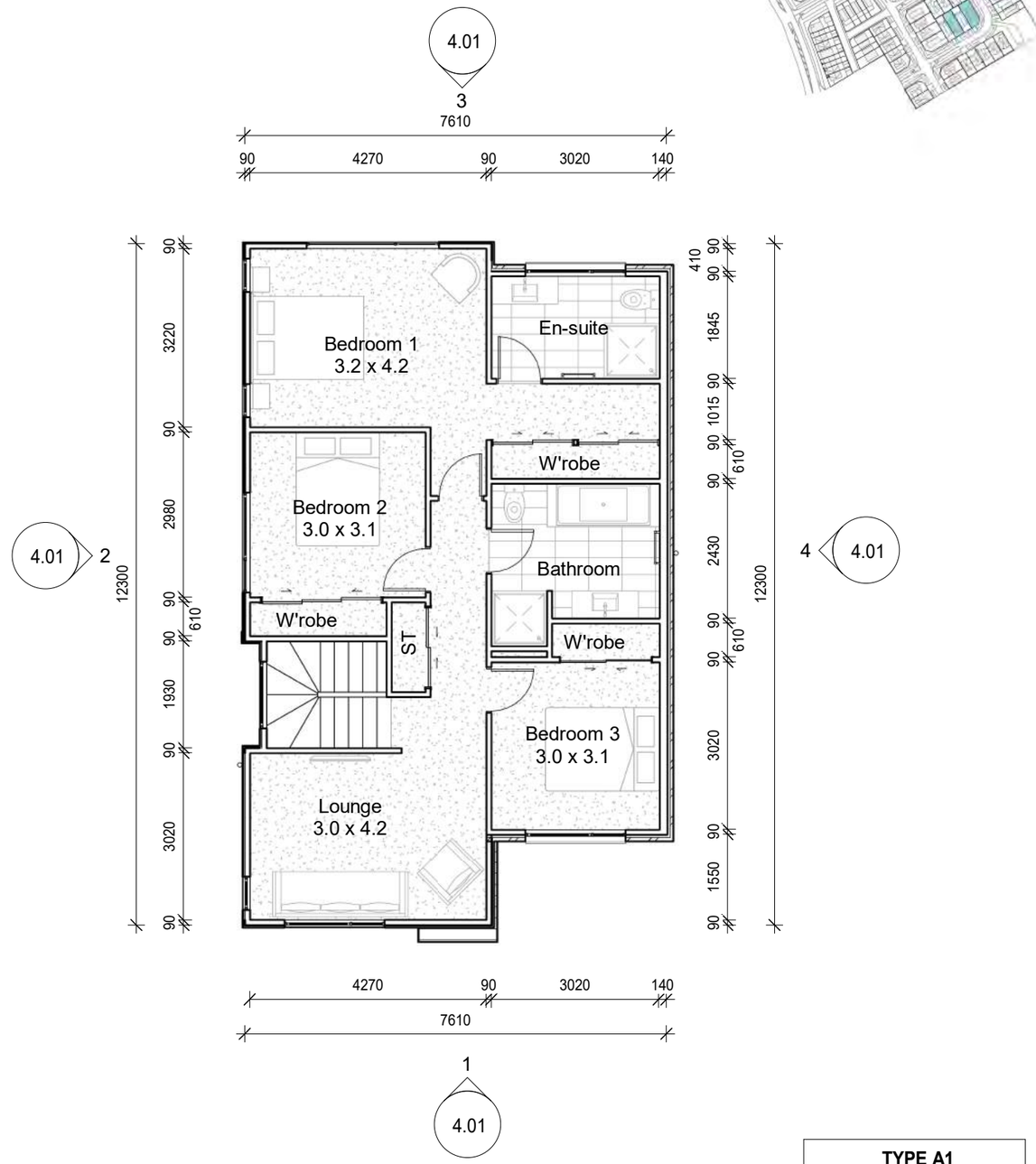


1 Type A1 - Ground Floor

1 : 100



2 Type A1 - Upper Floor

1 : 100

TYPE A1	
Ground Floor	84.7 m2
Level 1	88.2 m2
TOTAL	172.9 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.00**	Type A1 Plans	28/08/20

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1 **Type A1 - Front Elevation**
1 : 100

2 **Type A1 - Left Elevation**
1 : 100

3 **Type A1 - Rear Elevation**
1 : 100

4 **Type A1 - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.01**	Type A1 Elevations	28/08/20

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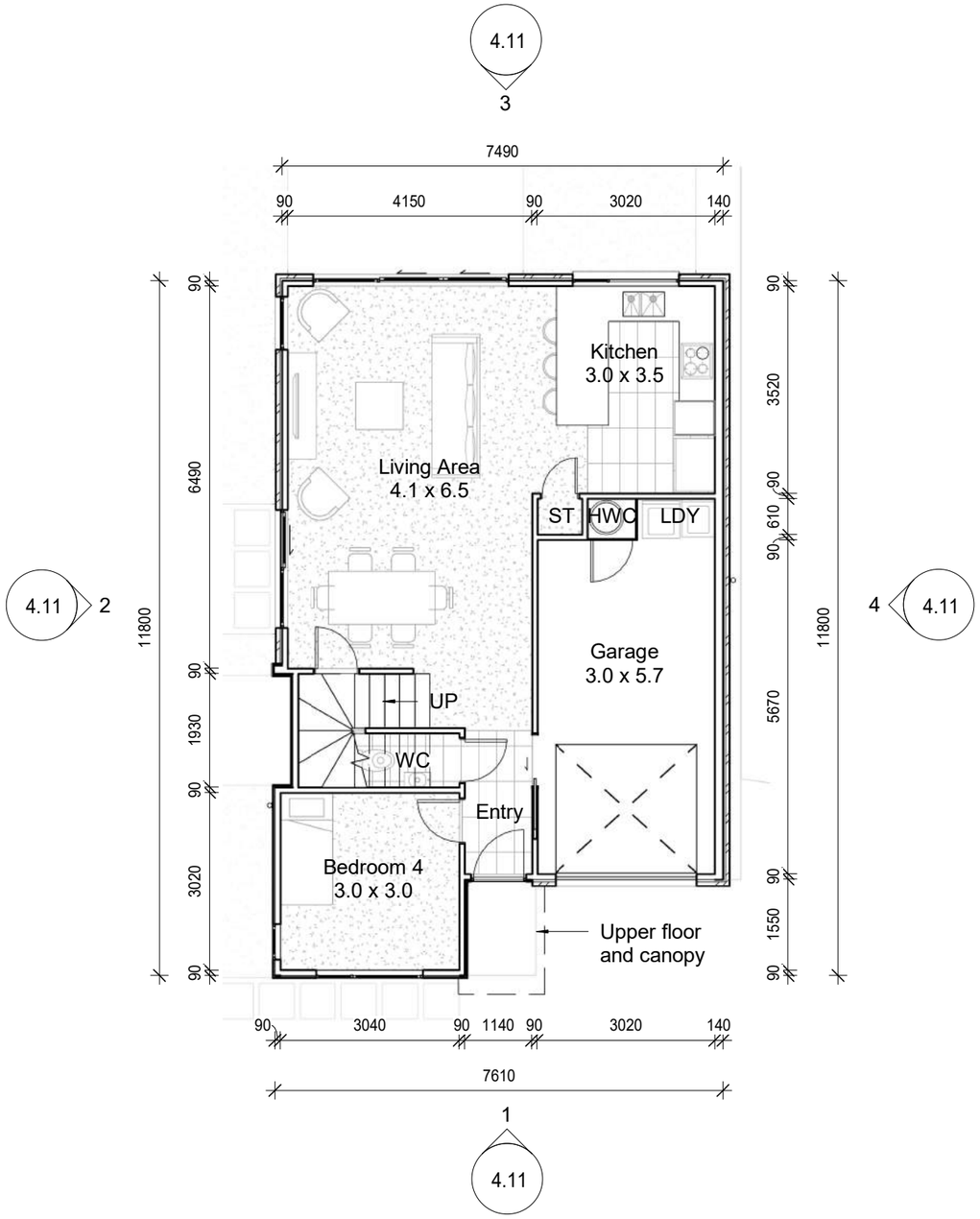

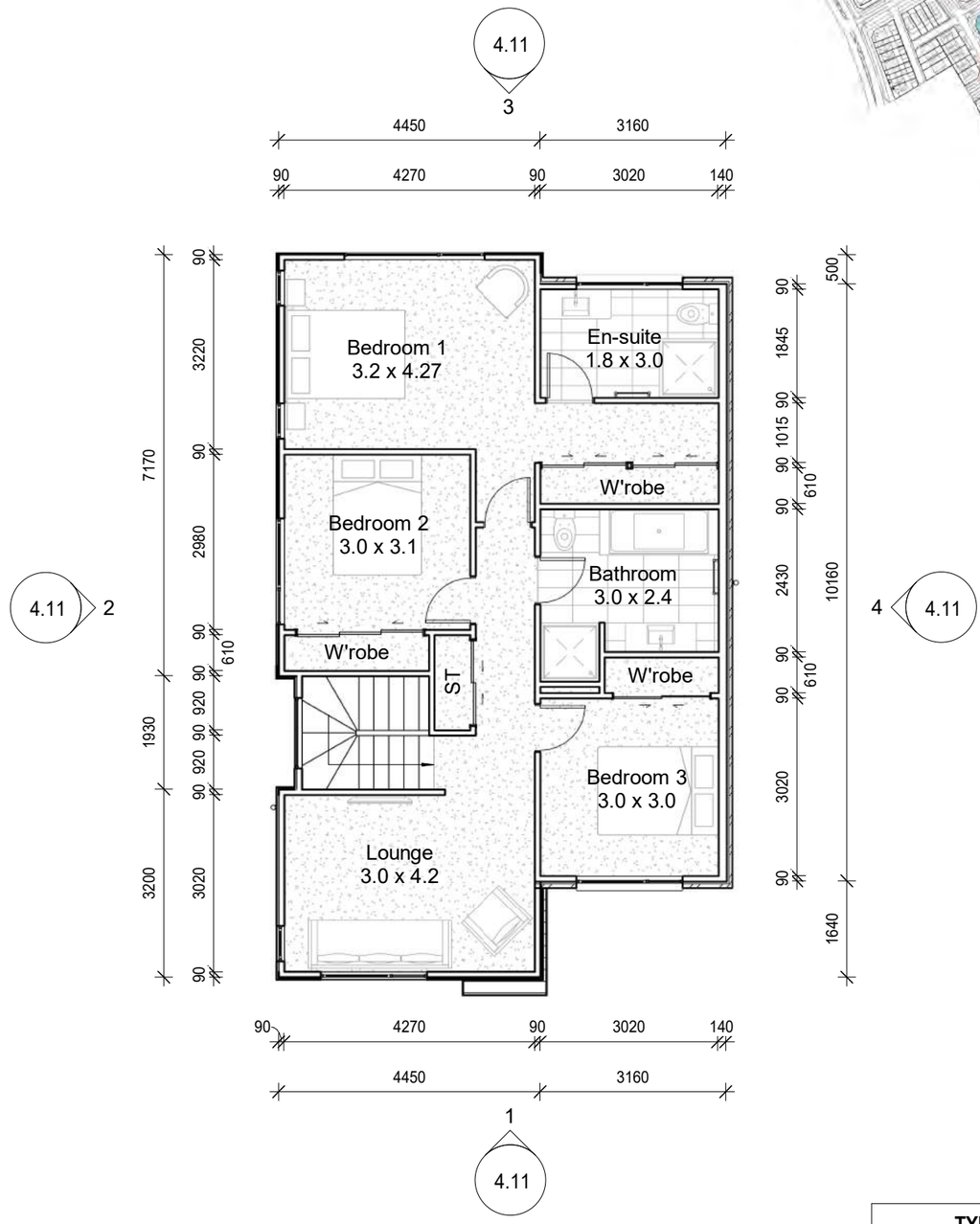

1 **Type A2 - Ground Floor**
1 : 100

2 **Type A2 - Upper Floor**
1 : 100

TYPE A2	
Ground Floor	84.7 m2
Level 1	88.2 m2
TOTAL	172.9 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.10**	Type A2 Plans	28/08/20

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1 **Type A2 - Front Elevation**
1 : 100

2 **Type A2 - Left Elevation**
1 : 100

3 **Type A2 - Rear Elevation**
1 : 100

4 **Type A2 - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.11**	Type A2 Elevations	28/08/20

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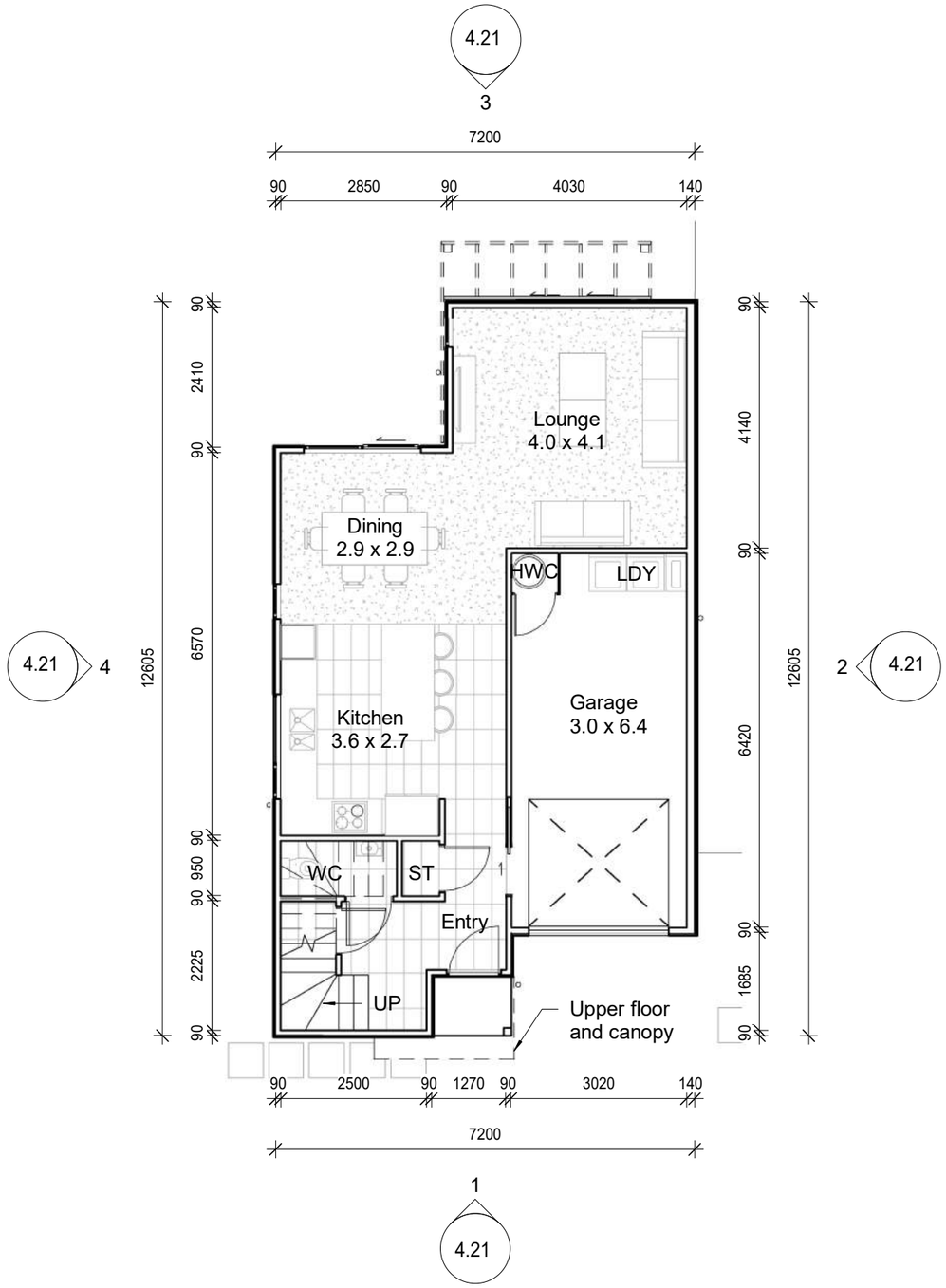
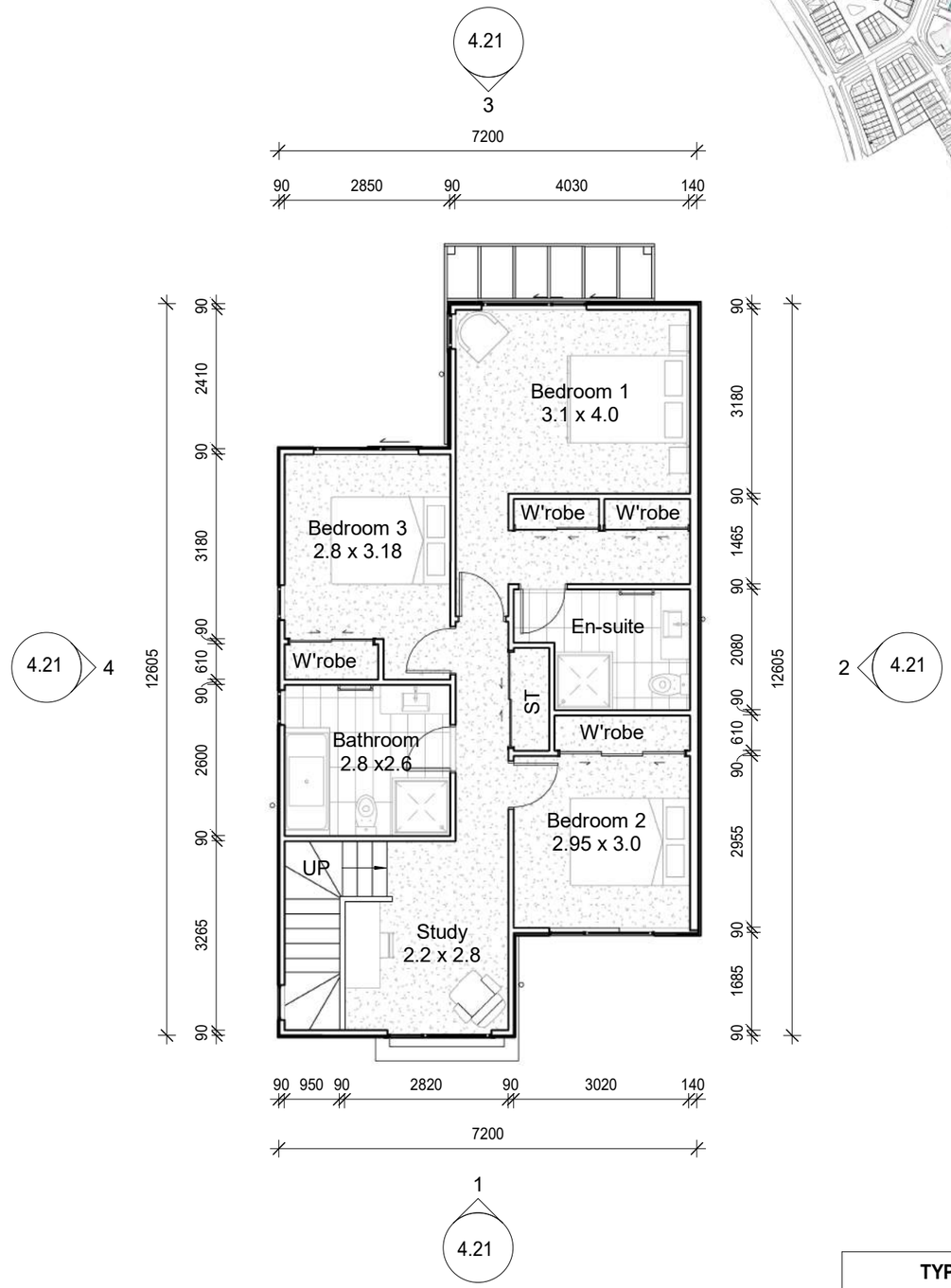


1 **Type B1 - Ground Floor**

1 : 100



2 **Type B1 - Upper Floor**

1 : 100

TYPE B1	
Ground Floor	76.4 m2
Level 1	77.9 m2
TOTAL	154.3 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.20**	Type B1 Plans	28/08/20

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1 **Type B1 - Front Elevation**
1 : 100

2 **Type B1 - Right Elevation**
1 : 100

3 **Type B1 - Rear Elevation**
1 : 100

4 **Type B1 - Left Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.21**	Type B1 Elevations	28/08/20

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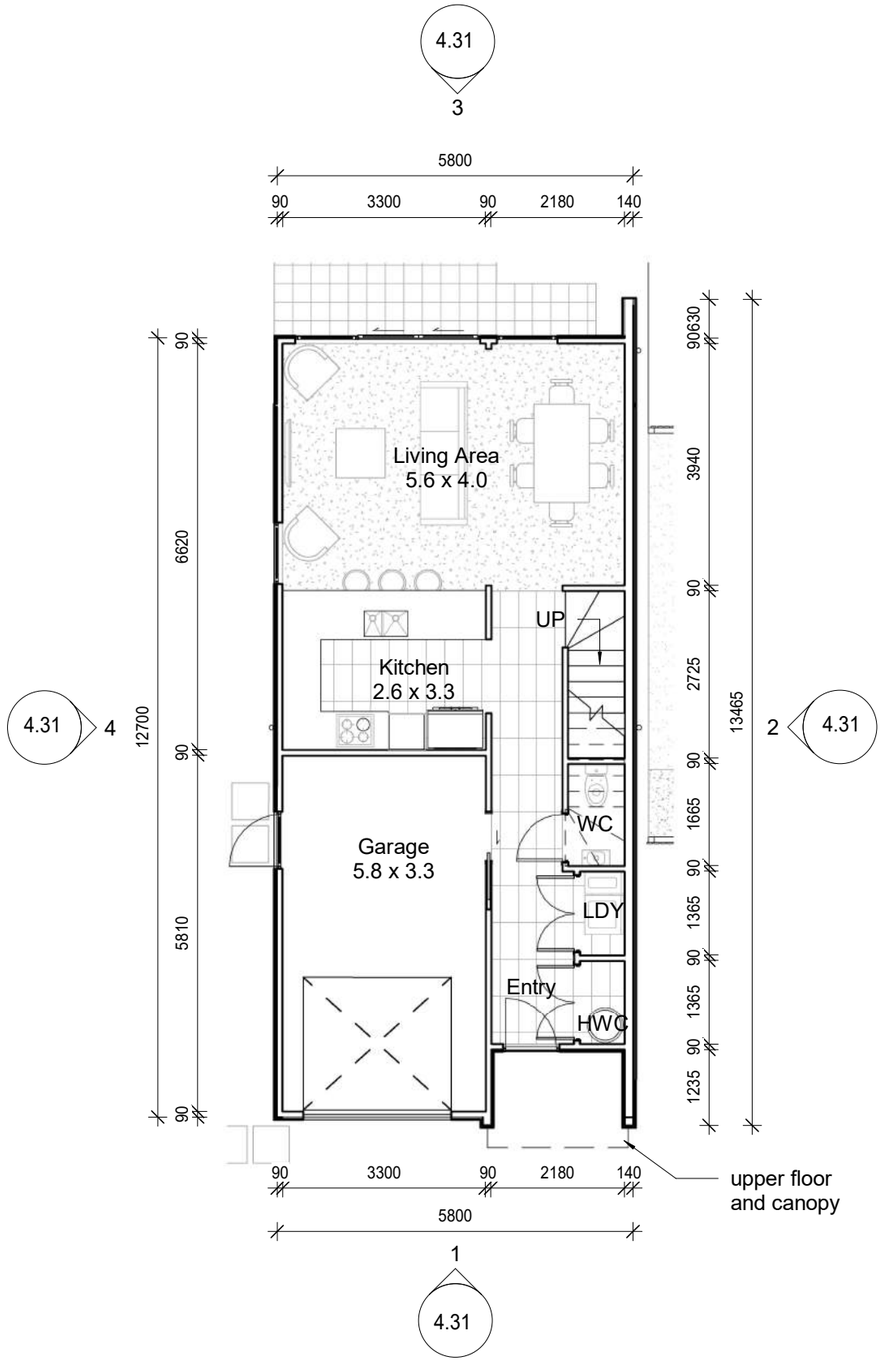
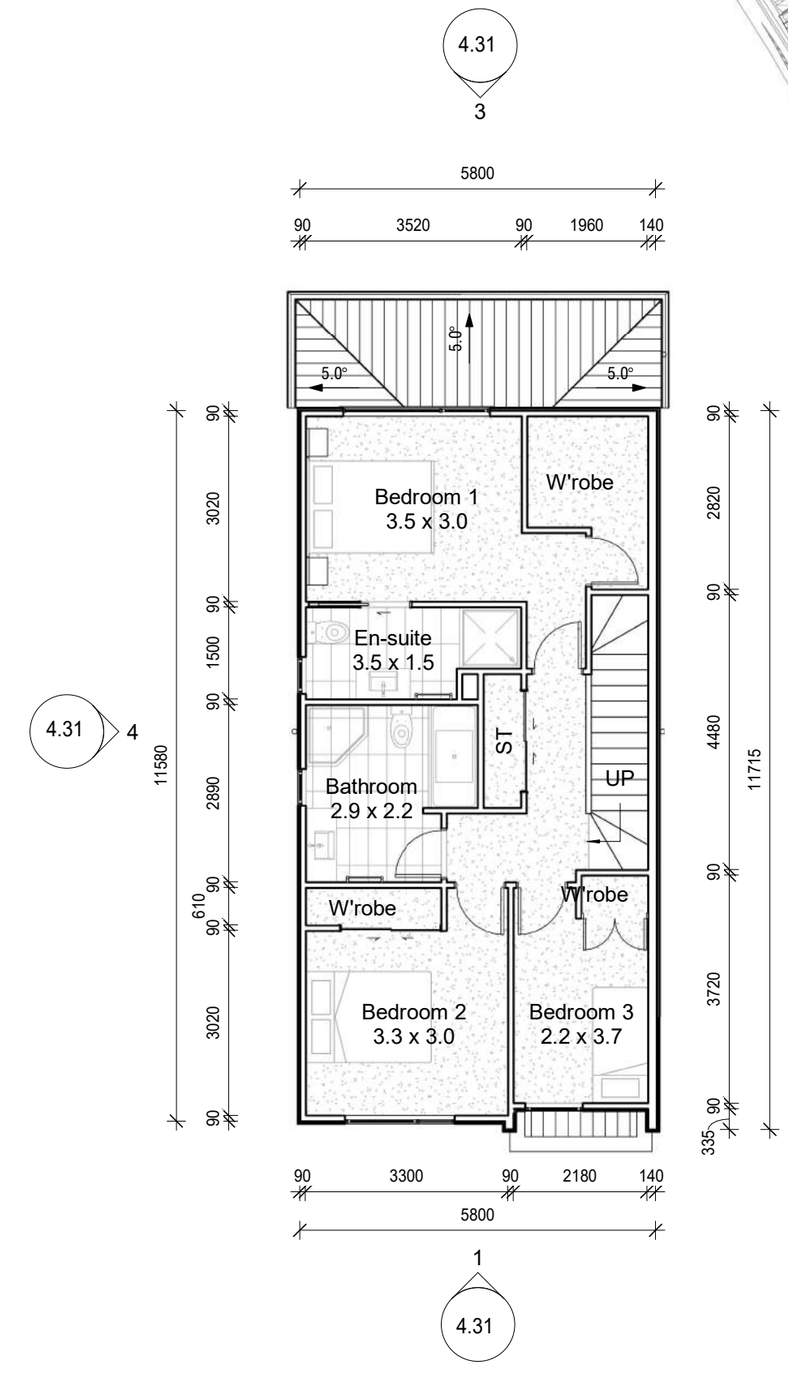


1 Type C1 - Ground Floor

1 : 100



2 Type C1 - Upper Floor

1 : 100

Note:
Refer to Type C2 and C3 for colour variations.
Sheets 4.32 and 4.33

TYPE C1	
Ground Floor	71.4 m2
Level 1	66.8 m2
TOTAL	138.2 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.30**	Type C1/C2/C3 Plans	31/07/2020

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1 **Type C1 - Front Elevation**
1 : 100

2 **Type C1 - Right Elevation**
1 : 100

3 **Type C1 - Rear Elevation**
1 : 100

4 **Type C1 - Left Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.31**	Type C1 Elevations	28/08/20

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1 Type C2 - Front Elevation

1 : 100

2 Type C2 - Right Elevation

1 : 100

3 Type C2 - Rear Elevation

1 : 100

4 Type C2 - Left Elevation

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.32**	Type C2 Elevations	28/08/20

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1 **Type C3 - Front Elevation**
1 : 100

2 **Type C3 - Right Elevation**
1 : 100

3 **Type C3 - Rear Elevation**
1 : 100

4 **Type C3 - Left Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.33**	Type C3 Elevations	28/08/20

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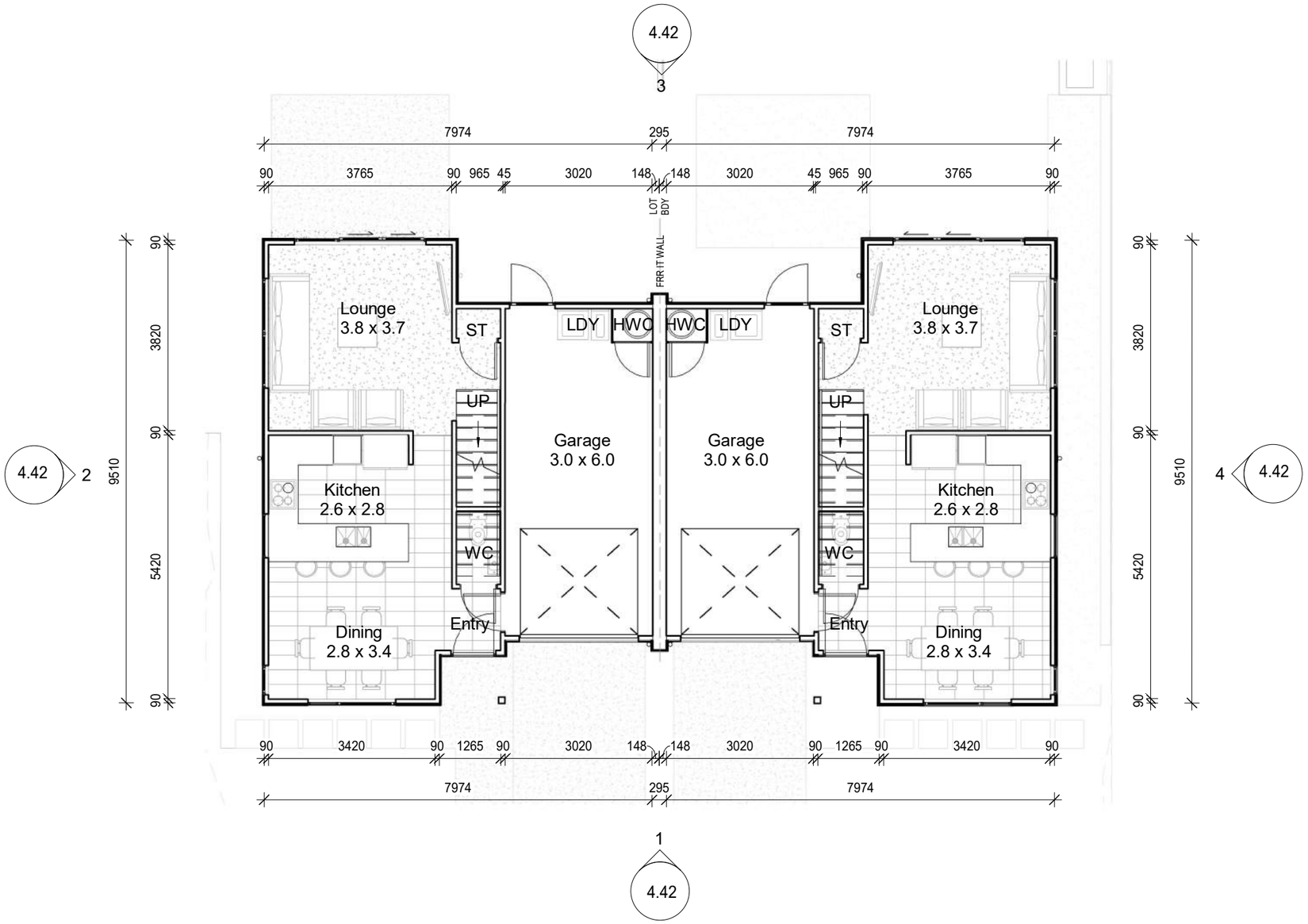

TYPE D	
Ground Floor	65.9 m2
Level 1	67.7 m2
TOTAL	133.6 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.40**	Type D Plans Ground	28/08/20

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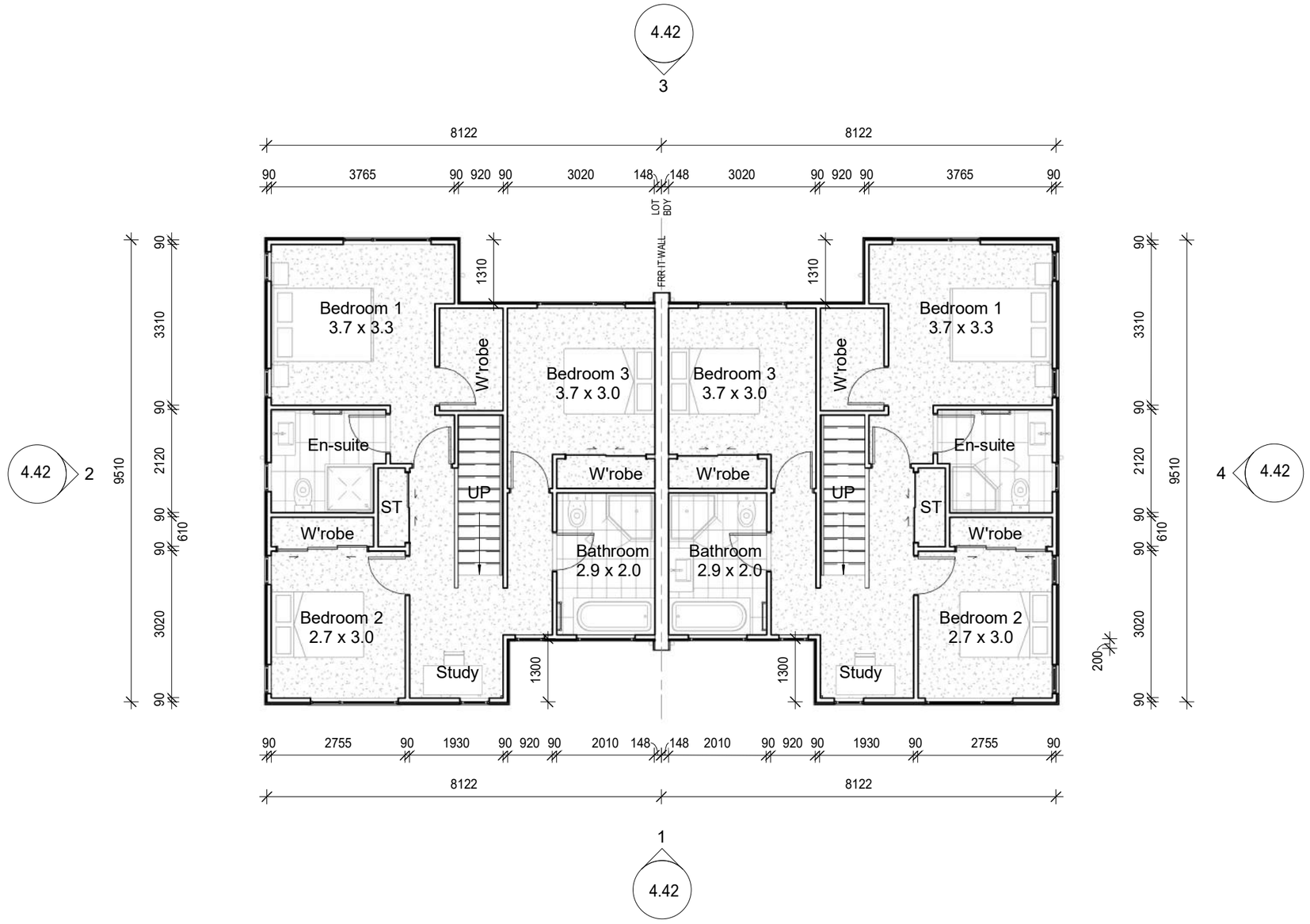

TYPE D	
Ground Floor	65.9 m2
Level 1	67.7 m2
TOTAL	133.6 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.41**	Type D Plans Upper	28/08/20

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1 **Type D - Front Elevation**
1 : 100

2 **Type D - Left Elevation**
1 : 100

3 **Type D - Rear Elevation**
1 : 100

4 **Type D - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.42**	Type D Elevations	28/08/20

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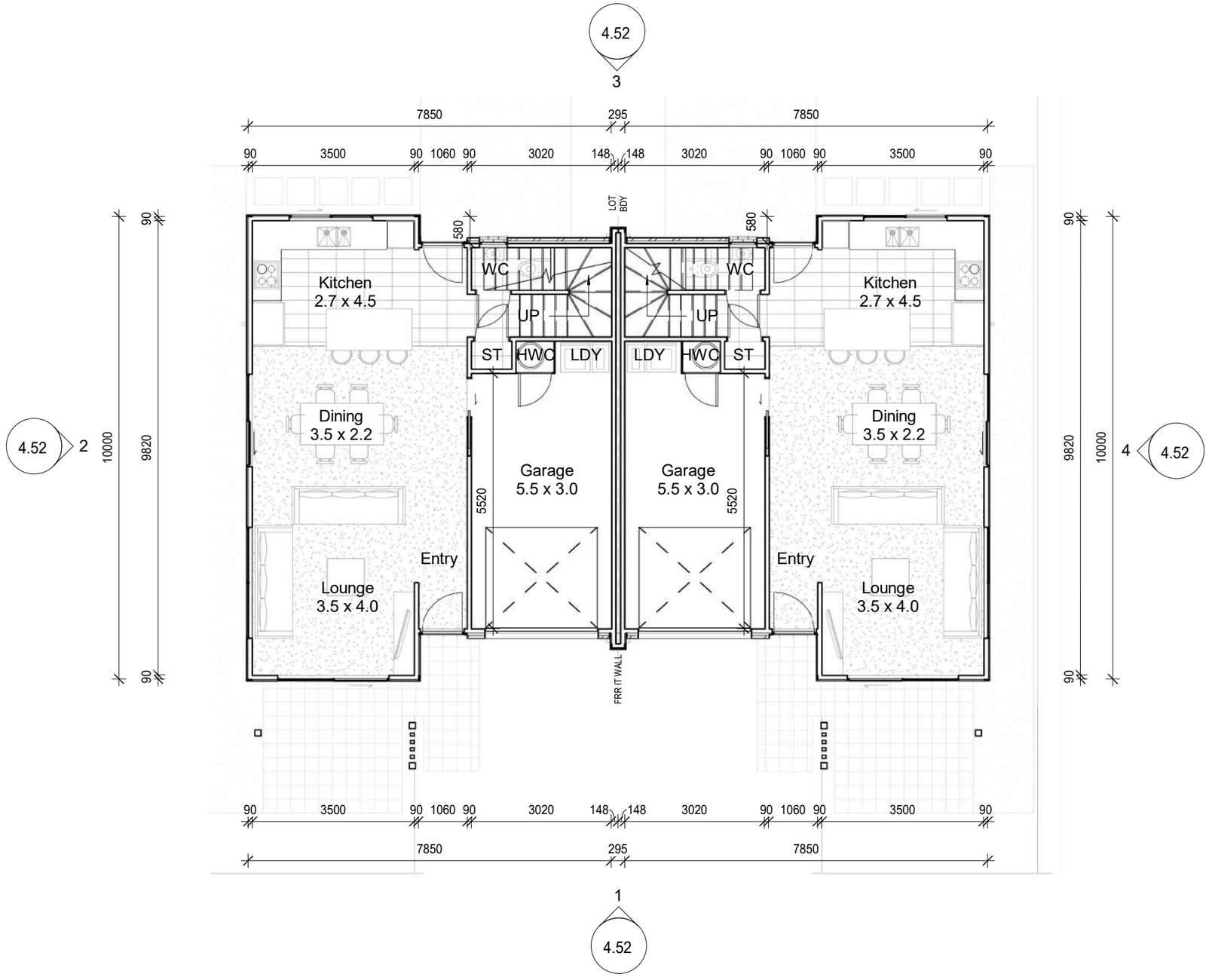

TYPE E1/2	
Ground Floor	74.3 m2
Level 1	75.8 m2
TOTAL	150.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.50**	Type E1/E2 Plans Ground	28/08/20

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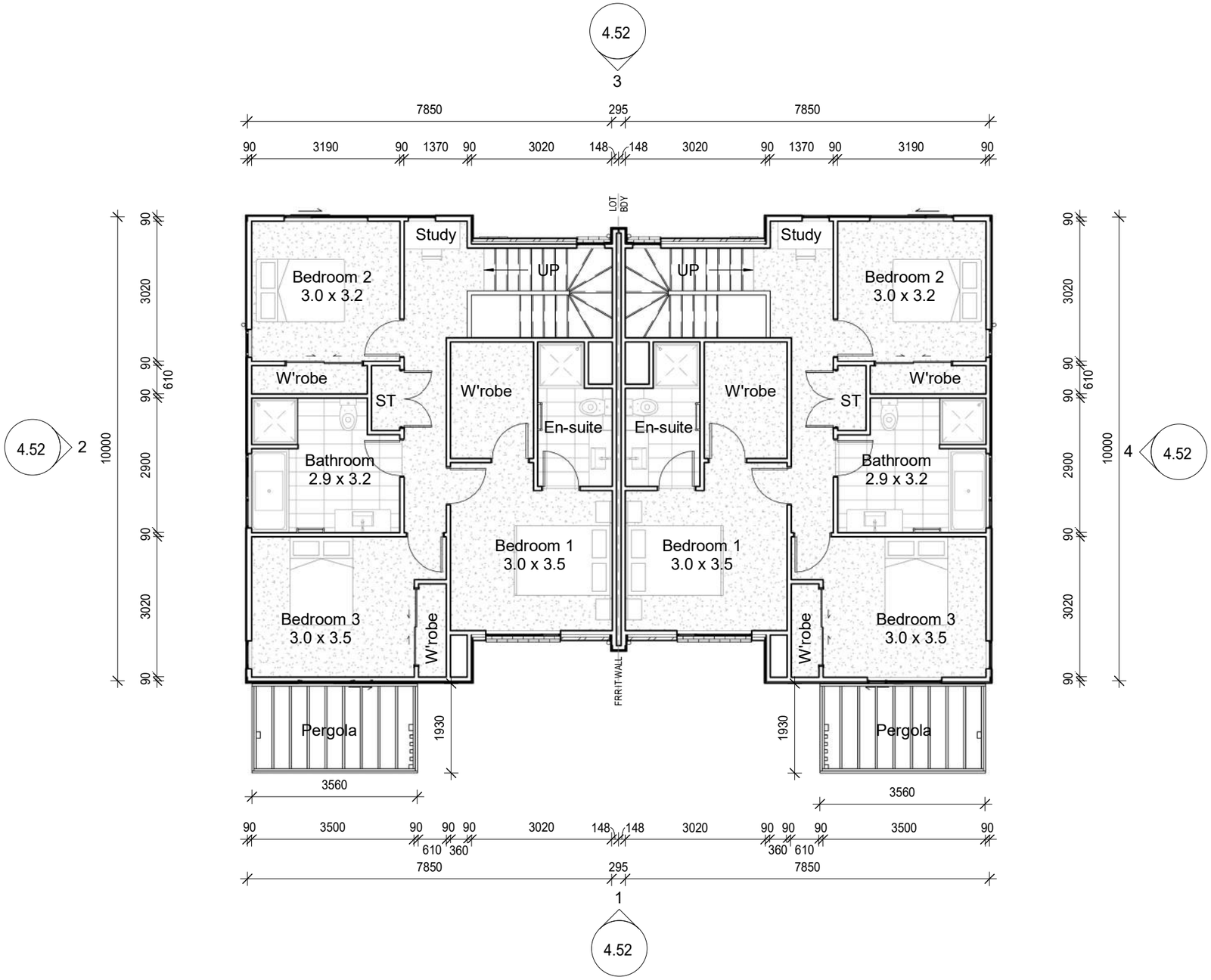

TYPE E1/2	
Ground Floor	74.3 m2
Level 1	75.8 m2
TOTAL	150.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.51**	Type E1/E2 Plans Upper	28/08/20

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1 **Type E1 - Front Elevation**
1 : 100

2 **Type E1 - Left Elevation**
1 : 100

3 **Type E1 - Rear Elevation**
1 : 100

4 **Type E1 - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.52**	Type E1 Elevations	28/08/20

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1 **Type E2 - Front Elevation**
1 : 100

2 **Type E2 - Left Elevation**
1 : 100

3 **Type E2 - Rear Elevation**
1 : 100

4 **Type E2 - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.53**	Type E2 Elevations	28/08/20

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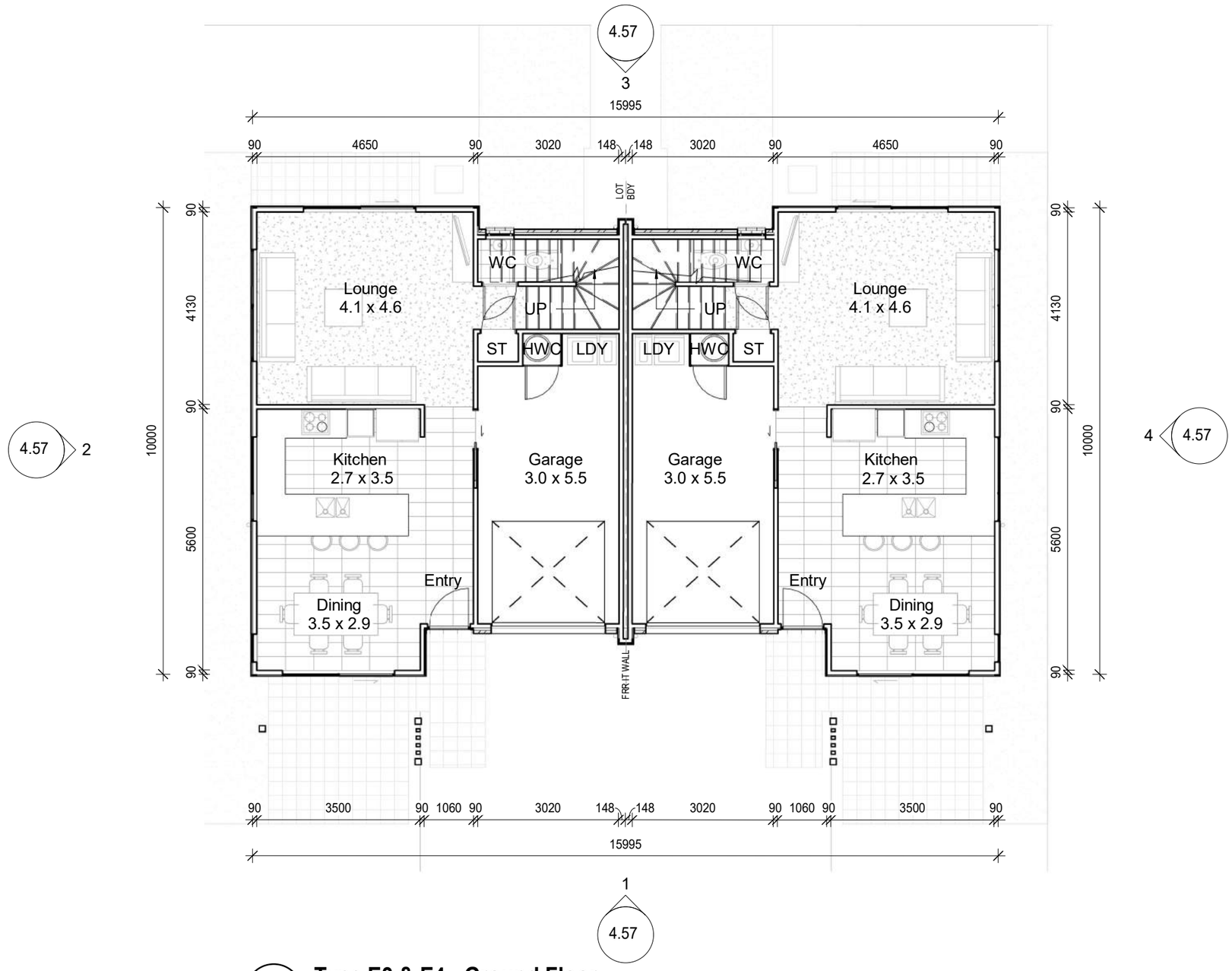

1 Type E3 & E4 - Ground Floor

1 : 100

TYPE E3/4	
Ground Floor	74.7 m2
Level 1	75.8 m2
TOTAL	150.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.54**	Type E3/E4 Plans Ground	28/08/20

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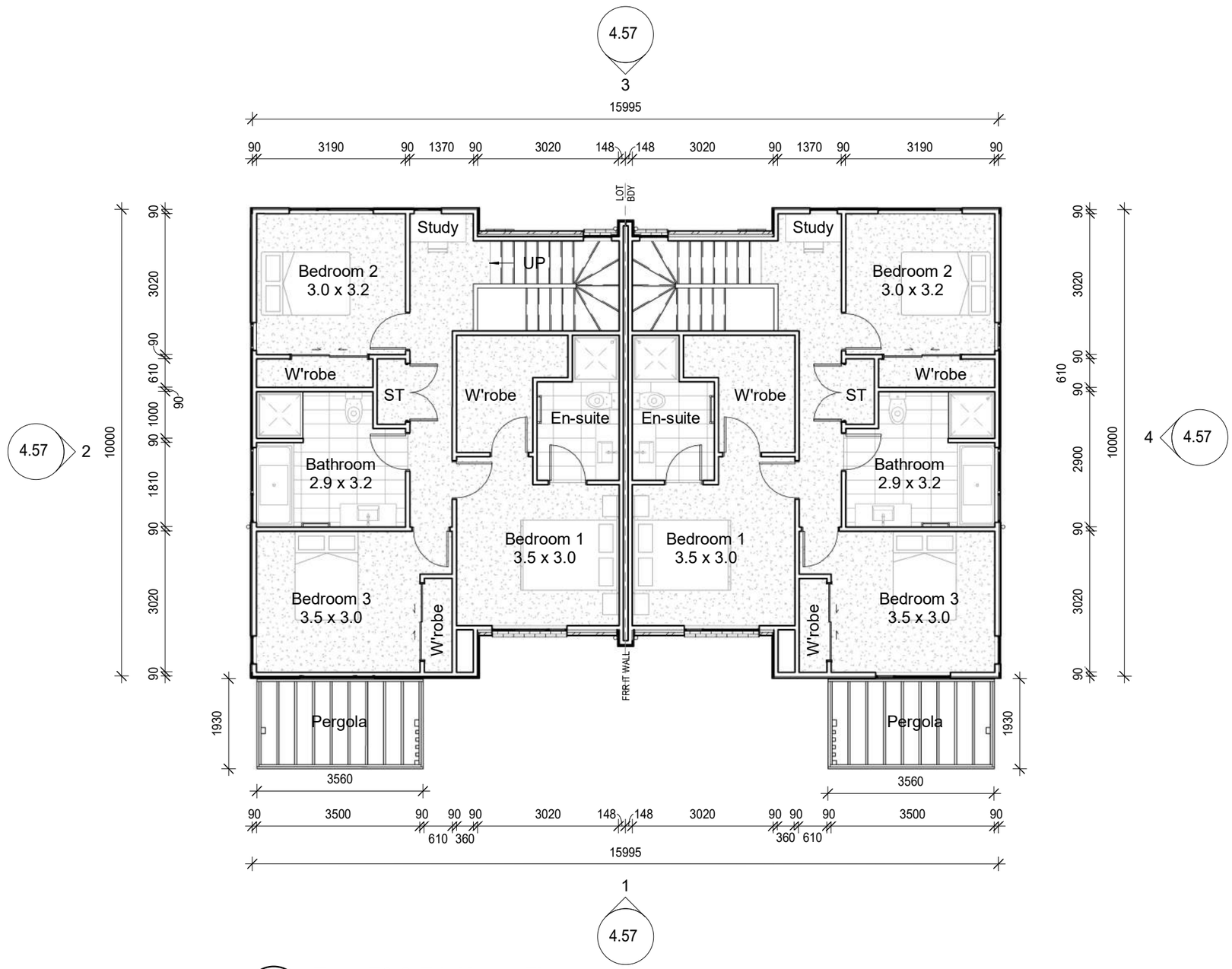

1 Type E3 & E4- Upper Floor

1 : 100

TYPE E3/4	
Ground Floor	74.7 m2
Level 1	75.8 m2
TOTAL	150.1 m2

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1
3.04

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.55**	Type E3/E4 Plans Upper	28/08/20

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1 **Type E3 - Front Elevation**
1 : 100

2 **Type E3 - Left Elevation**
1 : 100

3 **Type E3 - Rear Elevation**
1 : 100

4 **Type E3 - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.56**	Type E3 Elevations	28/08/20

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1 **Type E4 - Front Elevation**
1 : 100

2 **Type E4 - Left Elevation**
1 : 100

3 **Type E4 - Rear Elevation**
1 : 100

4 **Type E4 - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.57**	Type E4 Elevations	28/08/20

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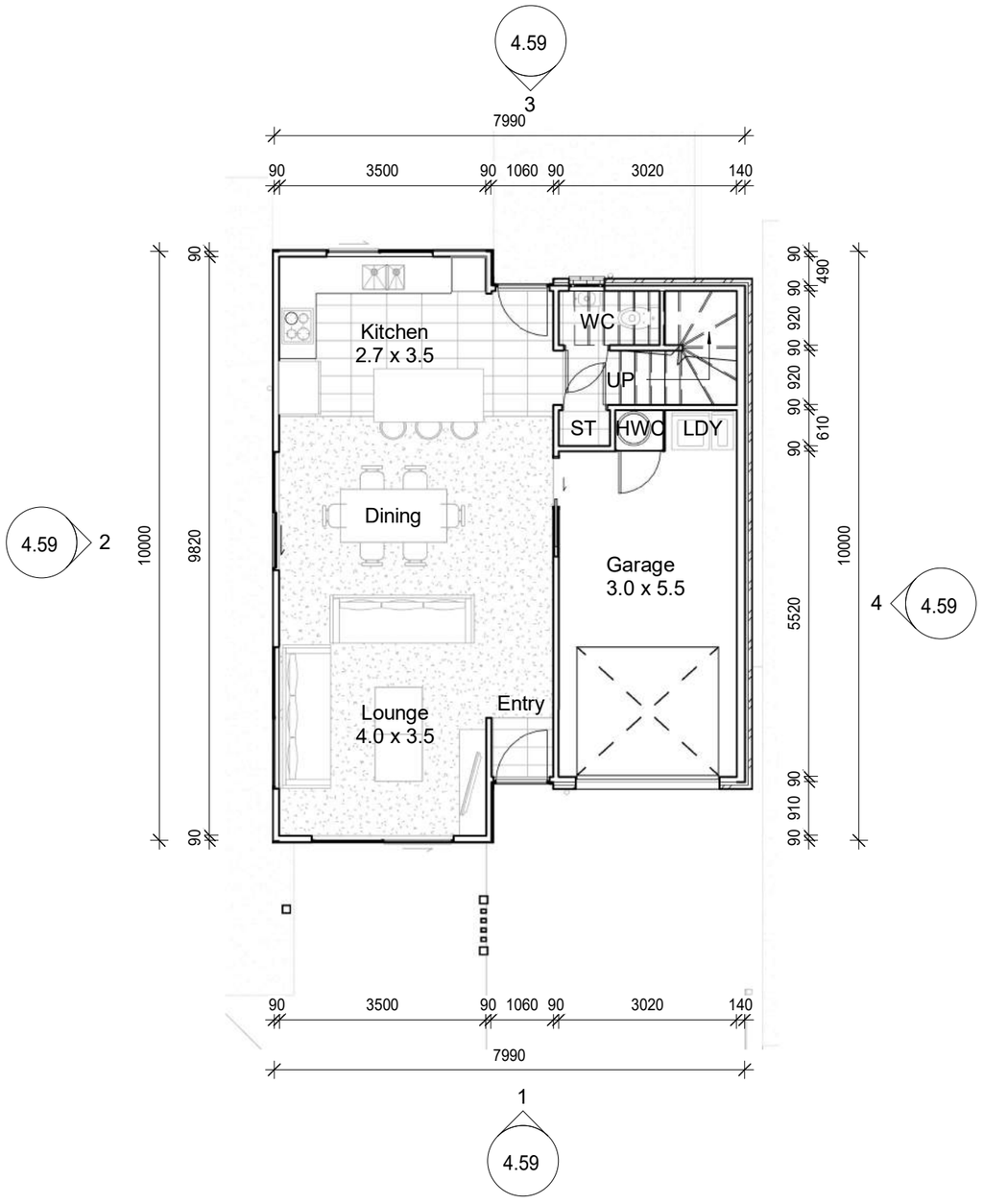
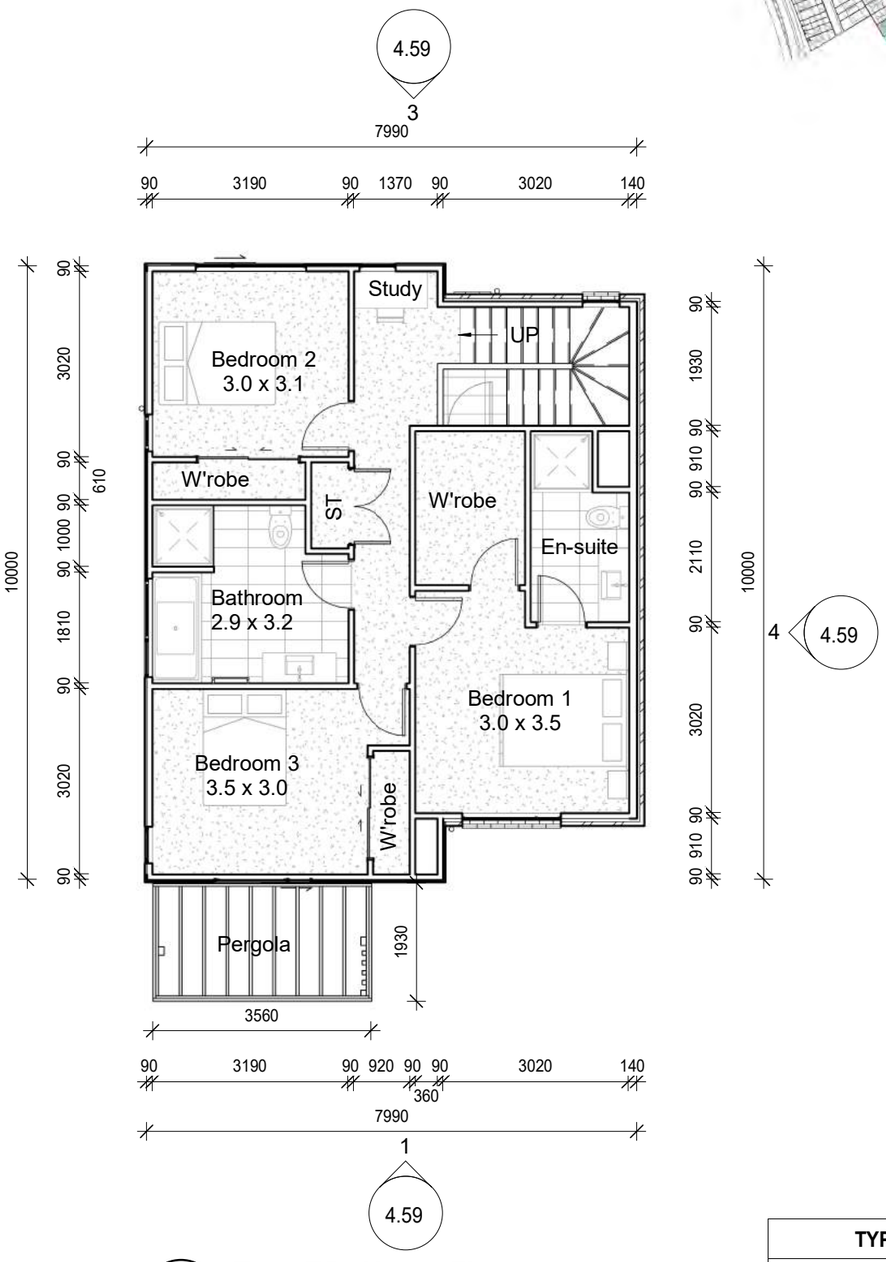


1 Type E5 - Ground Floor

1 : 100



2 Type E5 - Upper Floor

1 : 100

TYPE E5	
Ground Floor	75.1 m2
Level 1	76.7 m2
TOTAL	151.8 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.58**	Type E5 Plans	28/08/20

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1 **Type E5 - Front Elevation**

1 : 100

2 **Type E5 - Left Elevation**

1 : 100

3 **Type E5 - Rear Elevation**

1 : 100

4 **Type E5 - Right Elevation**

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.59**	Type E5 Elevations	28/08/20

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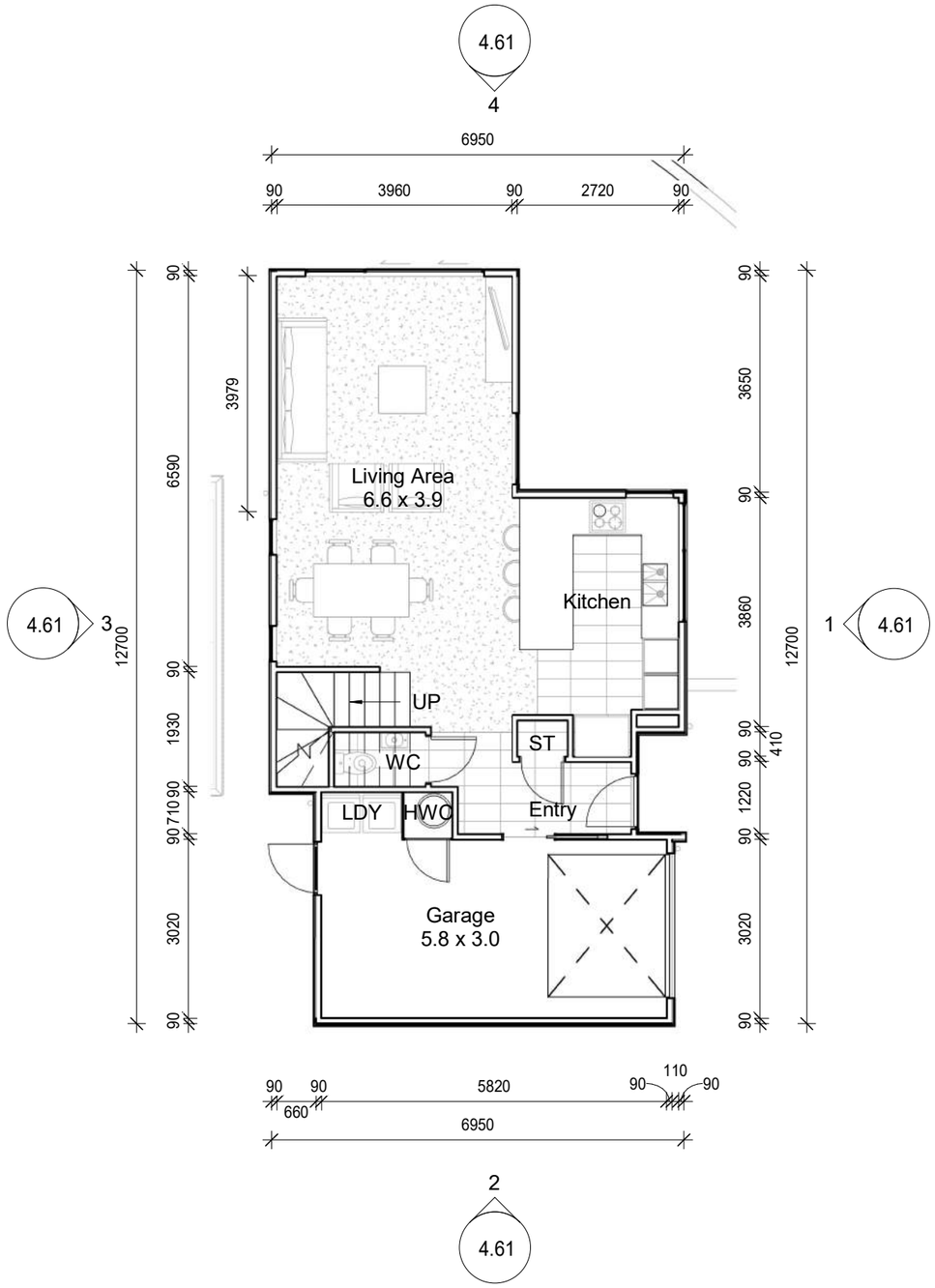

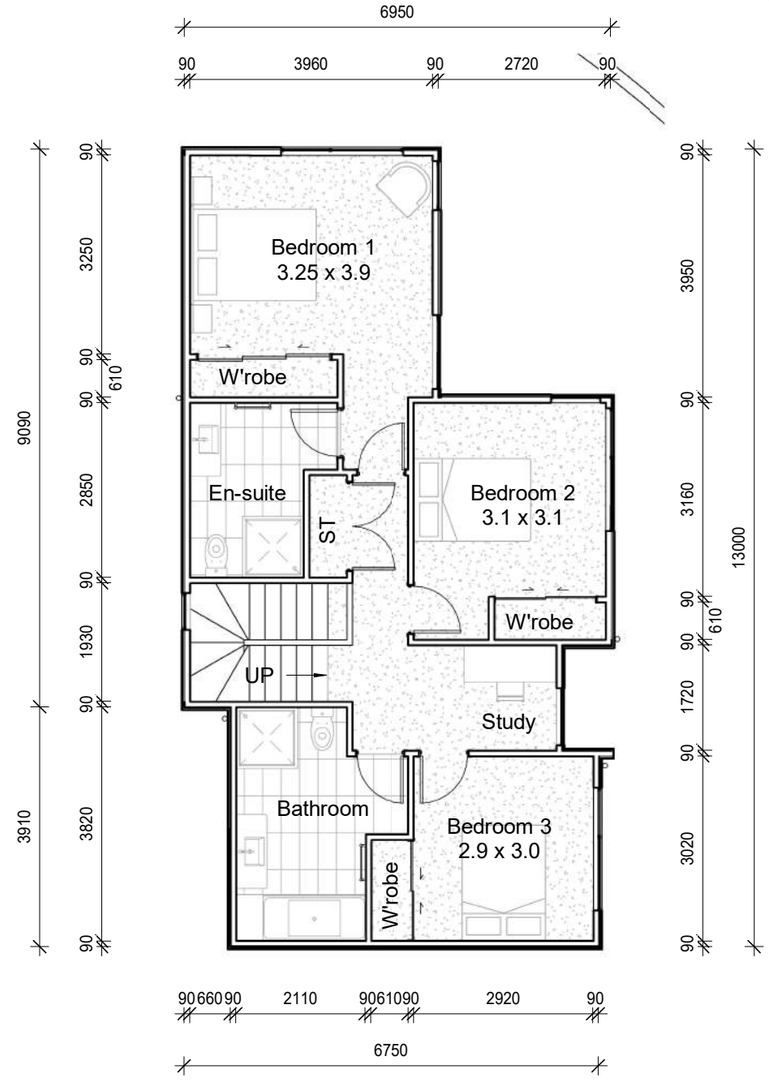

1 Type F1 - Ground Floor

1 : 100

2 Type F1 - Upper Floor

1 : 100

TYPE F1	
Ground Floor	72.8 m2
Level 1	74 m2
TOTAL	146.8 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.60**	Type F1 Plans	28/08/20

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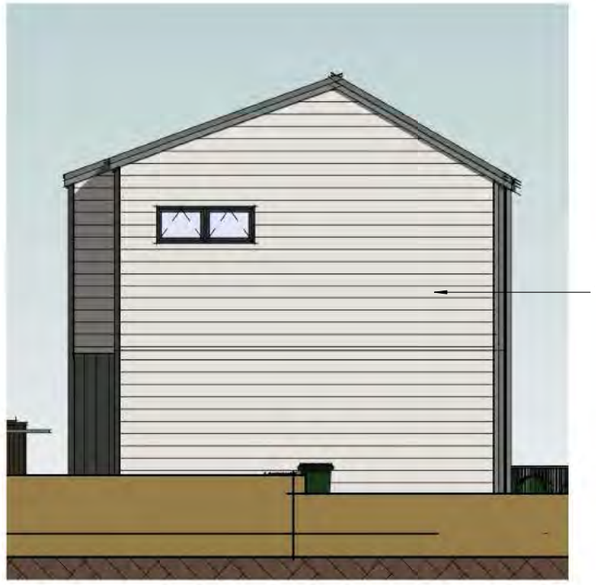
1 **Type F1 - Front Elevation**
1 : 100



2 **Type F1 - Left Elevation**
1 : 100

3 **Type F1 - Rear Elevation**
1 : 100

4 **Type F1 - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.61**	Type F1 Elevations	28/08/20

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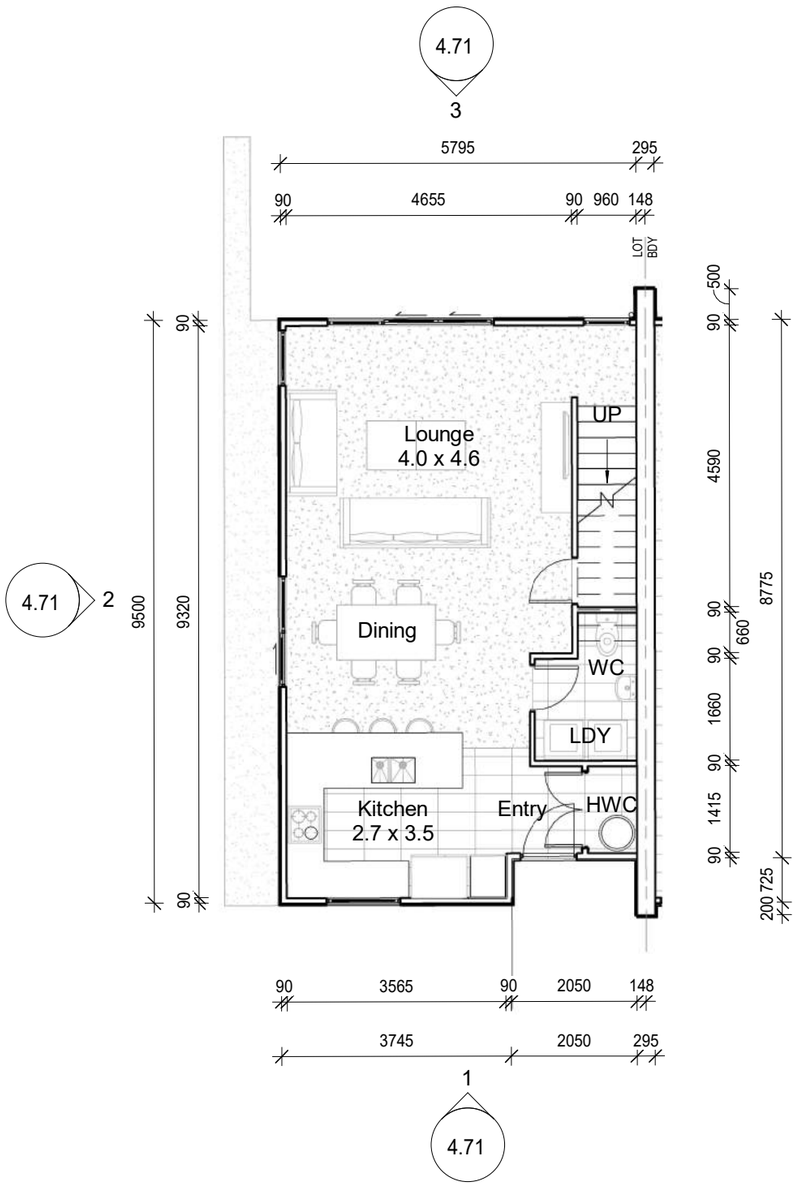
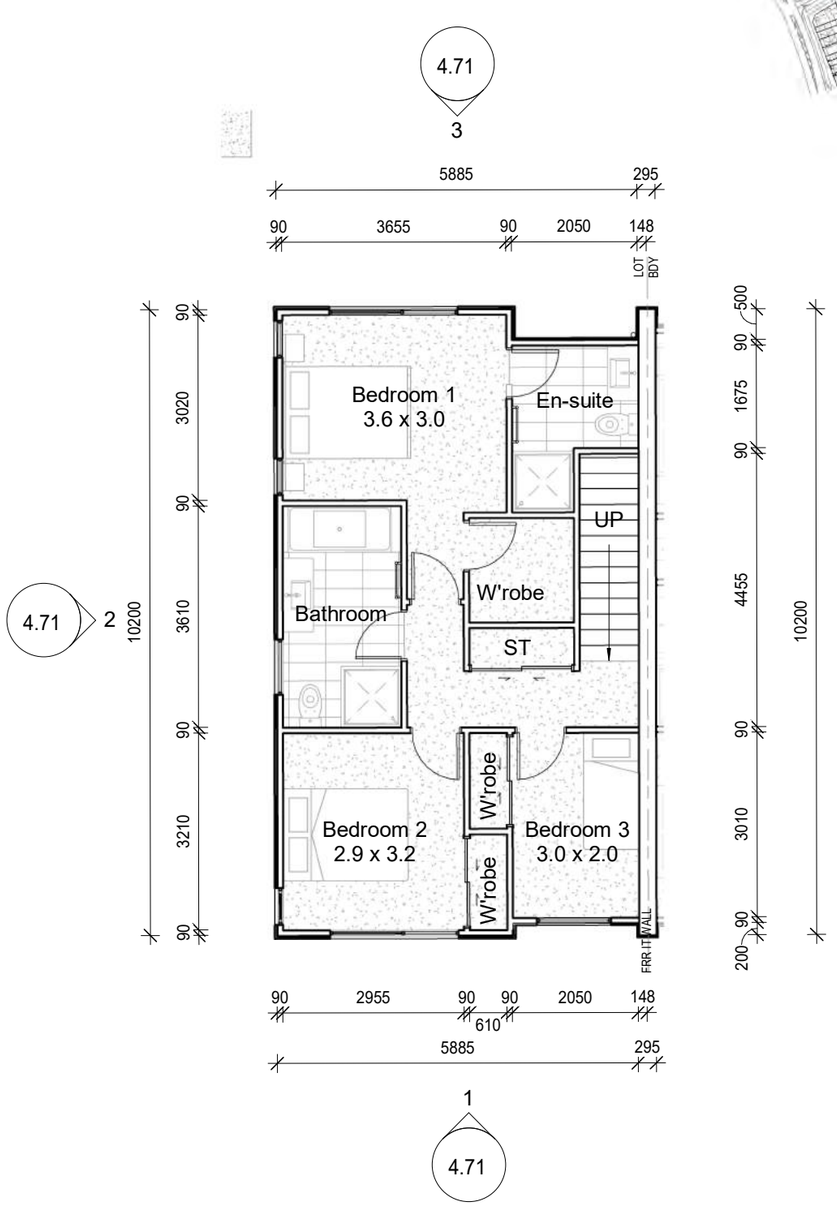


1 Type G1 - Ground Floor

1 : 100



2 Type G1 - Upper Floor

1 : 100

TYPE G1	
Ground Floor	55.1 m2
Level 1	60.6 m2
TOTAL	115.7 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.70**	Type G1 Plans	28/08/20

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1 **Type G1 - Front Elevation**
1 : 100

2 **Type G1 - Left Elevation**
1 : 100

3 **Type G1 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.71**	Type G1 Elevations	28/08/20

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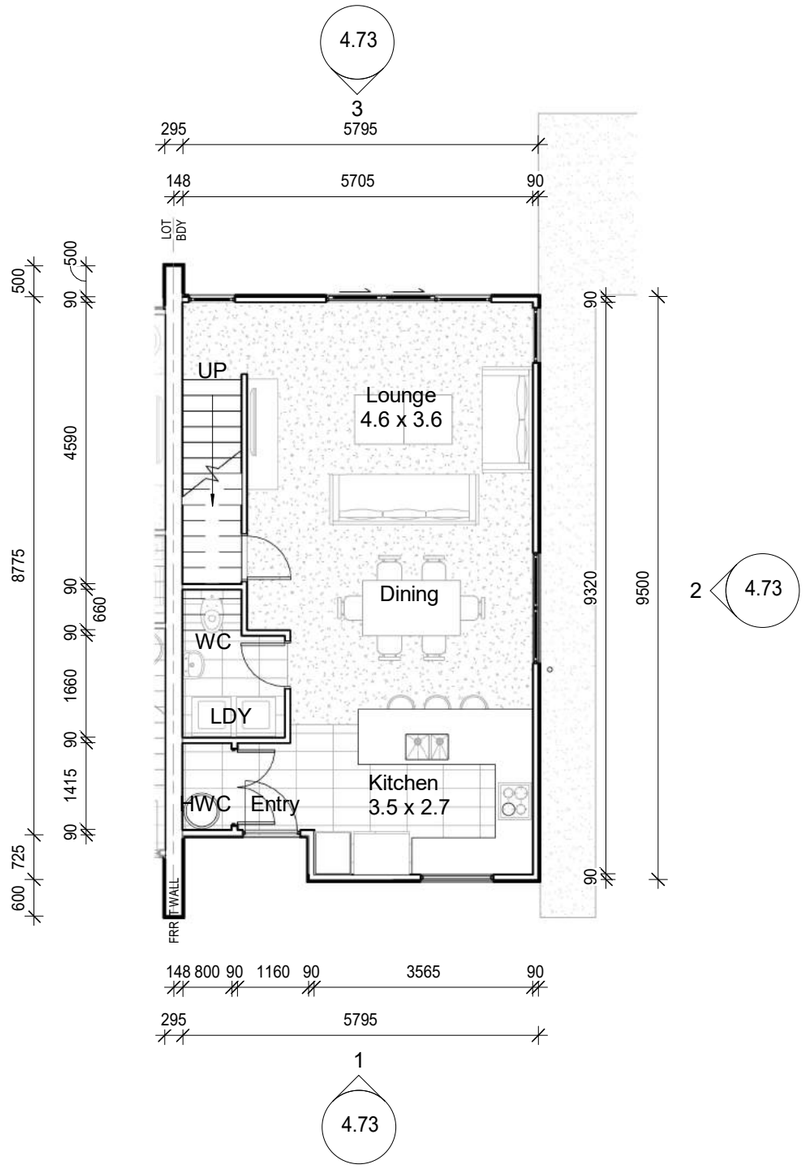

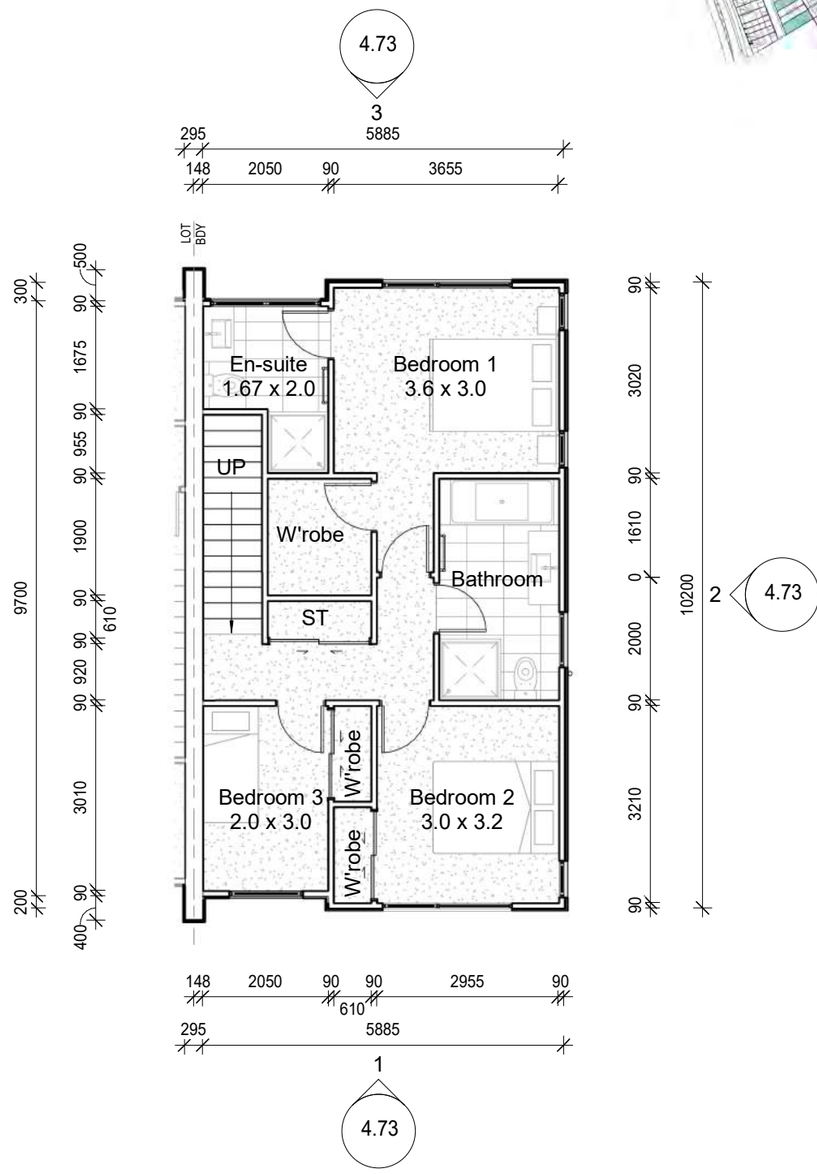

1 **Type G2 - Ground Floor**
1 : 100

2 **Type G2 - Upper Floor**
1 : 100

TYPE G2	
Ground Floor	55.1 m2
Level 1	60.6 m2
TOTAL	115.7 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.72**	Type G2 Plans	09/07/2020

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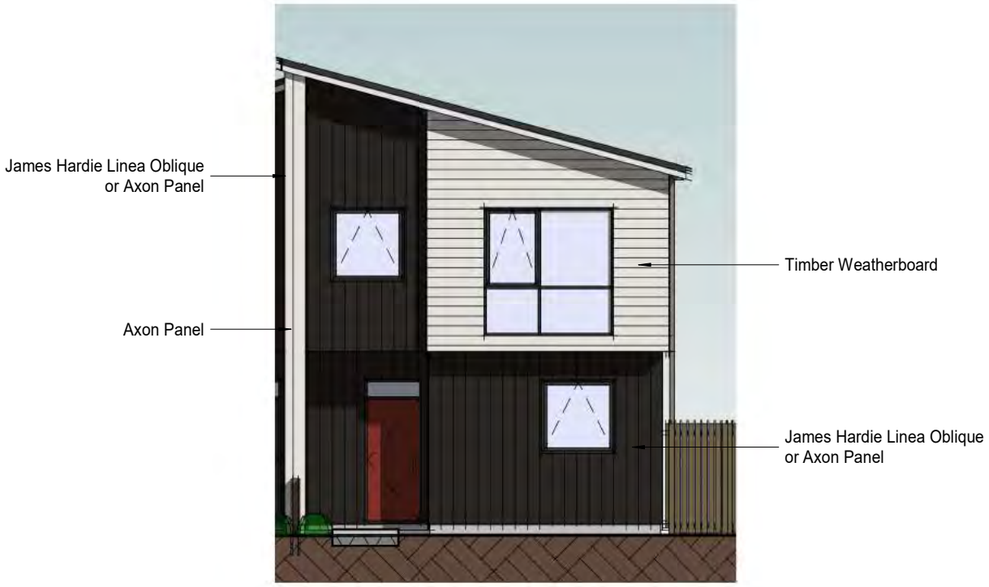
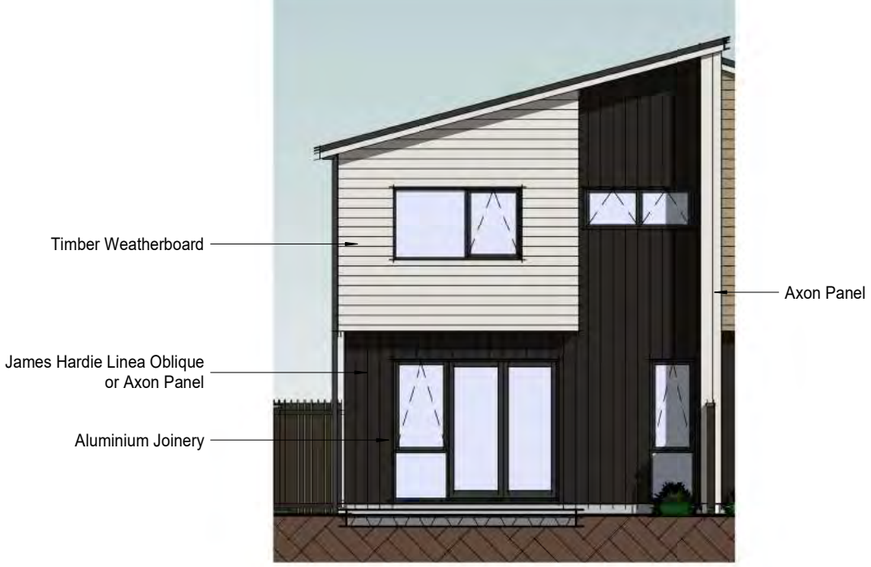


1 **Type G2 - Front Elevation**
1 : 100

2 **Type G2 - Right Elevation**
1 : 100



3 **Type G2 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.73**	Type G2 Elevations	28/08/20

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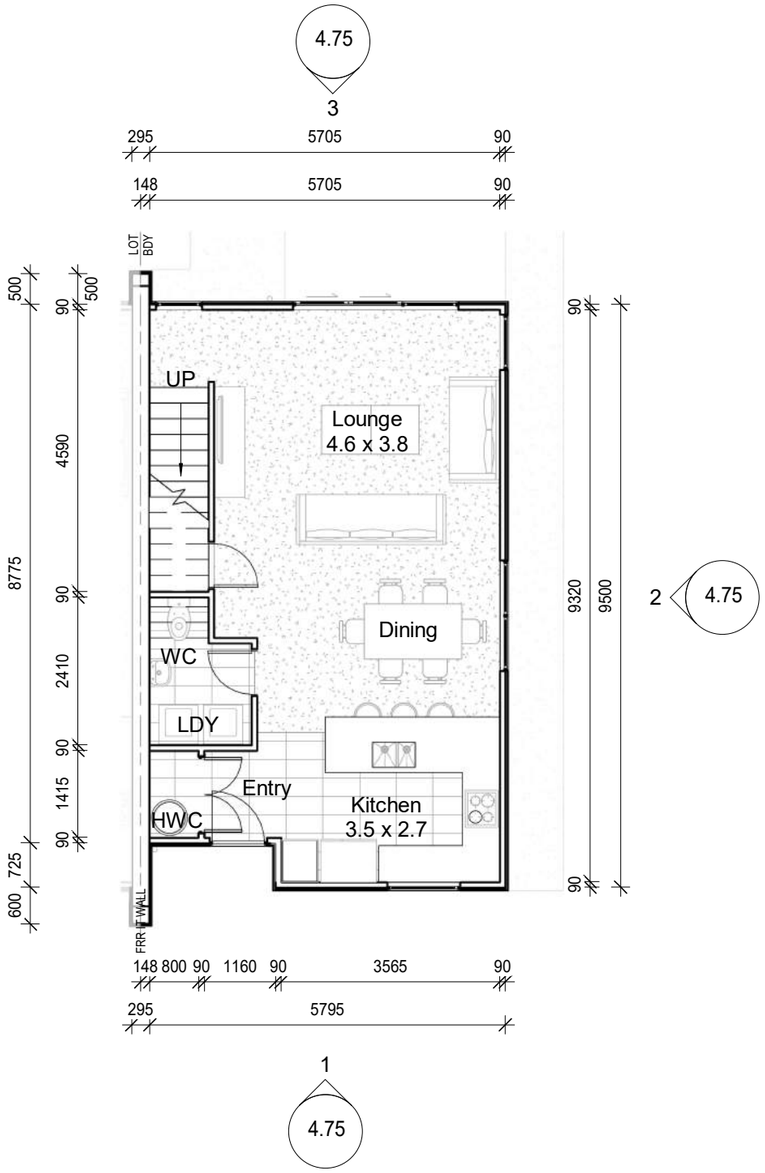

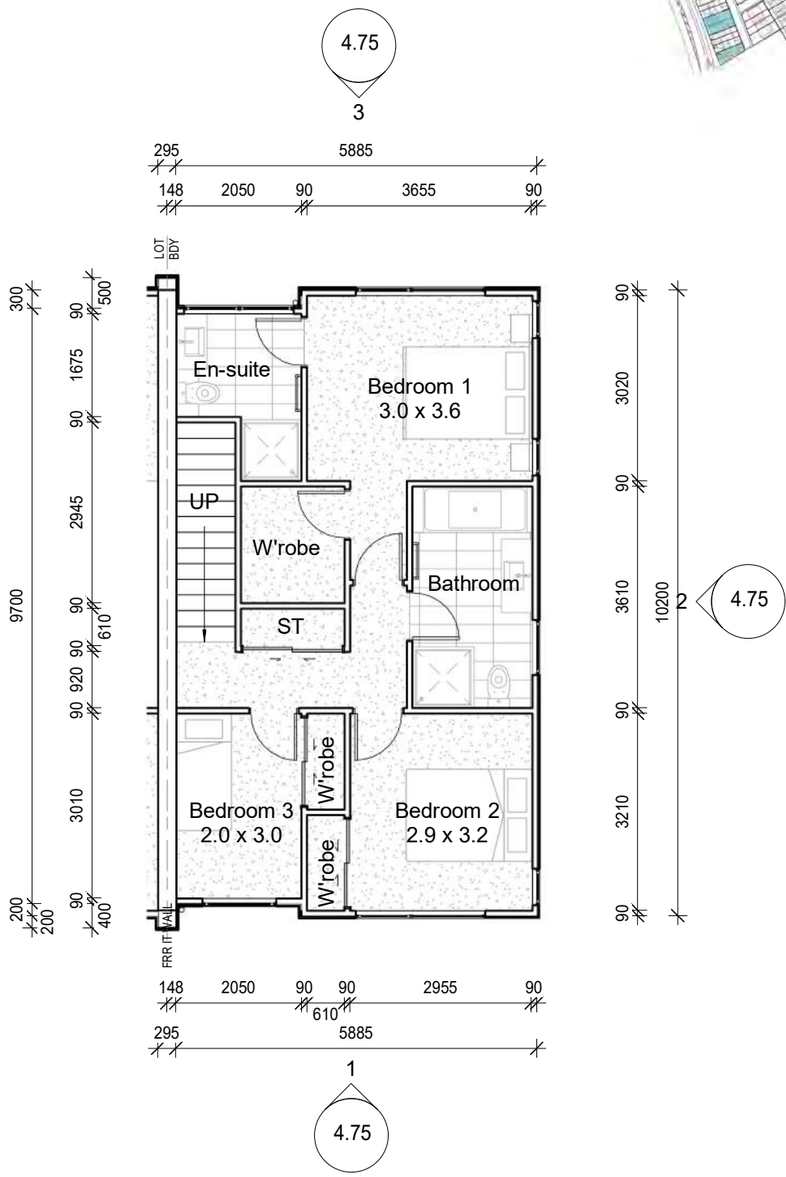

1 Type G3 - Ground Floor

1 : 100

2 Type G3 - Upper Floor

1 : 100

TYPE G3	
Ground Floor	55.1 m2
Level 1	60.6 m2
TOTAL	115.7 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.74**	Type G3 Plans	28/08/20

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1 **Type G3 - Front Elevation**
1 : 100

2 **Type G3 - Left Elevation**
1 : 100

3 **Type G3 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.75**	Type G3 Elevations	28/08/20

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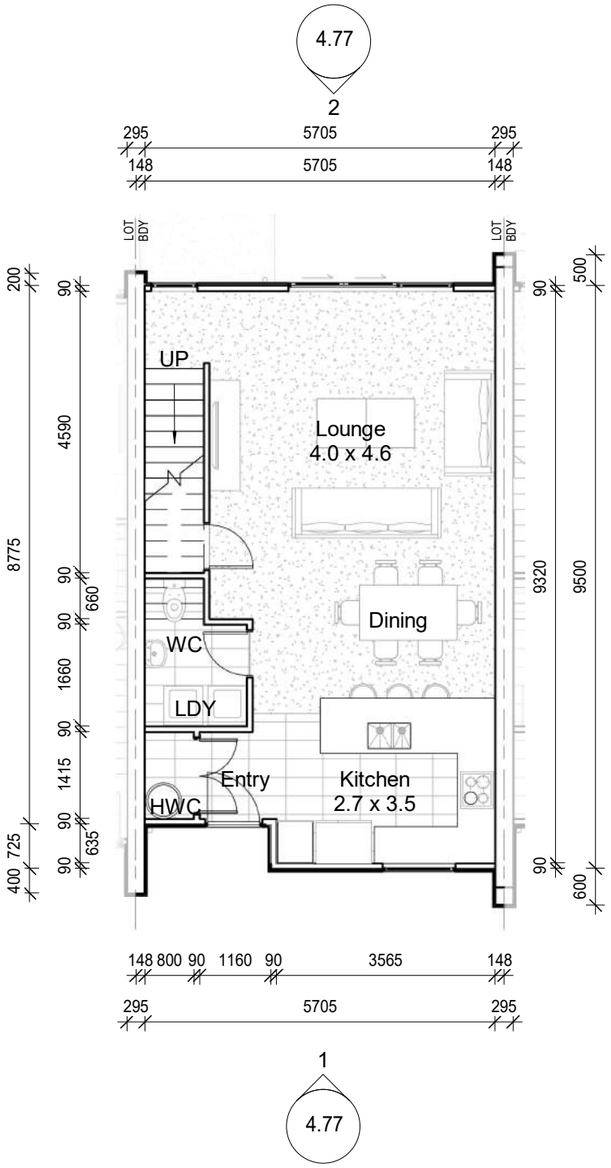

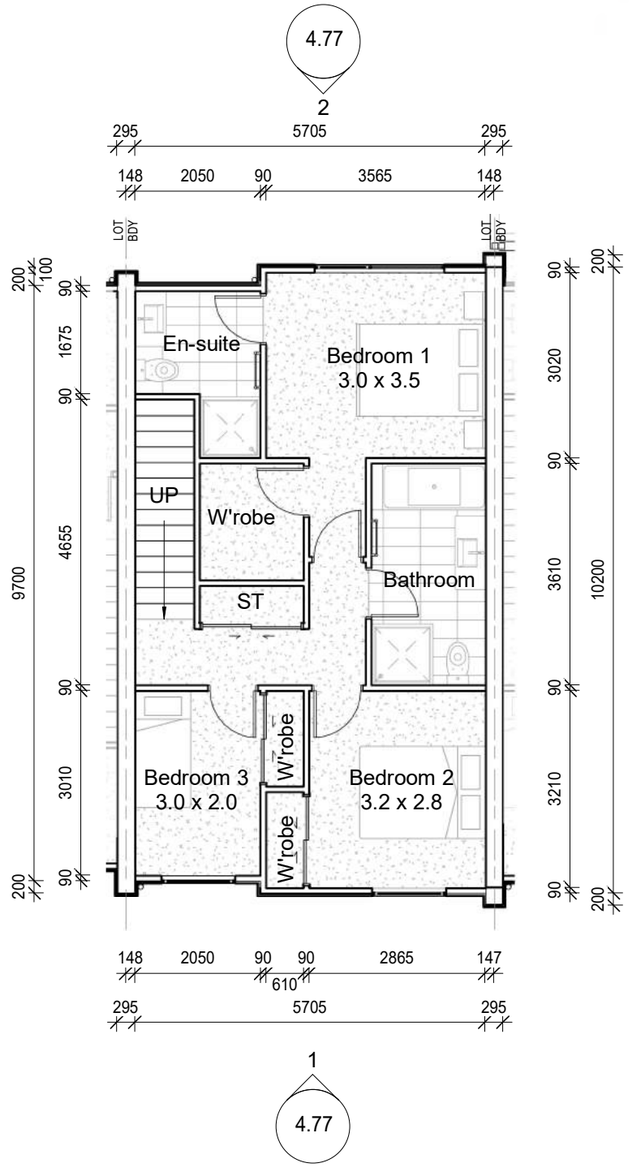

1 **Type G4 - Ground Floor**
1 : 100

2 **Type G4 - Upper Floor**
1 : 100

TYPE G4	
Ground Floor	56.4 m2
Level 1	60.8 m2
TOTAL	117.2 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.76**	Type G4 Plans	28/08/20

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1 **Type G4 - Front Elevation**
1 : 100

2 **Type G4 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.77**	Type G4 Elevations	28/08/20

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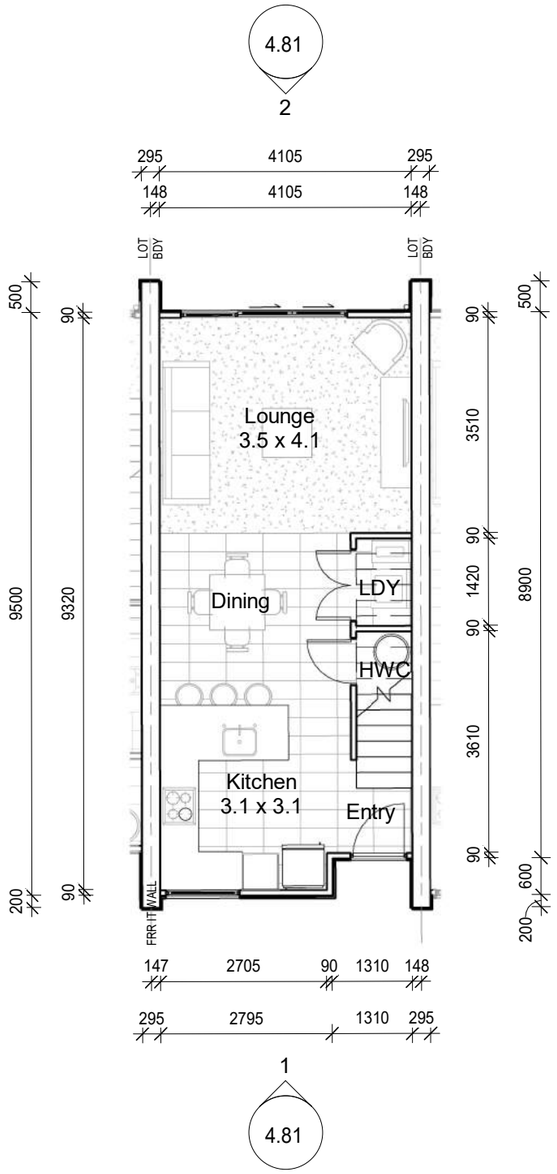
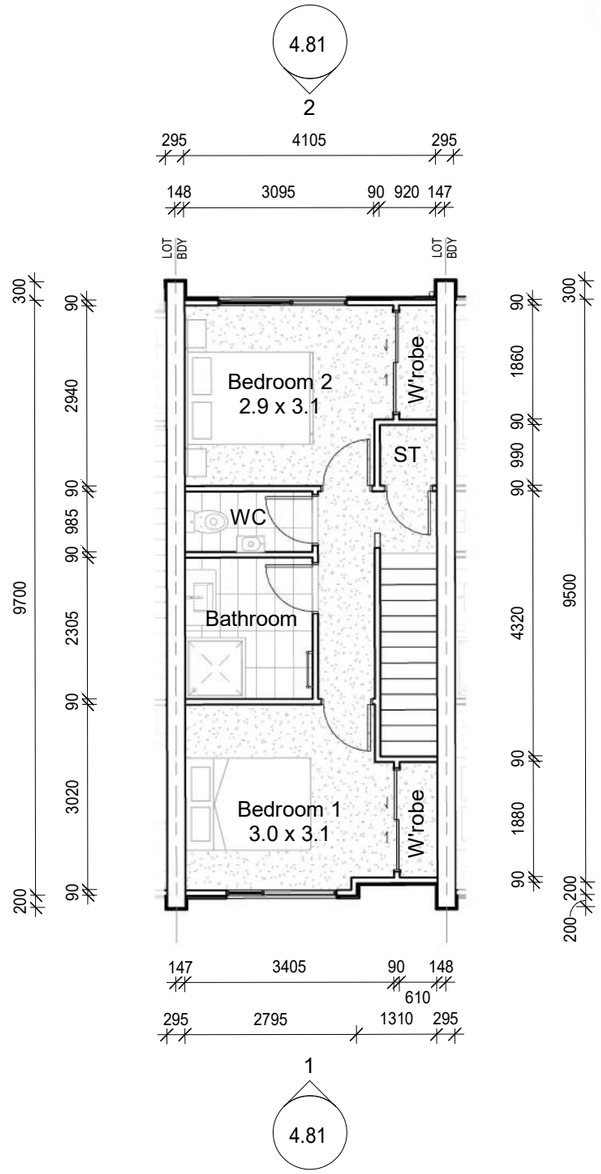


1 Type H1 - Ground Floor

1 : 100



2 Type H1 - Upper Floor

1 : 100

TYPE H1	
Ground Floor	41.4 m2
Level 1	42.7 m2
TOTAL	84.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.80**	Type H1 Plans	28/08/20

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1 **Type H1 - Front Elevation**
1 : 100

2 **Type H1 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.81**	Type H1 Elevations	28/08/20

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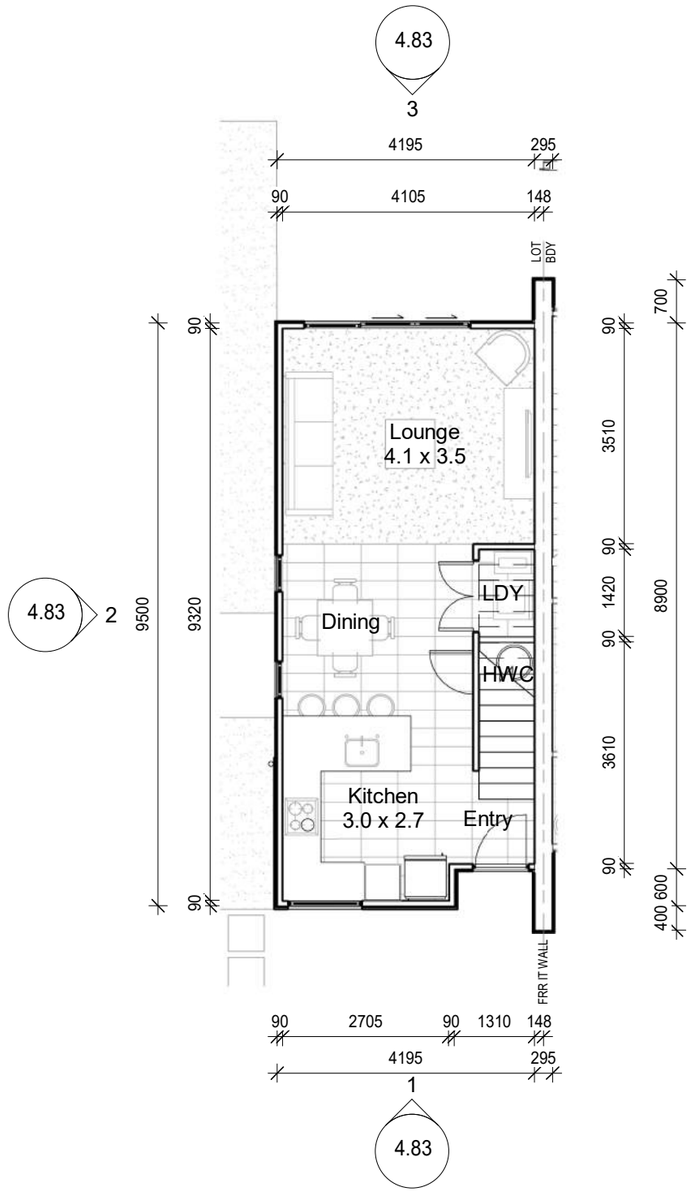
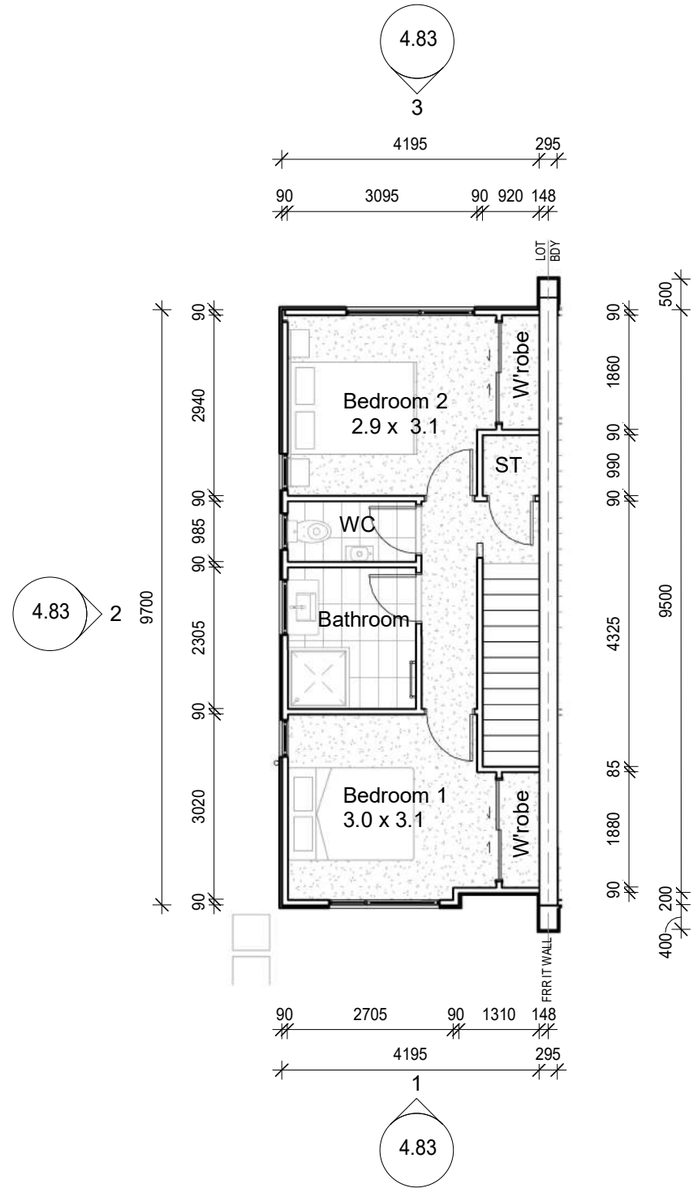


1 **Type H2 - Ground Floor**

1 : 100



2 **Type H2 - Upper Floor**

1 : 100

TYPE H2	
Ground Floor	40.6 m2
Level 1	42 m2
TOTAL	82.6 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.82**	Type H2 Plans	28/08/20

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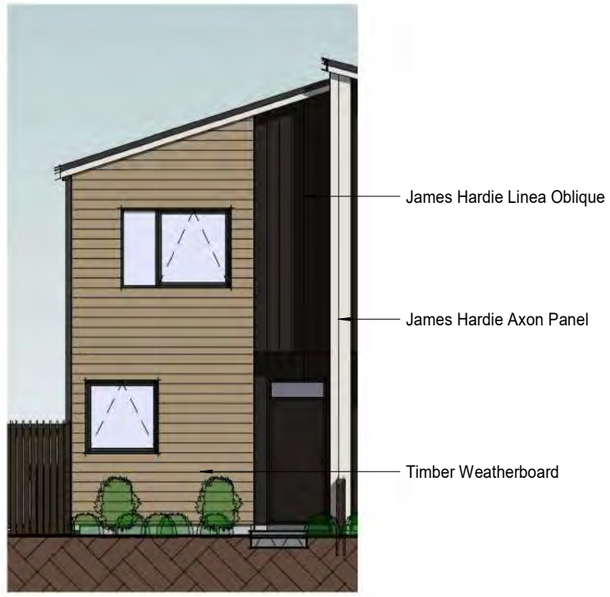

1 **Type H2 - Front Elevation**
1 : 100

2 **Type H2 - Left Elevation**
1 : 100

3 **Type H2 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.83**	Type H2 Elevations	28/08/20

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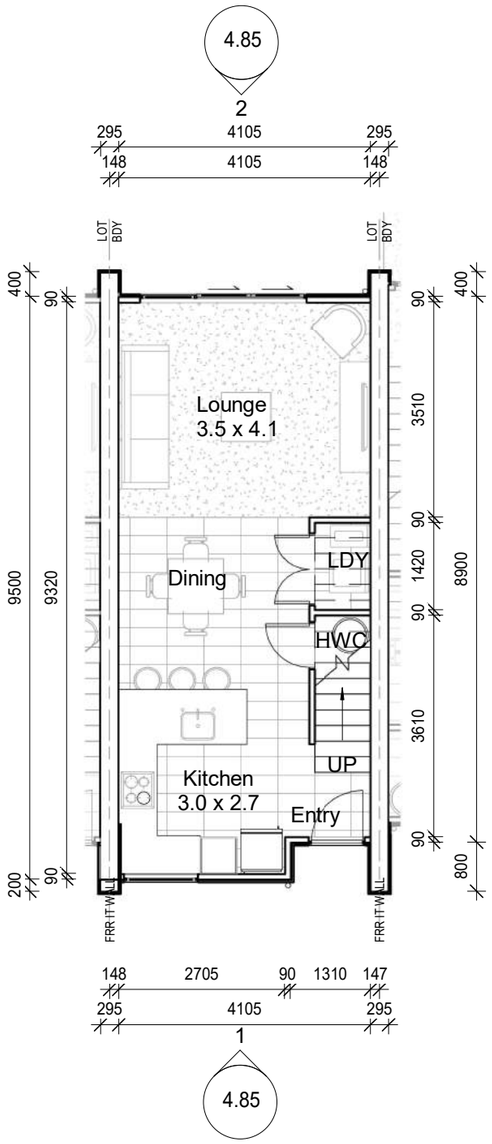

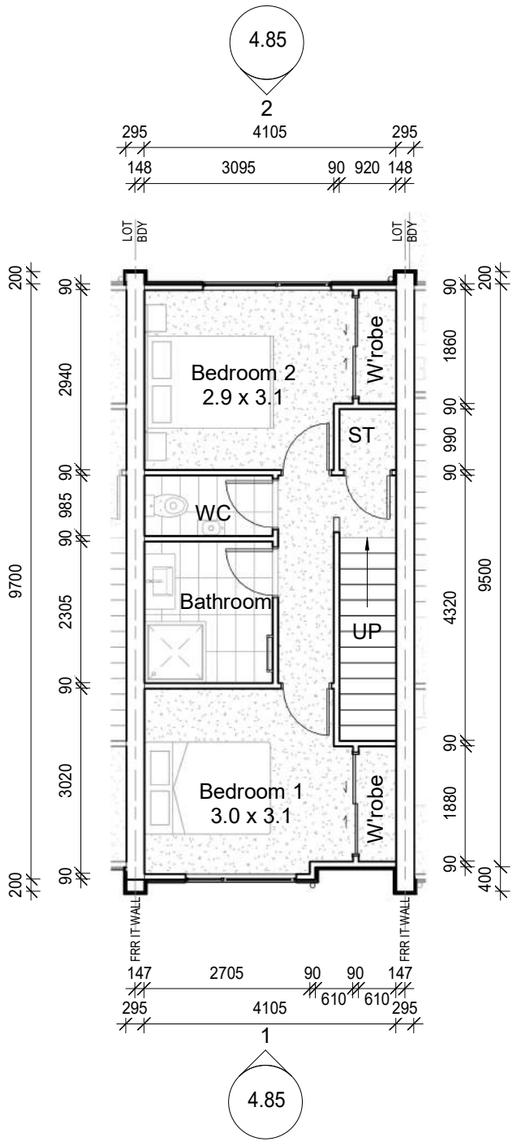

1 Type H3 - Ground Floor

1 : 100

2 Type H3 - Upper Floor

1 : 100

TYPE H3	
Ground Floor	41.4 m2
Level 1	42.7 m2
TOTAL	84.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.84**	Type H3 Plans	28/08/20

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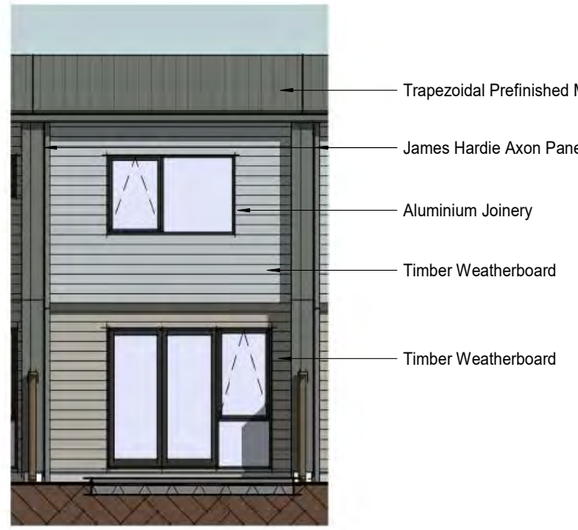
1 **Type H3 - Front Elevation**
1 : 100



2 **Type H3 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.85**	Type H3 Elevations	28/08/20

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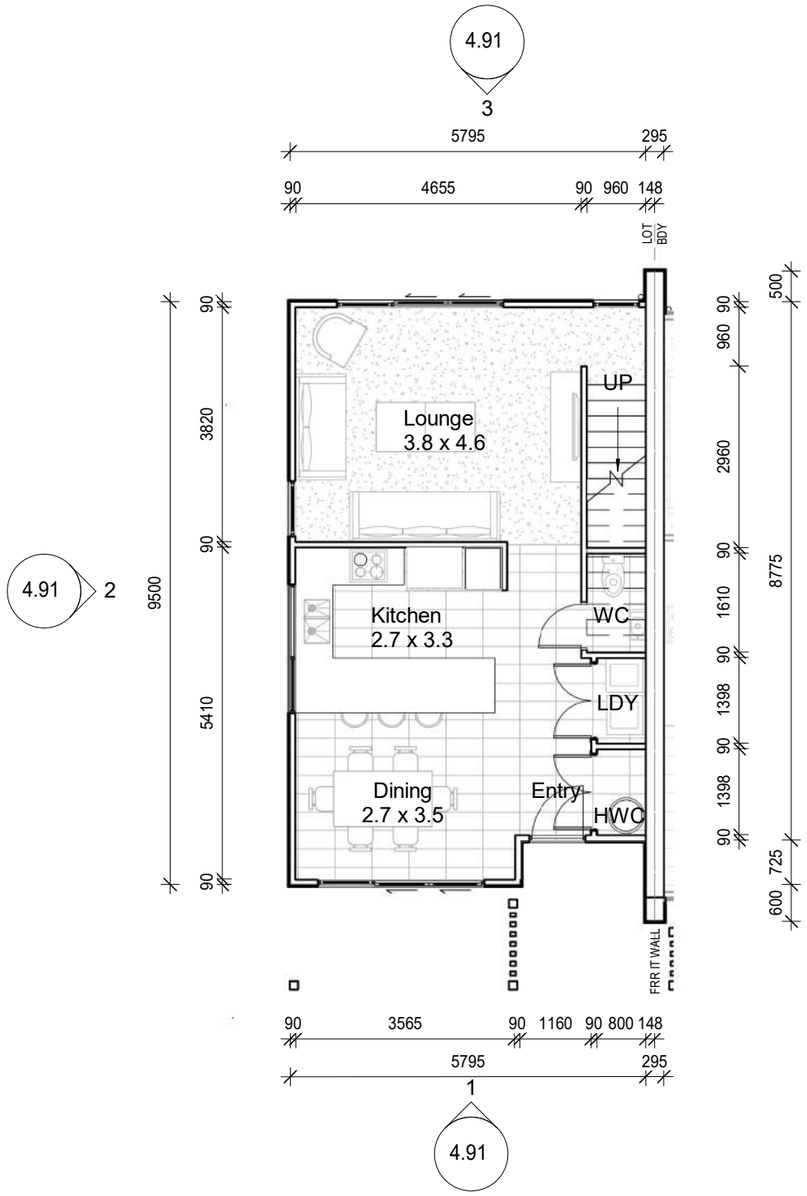
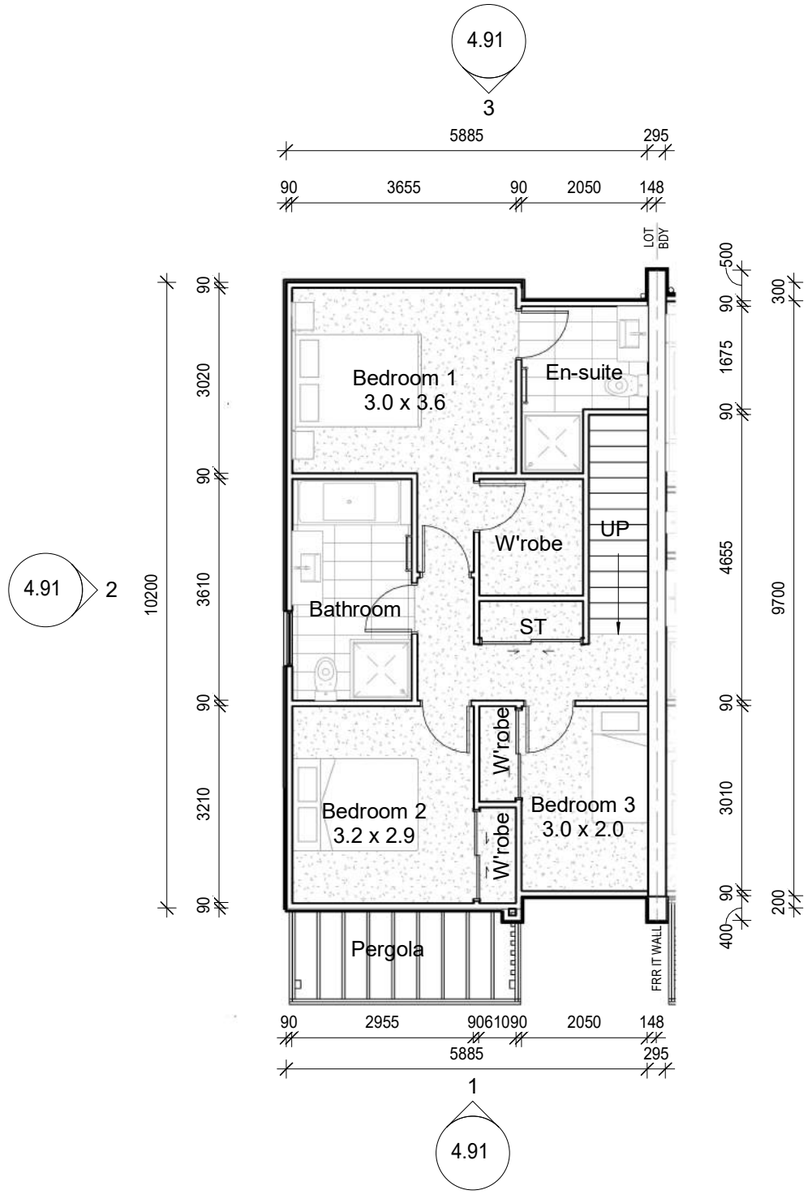


1 **Type I1 - Ground Floor**

1 : 100



2 **Type I1 - Upper Floor**

1 : 100

TYPE I1	
Ground Floor	55.1 m2
Level 1	60.6 m2
TOTAL	115.7 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.90**	Type I1 Plans	28/08/20

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1 **Type I1 - Front Elevation**
1 : 100

2 **Type I1 - Left Elevation**
1 : 100

3 **Type I1 - Rear Eelvation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.91**	Type I1 Elevations	28/08/20

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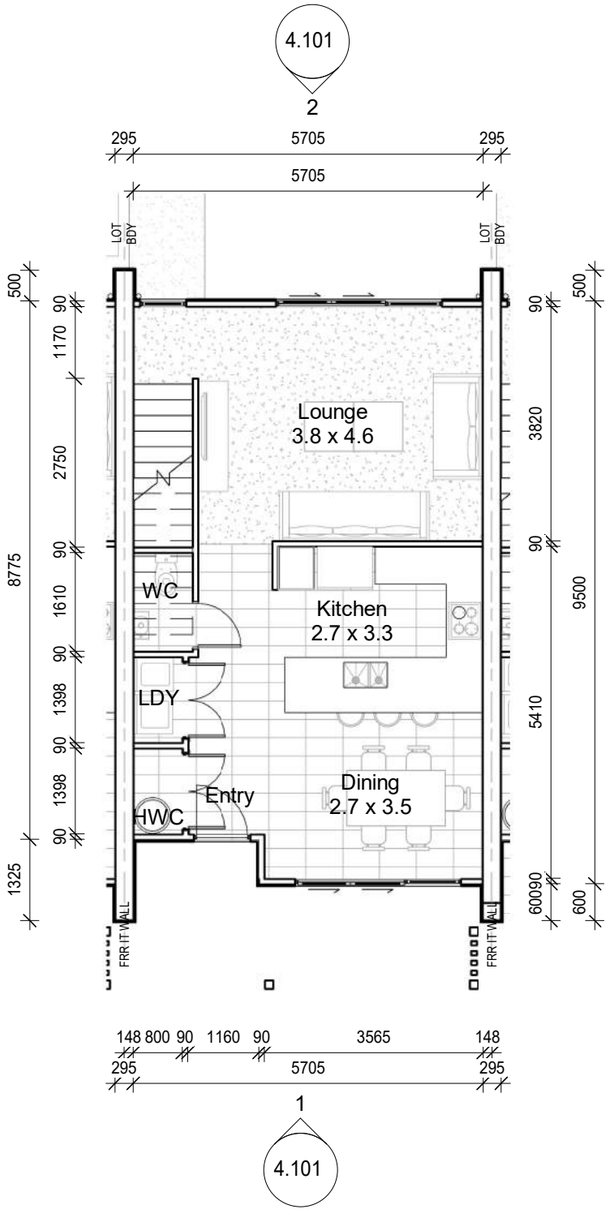
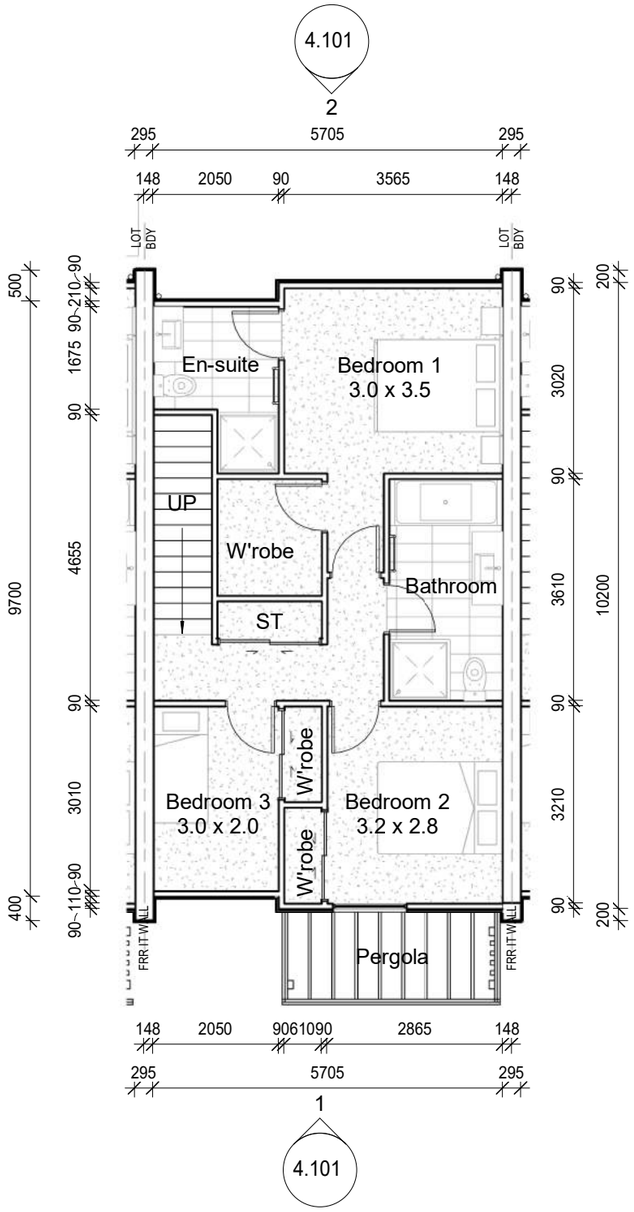


1 **Type I2 - Ground Floor**

1 : 100



2 **Type I2 - Upper Floor**

1 : 100

TYPE I2	
Ground Floor	55.8 m2
Level 1	60.3 m2
TOTAL	116.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.100**	Type I2 Plans	28/08/20

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1 / 4.100 **Type I2 - Front Elevation**

1 : 100

2 / 4.100 **Type I2 - Rear Eelvation**

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.101**	Type I2 Elevations	28/08/20

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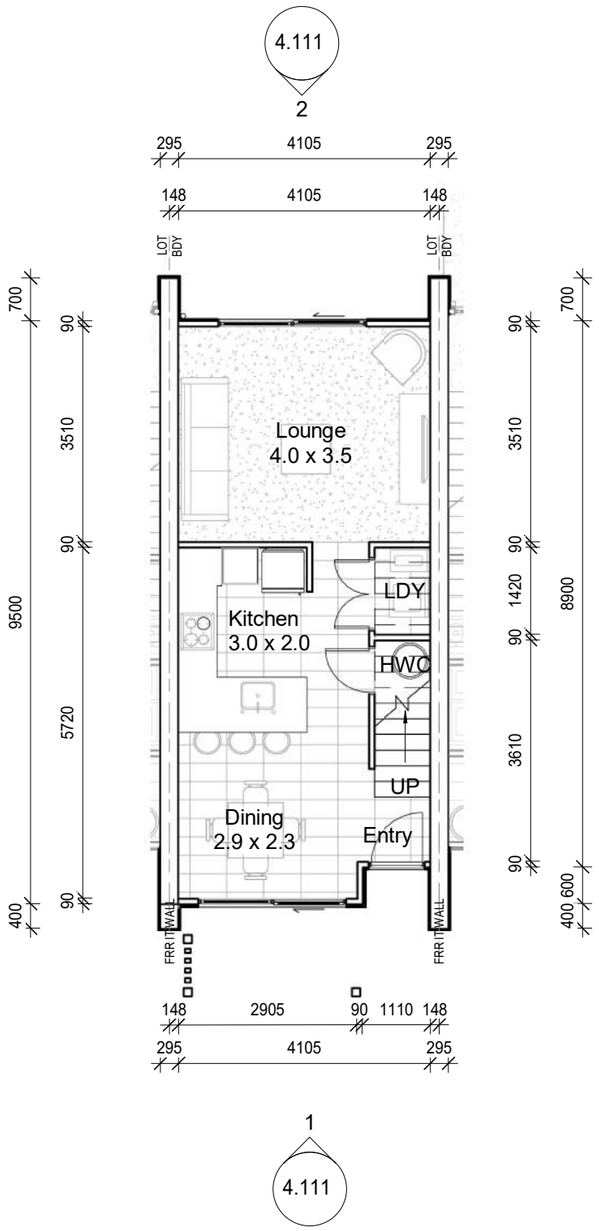
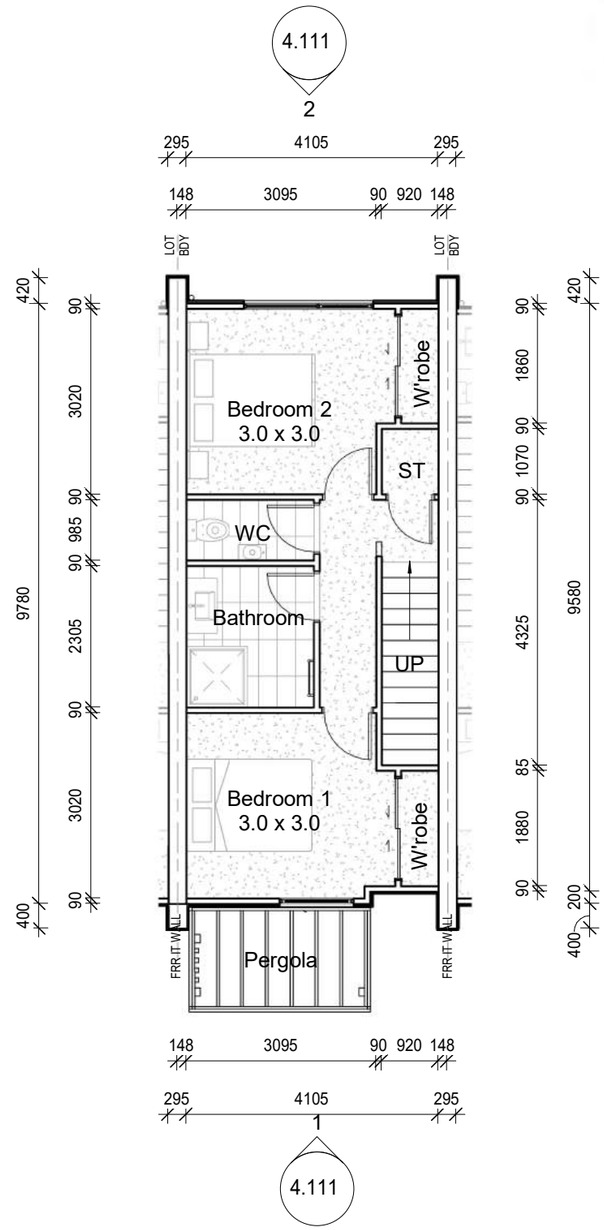


1 **Type J1 - Ground Floor**

1 : 100



2 **Type J1 - Upper Floor**

1 : 100

TYPE J1	
Ground Floor	41.4 m2
Level 1	43 m2
TOTAL	84.4 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.110**	Type J1 Plans	28/08/20

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1 **Type J1 - Front Elevation**
1 : 100

2 **Type J1 - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.111**	Type J1 Elevations	28/08/20

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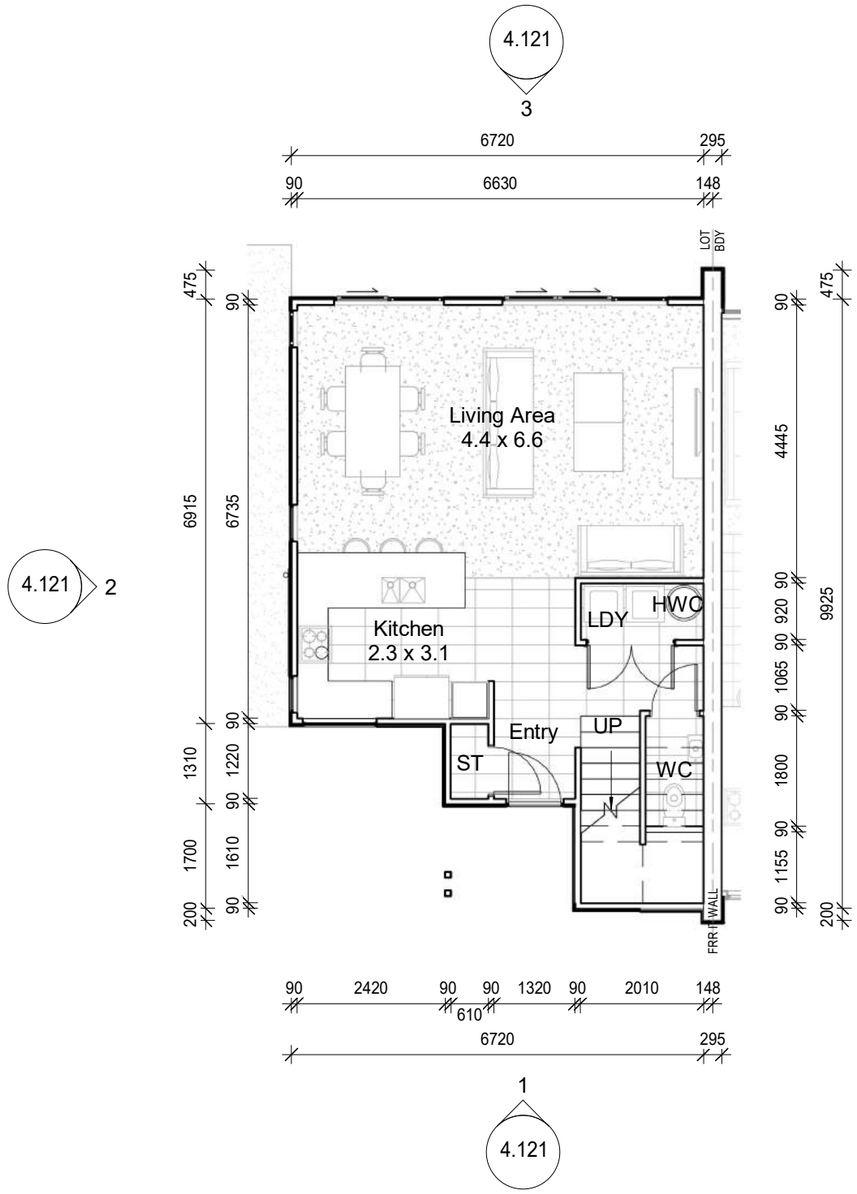
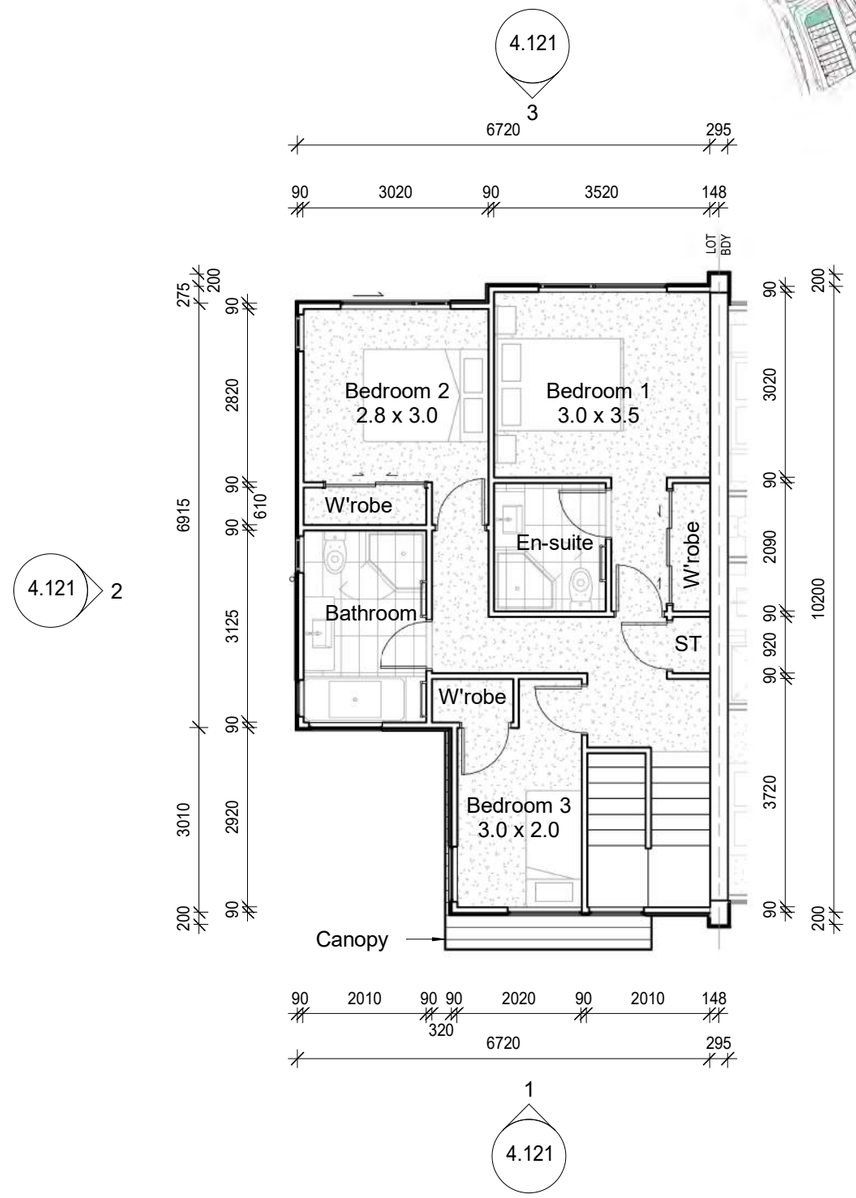


1 **Type K - Ground Floor**

1 : 100



2 **Type K - Upper Floor**

1 : 100

TYPE K	
Ground Floor	57.1 m2
Level 1	61.7 m2
TOTAL	118.8 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.120**	Type K Plans	28/08/20

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1 **Type K - Front Elevation**
1 : 100

2 **Type K - Left Elevation**
1 : 100

3 **Type K - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.121**	Type K Elevations	28/08/20

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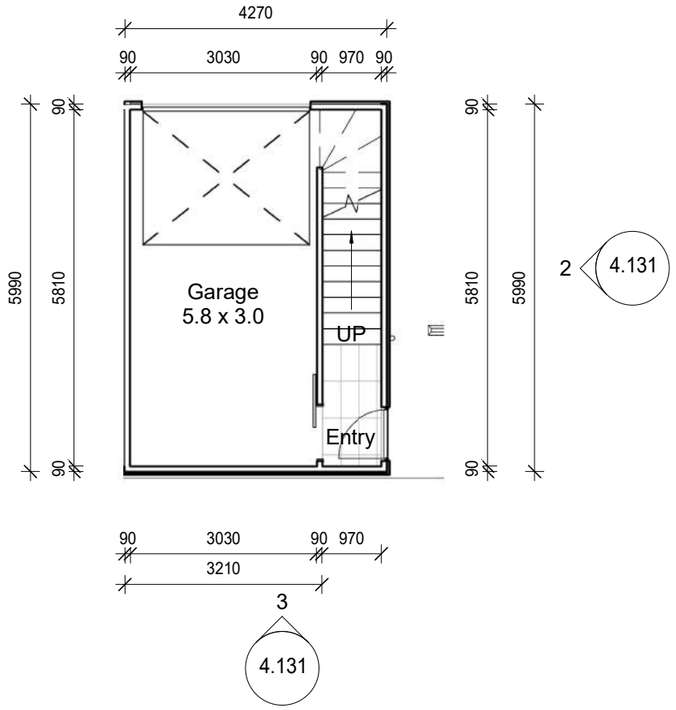
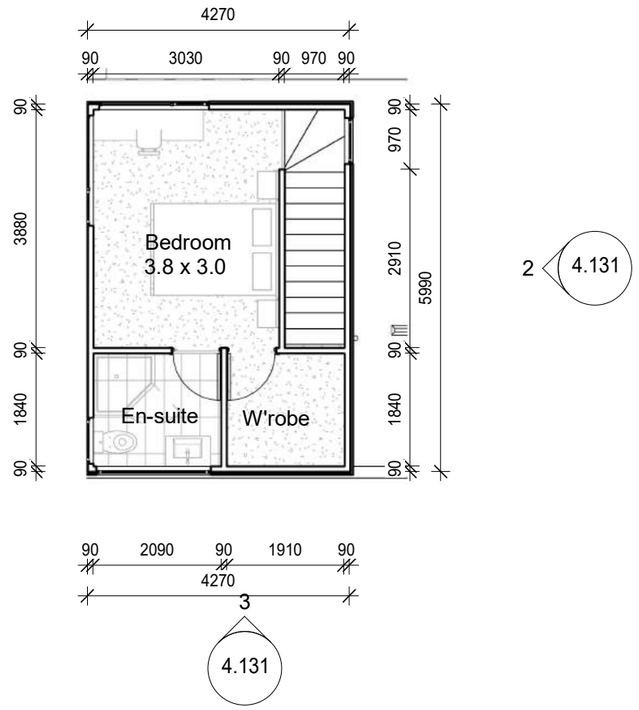


1 **Type K Garage - Ground Floor**
1 : 100



2 **Type K Garage - First Floor**
1 : 100

TYPE K Garage	
Ground Floor	24.6 m2
Level 1	25.6 m2
TOTAL	50.2 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.130**	Type K Garage Plans	28/08/20

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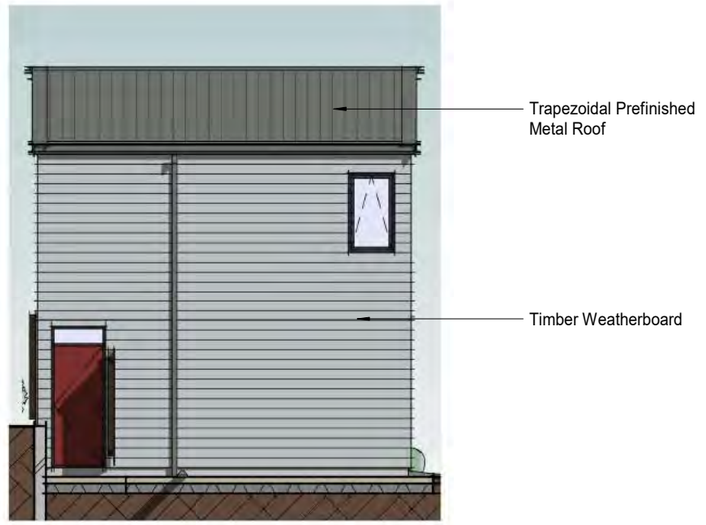
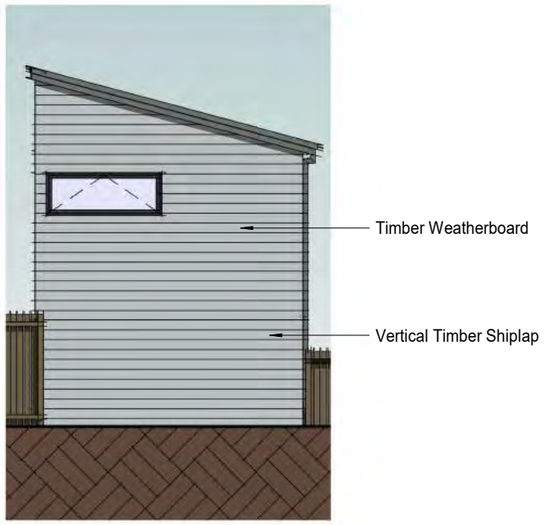
1 **Type K - Front elevation**
1 : 100



2 **Type K Elevation - Left Elevation**
1 : 100



3 **Type K Garage - Rear Elevation**
1 : 100

4 **Type K Garage - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.	Type K Garage Elevations	DATE
4167	1 : 100	**4.131**		28/08/20

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4.144
1

7360 9640

90 3530 90 3500 300 1920 90 3530 90 3770 90

Covered Balcony 2.3 x 4.2

FRR IT WALL

Covered Balcony 2.3 x 4.2

Bedroom 1 3.0 x 3.5

Bedroom 1 3.4 x 3.0

Dining 2.0 x 2.7

Living Area 3.5 x 3.2

W'robe

W'robe

Living Area 3.6 x 3.3

W'robe

ST

LDY

Kitchen 2.5 x 2.9

Bedroom 2 3.1 x 2.9

Dining 3.6 x 1.9

ST

HWC

Bathroom

Bathroom

HWC

LDY

Entry

101

102

Entry

Lobby

Kitchen 2.7 x 3.2

Bedroom 2 3.0 x 2.7

W'robe

MAIN ENTRY

1910 5420

4.143 2

90 800 90 5550 90 2960 90 830 90 10590

90 3070 90 610 90 610 90 7970 90 3020 300 2680

2 4.144

510 90 90 2710 90 610 90 90 3020 300 4370 90 2080 90 2770 90

7360 9640

1
4.143

TYPE Lot 16 Apartments

Apartment 101	71.2 m2
Apartment 102	70.3 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.140**	Type Lot 16 Apartments - Ground Floor Plan	28/08/20

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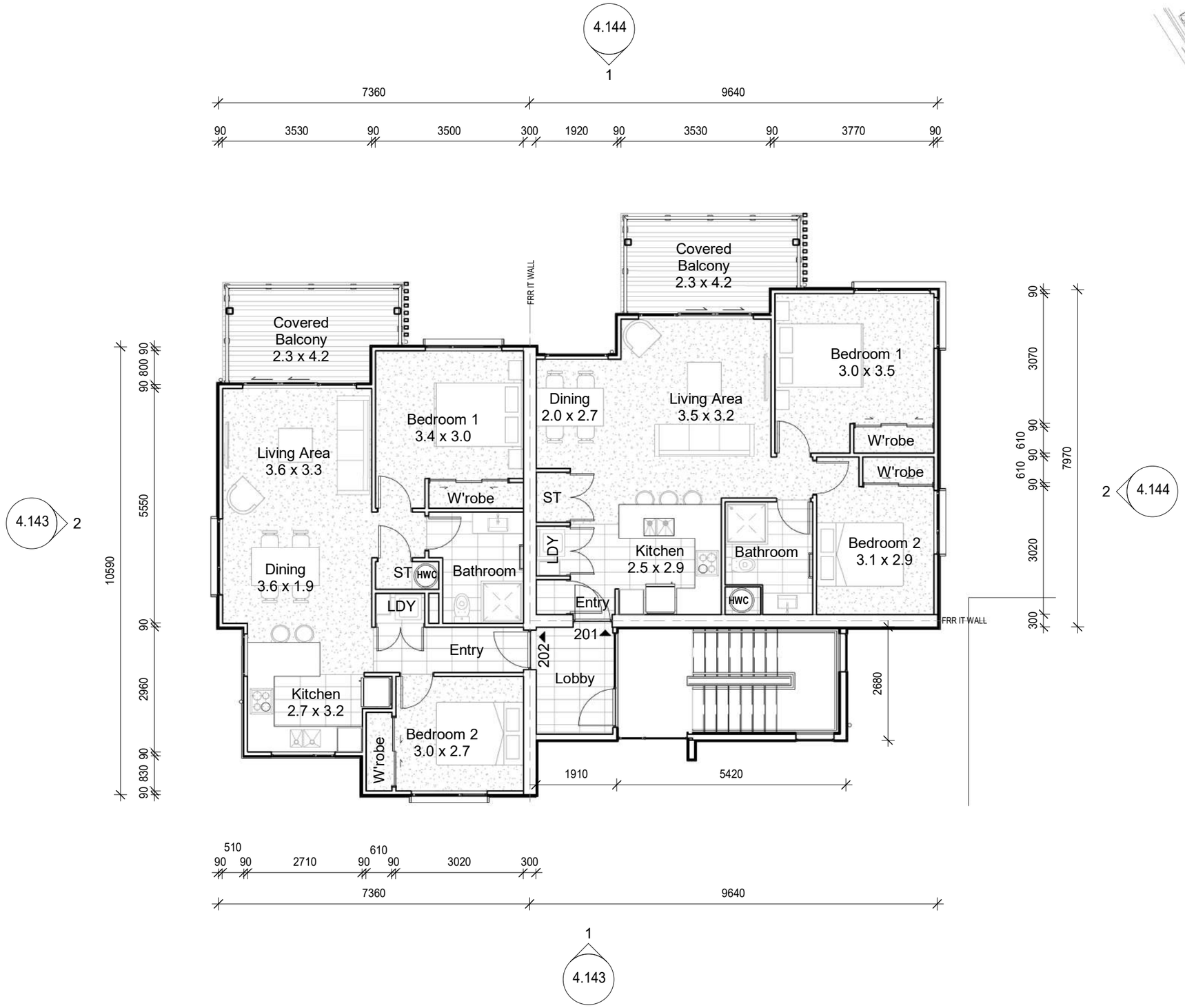

TYPE Lot 16 Apartments	
Apartment 201	71.2 m2
Apartment 202	70.3 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.141**	Type Lot 16 Apartments - Mid Floor Plan	28/08/20

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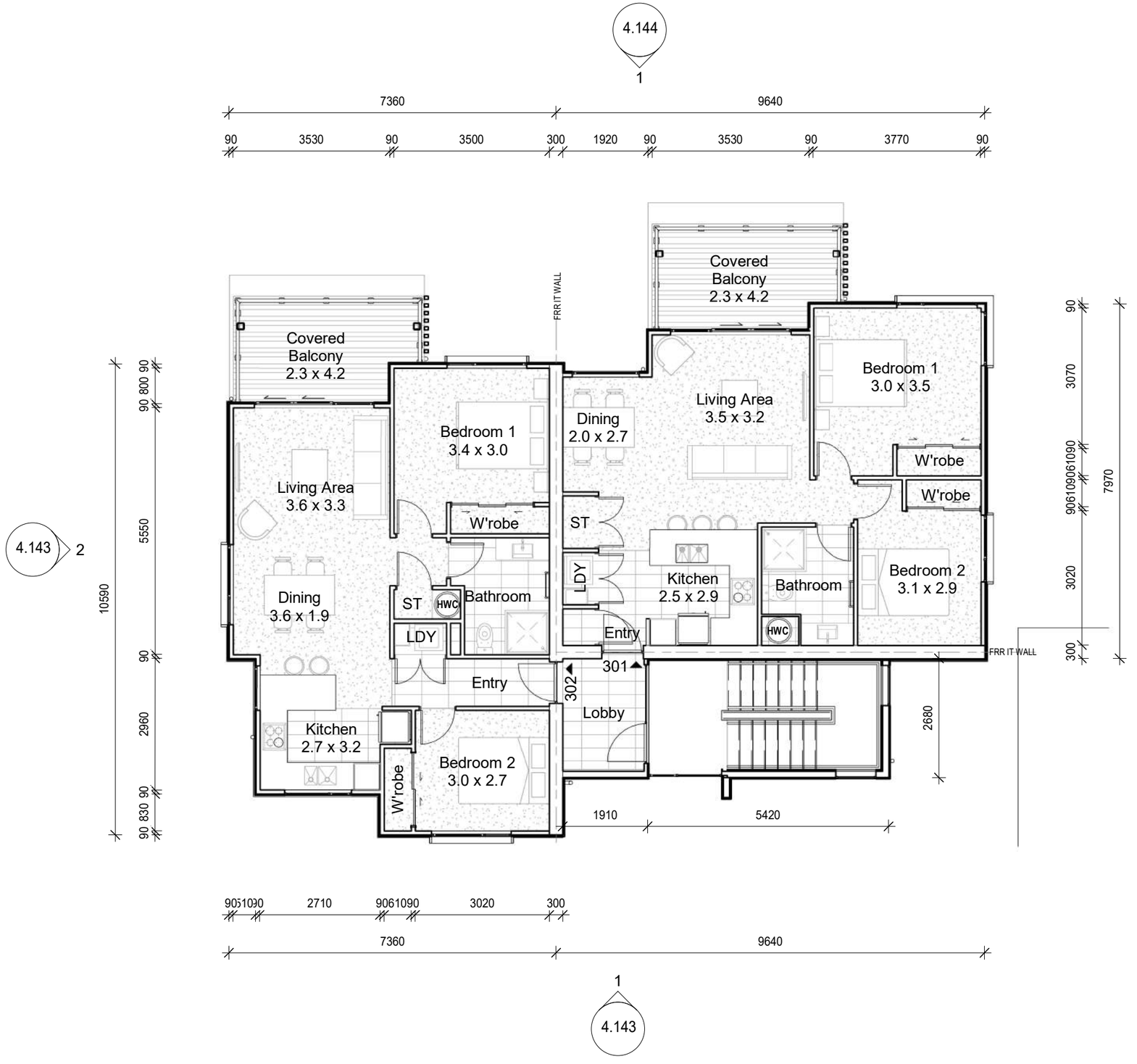

TYPE Lot 16 Apartments	
Apartment 301	71.2 m2
Apartment 302	70.3 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.142**	Type Lot 16 Apartments - Upper Floor Plan	28/08/20

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1 **Type Lot 16 Apartments - Front Elevation**

1 : 100

2 **Type Lot 16 Apartments -Left Elevation**

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.143**	Type Lot 16 Apartments - Elevations	28/08/20

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1 **Type Lot 16 Apartments - Rear Elevation**
1 : 100

2 **Type Lot 16 Apartments - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.144**	Type Lot 16 Apartments - Elevations	28/08/20

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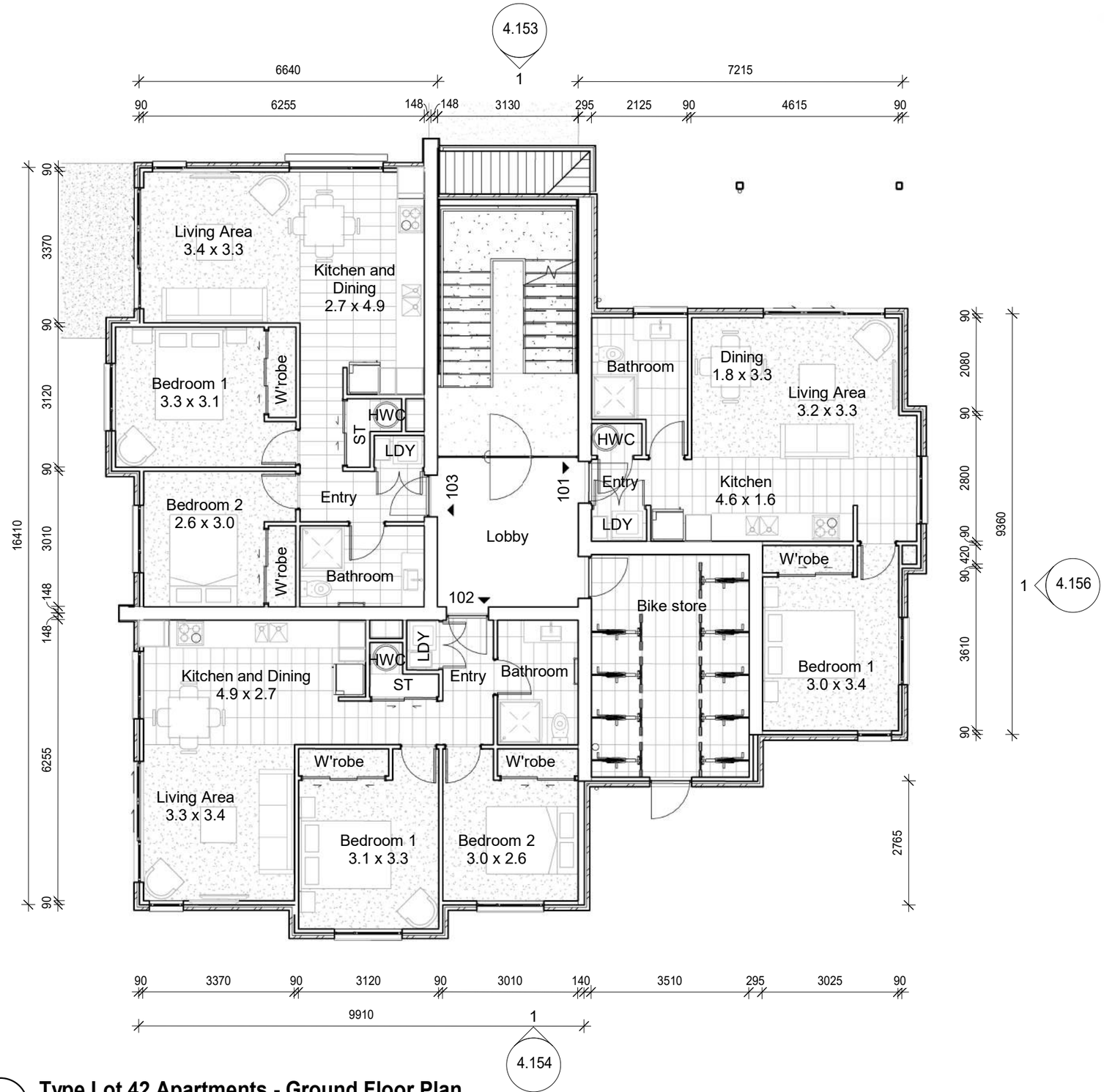

TYPE Lot 42 Apartments	
Apartment 101	54.3 m2
Apartment 102	68.9 m2
Apartment 103	68.9 m2

1 **Type Lot 42 Apartments - Ground Floor Plan**

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.150**	Type Lot 42 Apartments - Ground Floor Plan	28/08/20

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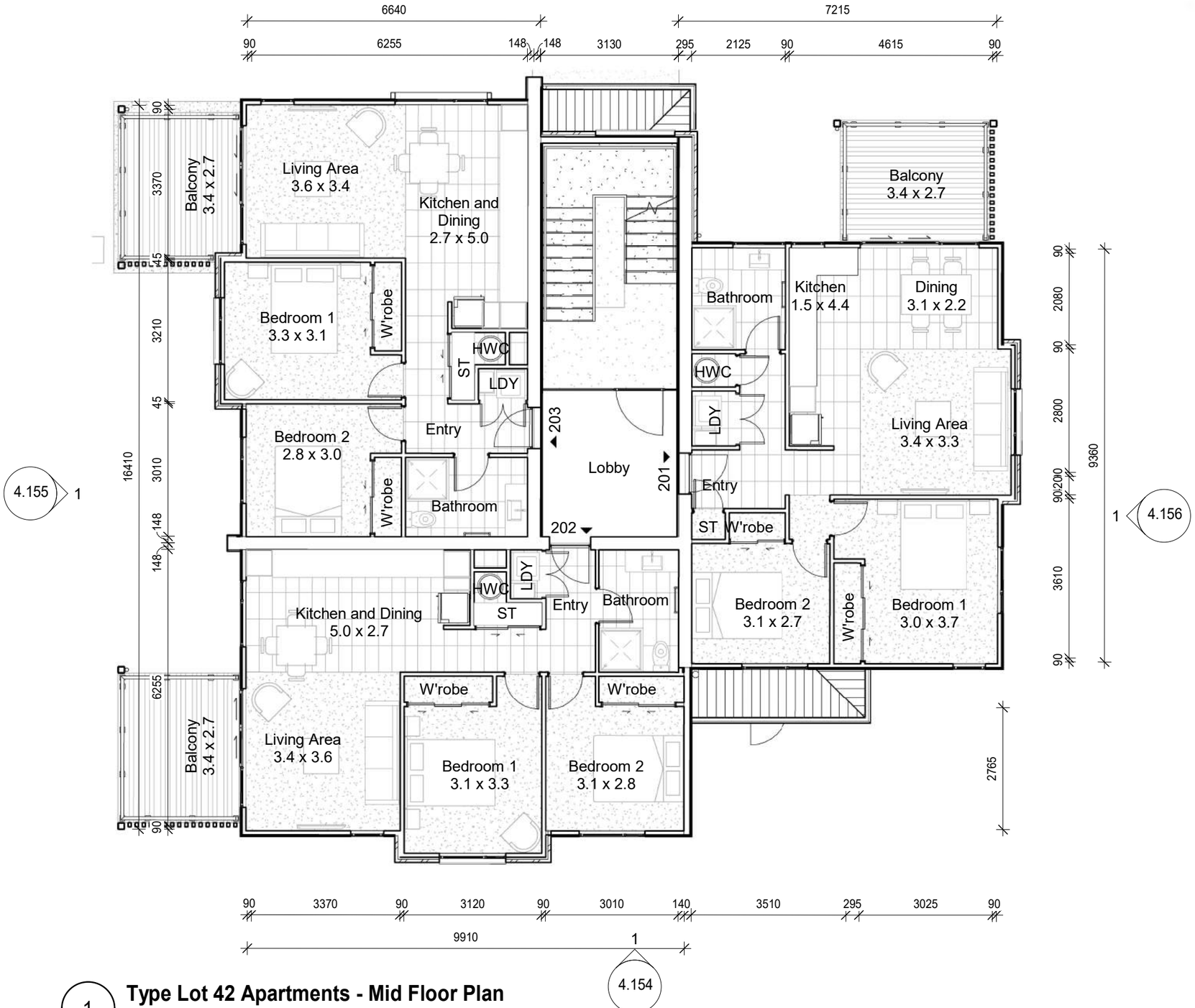

1 Type Lot 42 Apartments - Mid Floor Plan

1 : 100

TYPE Lot 42 Apartments	
Apartment 201	70.5 m2
Apartment 202	68.9 m2
Apartment 203	68.9 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.151**	Type Lot 42 Apartments - Mid Floor Plan	28/08/20

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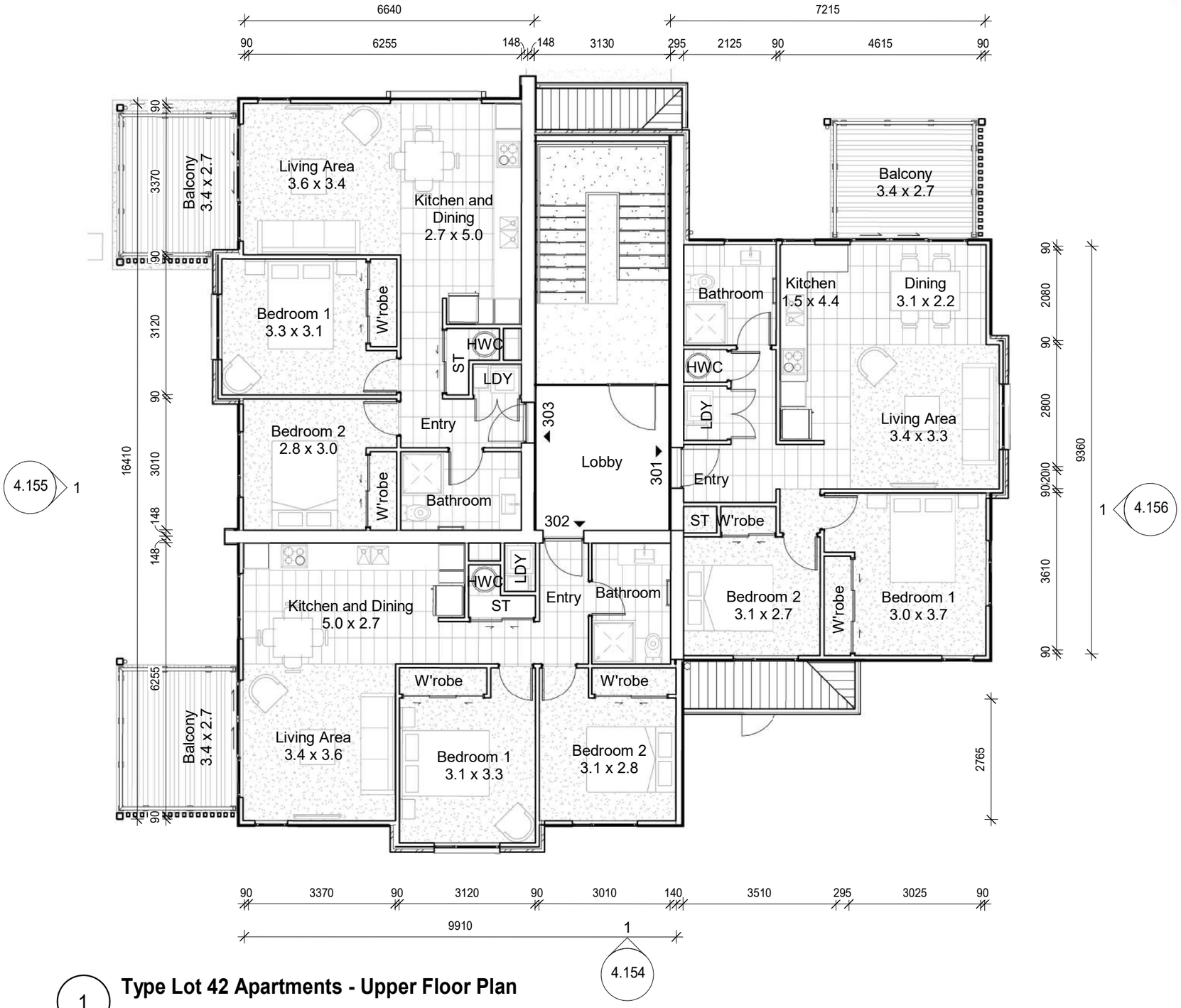

1 **Type Lot 42 Apartments - Upper Floor Plan**

1 : 100

TYPE Lot 42 Apartments	
Apartment 301	70.5 m2
Apartment 302	68.9 m2
Apartment 303	68.9 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.152**	Type Lot 42 Apartments - Upper Floor Plan	28/08/20

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1 **Type Lot 42 Apartments - East Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.153**	Type Lot 42 Apartments - Elevations	28/08/20

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1 **Type Lot 42 Apartments - West Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.154**	Type Lot 42 Apartments - Elevations	28/08/20

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1 **Type Lot 42 Apartments - North Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.155**	Type Lot 42 Apartments - Elevations	28/08/20

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1 **Type Lot 42 Apartments - South Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.156**	Type Lot 42 Apartments - Elevations	28/08/20

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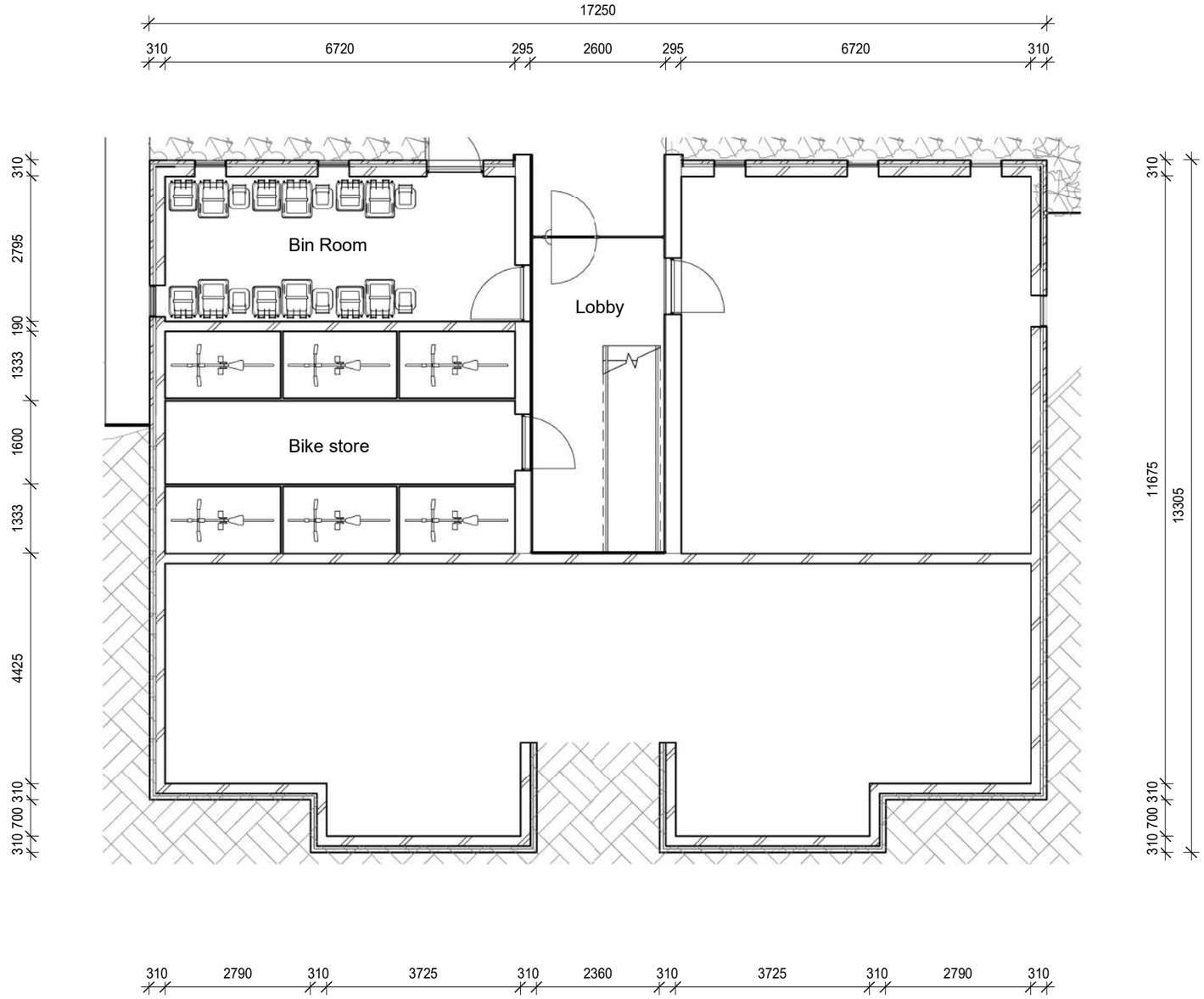

1 **Type Lot 61 Apartments - Basement Floor Plan**

1 : 100

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Job No.	Scale (A3):	Sheet no.	Type Lot 61 Apartments - Basement Floor Plan	DATE
4167	1 : 100	**4.160**		28/08/20

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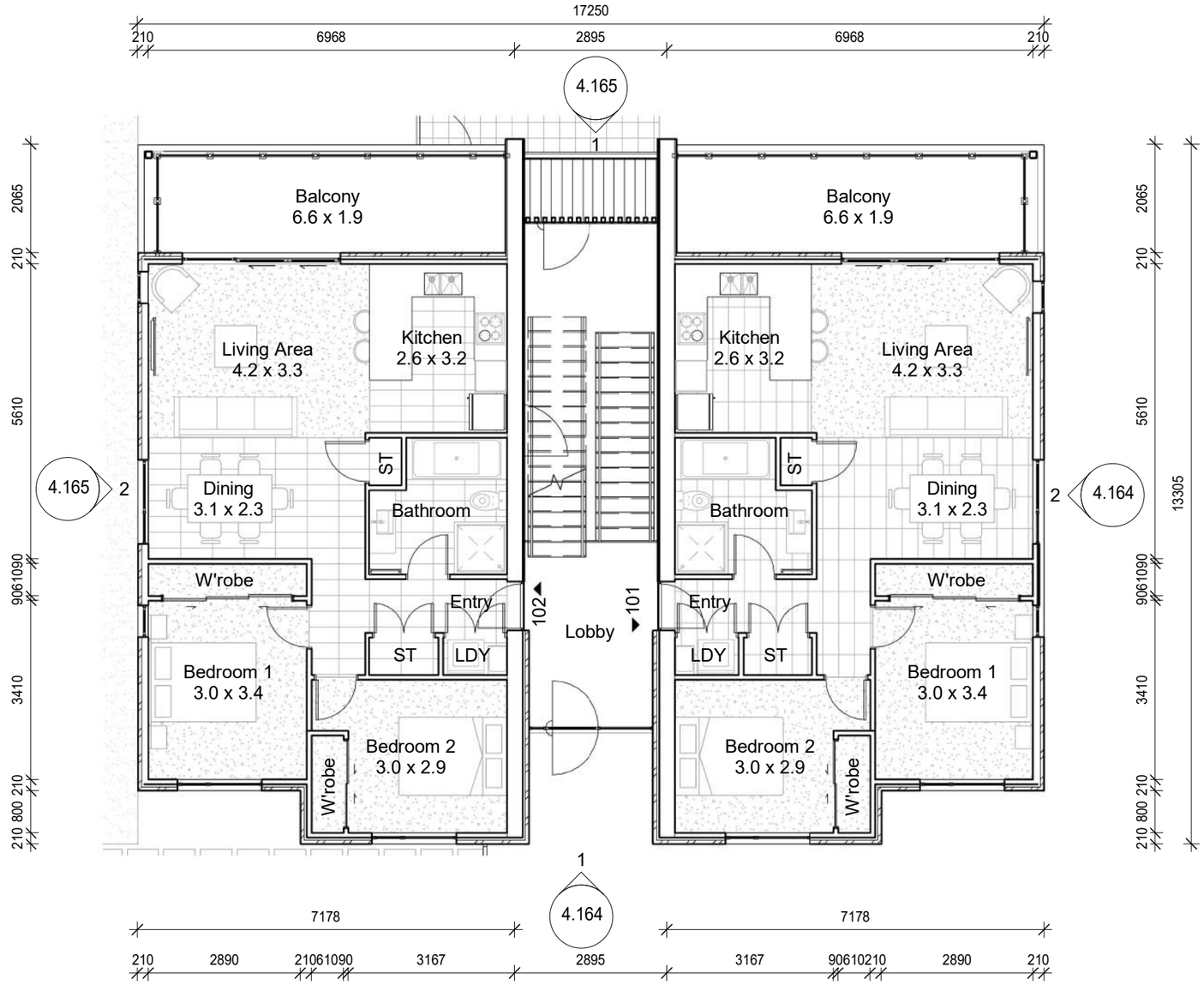

1 Type Lot 61 Apartments - Ground Floor Plan

1 : 100

TYPE Lot 61 Apartments	
Apartment 101	78.1 m2
Apartment 102	78.1 m2

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Job No.	Scale (A3):	Sheet no.	Type Lot 61 Apartments - Ground Floor Plan	DATE
4167	1 : 100	**4.161**		28/08/20

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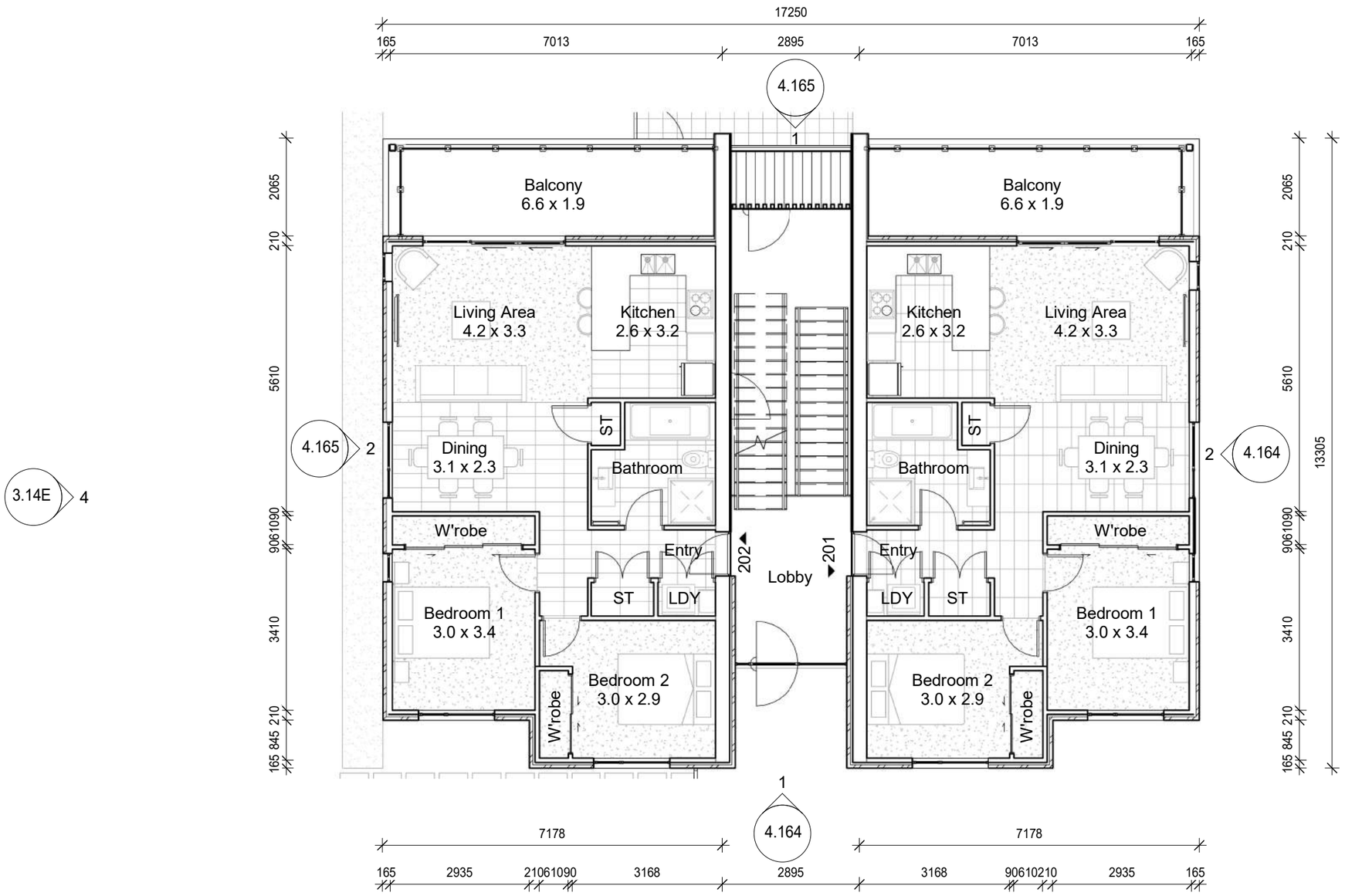

1 Type Lot 61 Apartments - Mid Floor Plan

1 : 100

TYPE Lot 61 Apartments	
Apartment 201	78.1 m2
Apartment 202	78.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.162**	Type Lot 61 Apartments - Mid Floor Plan	28/08/20

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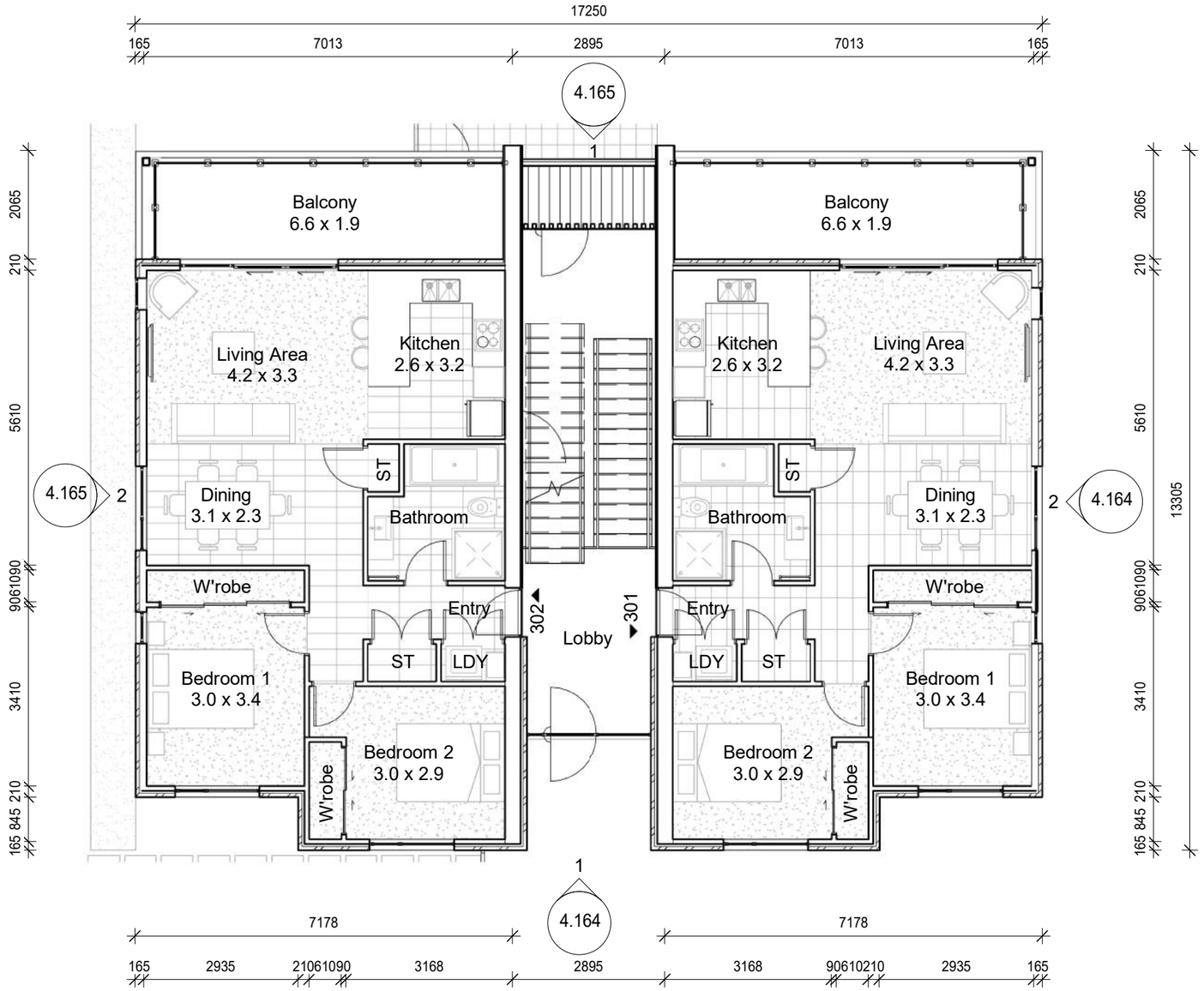

1 **Type Lot 61 Apartments - Upper Floor Plan**

1 : 100

TYPE Lot 61 Apartments	
Apartment 301	78.1 m2
Apartment 302	78.1 m2

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.163**	Type Lot 61 Apartments - Upper Floor Plan	28/08/20

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1 **Type Lot 61 Apartments - Front Elevation**
1 : 100

2 **Type Lot 61 Apartments - Right Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.164**	Type Lot 61 Apartments - Elevations	28/08/20

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1 **Type Lot 61 Apartments - Rear Elevation**
1 : 100

2 **Type Lot 61 Apartments - Left Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.165**	Type Lot 61 Apartments - Elevations	28/08/20

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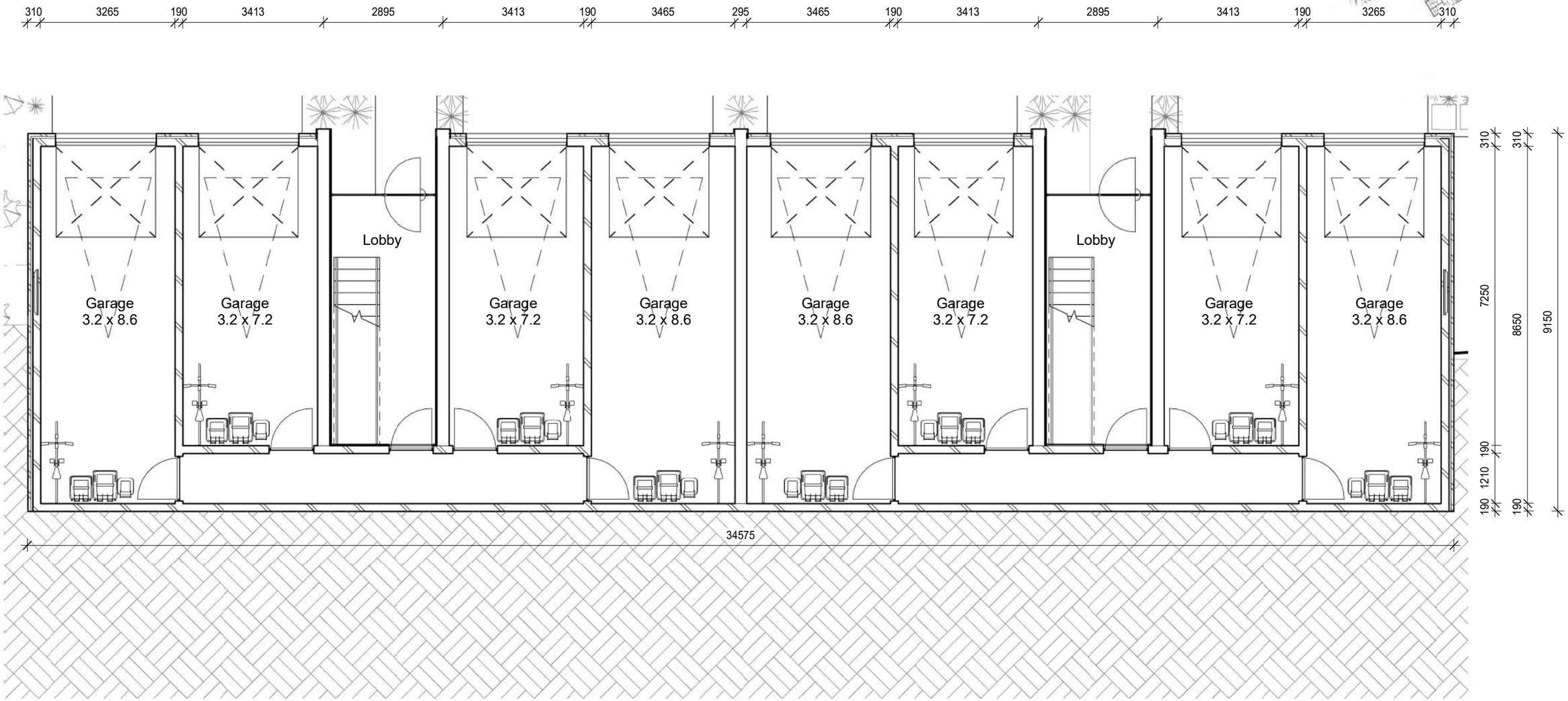

1 **Type Lot 66 Apartments - Basement Floor Plan**

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.170**	Type Lot 66 Apartments - Basement Floor Plan	28/08/20

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TYPE Lot 66 Apartments			
Apartment 101	78.7 m2	**Apartment 103**	78.0 m2
Apartment 102	78.7 m2	**Apartment 104**	78.7 m2

1

Type Lot 66 Apartments - Ground Floor Plan

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.171**	Type Lot 66 Apartments - Ground Floor Plan	28/08/20

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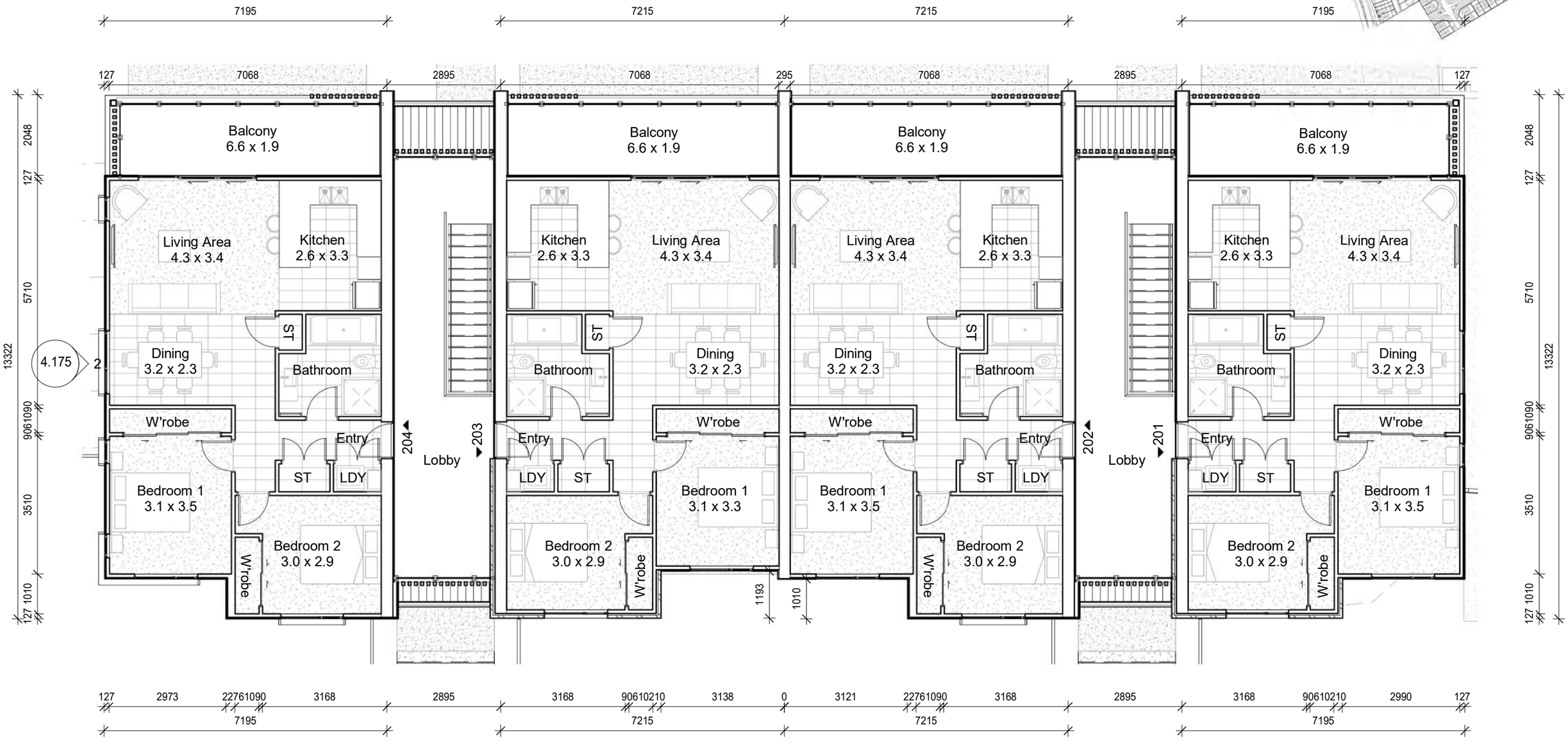

TYPE Lot 66 Apartments			
Apartment 201	78.7 m2	**Apartment 203**	78.0 m2
Apartment 202	78.7 m2	**Apartment 204**	78.7 m2

1

Type Lot 66 Apartments - Uper Floor Plan

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.172**	Type Lot 66 Apartments - Upper Floor Plan	28/08/20

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1 **Type Lot 66 Apartments - Front Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.173**	Type Lot 66 Apartments - Elevations	28/08/20

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1 **Type Lot 66 Apartments - Rear Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.174**	Type Lot 66 Apartments - Elevations	28/08/20

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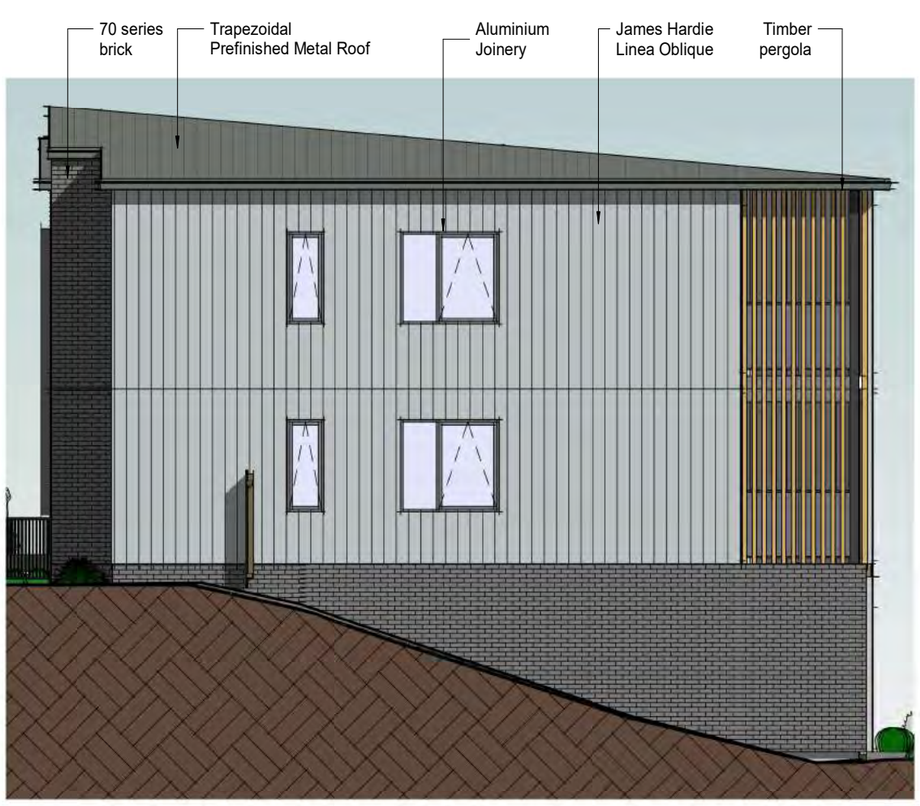
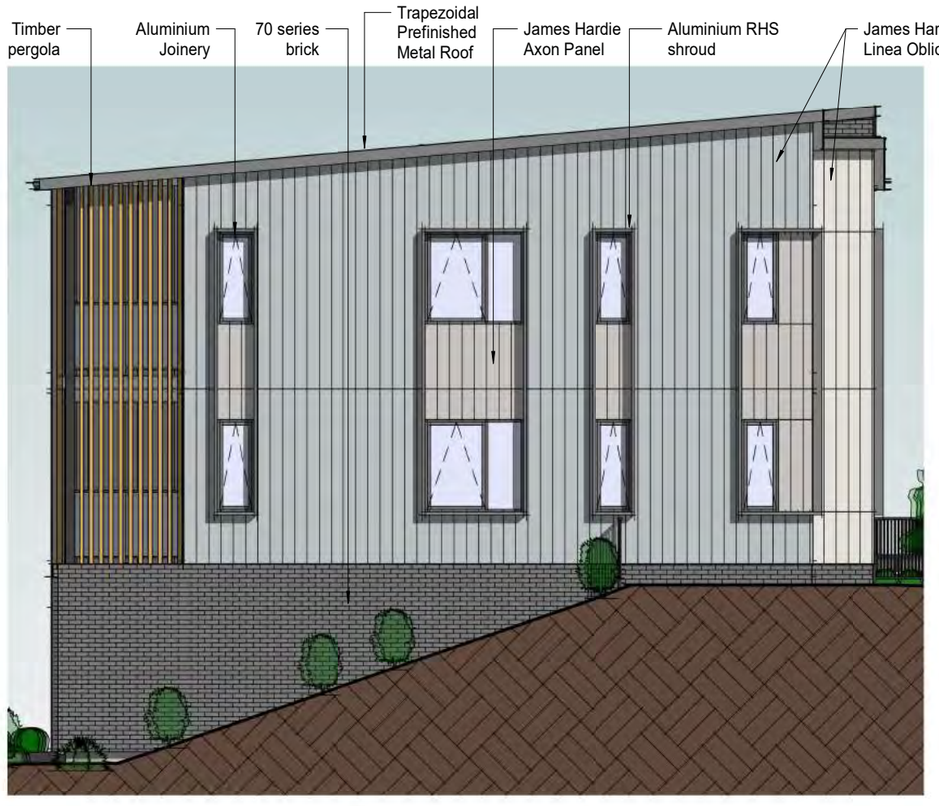


1 **Type Lot 66 Apartments - Right Elevation**
1 : 100



2 **Type Lot 66 Apartments - Left Elevation**
1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 100	**4.175**	Type Lot 66 Apartments - Elevations	28/08/20

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Compliance Schedule Checklist - AUPOP Mixed Housing Urban Zone

Lot No.	Typology	GFA Total floor area	Detached garage	GFA Total floor area	Lot Area (m²)	Impervious Area (m²)	Building Coverage (m²)	Landscaped Area (m²)	H5.6.4. Building Height: (11m max.) (max 50% of vertical height of roof - up to 1m)	H5.6.5. Height in Relation to Boundary (3m + 45°)	H5.6.6. Alternative HIRTB (3.6m vert + 1m hor + [73.3° + 1m] at 3.3m vert + 45° within 20m of site frontage	H5.6.7. HIRTB adjoining lower intensity zones (3m + 45°) 1.5m2 max in area no greater than 1m vert & 2.5m length along edge of roof	H5.6.8. Yards - Front = 2.5m min.	H5.6.8. Yards - Side = 1m min.	H5.6.8. Yards - Rear = 1m min.	H5.6.8. Yards - Riparian = 10m min.	H5.6.9. Maximum Impervious Area (60%)	H5.6.10. Maximum Building Coverage (45%)	H5.6.11. Minimum Landscaped Area (35%)	+ 50% min. landscaping within front yard	H5.6.12. Outlook space - Principal living/ dining 6m (d) x 4m (w)	H5.6.12. Outlook space - Principal bedroom 3m (d) x 3m (w)	H5.6.12. Outlook space - Other habitable room 1m (d) x 1m (w)	H5.6.13. Daylight	H5.6.14 Outdoor Living Space (Ground) 20m² min. 4m min. dimension / 1 in 20 gradient (5%)	H5.6.14 Outdoor Living Space (Balcony/Patio/ Roof terrace) 8m² min. / 1.8m min. dimension	H5.6.14 Outdoor Living Space at south 2.9m + 0.9(height of wall)	H5.6.15 Front fences and walls combined 1.4m height; or 1.8m height for 50% max (remainder 1.4m); or 1.8m height + 50% min. visually permeable.	H5.6.15 Side and rear fences and walls combined 2m height
Lot 1	A2	172.9 m²	-	172.9 m²	243 m²	126.3 m²	91.8 m²	137.9 m²	✓	✓	✓	N/A	✓	✓	✓	✓	52%	38%	57%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 2	B1	154.3 m²	-	154.3 m²	199 m²	119.7 m²	80.9 m²	105.2 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	60%	41%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 3	C1	138.2 m²	-	138.2 m²	164 m²	101.4 m²	76.7 m²	75.8 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	62%	47%	46%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 4	A1	172.9 m²	-	172.9 m²	208 m²	125.9 m²	91.8 m²	102.9 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	61%	44%	50%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 5	B1	154.3 m²	-	154.3 m²	199 m²	119.7 m²	80.9 m²	105.2 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	60%	41%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 6	C2	138.2 m²	-	138.2 m²	164 m²	101.4 m²	76.7 m²	75.8 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	62%	47%	46%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 7	B1	154.3 m²	-	154.3 m²	199 m²	120.1 m²	80.9 m²	105.0 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	60%	41%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 8	A2	172.9 m²	-	172.9 m²	208 m²	125.9 m²	91.8 m²	102.9 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	61%	44%	50%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 9	C1	138.2 m²	-	138.2 m²	237 m²	117.9 m²	76.7 m²	145.4 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	50%	32%	61%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 10	C3	138.2 m²	-	138.2 m²	192 m²	118.0 m²	76.7 m²	101.5 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	61%	40%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 11	C2	138.2 m²	-	138.2 m²	193 m²	117.9 m²	76.7 m²	101.7 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	61%	40%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 12	A1	172.9 m²	-	172.9 m²	243 m²	128.0 m²	91.8 m²	138.5 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	53%	38%	57%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 13	B1	154.3 m²	-	154.3 m²	203 m²	119.5 m²	80.9 m²	109.1 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	59%	40%	54%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 14	A2	172.9 m²	-	172.9 m²	212 m²	125.8 m²	91.8 m²	107.6 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	59%	43%	51%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 15	C1	138.2 m²	-	138.2 m²	168 m²	101.8 m²	76.7 m²	78.9 m²	✓	✓	N/A	N/A	✓	✓	✓	✓	61%	46%	47%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 16	L16 Aptms	varies	-	varies	774 m²	485.5 m²	183.1 m²	385.0 m²	X	✓	N/A	N/A	✓	✓	✓	✓	63%	24%	50%	✓	X	✓	✓	✓	✓	✓	N/A	✓	X
Lot 17																													
Lot 18	E3	150.1 m²	-	150.1 m²	183 m²	99.5 m²	78.2 m²	88.8 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	54%	43%	49%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 19	E3	150.1 m²	-	150.1 m²	183 m²	99.6 m²	78.2 m²	88.8 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	54%	43%	49%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 20	E4	150.1 m²	-	150.1 m²	183 m²	99.6 m²	78.2 m²	88.8 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	54%	43%	49%	✓	✓	X	✓	✓	✓	N/A	N/A	X	X
Lot 21	E4	150.1 m²	-	150.1 m²	183 m²	99.5 m²	78.2 m²	88.8 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	54%	43%	49%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 22	D	133.6 m²	-	133.6 m²	210 m²	113.4 m²	70.6 m²	122.7 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	54%	34%	59%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 23	D	133.6 m²	-	133.6 m²	188 m²	113.4 m²	70.6 m²	101.5 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	60%	37%	54%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 24	E2	150.1 m²	-	150.1 m²	167 m²	101.0 m²	78.6 m²	71.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	60%	47%	43%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 25	E2	150.1 m²	-	150.1 m²	185 m²	101.0 m²	78.6 m²	89.7 m²	✓	X	N/A	N/A	✓	✓	✓	N/A	55%	43%	48%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 26	E5	151.8 m²	-	151.8 m²	184 m²	103.5 m²	79.7 m²	88.6 m²	✓	X	N/A	N/A	X	✓	✓	N/A	56%	43%	48%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	✓
Lot 27	E2	150.1 m²	-	150.1 m²	163 m²	99.6 m²	78.9 m²	69.3 m²	✓	X	N/A	N/A	✓	✓	✓	N/A	61%	48%	43%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 28	E2	150.1 m²	-	150.1 m²	164 m²	99.6 m²	78.9 m²	70.2 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	61%	48%	43%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 29	E1	150.1 m²	-	150.1 m²	164 m²	99.6 m²	78.9 m²	70.2 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	61%	48%	43%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 30	E1	150.1 m²	-	150.1 m²	163 m²	99.4 m²	78.9 m²	69.8 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	61%	48%	43%	✓	✓	X	✓	✓	✓	N/A	N/A	✓	X
Lot 31	A2	172.9 m²	-	172.9 m²	249 m²	124.0 m²	91.5 m²	146.4 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	50%	37%	59%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 32	D	133.6 m²	-	133.6 m²	201 m²	109.5 m²	70.6 m²	116.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	55%	35%	58%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 33	D	133.6 m²	-	133.6 m²	201 m²	109.5 m²	70.6 m²	116.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	55%	35%	58%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 34	A2	172.9 m²	-	172.9 m²	249 m²	124.0 m²	91.5 m²	145.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	50%	37%	58%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 35	C2	138.2 m²	-	138.2 m²	172 m²	101.3 m²	76.7 m²	83.1 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	59%	45%	48%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 36	A1	172.9 m²	-	172.9 m²	213 m²	126.1 m²	91.6 m²	108.4 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	59%	43%	51%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 37	C1	138.2 m²	-	138.2 m²	172 m²	101.3 m²	76.7 m²	83.1 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	59%	45%	48%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 38	A1	172.9 m²	-	172.9 m²	245 m²	131.2 m²	91.6 m²	137.0 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	53%	37%	56%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 39	F1	146.8 m²	-	146.8 m²	237 m²	129.5 m²	78.3 m²	140.5 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	55%	33%	59%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X

Key	
✓	Complies
X	Does not comply
N/A	Not applicable

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 50	**5.01**	Compliance Table	28/08/20

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Compliance Schedule Checklist - AUPOP Mixed Housing Urban Zone

Lot No.	Typology	GFA Total floor area	Detached garage	GFA Total floor area	Lot Area (m^2)	Impervious Area (m^2)	Building Coverage (m^2)	Landscaped Area (m^2)	H5.6.4. Building Height: (11m max.) (max 50% of vertical height of roof - up to 1m)	H5.6.5. Height in Relation to Boundary (3m + 45°)	H5.6.6. Alternative HIRTB (3.6m vert + 1m hor + [73.3° + 1m] at 3.3m vert + 45° within 20m of site frontage	H5.6.7. HIRTB adjoining lower intensity zones (3m + 45°) 1.5m2 max in area no greater than 1m vert & 2.5m length along edge of roof	H5.6.8. Yards - Front = 2.5m min.	H5.6.8. Yards - Side = 1m min.	H5.6.8. Yards - Rear = 1m min.	H5.6.8. Yards - Riparian = 10m min.	H5.6.9. Maximum Impervious Area (60%)	H5.6.10. Maximum Building Coverage (45%)	H5.6.11. Minimum Landscaped Area (35%)	+ 50% min. landscaping within front yard	H5.6.12. Outlook space - Principal living/ dining 6m (d) x 4m (w)	H5.6.12. Outlook space - Principal bedroom 3m (d) x 3m (w)	H5.6.12. Outlook space - Other habitable room 1m (d) x 1m (w)	H5.6.13. Daylight	H5.6.14 Outdoor Living Space (Ground) 20m² min. 4m min. dimension / 1 in 20 gradient (5%)	H5.6.14 Outdoor Living Space (Balcony/Patio/ Roof terrace) 8m² min. / 1.8m min. dimension	H5.6.14 Outdoor Living Space at south 2.9m + 0.9(height of wall)	H5.6.15 Front fences and walls combined 1.4m height; or 1.8m height for 50% max (remainder 1.4m); or 1.8m height + 50% min. visually permeable.	H5.6.15 Side and rear fences and walls combined 2m height
Lot 40	E4	150.1 m²	-	150.1 m²	179 m²	101.7 m²	78.2 m²	83.2 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	57%	44%	46%	✓	✓	✓	✓	✓	✓	N/A	N/A	X	X
Lot 41	E4	150.1 m²	-	150.1 m²	179 m²	101.8 m²	78.3 m²	83.1 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	57%	44%	46%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 42	L42 Aptms	varies		varies	955 m²	569.1 m²	278.7 m²	532.1 m²	X	N/A	N/A	N/A	✓	✓	✓	N/A	60%	29%	56%	✓	X	✓	✓	✓	✓	N/A	N/A	X	X
Lot 43	G2	115.7 m²	-	115.7 m²	155 m²	85.0 m²	64.3 m²	78.3 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	55%	41%	51%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 44	H2	82.6 m²	-	82.6 m²	122 m²	62.0 m²	44.0 m²	64.3 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	51%	36%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 45	H2	82.6 m²	-	82.6 m²	127 m²	62.0 m²	44.5 m²	69.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	49%	35%	55%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 46	G2	115.7 m²	-	115.7 m²	198 m²	115.1 m²	62.7 m²	109.6 m²	✓	X	N/A	N/A	✓	✓	✓	N/A	58%	32%	55%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 47	G3	115.7 m²	-	115.7 m²	193 m²	106.7 m²	63.3 m²	103.9 m²	✓	X	X	N/A	X	✓	✓	N/A	55%	33%	54%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 48	G4				135 m²	82.7 m²	62.5 m²	60.7 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	61%	46%	45%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 49	H3	84.1 m²	-	84.1 m²	99 m²	63.5 m²	44.1 m²	42.5 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	64%	45%	43%	✓	X	✓	✓	✓	X	N/A	N/A	✓	✓
Lot 50	H3	84.1 m²	-	84.1 m²	99 m²	63.6 m²	44.2 m²	42.4 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	64%	45%	43%	✓	X	✓	✓	✓	X	N/A	N/A	✓	✓
Lot 51	G3	115.7 m²	-	115.7 m²	160 m²	98.6 m²	63.3 m²	75.6 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	62%	40%	46%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 52	G3	115.7 m²	-	115.7 m²	164 m²	94.3 m²	63.3 m²	70.6 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	51%	39%	44%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 53	G4	117.2 m²	-	117.2 m²	135 m²	82.7 m²	62.5 m²	58.7 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	61%	46%	44%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 54	H3	84.1 m²	-	84.1 m²	99 m²	63.2 m²	44.2 m²	42.4 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	64%	45%	43%	✓	X	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 55	K	118.8 m²	-	118.8 m²	234 m²	129.0 m²	91.6 m²	129.4 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	56%	39%	55%	✓	✓	✓	✓	✓	X	N/A	N/A	✓	X
Lot 56	I1	115.7 m²	-	115.7 m²	195 m²	94.9 m²	63.3 m²	108.9 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	49%	32%	56%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 57	I2	116.1 m²	-	116.1 m²	141 m²	89.3 m²	62.5 m²	57.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	63%	44%	41%	✓	X	✓	✓	✓	✓	N/A	N/A	X	✓
Lot 58	I2	116.1 m²	-	116.1 m²	141 m²	89.3 m²	62.5 m²	57.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	63%	44%	41%	✓	X	✓	✓	✓	✓	N/A	N/A	X	✓
Lot 59	J1	84.4 m²	-	84.4 m²	103 m²	64.1 m²	44.6 m²	47.5 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	62%	43%	46%	✓	X	✓	✓	✓	X	N/A	N/A	X	✓
Lot 60	I1	115.7 m²	-	115.7 m²	215 m²	115.7 m²	63.3 m²	128.8 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	54%	29%	60%	✓	✓	✓	✓	✓	✓	N/A	N/A	X	✓
Lot 61	L61 Aptms	varies		varies	494 m²	326.2 m²	218.1 m²	195.4 m²	X	N/A	N/A	N/A	✓	✓	✓	N/A	66%	44%	40%	✓	✓	✓	✓	✓	N/A	✓	N/A	✓	✓
Lot 62	G1	115.7 m²	-	115.7 m²	166 m²	85.5 m²	63.7 m²	71.7 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	51%	38%	43%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 63	H1	84.1 m²	-	84.1 m²	101 m²	66.5 m²	44.4 m²	26.4 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	65%	44%	27%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 64	H1	84.1 m²	-	84.1 m²	101 m²	66.5 m²	44.4 m²	26.4 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	65%	44%	27%	✓	X	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 65	G1	115.7 m²	-	115.7 m²	165 m²	85.5 m²	63.7 m²	70.6 m²	✓	N/A	N/A	N/A	✓	✓	✓	N/A	52%	39%	43%	✓	X	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 66	L66 Aptms	varies		varies	1425 m²	917.3 m²	435.5 m²	598.1 m²	✓	✓	✓	✓	✓	✓	✓	N/A	64%	31%	42%	✓	✓	✓	✓	✓	✓	N/A	✓	N/A	✓	✓
Lot 67	D	133.6 m²	-	133.6 m²	174 m²	96.5 m²	70.6 m²	91.7 m²	✓	✓	N/A	N/A	✓	✓	✓	N/A	55%	40%	52%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 68	D	133.6 m²	-	133.6 m²	178 m²	96.5 m²	70.6 m²	95.9 m²	✓	X	N/A	N/A	✓	✓	✓	N/A	54%	39%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 69	D	133.6 m²	-	133.6 m²	180 m²	96.5 m²	70.6 m²	95.9 m²	✓	X	N/A	N/A	✓	✓	✓	N/A	54%	39%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 70	D	133.6 m²	-	133.6 m²	177 m²	96.5 m²	70.6 m²	94.4 m²	✓	X	N/A	N/A	✓	✓	✓	N/A	50%	40%	53%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 71	G1	115.7 m²	-	115.7 m²	213 m²	106.0 m²	62.8 m²	127.3 m²	✓	X	✓	N/A	X	✓	✓	N/A	49%	30%	60%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 72	H1	84.1 m²	-	84.1 m²	98 m²	61.5 m²	43.0 m²	42.8 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	63%	44%	44%	✓	X	✓	✓	✓	X	N/A	N/A	✓	✓
Lot 73	H1	84.1 m²	-	84.1 m²	98 m²	61.5 m²	44.1 m²	42.8 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	63%	45%	44%	✓	X	✓	✓	✓	X	N/A	N/A	✓	✓
Lot 74	G1	115.7 m²	-	115.7 m²	222 m²	106.1 m²	62.8 m²	137.1 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	48%	28%	62%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	✓
Lot 75	G1	115.7 m²	-	115.7 m²	221 m²	103.8 m²	62.8 m²	135.5 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	47%	28%	61%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X
Lot 76	H1	84.1 m²	-	84.1 m²	98 m²	61.4 m²	44.1 m²	42.8 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	63%	45%	44%	✓	X	✓	✓	✓	X	N/A	N/A	✓	X
Lot 77	H1	84.1 m²	-	84.1 m²	98 m²	61.4 m²	44.1 m²	42.8 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	63%	45%	44%	✓	X	✓	✓	✓	X	N/A	N/A	✓	X
Lot 78	G1	115.7 m²	-	115.7 m²	165 m²	92.3 m²	62.8 m²	79.8 m²	✓	N/A	N/A	N/A	X	✓	✓	N/A	56%	38%	48%	✓	✓	✓	✓	✓	✓	N/A	N/A	✓	X

Key	
✓	Complies
X	Does not comply
N/A	Not applicable

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1 **HIRTB Key Plan**
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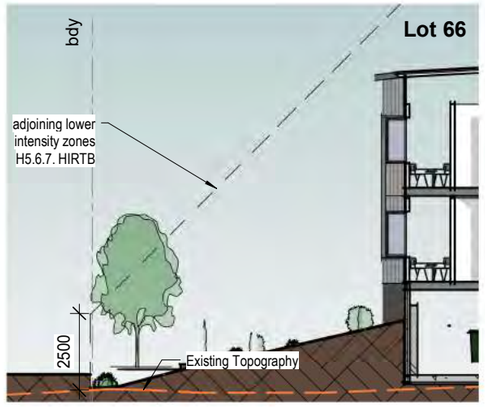
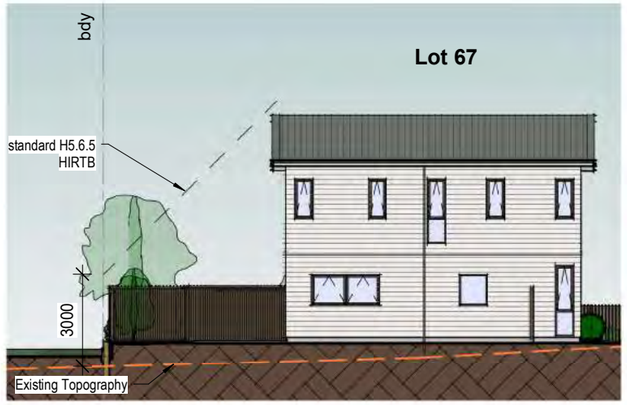


1 **HIRTB 1 Lot 66 West Elevation**

1 : 200



2 **HIRTB 2 Lot 67 West Elevation**

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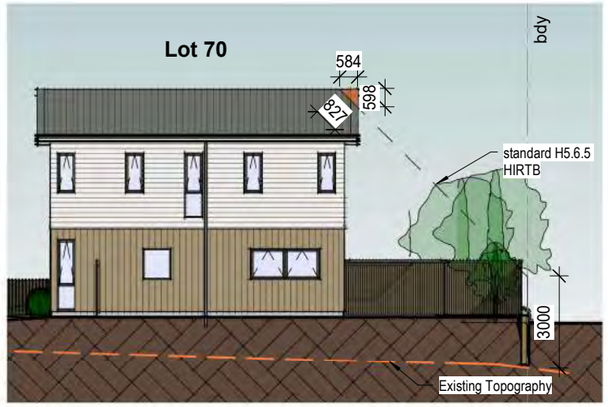
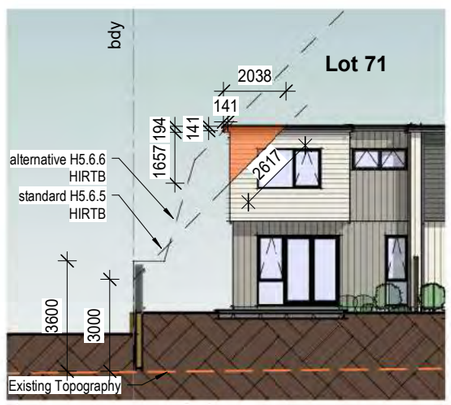


3 **HIRTB 3 Lot 70 East Elevation**

1 : 200

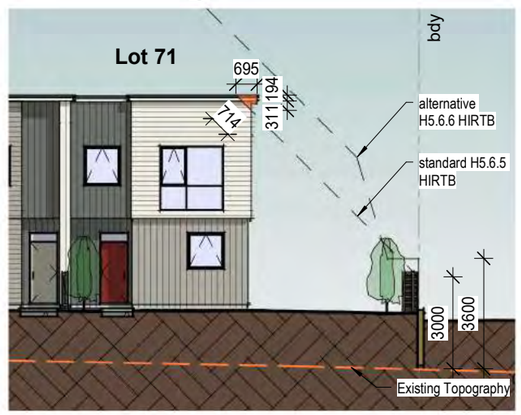
2-3 **HIRTB 2-3 Lots 67-70 North Elevation**

1 : 200



4 **HIRTB 4 Lot 71 North Elevation**

1 : 200



5 **HIRTB 5 Lot 71 South Elevation**

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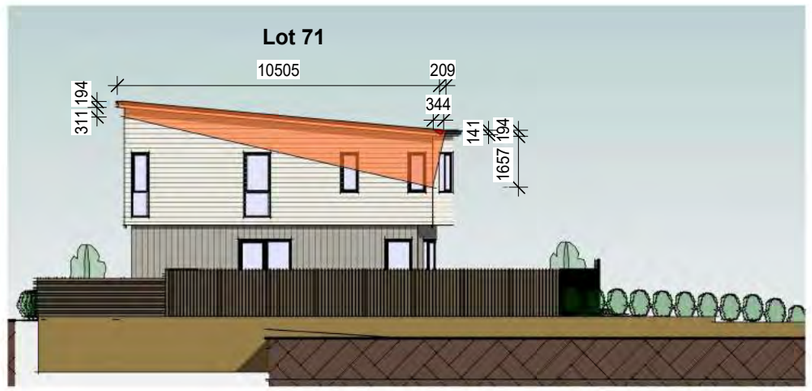

4-5 **HIRTB 4-5 Lot 71 East Elevation**

1 : 200

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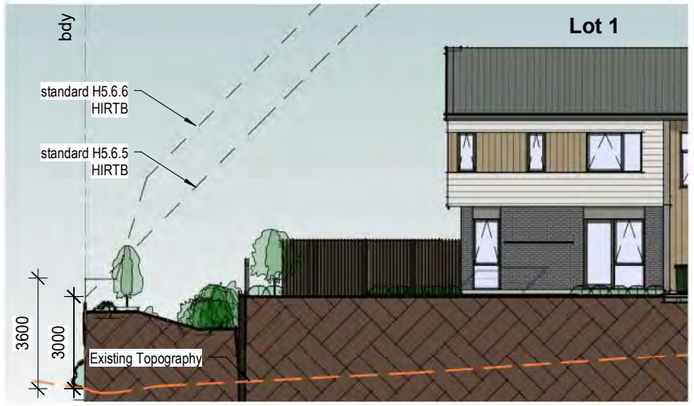
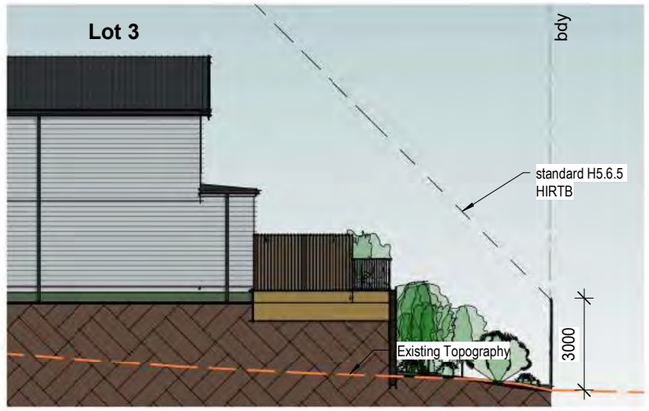


6 **HIRTB 6 Lot 1 North Elevation**

1 : 200

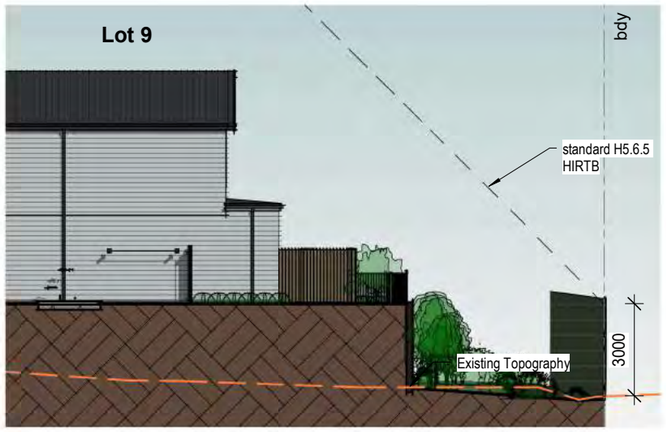


7 **HIRTB 7 Lot 3 South Elevation**

1 : 200

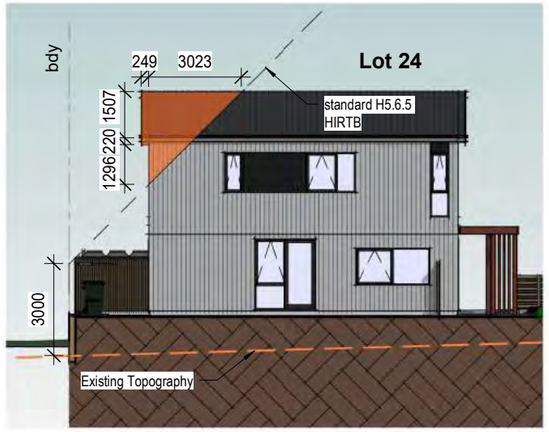
8 **HIRTB 8 Lot 7 South Elevation**

1 : 200



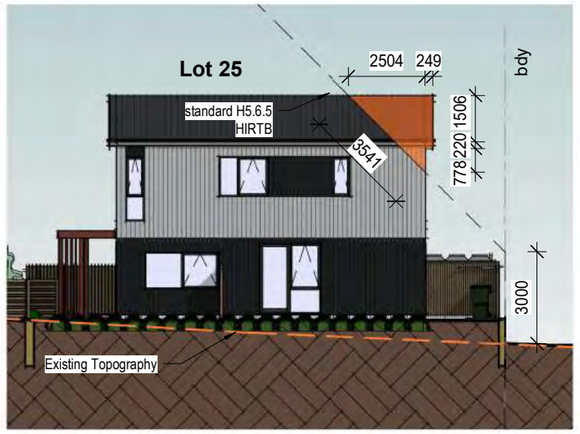
9 **HIRTB 9 Lot 9 South Elevation**

1 : 200



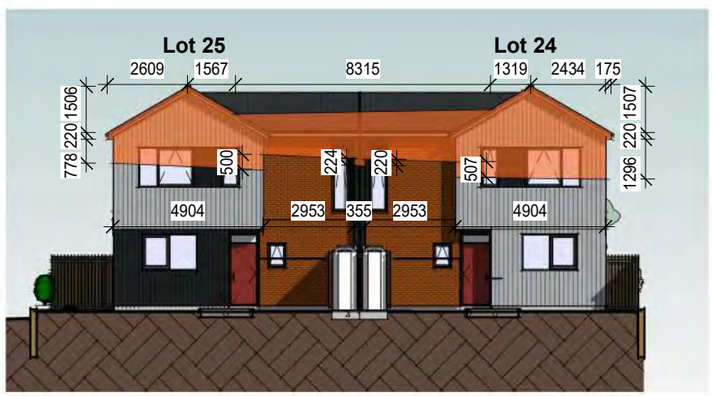
10 **HIRTB 10 Lot 24 South Elevation**

1 : 200



11 **HIRTB 11 Lot 25 North Elevation**

1 : 200



10-11 **HIRTB 10-11 Lots 24-25 West Elevation**

1 : 200

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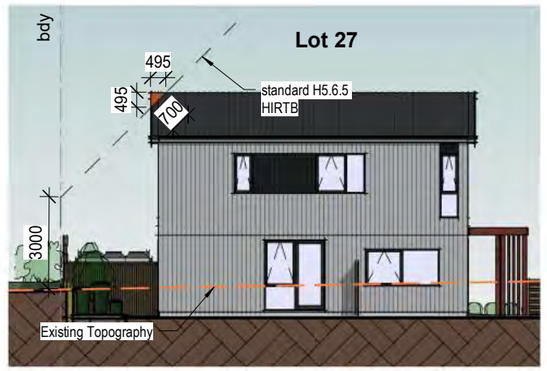
12 **HIRTB 12 Lot 26 South Elevation**

1 : 200

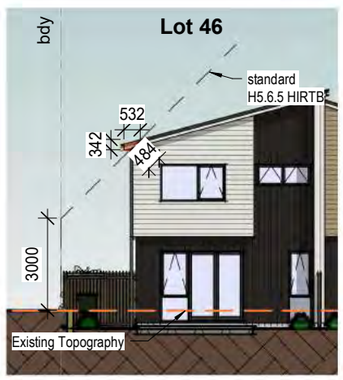


13 **HIRTB 13 Lot 27 South Elevations**

1 : 200

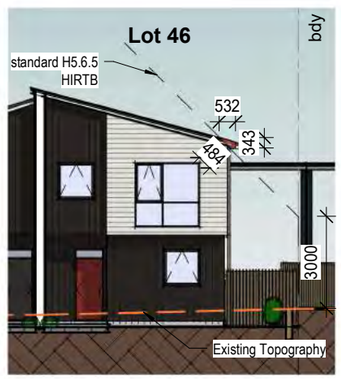
12-13 **HIRTB 12-13 Lots 26-27 West Elevation**

1 : 200



14 **HIRTB 14 Lot 46 East Elevation**

1 : 200

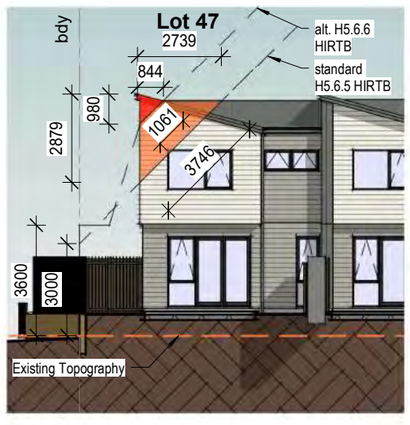


15 **HIRTB 15 Lot 46 West Elevation**

1 : 200

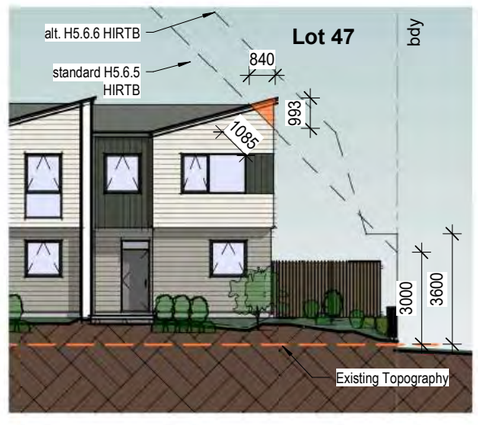
14-15 **HIRTB 14-15 Lot 46 South Elevation**

1 : 200



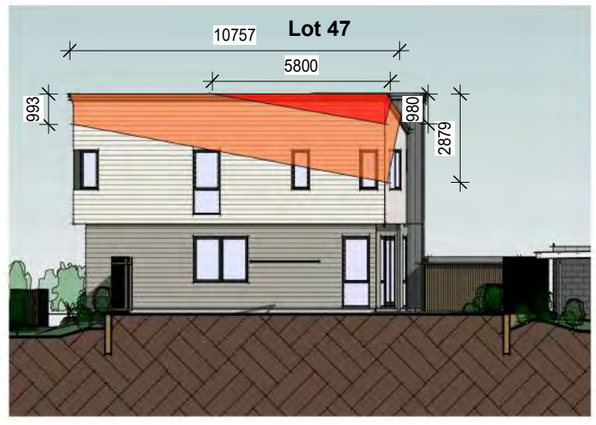
16 **HIRTB 16 Lot 47 East Elevation**

1 : 200



17 **HIRTB 17 Lot 47 East Elevation**

1 : 200



16-17 **HIRTB 16-17 Lot 47 South Elevation**

1 : 200

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Job No.	Scale (A3):	Sheet no.	HIRTB Elevations	DATE
4167	1 : 200	**5.14**		28/08/20

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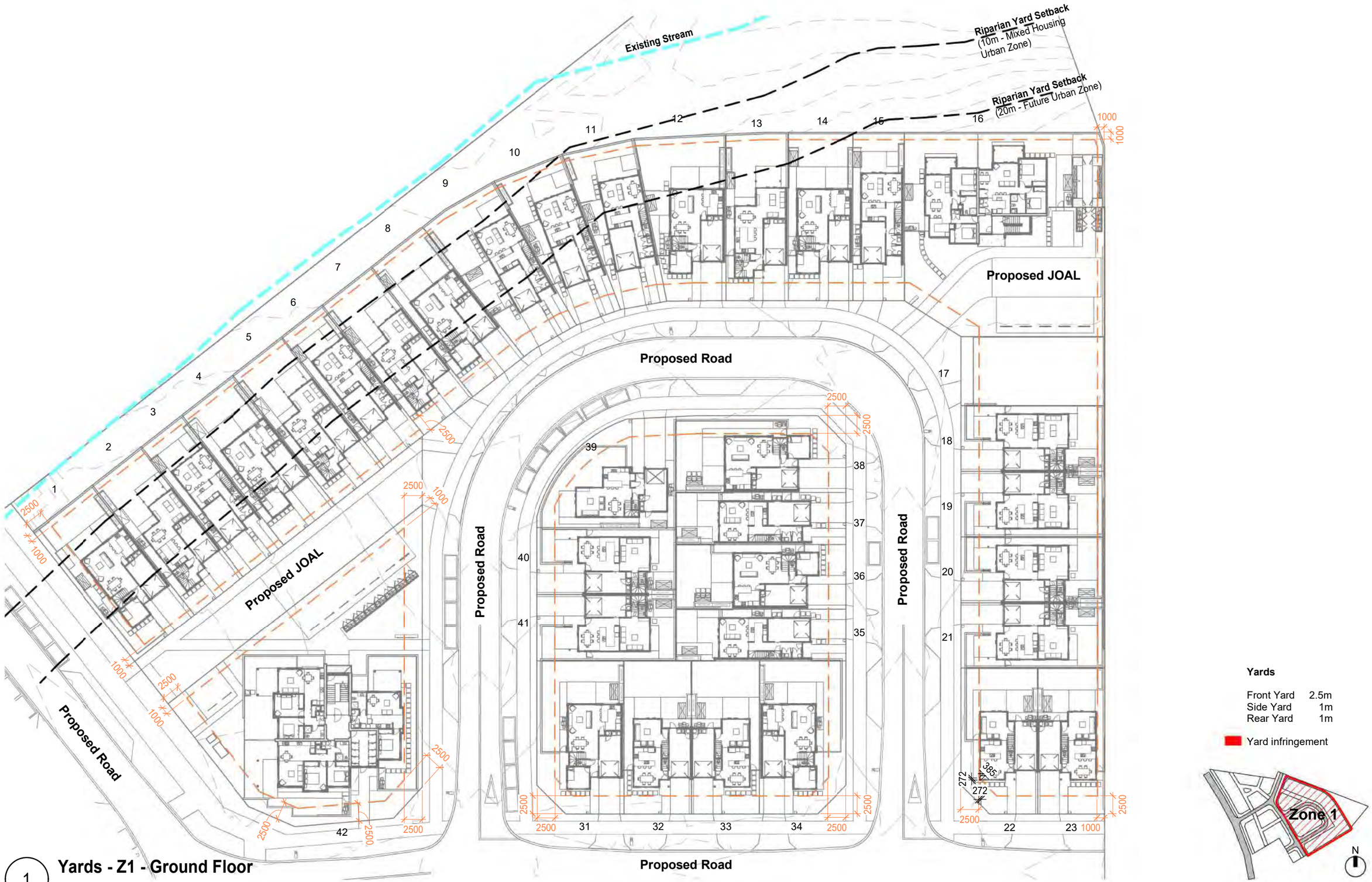

1 **Yards - Z1 - Ground Floor**

1 : 500

Yards

Front Yard	2.5m
Side Yard	1m
Rear Yard	1m

Yard infringement

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.21**	Yards Z1 - Ground	28/08/20

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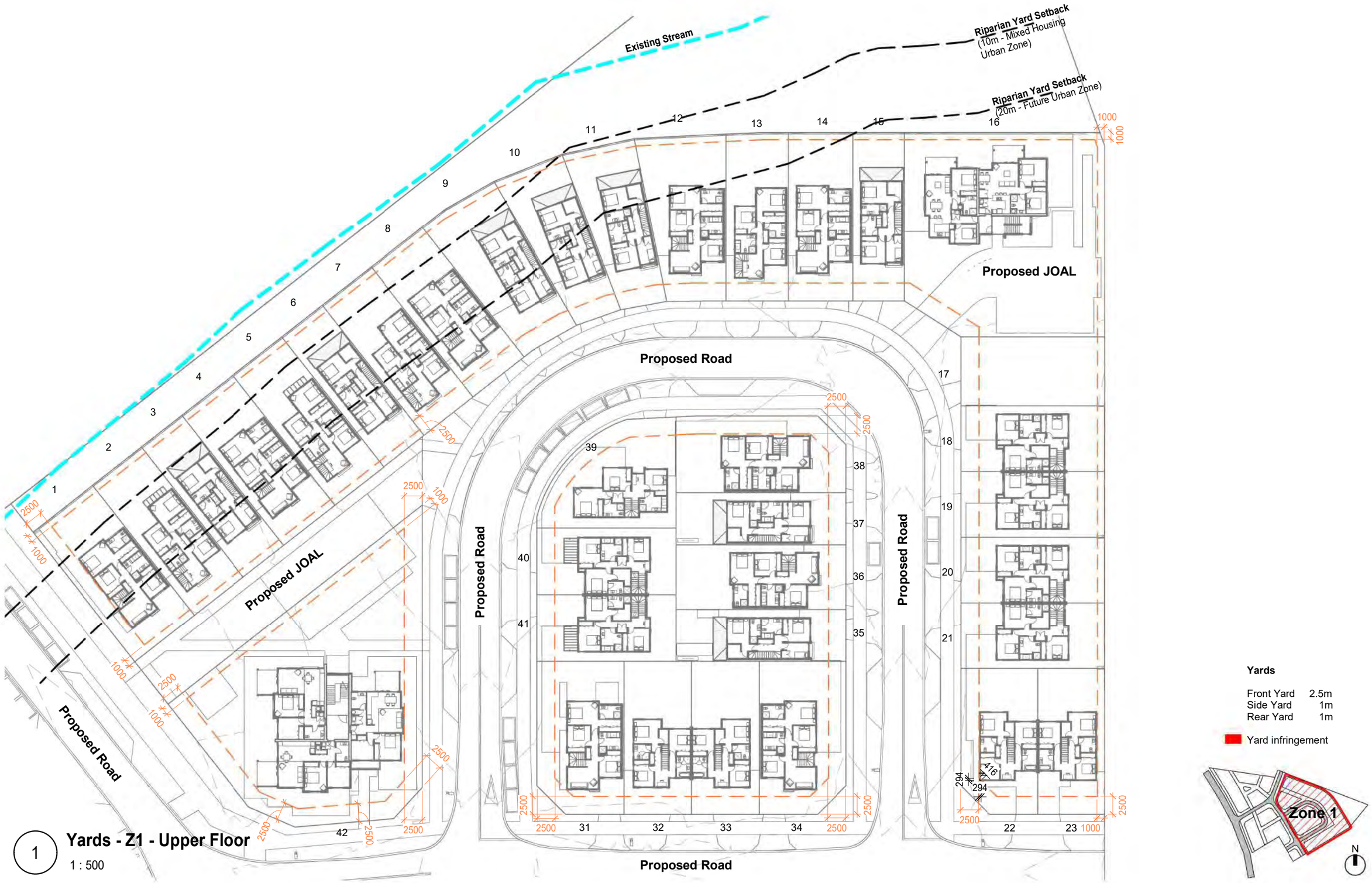

1 **Yards - Z1 - Upper Floor**
1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.22**	Yards Z1 - Upper	28/08/20

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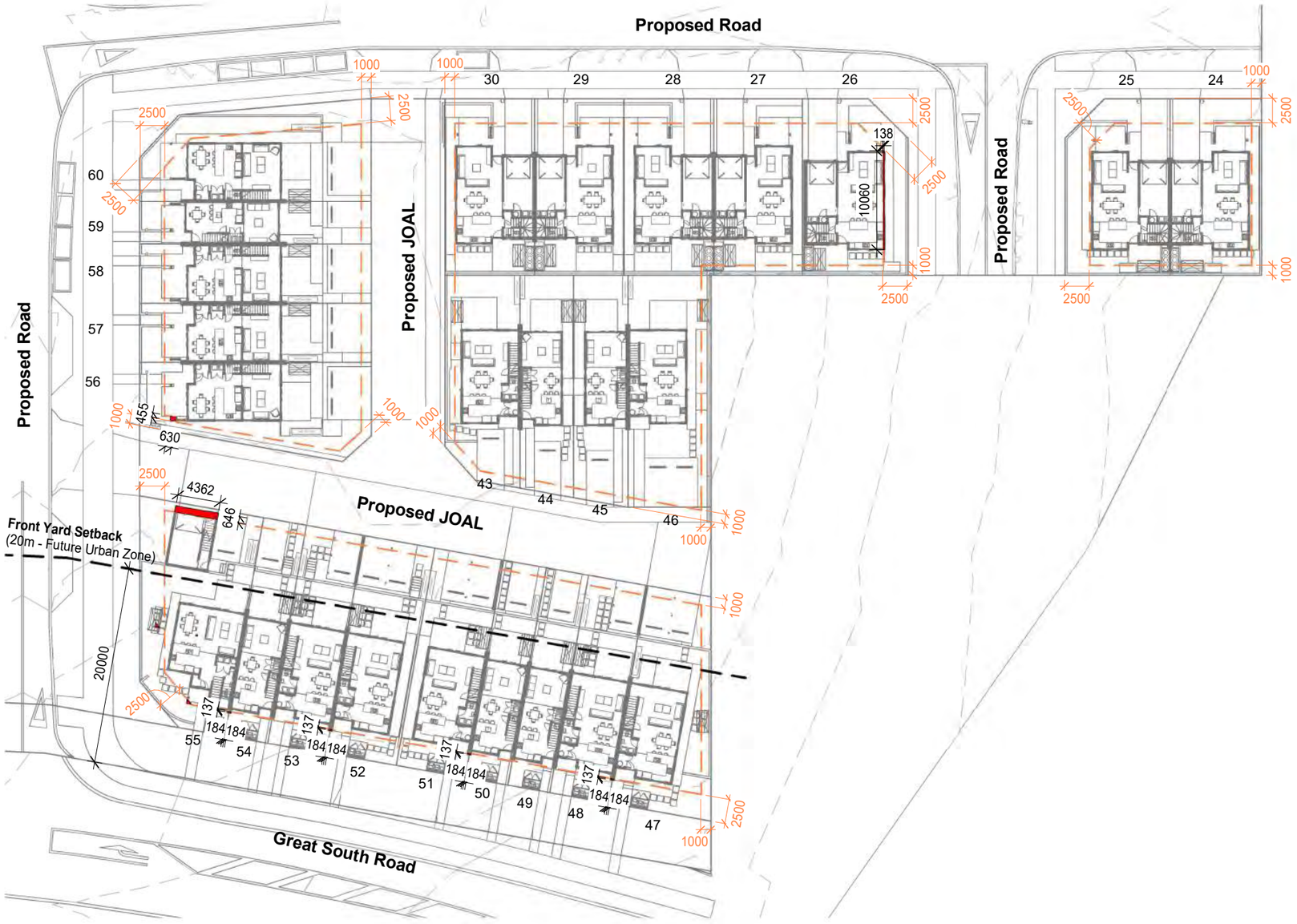

1 **Yards - Z2 - Ground Floor**

1 : 500

Yards

Front Yard	2.5m
Side Yard	1m
Rear Yard	1m

Yard infringement

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.23**	Yards Z2 - Ground	28/08/20

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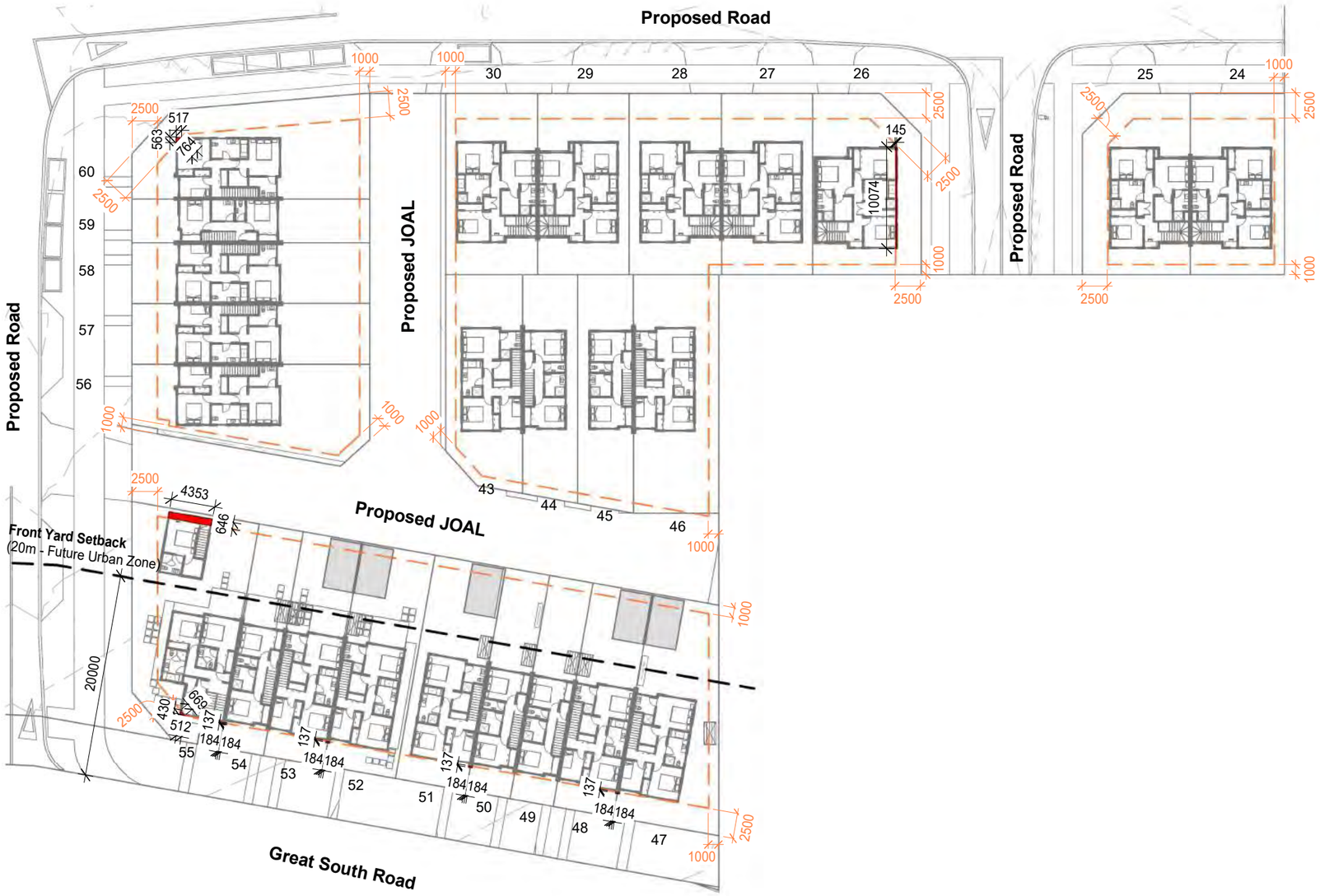

1 **Yards - Z2 - Upper Floor**

1 : 500

Yards

Front Yard	2.5m
Side Yard	1m
Rear Yard	1m

Yard infringement

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.24**	Yards Z2 - Upper	28/08/20

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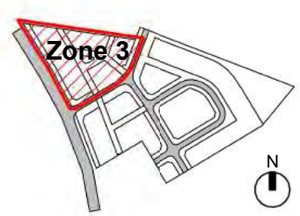
1 **Yards - Z3 - Ground Floor**

1 : 500

Yards

Front Yard	2.5m
Side Yard	1m
Rear Yard	1m

Yard infringement



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.25**	Yards Z3 - Ground	28/08/20

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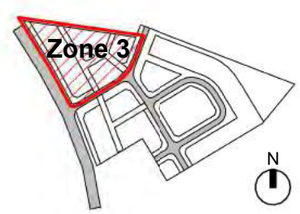
1 **Yards - Z3 - Upper Floor**

1 : 500

Yards

Front Yard	2.5m
Side Yard	1m
Rear Yard	1m

Yard infringement



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.26**	Yards Z3 - Upper	28/08/20

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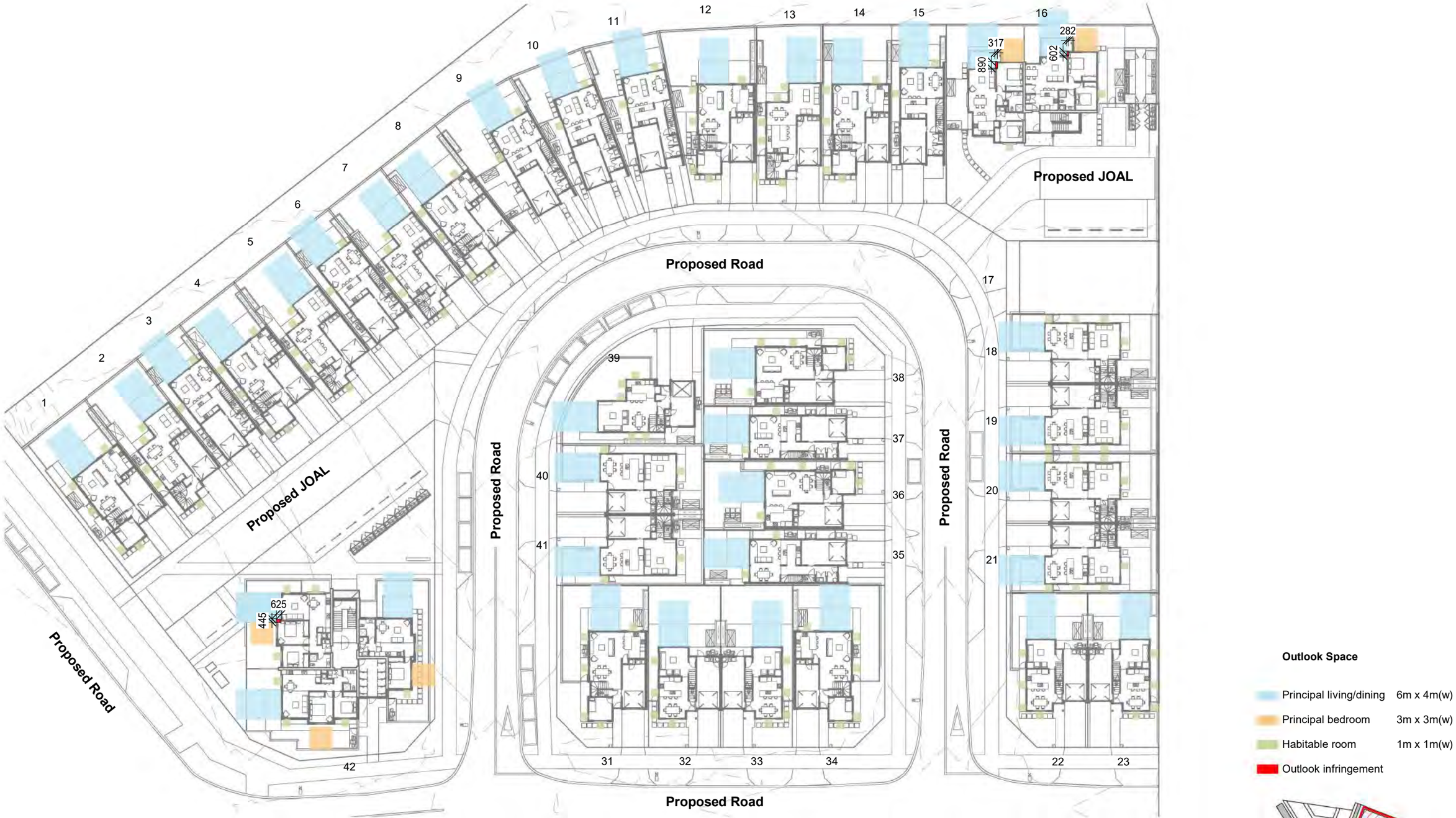

Outlook Space

Principal living/dining	6m x 4m(w)
Principal bedroom	3m x 3m(w)
Habitable room	1m x 1m(w)
Outlook infringement	

1 **Outlook Z1 - Ground Floor**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.30**	Outlook Z1 - Ground	28/08/20

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Outlook Space

Principal living/dining	6m x 4m(w)
Principal bedroom	3m x 3m(w)
Habitable room	1m x 1m(w)
Outlook infringement	

1 **Outlook Z1 - Upper Floor**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.31**	Outlook Z1 - Upper	28/08/20

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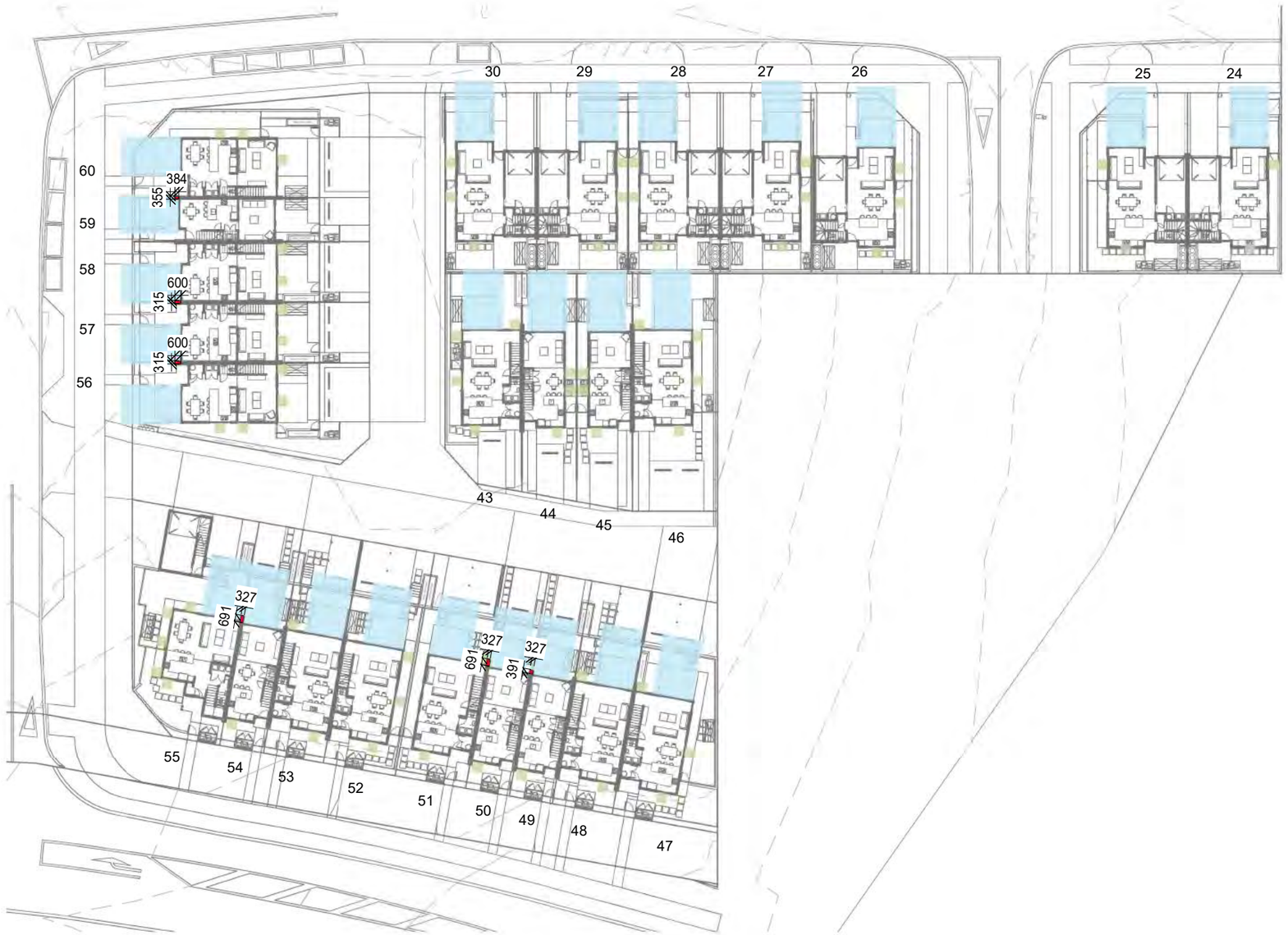

Outlook Space

Principal living/dining	6m x 4m(w)
Principal bedroom	3m x 3m(w)
Habitable room	1m x 1m(w)
Outlook infringement	

1 Outlook Z2 - Ground Floor

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.32**	Outlook Z2 - Ground	28/08/20

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1 **Outlook Z2 - Upper Floor**

1 : 500

Outlook Space

Principal living/dining	6m x 4m(w)
Principal bedroom	3m x 3m(w)
Habitable room	1m x 1m(w)
Outlook infringement	

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.33**	Outlook Z2 - Upper	28/08/20

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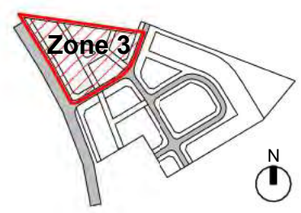
1 **Outlook Z3 - Ground Floor**

1 : 500

Outlook Space

Principal living/dining	6m x 4m(w)
Principal bedroom	3m x 3m(w)
Habitable room	1m x 1m(w)
Outlook infringement	



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.34**	Outlook Z3 - Ground	28/08/20

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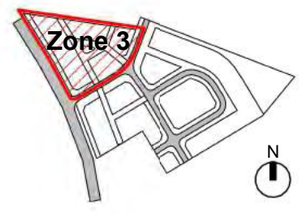
1 **Outlook Z3 - Upper Floor**

1 : 500

Outlook Space

Principal living/dining	6m x 4m(w)
Principal bedroom	3m x 3m(w)
Habitable room	1m x 1m(w)
Outlook infringement	



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.35**	Outlook Z3 - Upper	28/08/20

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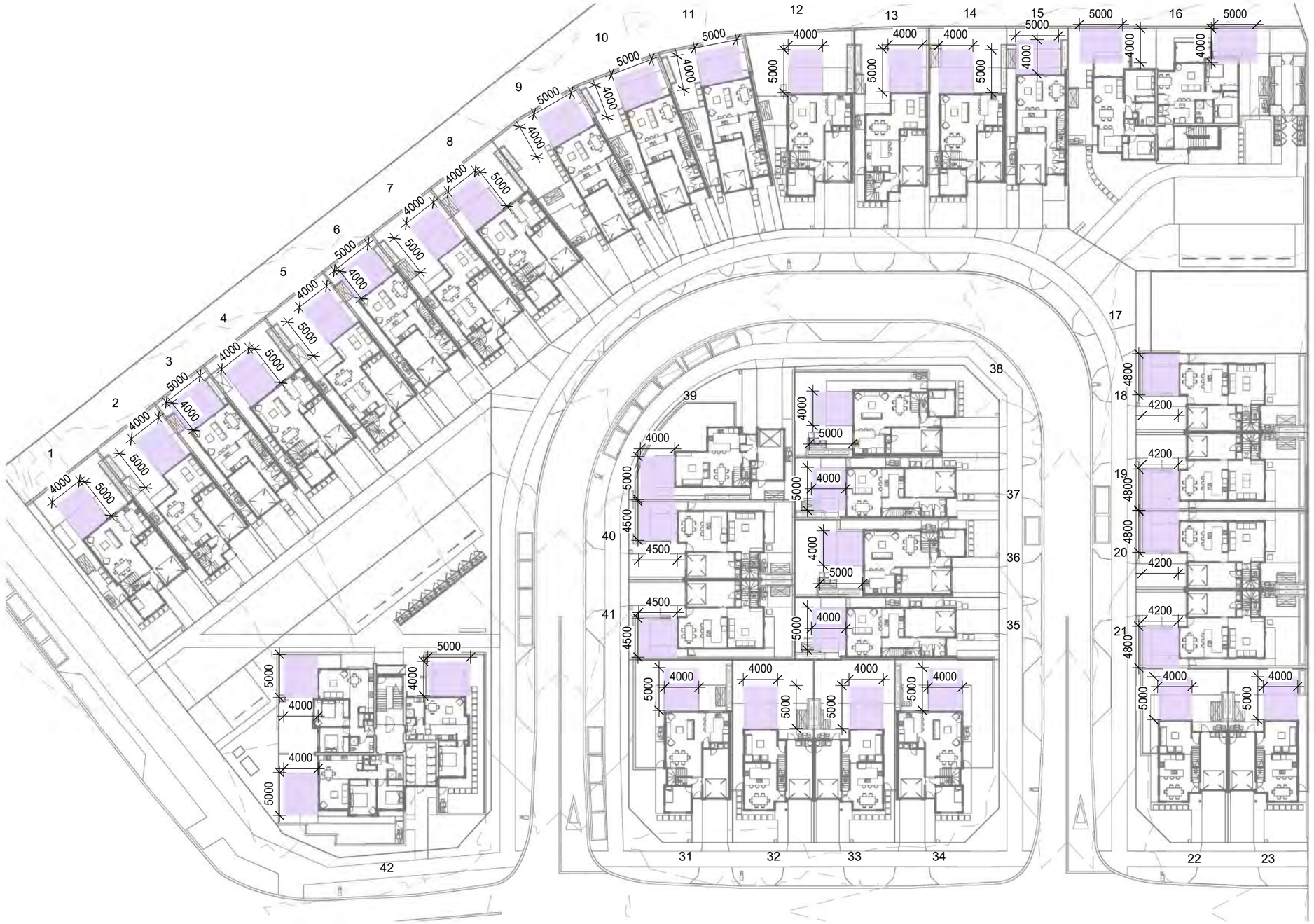

Outdoor Living Space

- At least 20m²
- No dimension less than 4m
- 1 in 20 gradient (5%)
- At least 8m2 and min. 1.8m dimension when balcony

Outdoor Living infringement

1 Outdoor Space Z1 - Ground

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.36**	Outdoor Space Z1 - Ground	28/08/20

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Outdoor Living Space

- At least 20m²
- No dimension less than 4m
- 1 in 20 gradient (5%)
- At least 8m2 and min. 1.8m dimension when balcony

Outdoor Living infringement

1 **Outdoor Space Z1 - Upper**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.37**	Outdoor Space Z1 - Upper	28/08/20

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1 **Outdoor Space Z2**

1 : 500

Outdoor Living Space

- At least 20m²
- No dimension less than 4m
- 1 in 20 gradient (5%)
- At least 8m2 and min. 1.8m dimension when balcony

Outdoor Living infringement

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.38**	Outdoor Space Z2	28/08/20

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1 **Outdoor Space Z3**

1 : 500

Outdoor Living Space

- At least 20m²
- No dimension less than 4m
- 1 in 20 gradient (5%)
- At least 8m2 and min. 1.8m dimension when balcony

Outdoor Living infringement

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.39**	Outdoor Space Z3	28/08/20

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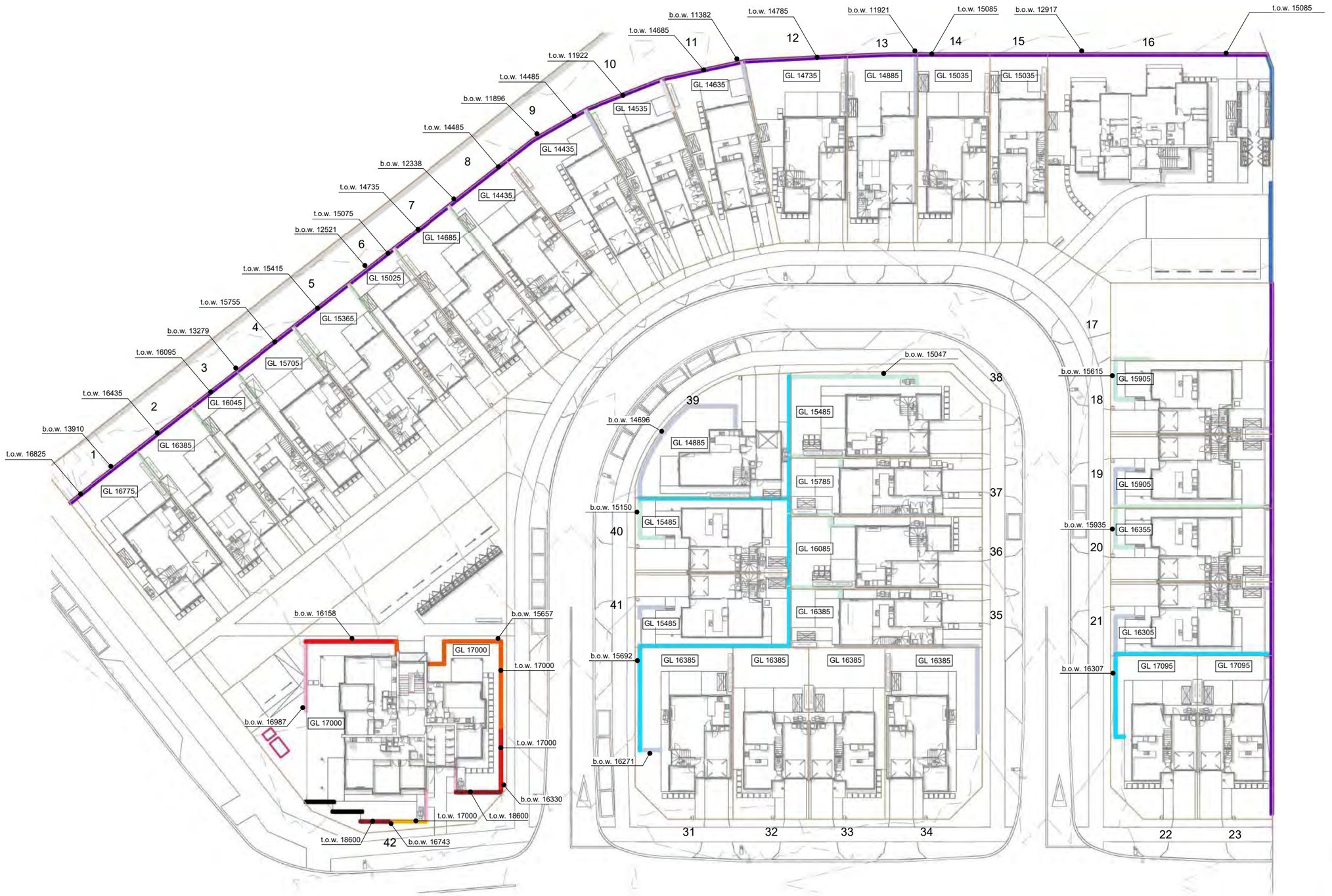

Timber Retaining over 1.5m

Timber Retaining 1 - 1.5m

Timber Retaining 0.5 - 1m

Timber Retaining 0.25 - 0.5 m

Timber Retaining 0 - 0.25m

Block Retaining over 1.5m

Block Retaining 1 - 1.5m

Block Retaining 0.5 - 1m

Block Retaining 0.25 - 0.5 m

Block Retaining 0 - 0.25m

1 **Retaining Plan Z1**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.40**	Retaining Plan Z1	28/08/20

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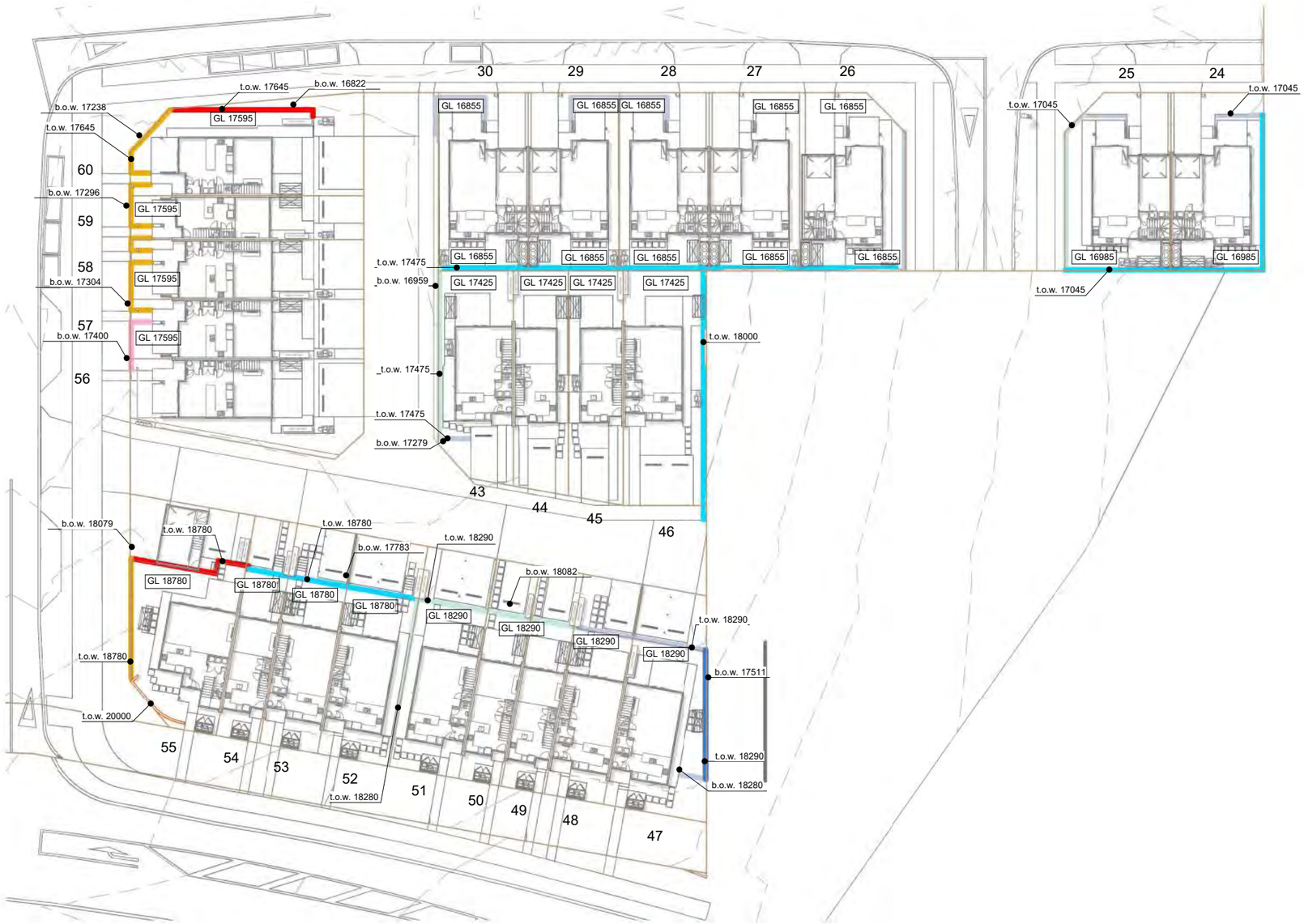

Timber Retaining over 1.5m
Timber Retaining 1 - 1.5m
Timber Retaining 0.5 - 1m
Timber Retaining 0.25 - 0.5 m
Timber Retaining 0 - 0.25m

Block Retaining over 1.5m
Block Retaining 1 - 1.5m
Block Retaining 0.5 - 1m
Block Retaining 0.25 - 0.5 m
Block Retaining 0 - 0.25m

1 **Retaining Plan Z2**
1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.41**	Retaining Plan Z2	28/08/20

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1 **Retaining Plan Z3**

1 : 500

- Timber Retaining over 1.5m
- Timber Retaining 1 - 1.5m
- Timber Retaining 0.5 - 1m
- Timber Retaining 0.25 - 0.5 m
- Timber Retaining 0 - 0.25m

- Block Retaining over 1.5m
- Block Retaining 1 - 1.5m
- Block Retaining 0.5 - 1m
- Block Retaining 0.25 - 0.5 m
- Block Retaining 0 - 0.25m

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.42**	Retaining Plan Z3	28/08/20

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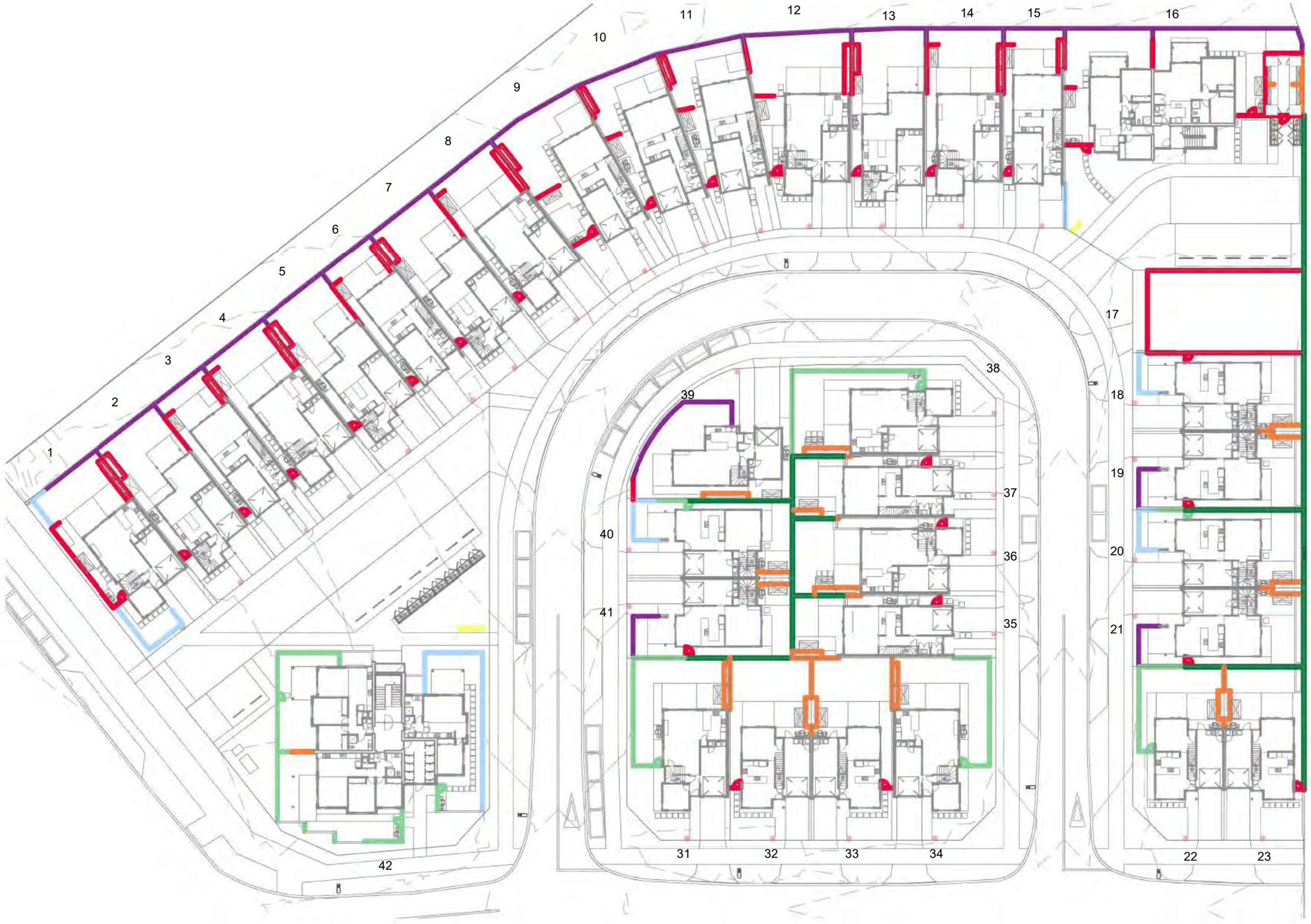

Utilities:

- Wheelie Bins - No enclosure
- Wheelie Bins - Thin Enclosure
- Wheelie Bins - Enclosure
- Clothesline
- Clothesline Slim
- 2000l Baileys Slimline Tank
- 3000l Baileys Slimline Tank
- 3000l Baileys Tank
- Letter Box Type 1- fixed to fencing
- Letter Box Type 2- on post
- Letter Box Type 3 - in block

Fence Type A

1800 High Timber Palling Fence

Fence Type B

1800 High Close Boarded Timber Fence

Fence Type C

1500 High Timber Palling Fence

Fence Type D

1500 High Close Boarded Timber Fence

Fence Type E

1200 High Timber Palling Fence

Fence Type F

1200 High Spectrum Black Powder Coated High Visibility Aluminium Fence

Fence Type G

1200 High Horizontal Veriable Timber Palling Fence

1 **Fencing Plan Z1**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.43**	Fencing Plan Z1	28/08/20

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1 **Fencing Plan Z2**

1 : 500

Utilities:

- Wheelie Bins - No enclosure
- Wheelie Bins - Thin Enclosure
- Wheelie Bins - Enclosure
- Clothesline
- Clothesline Slim
- 2000l Baileys Slimline Tank
- 3000l Baileys Slimline Tank
- 3000l Baileys Tank
- Letter Box Type 1- fixed to fencing
- Letter Box Type 2- on post
- Letter Box Type 3 - in block

Fence Type A

1800 High Timber Palling Fence

Fence Type B

1800 High Close Boarded Timber Fence

Fence Type C

1500 High Timber Palling Fence

Fence Type D

1500 High Close Boarded Timber Fence

Fence Type E

1200 High Timber Palling Fence

Fence Type F

1200 High Spectrum Black Powder Coated High Visibility Aluminium Fence

Fence Type G

1200 High Horizontal Veriable Timber Palling Fence

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.44**	Fencing Plan Z2	28/08/20

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Utilities:

- Wheelie Bins - No enclosure
- Wheelie Bins - Thin Enclosure
- Wheelie Bins - Enclosure
- Clothesline
- Clothesline Slim
- 2000l Baileys Slimline Tank
- 3000l Baileys Slimline Tank
- 3000l Baileys Tank
- Letter Box Type 1- fixed to fencing
- Letter Box Type 2- on post
- Letter Box Type 3 - in block

Fence Type A

1800 High Timber Palling Fence

Fence Type B

1800 High Close Boarded Timber Fence

Fence Type C

1500 High Timber Palling Fence

Fence Type D

1500 High Close Boarded Timber Fence

Fence Type E

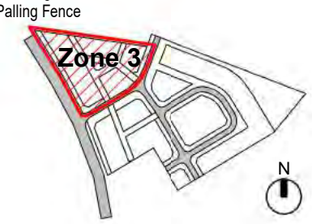
1200 High Timber Palling Fence

Fence Type F

1200 High Spectrum Black Powder Coated High Visibility Aluminium Fence

Fence Type G

1200 High Horizontal Veriable Timber Palling Fence



1 **Fencing Plan Z3**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.45**	Fencing Plan Z3	28/08/20

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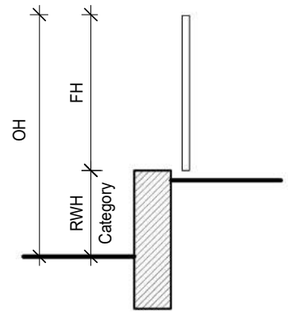
RWH - Retaining Wall Height Category (see retaining wall plan)
FH - Fence Height (see retaining wall plan)
OH - Overall Height

Front Yard Infringments

Rear and Side Yard Infringments



RWH-1500+ FH-1200 OH-2700+ (1)
RWH-1500+ FH-1200 OH-2700+ (2)
RWH-1500+ FH-1200 OH-2700+ (3)
RWH-1500+ FH-1200 OH-2700+ (4)
RWH-1500+ FH-1200 OH-2700+ (5)
RWH-1500+ FH-1200 OH-2700+ (6)
RWH-1500+ FH-1200 OH-2700+ (7)
RWH-1500+ FH-1200 OH-2700+ (8)
RWH-1500+ FH-1200 OH-2700+ (9)
RWH-1500+ FH-1200 OH-2700+ (10)
RWH-1500+ FH-1200 OH-2700+ (11)
RWH-1500+ FH-1200 OH-2700+ (12)
RWH-1500+ FH-1200 OH-2700+ (13)
RWH-1500+ FH-1200 OH-2700+ (14)
RWH-1500+ FH-1200 OH-2700+ (15)
RWH-1500+ FH-1200 OH-2700+ (16)
RWH-1500 FH-1200 OH-2700
RWH-1500 FH-1800 OH-3300
RWH-1500+ FH-1500 OH-3000+ (17)
RWH-1500+ FH-1500 OH-3000+ (18)
RWH-1500+ FH-1500 OH-3000+ (19)
RWH-1500+ FH-1500 OH-3000+ (20)
RWH-1500+ FH-1500 OH-3000+ (21)
RWH-1500+ FH-1500 OH-3000+ (22)
RWH-1500+ FH-1500 OH-3000+ (23)
RWH-500-1000 FH-1500 OH-2000+ (24)
RWH-250-500 FH-1200 OH-1450+ (25)
RWH-500-1000 FH-1500 OH-2000+ (26)
RWH-500-1000 FH-1500 OH-2000+ (27)
RWH-500-1500 FH-1200 OH-2000+ (28)
RWH-1500+ FH-1500 OH-1500+ (29)
RWH-1500+ FH-1500 OH-1500+ (30)
RWH-500-1000 FH-1500 OH-2000+ (31)
RWH-250-500 FH-1200 OH-1450+ (32)
RWH-500-1000 FH-1500 OH-2000+ (33)
RWH-500-1000 FH-1500 OH-2000+ (34)
RWH-500-1000 FH-1500 OH-2000+ (35)
RWH-250-500 FH-1200 OH-1450+ (36)
RWH-500-1000 FH-1500 OH-2000+ (37)
RWH-500-1000 FH-1500 OH-2000+ (38)
RWH-500-1000 FH-1500 OH-2000+ (39)
RWH-250-500 FH-1200 OH-1450+ (40)
RWH-500-1000 FH-1500 OH-2000+ (41)
RWH-1500+ FH-1500 OH-1500+ (42)

1 Fencing Compliance Infringements Z1

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.45.1**	Fence Height Infringements Z1	28/08/20

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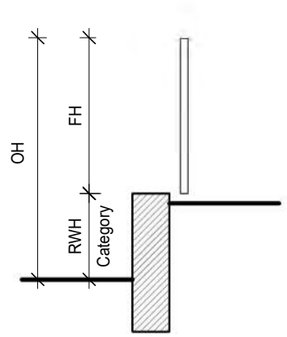
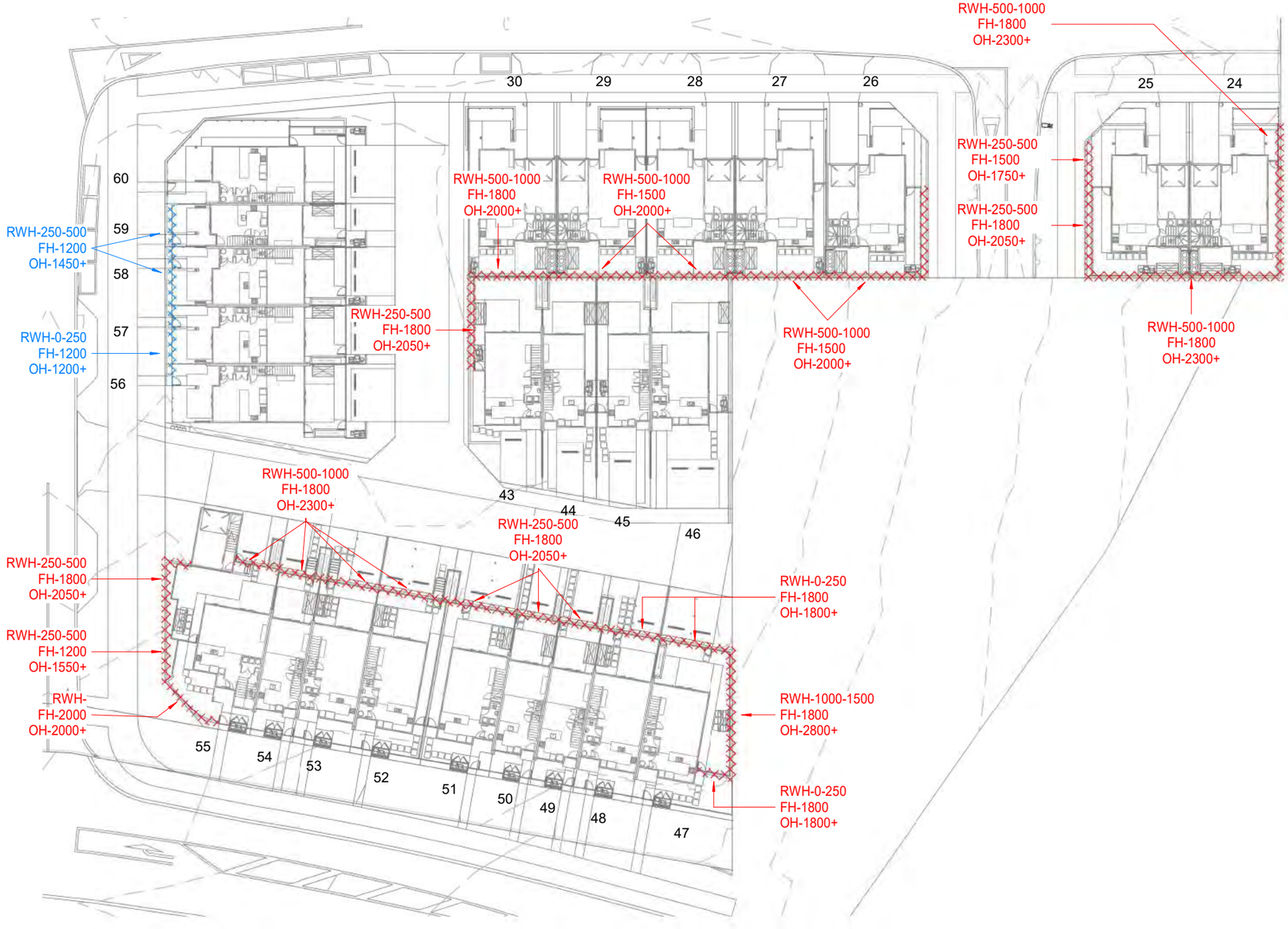
RWH - Retaining Wall Height Category (see retaining wall plan)
FH - Fence Height (see retaining wall plan)
OH - Overall Height

Front Yard Infringments

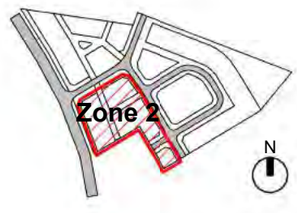
Rear and Side Yard Infringments





1 Fencing Compliance Infringements Z2

1 : 500



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.45.2**	Fence Height Infringements Z2	28/08/20

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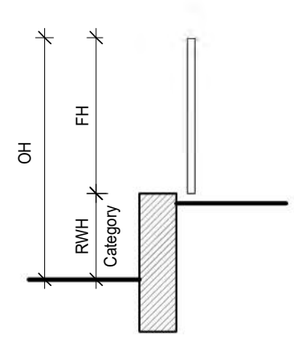
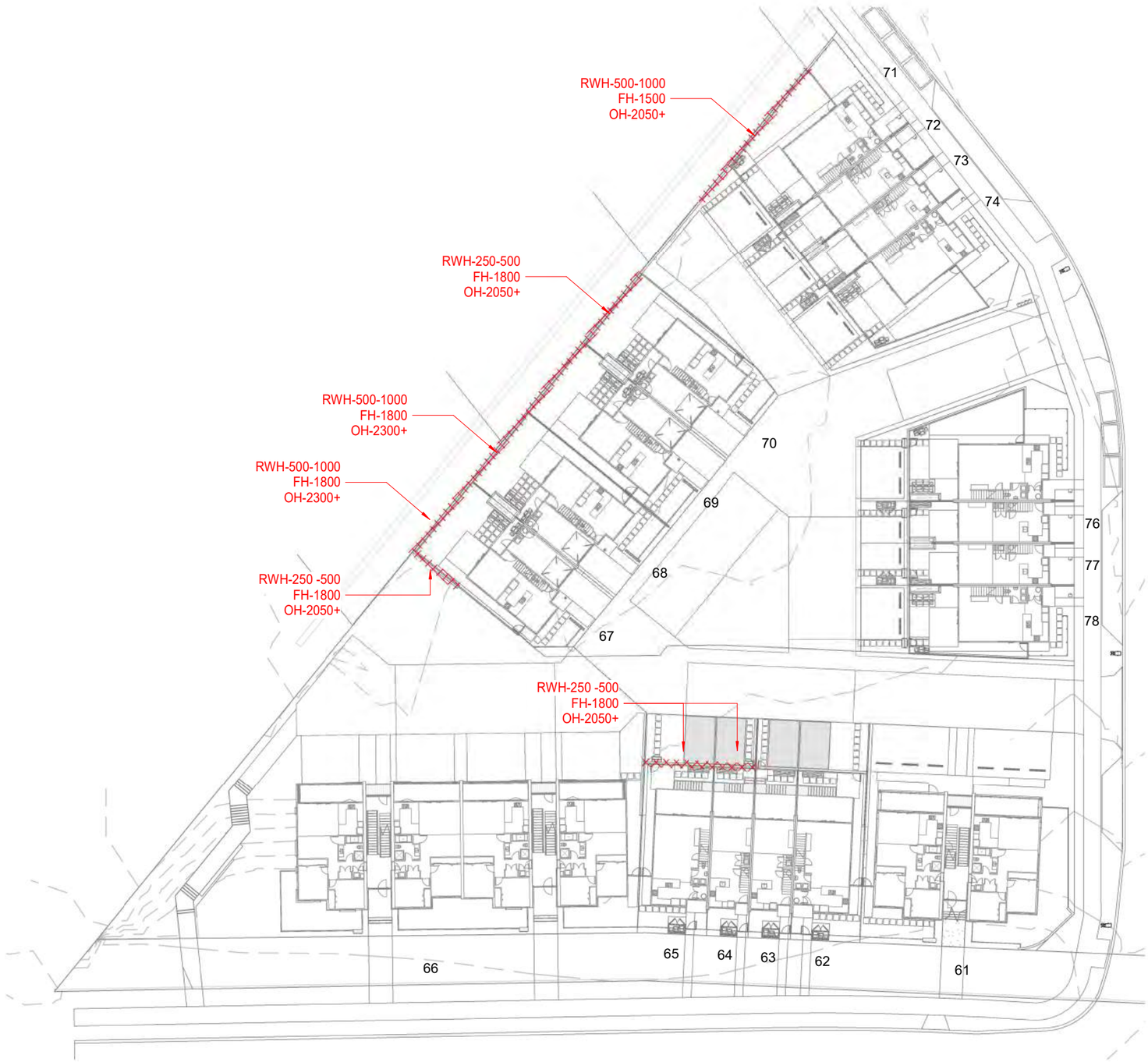
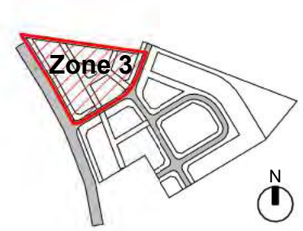
RWH - Retaining Wall Height Category (see retaining wall plan)
FH - Fence Height (see retaining wall plan)
OH - Overall Height

Front Yard Infringments

Rear and Side Yard Infringments







1 **Fencing Compliance Infringements Z3**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.45.3**	Fence Height Infringements Z3	28/08/20

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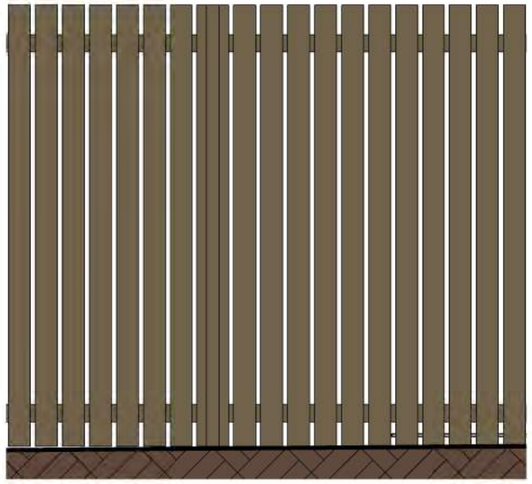
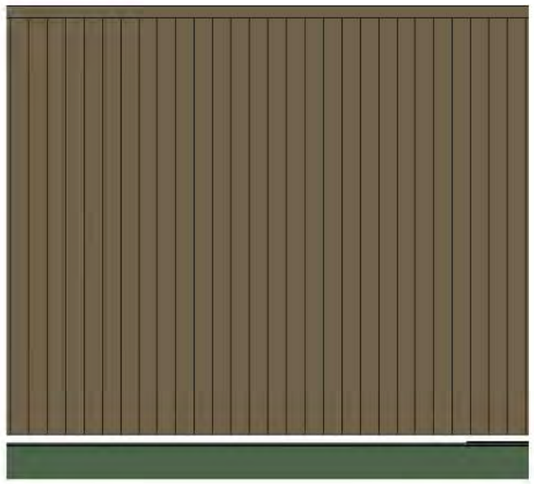


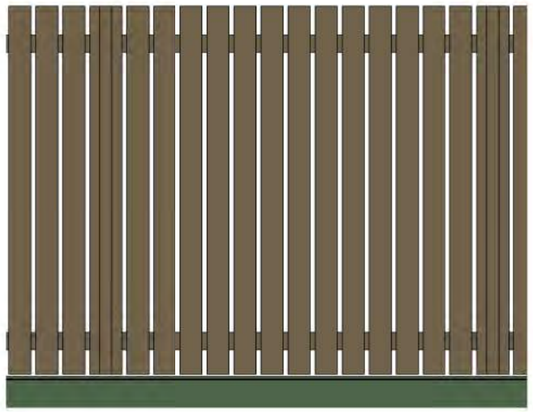
Fence Type A

1800 High Timber Palling Fence



Fence Type B

1800 High Close Boarded Timber Fence



Fence Type C

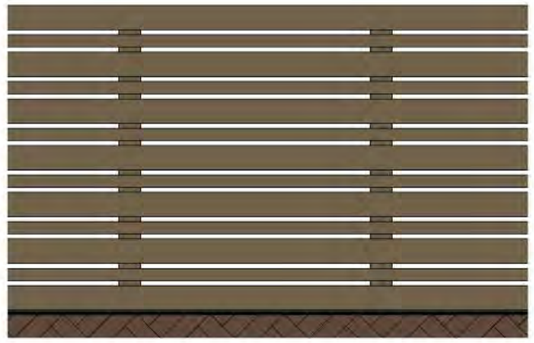
1500 High Timber Palling Fence

Fence Type D

1500 High Close Boarded Timber Fence

Fence Type E

1200 High Timber Palling Fence



Fence Type G

1200 High Horizontal Veriable Timber Paling Fence

Fence Type F

1200 High Spectrum Black Powder Coated High Visibility Aluminium Fence

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Job No.	Scale (A3):	Sheet no.	Fence Types	DATE
4167	1 : 25	**5.46**		28/08/20

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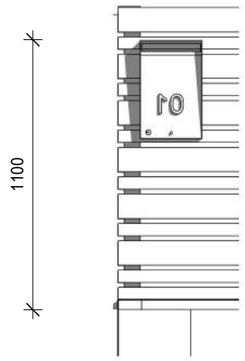
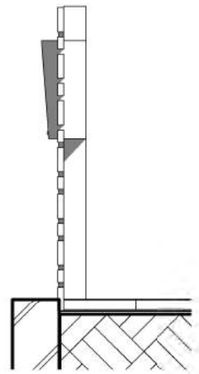
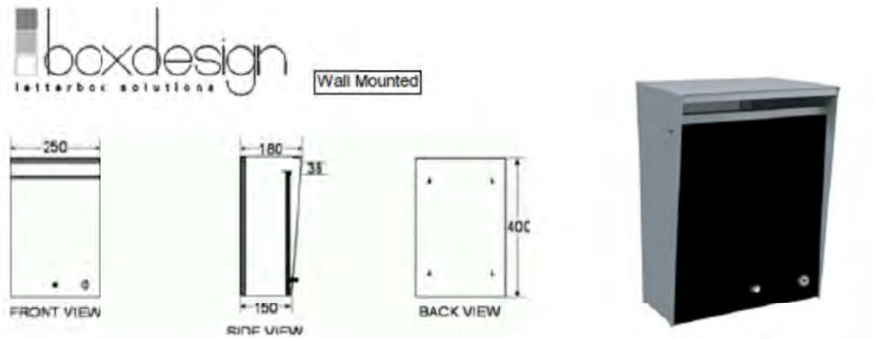
Letterbox Type 1



Front Elevation

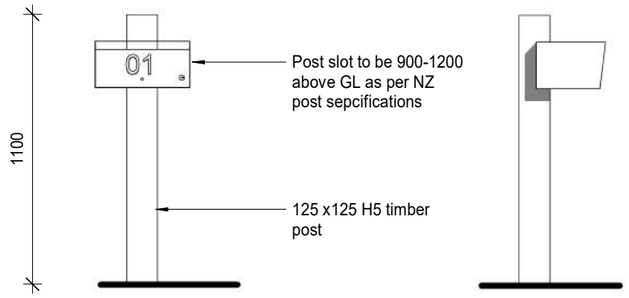


Side Elevation



3d Perspective

Letterbox Type 2

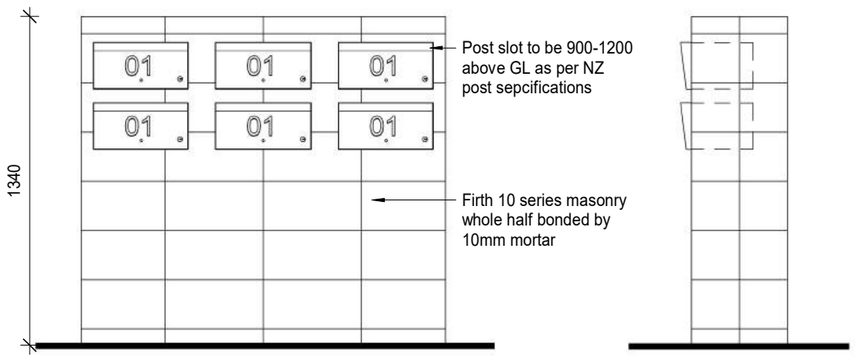


Front Elevation

Side Elevation

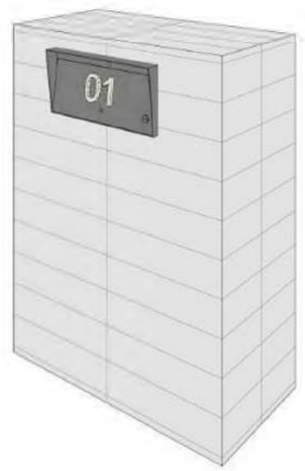
3d Perspective

Letterbox Type 3



Front Elevation

Side Elevation



3d Perspective

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Job No.	Scale (A3):	Sheet no.	Letterbox Type	DATE
4167	1 : 25	**5.47**		28/08/20

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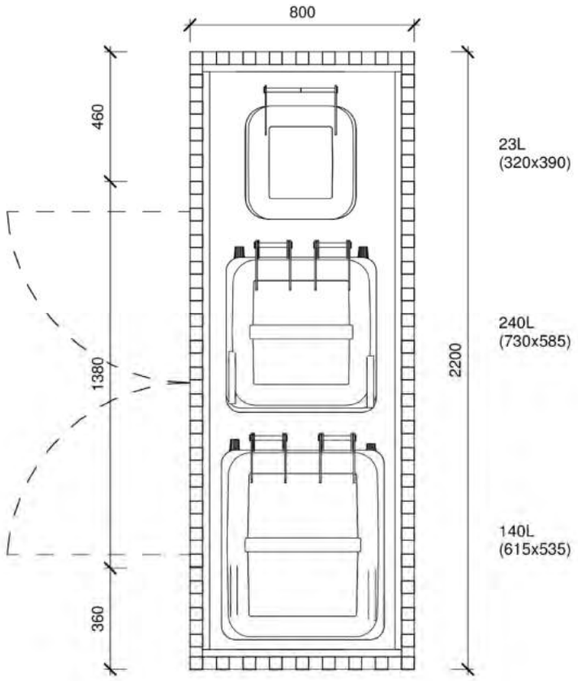
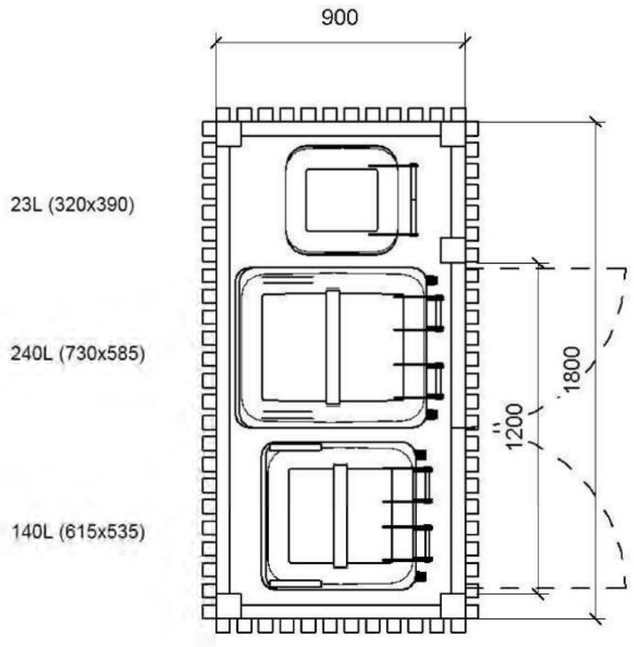
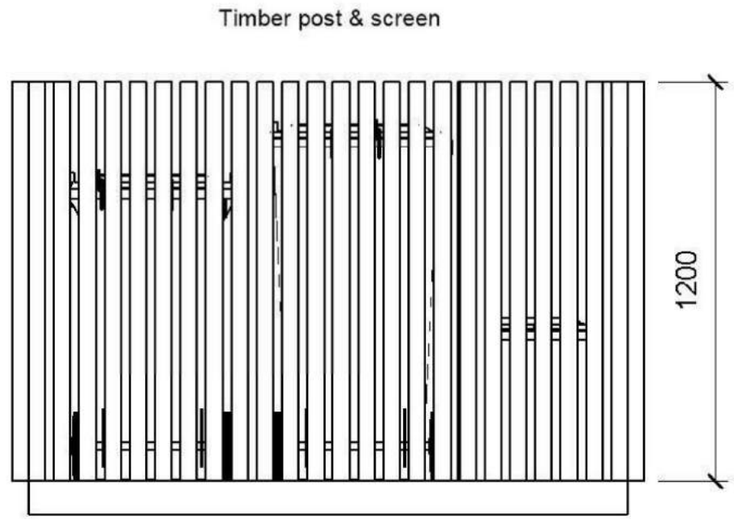
BIN ENCLOSURE



Long Bin Enclosure Plan

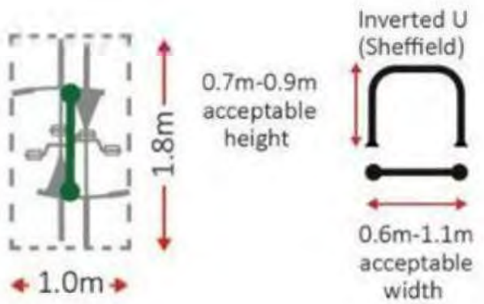


Bin Enclosure Plan



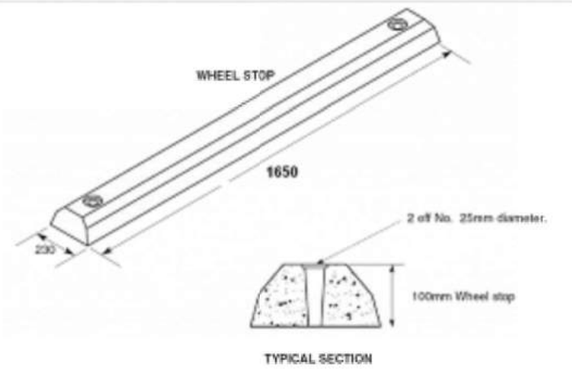
Bin Enclosure Elevation

VISITOR BYCYCLE PARKING



Visitor bicycle parking as per Australian/NZ bicycle parking standard AS 2890.3:2015

WHEEL STOP



Wheel stop as per Australian/NZ parking standard AS2890.1-2004

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 50	**5.48**	Utilities	28/08/20

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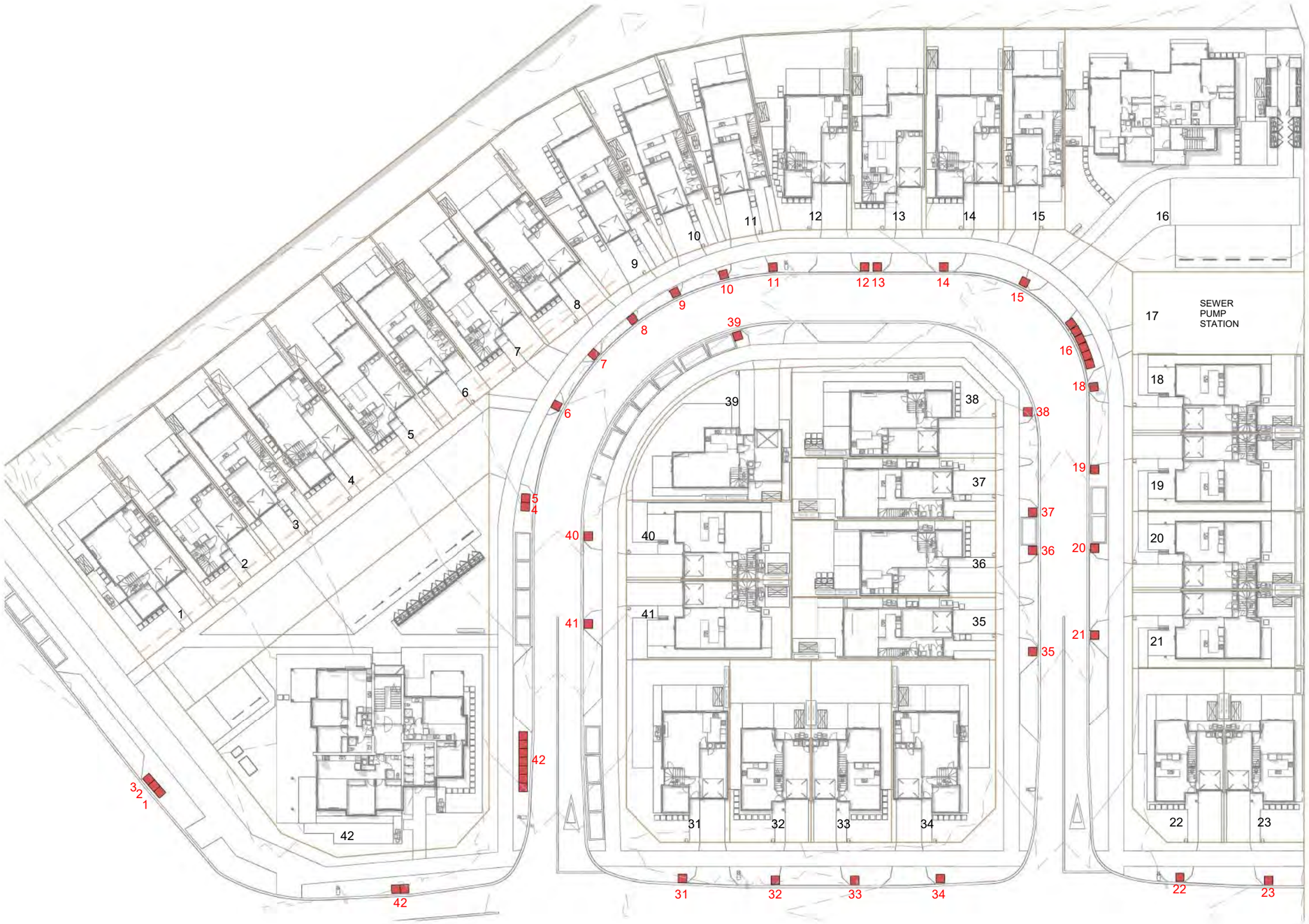
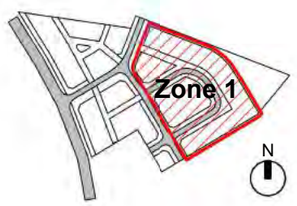


Lot #	Approximate travel distance to / from collection point
1	19m
2	25m
3	34m
4	19m
5	13m
6	9m
7	8m
8	5m
9	3m
10	3m
11	3m
12	6m
13	4m
14	4m
15	6m
16	30-35m
17	-
18	4m
19	4m
20	4m
21	4m
22	4m
23	4m
31	4m
32	4m
33	4m
34	4m
35	4m
36	4m
37	4m
38	3m
39	4m
40	4m
41	4m
42	23-27m



1

Bin Collection Points Z1

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.49**	Bin Collection Points Z1	28/08/20

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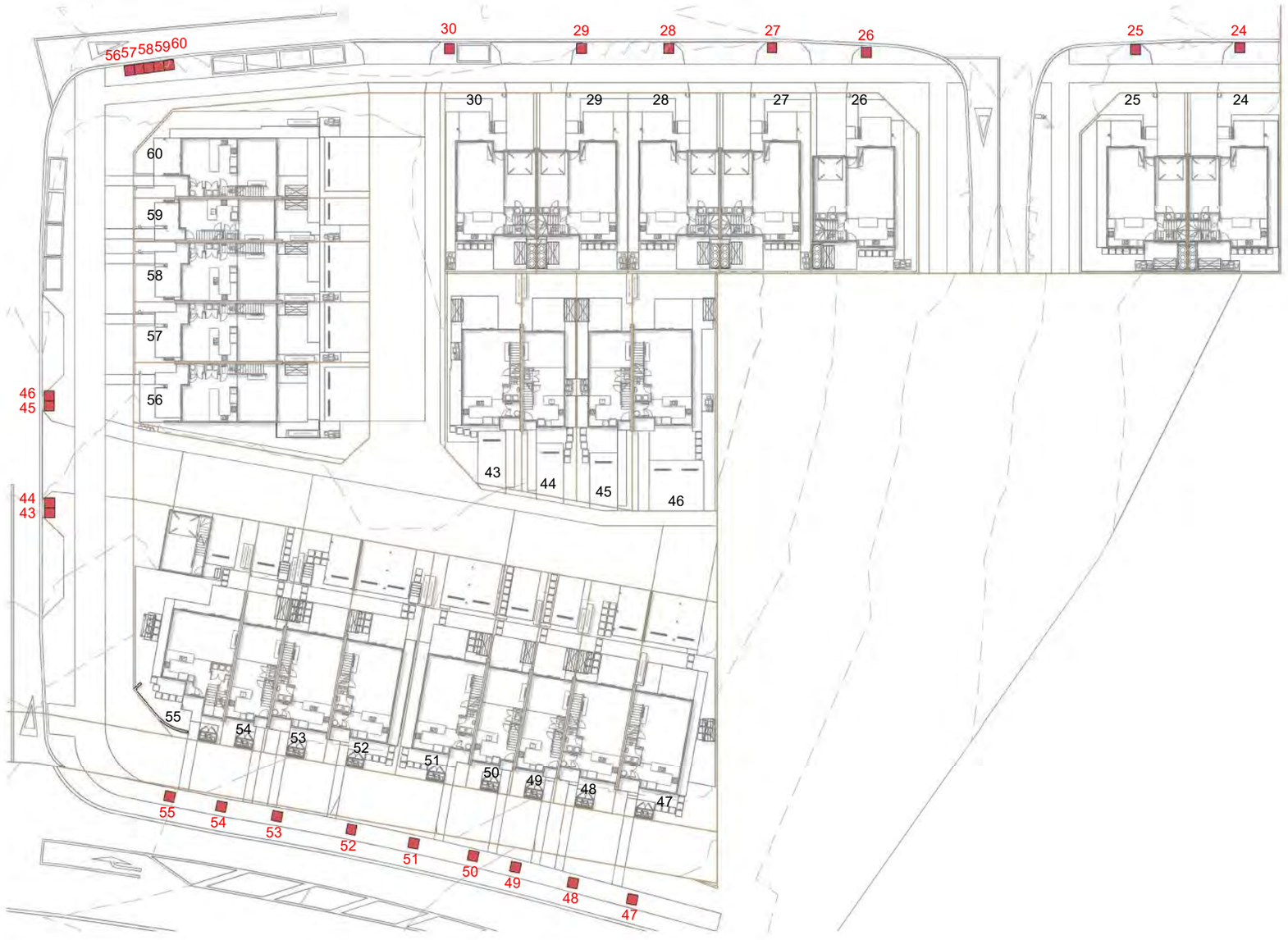

Bin area (1 m2)

70 Corresponding Lot number

Lot #	Approximate travel distance to / from collection point
24	4m
25	4m
26	4m
27	4m
28	4m
29	4m
30	4m
43	45m
44	47m
45	57m
46	59m
47	7m
48	7m
49	6m
50	6m
51	6m
52	6m
53	6m
54	6m
55	5m
56	30m
57	24m
58	18m
59	16m
60	13m

1 **Bin Collection Points Z2**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.50**	Bin Collection Points Z2	28/08/20

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70
Bin area (1 m2)
Corresponding Lot number

* Lot 66 rubbish management by private collection

Lot #	Approximate travel distance to / from collection point
61	15-17m
62	5m
63	5m
64	5m
65	5m
66*	7-10m
67	61m
68	54m
69	43m
70	36m
71	16m
72	15m
73	12m
74	8m
75	20m
76	23m
77	20m
78	23m

1 **Bin Collection Points Z3**
1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.51**	Bin Collection Points Z3	28/08/20

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IA Lot 1	
IA Other	48%
Impervious Area	52%
Grand total	100%

IA Lot 2	
IA Other	40%
Impervious Area	60%
Grand total	100%

IA Lot 3	
IA Other	38%
Impervious Area	62%
Grand total	100%

IA Lot 4	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 5	
IA Other	40%
Impervious Area	60%
Grand total	100%

IA Lot 6	
IA Other	38%
Impervious Area	62%
Grand total	100%

IA Lot 7	
IA Other	40%
Impervious Area	60%
Grand total	100%

IA Lot 8	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 9	
IA Other	50%
Impervious Area	50%
Grand total	100%

IA Lot 10	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 11	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 12	
IA Other	47%
Impervious Area	53%
Grand total	100%

IA Lot 13	
IA Other	41%
Impervious Area	59%
Grand total	100%

IA Lot 14	
IA Other	41%
Impervious Area	59%
Grand total	100%

IA Lot 15	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 16	
IA Other	37%
Impervious Area	63%
Grand total	100%

IA Lot 17	
IA Other	100%
Grand total	100%

IA Lot 18	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 19	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 20	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 21	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 22	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 23	
IA Other	40%
Impervious Area	60%
Grand total	100%

IA Lot 24	
IA Other	40%
Impervious Area	60%
Grand total	100%

IA Lot 25	
IA Other	45%
Impervious Area	55%
Grand total	100%

IA Lot 26	
IA Other	44%
Impervious Area	56%
Grand total	100%

IA Lot 27	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 28	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 29	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 30	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 31	
IA Other	50%
Impervious Area	50%
Grand total	100%

IA Lot 32	
IA Other	45%
Impervious Area	55%
Grand total	100%

IA Lot 33	
IA Other	45%
Impervious Area	55%
Grand total	100%

IA Lot 34	
IA Other	50%
Impervious Area	50%
Grand total	100%

IA Lot 35	
IA Other	41%
Impervious Area	59%
Grand total	100%

IA Lot 36	
IA Other	41%
Impervious Area	59%
Grand total	100%

Note: 'IA Other' refers to all areas that fall outside of the definition of 'Impervious' as defined in the Auckland Unitary Plan

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.53**	Impervious Area Schedule	28/08/20

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IA Lot 37	
IA Other	41%
Impervious Area	59%
Grand total	100%

IA Lot 38	
IA Other	47%
Impervious Area	53%
Grand total	100%

IA Lot 39	
IA Other	45%
Impervious Area	55%
Grand total	100%

IA Lot 40	
IA Other	43%
Impervious Area	57%
Grand total	100%

IA Lot 41	
IA Other	43%
Impervious Area	57%
Grand total	100%

IA Lot 42	
IA Other	40%
Impervious Area	60%
Grand total	100%

IA Lot 43	
IA Other	45%
Impervious Area	55%
Grand total	100%

IA Lot 44	
IA Other	49%
Impervious Area	51%
Grand total	100%

IA Lot 45	
IA Other	51%
Impervious Area	49%
Grand total	100%

IA Lot 46	
IA Other	42%
Impervious Area	58%
Grand total	100%

IA Lot 47	
IA Other	45%
Impervious Area	55%
Grand total	100%

IA Lot 48	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 49	
IA Other	36%
Impervious Area	64%
Grand total	100%

IA Lot 50	
IA Other	36%
Impervious Area	64%
Grand total	100%

IA Lot 51	
IA Other	38%
Impervious Area	62%
Grand total	100%

IA Lot 52	
IA Other	43%
Impervious Area	57%
Grand total	100%

IA Lot 53	
IA Other	39%
Impervious Area	61%
Grand total	100%

IA Lot 54	
IA Other	36%
Impervious Area	64%
Grand total	100%

IA Lot 55	
IA Other	44%
Impervious Area	56%
Grand total	100%

IA Lot 56	
IA Other	51%
Impervious Area	49%
Grand total	100%

IA Lot 57	
IA Other	37%
Impervious Area	63%
Grand total	100%

IA Lot 58	
IA Other	37%
Impervious Area	63%
Grand total	100%

IA Lot 59	
IA Other	38%
Impervious Area	62%
Grand total	100%

IA Lot 60	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 61	
IA Other	34%
Impervious Area	66%
Grand total	100%

IA Lot 62	
IA Other	49%
Impervious Area	51%
Grand total	100%

IA Lot 63	
IA Other	34%
Impervious Area	66%
Grand total	100%

IA Lot 64	
IA Other	34%
Impervious Area	66%
Grand total	100%

IA Lot 65	
IA Other	48%
Impervious Area	52%
Grand total	100%

IA Lot 66	
IA Other	36%
Impervious Area	64%
Grand total	100%

IA Lot 67	
IA Other	45%
Impervious Area	55%
Grand total	100%

IA Lot 68	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 69	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 70	
IA Other	46%
Impervious Area	54%
Grand total	100%

IA Lot 71	
IA Other	50%
Impervious Area	50%
Grand total	100%

IA Lot 72	
IA Other	37%
Impervious Area	63%
Grand total	100%

Note: 'IA Other' refers to all areas that fall outside of the definition of 'Impervious' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.54**	Impervious Area Schedule	28/08/20

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IA Lot 73	
IA Other	37%
Impervious Area	63%
Grand total	100%

IA Lot 74	
IA Other	52%
Impervious Area	48%
Grand total	100%

IA Lot 75	
IA Other	53%
Impervious Area	47%
Grand total	100%

IA Lot 76	
IA Other	37%
Impervious Area	63%
Grand total	100%

IA Lot 77	
IA Other	37%
Impervious Area	63%
Grand total	100%

IA Lot 78	
IA Other	44%
Impervious Area	56%
Grand total	100%

Note: 'IA Other' refers to all areas that fall outside of the definition of 'Impervious' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.55**	Impervious Area Schedule	28/08/20

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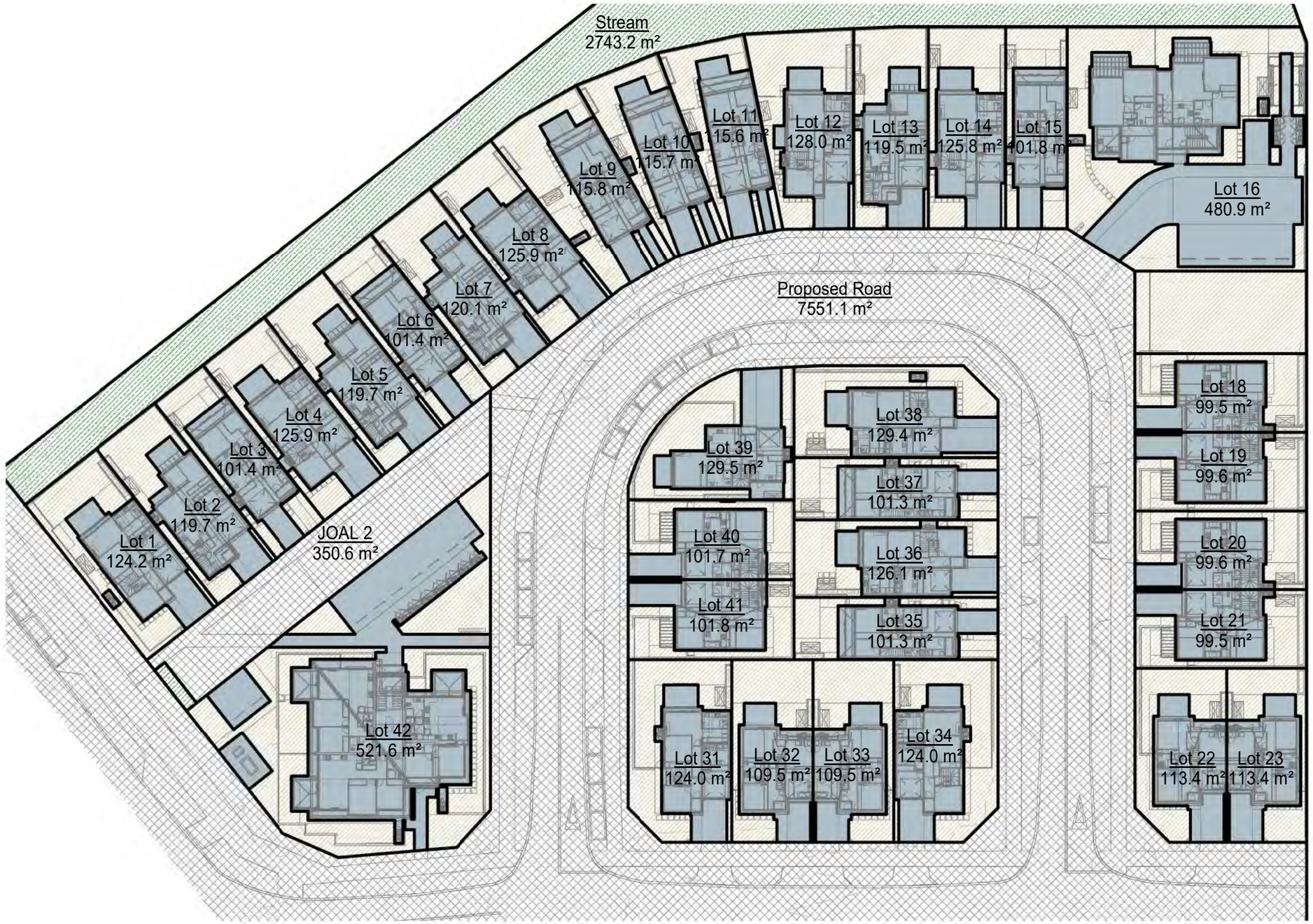

IMPERVIOUS AREA:
SITE TOTALS

IA GROSS		
IA Other	7101.6 m²	24%
IA Other JOAL	2951.9 m²	10%
Impervious Area	9561.8 m²	32%
Impervious Area JOAL	10571.4 m²	35%
Grand total	30186.8 m²	100%

IA NET		
IA Other	7101.6 m²	43%
Impervious Area	9561.8 m²	57%
Grand total	16663.5 m²	100%

IA Other

IA Other JOAL

Impervious Area

Impervious Area JOAL

Note: 'IA Other' refers to all areas that fall outside of the definition of 'Impervious' as defined in the Auckland Unitary Plan

1 **Impervious Area Plan Z1**
1 : 500

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NEWHAVEN -PROPERTY-

520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.56**	Impervious Area Plan Z1	28/08/20

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1 **Impervious Area Plan Z2**

1 : 500

IMPERVIOUS AREA:
SITE TOTALS

IA GROSS		
IA Other	7101.6 m²	24%
IA Other JOAL	2951.9 m²	10%
Impervious Area	9561.8 m²	32%
Impervious Area JOAL	10571.4 m²	35%
Grand total	30186.8 m²	100%

IA NET		
IA Other	7101.6 m²	43%
Impervious Area	9561.8 m²	57%
Grand total	16663.5 m²	100%

IA Other

IA Other JOAL

Impervious Area

Impervious Area JOAL

Note: 'IA Other' refers to all areas that fall outside of the definition of 'Impervious' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR
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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.57**	Impervious Area Plan Z2	28/08/20

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1 **Impervious Area Plan Z3**

1 : 500

IMPERVIOUS AREA:
SITE TOTALS

IA GROSS		
IA Other	7101.6 m²	24%
IA Other JOAL	2951.9 m²	10%
Impervious Area	9561.8 m²	32%
Impervious Area JOAL	10571.4 m²	35%
Grand total	30186.8 m²	100%

IA NET		
IA Other	7101.6 m²	43%
Impervious Area	9561.8 m²	57%
Grand total	16663.5 m²	100%

IA Other

IA Other JOAL

Impervious Area

Impervious Area JOAL

Note: 'IA Other' refers to all areas that fall outside of the definition of 'Impervious' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.58**	Impervious Area Plan Z3	28/08/20

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BC Lot 1	
BC Other	62%
Building Coverage	38%
Grand total	100%

BC Lot 2	
BC Other	59%
Building Coverage	41%
Grand total	100%

BC Lot 3	
BC Other	53%
Building Coverage	47%
Grand total	100%

BC Lot 4	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 5	
BC Other	59%
Building Coverage	41%
Grand total	100%

BC Lot 6	
BC Other	53%
Building Coverage	47%
Grand total	100%

BC Lot 7	
BC Other	59%
Building Coverage	41%
Grand total	100%

BC Lot 8	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 9	
BC Other	68%
Building Coverage	32%
Grand total	100%

BC Lot 10	
BC Other	60%
Building Coverage	40%
Grand total	100%

BC Lot 11	
BC Other	60%
Building Coverage	40%
Grand total	100%

BC Lot 12	
BC Other	62%
Building Coverage	38%
Grand total	100%

BC Lot 13	
BC Other	60%
Building Coverage	40%
Grand total	100%

BC Lot 14	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 15	
BC Other	54%
Building Coverage	46%
Grand total	100%

BC Lot 16	
BC Other	76%
Building Coverage	24%
Grand total	100%

BC Lot 17	
BC Other	100%
Grand total	100%

BC Lot 18	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 19	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 20	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 21	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 22	
BC Other	66%
Building Coverage	34%
Grand total	100%

BC Lot 23	
BC Other	63%
Building Coverage	37%
Grand total	100%

BC Lot 24	
BC Other	53%
Building Coverage	47%
Grand total	100%

BC Lot 25	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 26	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 27	
BC Other	52%
Building Coverage	48%
Grand total	100%

BC Lot 28	
BC Other	52%
Building Coverage	48%
Grand total	100%

BC Lot 29	
BC Other	52%
Building Coverage	48%
Grand total	100%

BC Lot 30	
BC Other	52%
Building Coverage	48%
Grand total	100%

BC Lot 31	
BC Other	63%
Building Coverage	37%
Grand total	100%

BC Lot 32	
BC Other	65%
Building Coverage	35%
Grand total	100%

BC Lot 33	
BC Other	65%
Building Coverage	35%
Grand total	100%

BC Lot 34	
BC Other	63%
Building Coverage	37%
Grand total	100%

BC Lot 35	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 36	
BC Other	57%
Building Coverage	43%
Grand total	100%

Note: 'BC Other' refers to all areas that fall outside of the definition of 'Building Coverage' as defined in the Auckland Unitary Plan

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520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.61**	Building Schedule	28/08/20

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BC Lot 37	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 38	
BC Other	63%
Building Coverage	37%
Grand total	100%

BC Lot 39	
BC Other	67%
Building Coverage	33%
Grand total	100%

BC Lot 40	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 41	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 42	
BC Other	71%
Building Coverage	29%
Grand total	100%

BC Lot 43	
BC Other	59%
Building Coverage	41%
Grand total	100%

BC Lot 44	
BC Other	64%
Building Coverage	36%
Grand total	100%

BC Lot 45	
BC Other	65%
Building Coverage	35%
Grand total	100%

BC Lot 46	
BC Other	68%
Building Coverage	32%
Grand total	100%

BC Lot 47	
BC Other	67%
Building Coverage	33%
Grand total	100%

BC Lot 48	
BC Other	54%
Building Coverage	46%
Grand total	100%

BC Lot 49	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 50	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 51	
BC Other	60%
Building Coverage	40%
Grand total	100%

BC Lot 52	
BC Other	61%
Building Coverage	39%
Grand total	100%

BC Lot 53	
BC Other	54%
Building Coverage	46%
Grand total	100%

BC Lot 54	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 55	
BC Other	61%
Building Coverage	39%
Grand total	100%

BC Lot 56	
BC Other	68%
Building Coverage	32%
Grand total	100%

BC Lot 57	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 58	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 59	
BC Other	57%
Building Coverage	43%
Grand total	100%

BC Lot 60	
BC Other	71%
Building Coverage	29%
Grand total	100%

BC Lot 61	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 62	
BC Other	62%
Building Coverage	38%
Grand total	100%

BC Lot 63	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 64	
BC Other	56%
Building Coverage	44%
Grand total	100%

BC Lot 65	
BC Other	61%
Building Coverage	39%
Grand total	100%

BC Lot 66	
BC Other	69%
Building Coverage	31%
Grand total	100%

BC Lot 67	
BC Other	60%
Building Coverage	40%
Grand total	100%

BC Lot 68	
BC Other	61%
Building Coverage	39%
Grand total	100%

BC Lot 69	
BC Other	61%
Building Coverage	39%
Grand total	100%

BC Lot 70	
BC Other	60%
Building Coverage	40%
Grand total	100%

BC Lot 71	
BC Other	70%
Building Coverage	30%
Grand total	100%

BC Lot 72	
BC Other	56%
Building Coverage	44%
Grand total	100%

Note: 'BC Other' refers to all areas that fall outside of the definition of 'Building Coverage' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.61A**	Building Schedule	28/08/20

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BC Lot 73	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 74	
BC Other	72%
Building Coverage	28%
Grand total	100%

BC Lot 75	
BC Other	72%
Building Coverage	28%
Grand total	100%

BC Lot 76	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 77	
BC Other	55%
Building Coverage	45%
Grand total	100%

BC Lot 78	
BC Other	62%
Building Coverage	38%
Grand total	100%

Note: 'BC Other' refers to all areas that fall outside of the definition of 'Building Coverage' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.61B**	Building Schedule	28/08/20

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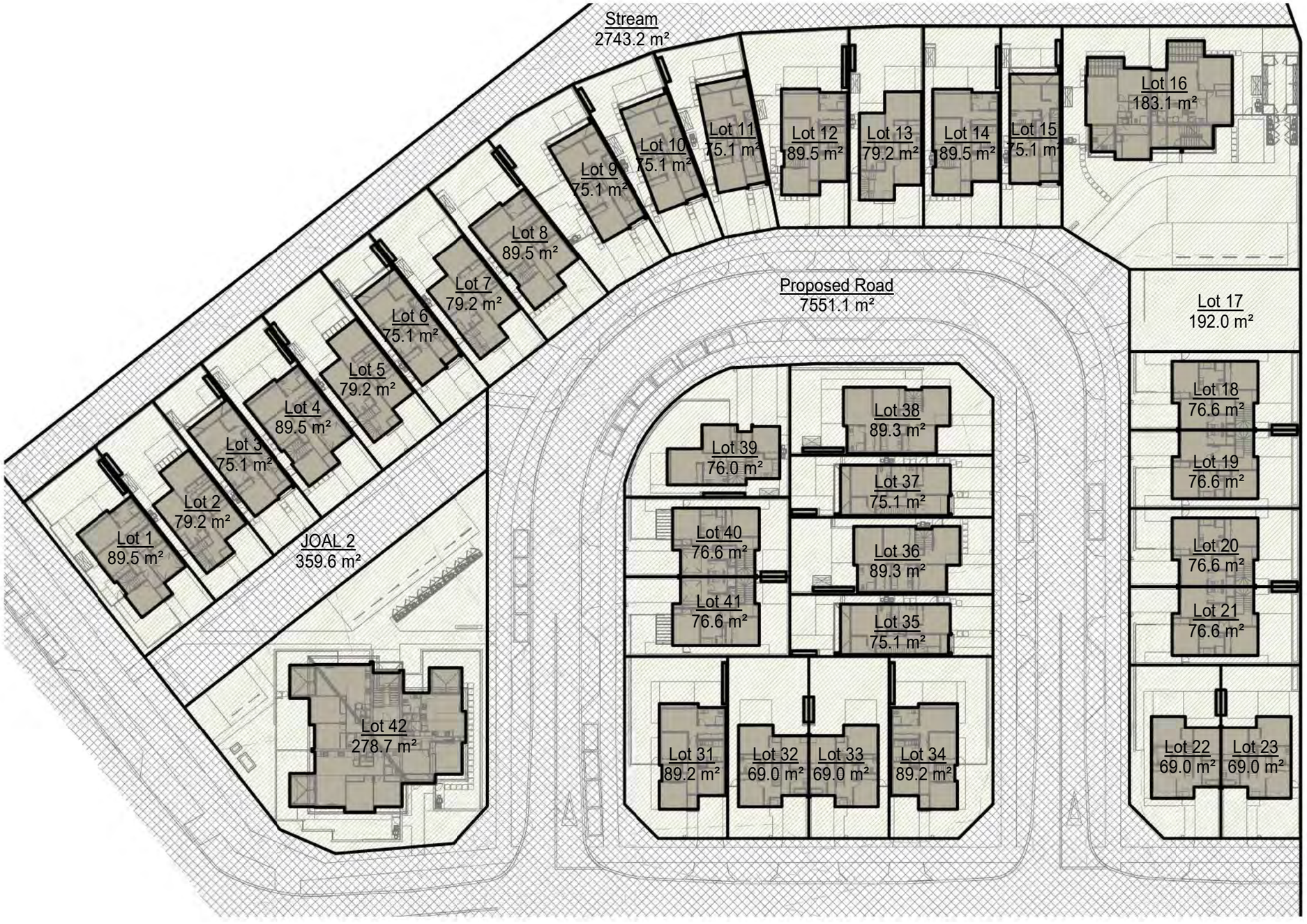

BUILDING COVERAGE: SITE TOTALS

BC GROSS		
BC Other	10431.1 m²	35%
BC Other JOAL	13522.1 m²	45%
Building Coverage	6236.0 m²	21%
Grand total	30189.2 m²	100%

BC NET		
BC Other	10431.1 m²	63%
Building Coverage	6236.0 m²	37%
Grand total	16667.1 m²	100%

BC Other

BC Other JOAL

Building Coverage

Note: 'BC Other' refers to all areas that fall outside of the definition of 'Building Coverage' as defined in the Auckland Unitary Plan

1 **Building Area Plan Z1**

1 : 500

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NEWHAVEN -PROPERTY-

520 GSR

520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.	Building Area Plan Z1	DATE
4167	As indicated	**5.62**		28/08/20

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1 **Building Area Plan Z2**

1 : 500

BUILDING COVERAGE: SITE TOTALS

BC GROSS		
BC Other	10431.1 m²	35%
BC Other JOAL	13522.1 m²	45%
Building Coverage	6236.0 m²	21%
Grand total	30189.2 m²	100%

BC NET		
BC Other	10431.1 m²	63%
Building Coverage	6236.0 m²	37%
Grand total	16667.1 m²	100%

BC Other

BC Other JOAL

Building Coverage

Note: 'BC Other' refers to all areas that fall outside of the definition of 'Building Coverage' as defined in the Auckland Unitary Plan

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520 GSR

520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.63**	Building Area Plan Z2	28/08/20

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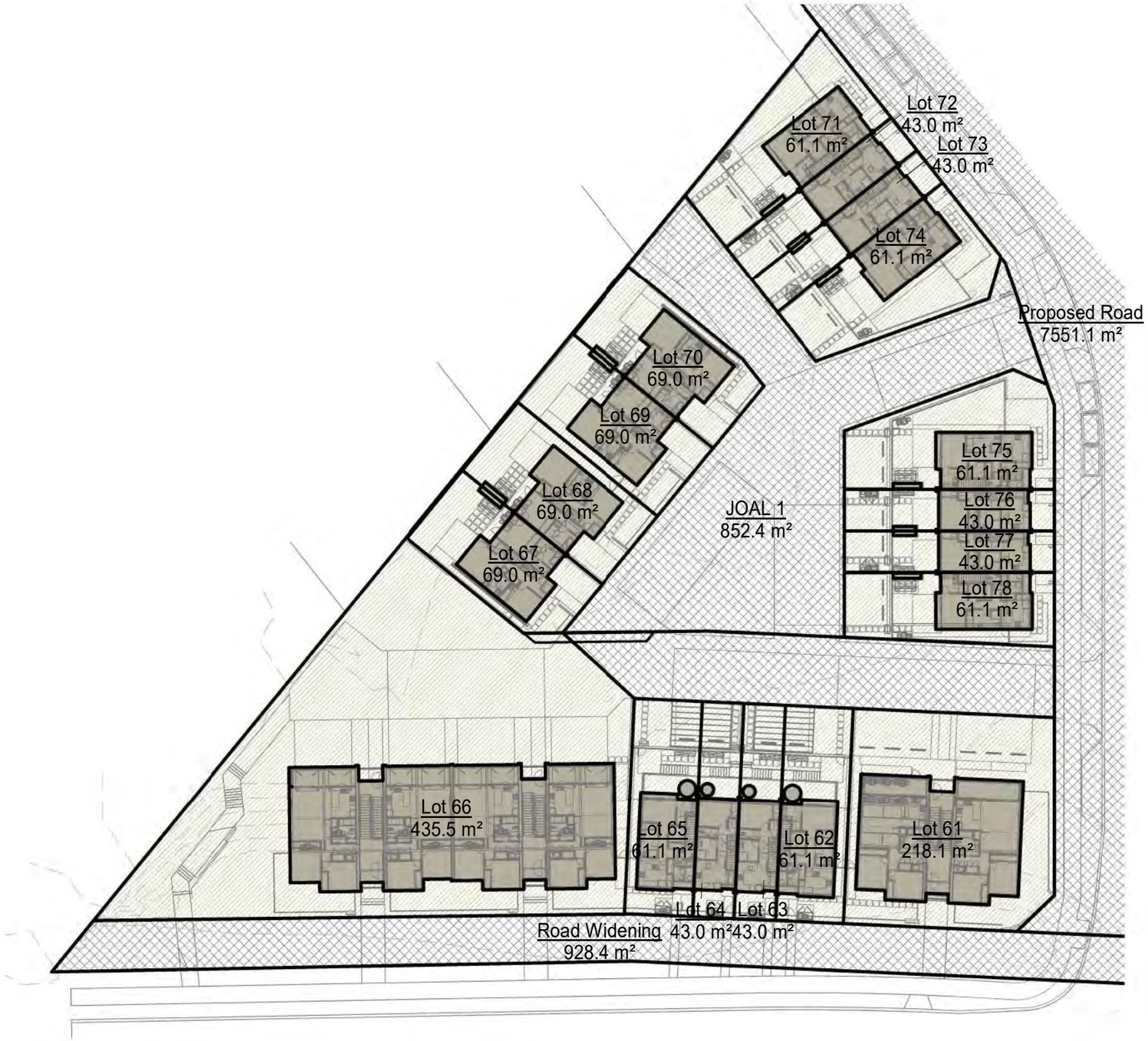


1 **Building Area Plan Z3**

1 : 500

BUILDING COVERAGE: SITE TOTALS

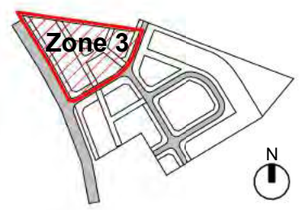
BC GROSS		
BC Other	10431.1 m²	35%
BC Other JOAL	13522.1 m²	45%
Building Coverage	6236.0 m²	21%
Grand total	30189.2 m²	100%

BC NET		
BC Other	10431.1 m²	63%
Building Coverage	6236.0 m²	37%
Grand total	16667.1 m²	100%

BC Other

BC Other JOAL

Building Coverage



Note: 'BC Other' refers to all areas that fall outside of the definition of 'Building Coverage' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR

520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.64**	Building Area Plan Z3	28/08/20

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LA Lot 1	
LA Other	43%
Landscaped Area	57%
Grand total	100%

LA Lot 2	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 3	
LA Other	54%
Landscaped Area	46%
Grand total	100%

LA Lot 4	
LA Other	50%
Landscaped Area	50%
Grand total	100%

LA Lot 5	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 6	
LA Other	54%
Landscaped Area	46%
Grand total	100%

LA Lot 7	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 8	
LA Other	50%
Landscaped Area	50%
Grand total	100%

LA Lot 9	
LA Other	39%
Landscaped Area	61%
Grand total	100%

LA Lot 10	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 11	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 12	
LA Other	43%
Landscaped Area	57%
Grand total	100%

LA Lot 13	
LA Other	46%
Landscaped Area	54%
Grand total	100%

LA Lot 14	
LA Other	49%
Landscaped Area	51%
Grand total	100%

LA Lot 15	
LA Other	53%
Landscaped Area	47%
Grand total	100%

LA Lot 16	
LA Other	50%
Landscaped Area	50%
Grand total	100%

LA Lot 17	
Landscaped Area	100%
Grand total	100%

LA Lot 18	
LA Other	51%
Landscaped Area	49%
Grand total	100%

LA Lot 19	
LA Other	51%
Landscaped Area	49%
Grand total	100%

LA Lot 20	
LA Other	51%
Landscaped Area	49%
Grand total	100%

LA Lot 21	
LA Other	51%
Landscaped Area	49%
Grand total	100%

LA Lot 22	
LA Other	41%
Landscaped Area	59%
Grand total	100%

LA Lot 23	
LA Other	46%
Landscaped Area	54%
Grand total	100%

LA Lot 24	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 25	
LA Other	52%
Landscaped Area	48%
Grand total	100%

LA Lot 26	
LA Other	52%
Landscaped Area	48%
Grand total	100%

LA Lot 27	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 28	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 29	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 30	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 31	
LA Other	41%
Landscaped Area	59%
Grand total	100%

LA Lot 32	
LA Other	42%
Landscaped Area	58%
Grand total	100%

LA Lot 33	
LA Other	42%
Landscaped Area	58%
Grand total	100%

LA Lot 34	
LA Other	42%
Landscaped Area	58%
Grand total	100%

LA Lot 35	
LA Other	52%
Landscaped Area	48%
Grand total	100%

LA Lot 36	
LA Other	49%
Landscaped Area	51%
Grand total	100%

Note: 'LA Other' refers to all areas that fall outside of the definition of 'Landscaped Area' as defined in the Auckland Unitary Plan

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NEWHAVEN -PROPERTY-

520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.71**	Landscaped Schedule	28/08/20

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LA Lot 37	
LA Other	52%
Landscaped Area	48%
Grand total	100%

LA Lot 38	
LA Other	44%
Landscaped Area	56%
Grand total	100%

LA Lot 39	
LA Other	41%
Landscaped Area	59%
Grand total	100%

LA Lot 40	
LA Other	54%
Landscaped Area	46%
Grand total	100%

LA Lot 41	
LA Other	54%
Landscaped Area	46%
Grand total	100%

LA Lot 42	
LA Other	44%
Landscaped Area	56%
Grand total	100%

LA Lot 43	
LA Other	49%
Landscaped Area	51%
Grand total	100%

LA Lot 44	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 45	
LA Other	45%
Landscaped Area	55%
Grand total	100%

LA Lot 46	
LA Other	45%
Landscaped Area	55%
Grand total	100%

LA Lot 47	
LA Other	46%
Landscaped Area	54%
Grand total	100%

LA Lot 48	
LA Other	55%
Landscaped Area	45%
Grand total	100%

LA Lot 49	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 50	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 51	
LA Other	54%
Landscaped Area	46%
Grand total	100%

LA Lot 52	
LA Other	56%
Landscaped Area	44%
Grand total	100%

LA Lot 53	
LA Other	56%
Landscaped Area	44%
Grand total	100%

LA Lot 54	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 55	
LA Other	45%
Landscaped Area	55%
Grand total	100%

LA Lot 56	
LA Other	44%
Landscaped Area	56%
Grand total	100%

LA Lot 57	
LA Other	59%
Landscaped Area	41%
Grand total	100%

LA Lot 58	
LA Other	59%
Landscaped Area	41%
Grand total	100%

LA Lot 59	
LA Other	54%
Landscaped Area	46%
Grand total	100%

LA Lot 60	
LA Other	40%
Landscaped Area	60%
Grand total	100%

LA Lot 61	
LA Other	60%
Landscaped Area	40%
Grand total	100%

LA Lot 62	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 63	
LA Other	74%
Landscaped Area	26%
Grand total	100%

LA Lot 64	
LA Other	74%
Landscaped Area	26%
Grand total	100%

LA Lot 65	
LA Other	57%
Landscaped Area	43%
Grand total	100%

LA Lot 66	
LA Other	58%
Landscaped Area	42%
Grand total	100%

LA Lot 67	
LA Other	48%
Landscaped Area	52%
Grand total	100%

LA Lot 68	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 69	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 70	
LA Other	47%
Landscaped Area	53%
Grand total	100%

LA Lot 71	
LA Other	40%
Landscaped Area	60%
Grand total	100%

LA Lot 72	
LA Other	56%
Landscaped Area	44%
Grand total	100%

Note: 'LA Other' refers to all areas that fall outside of the definition of 'Landscaped Area' as defined in the Auckland Unitary Plan

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520 GSR
520 Great South Road, Drury

Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.71A**	Landscaped Schedule	28/08/20

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LA Lot 73	
LA Other	56%
Landscaped Area	44%
Grand total	100%

LA Lot 74	
LA Other	38%
Landscaped Area	62%
Grand total	100%

LA Lot 75	
LA Other	39%
Landscaped Area	61%
Grand total	100%

LA Lot 76	
LA Other	56%
Landscaped Area	44%
Grand total	100%

LA Lot 77	
LA Other	56%
Landscaped Area	44%
Grand total	100%

LA Lot 78	
LA Other	52%
Landscaped Area	48%
Grand total	100%

Note: 'LA Other' refers to all areas that fall outside of the definition of 'Landscaped Area' as defined in the Auckland Unitary Plan

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Job No.	Scale (A3):	Sheet no.		DATE
4167	1 : 500	**5.71B**	Landscaped Schedule	28/08/20

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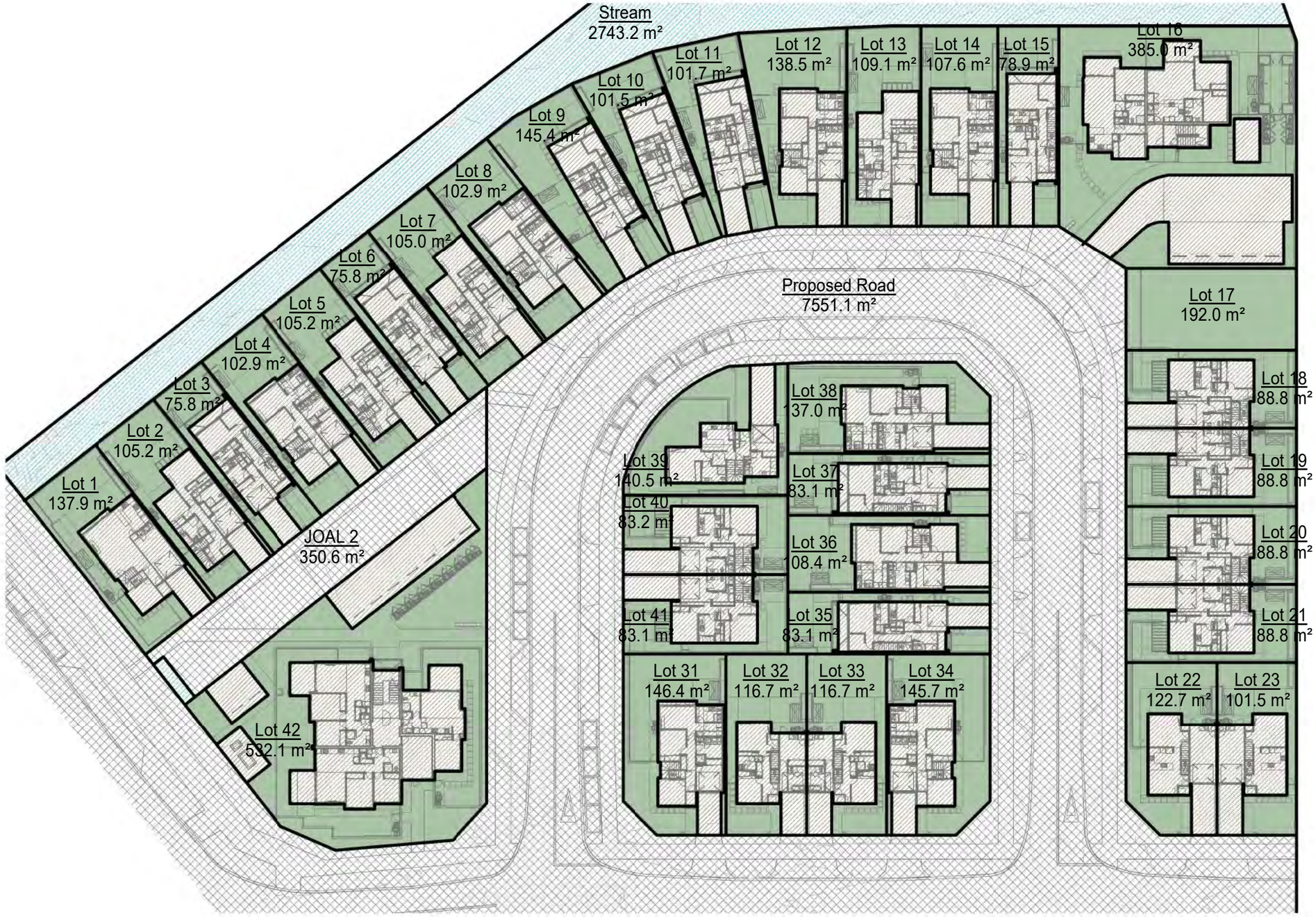

LANDSCAPE AREA: SITE TOTALS

LA GROSS		
LA Other	8245.6 m²	27%
LA Other JOAL	10579.7 m²	35%
Landscaped Area	8421.6 m²	28%
Landscaped Area JOAL	2943.6 m²	10%
Grand total	30190.5 m²	100%

LA NET		
LA Other	8245.6 m²	49%
Landscaped Area	8421.6 m²	51%
Grand total	16667.2 m²	100%

LA Other

LA Other JOAL

Landscaped Area

Landscaped Area JOAL

Note: 'LA Other' refers to all areas that fall outside of the definition of 'Landscaped Area' as defined in the Auckland Unitary Plan

1 **Landscaped Area Plan Z1**

1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.72**	Landscaped Area Plan Z1	28/08/20

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1 **Landscaped Area Plan Z2**

1 : 500

LANDSCAPE AREA:
SITE TOTALS

LA GROSS		
LA Other	8245.6 m²	27%
LA Other JOAL	10579.7 m²	35%
Landscaped Area	8421.6 m²	28%
Landscaped Area JOAL	2943.6 m²	10%
Grand total	30190.5 m²	100%

LA NET		
LA Other	8245.6 m²	49%
Landscaped Area	8421.6 m²	51%
Grand total	16667.2 m²	100%

LA Other

LA Other JOAL

Landscaped Area

Landscaped Area JOAL

Note: 'LA Other' refers to all areas that fall outside of the definition of 'Landscaped Area' as defined in the Auckland Unitary Plan

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.73**	Landscaped Area Plan Z2	28/08/20

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1 **Landscaped Area Plan Z3**

1 : 500

LANDSCAPE AREA:
SITE TOTALS

LA GROSS		
LA Other	8245.6 m²	27%
LA Other JOAL	10579.7 m²	35%
Landscaped Area	8421.6 m²	28%
Landscaped Area JOAL	2943.6 m²	10%
Grand total	30190.5 m²	100%

LA NET		
LA Other	8245.6 m²	49%
Landscaped Area	8421.6 m²	51%
Grand total	16667.2 m²	100%

LA Other

LA Other JOAL

Landscaped Area

Landscaped Area JOAL

Note: 'LA Other' refers to all areas that fall outside of the definition of 'Landscaped Area' as defined in the Auckland Unitary Plan

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.74**	Landscaped Area Plan Z3	28/08/20

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1 **50% Min. Landscaping within Front Yard Z1**

1 : 500

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Job No.	Scale (A3):	Sheet no.	50% Min. Landscaping within Front Yard Z1	DATE
4167	As indicated	**5.75**		28/08/20

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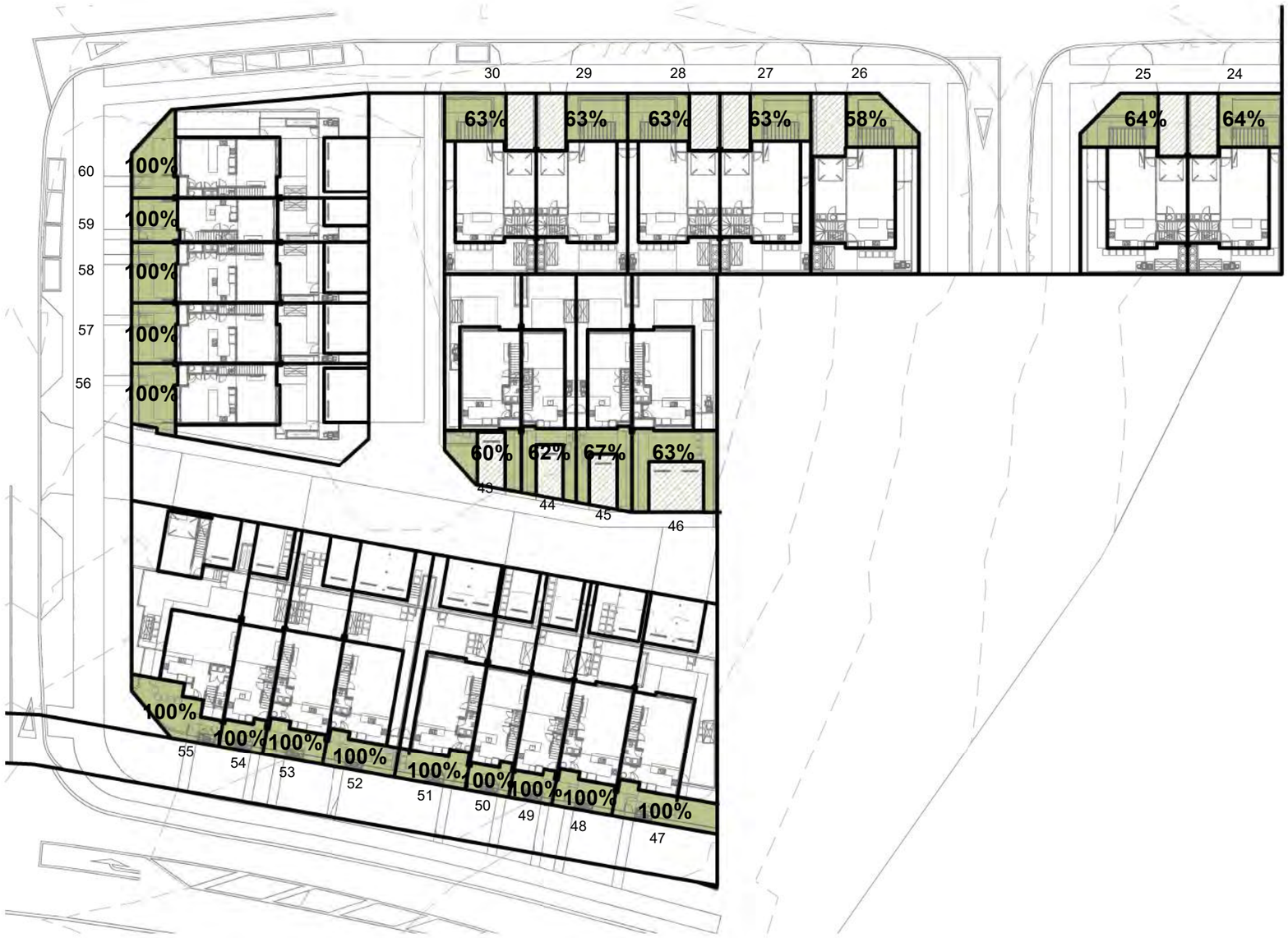

1 **50% Min. Landscaping within Front Yard Z2**

1 : 500

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Job No.	Scale (A3):	Sheet no.	50% Min. Landscaping within Front Yard Z2	DATE
4167	As indicated	**5.76**		28/08/20

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LA Other Front

Landscaped Area Front

1 **50% Min. Landscaping within Front Yard Z3**

1 : 500

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Job No.	Scale (A3):	Sheet no.	50% Min. Landscaping within Front Yard Z3	DATE
4167	As indicated	**5.77**		28/08/20

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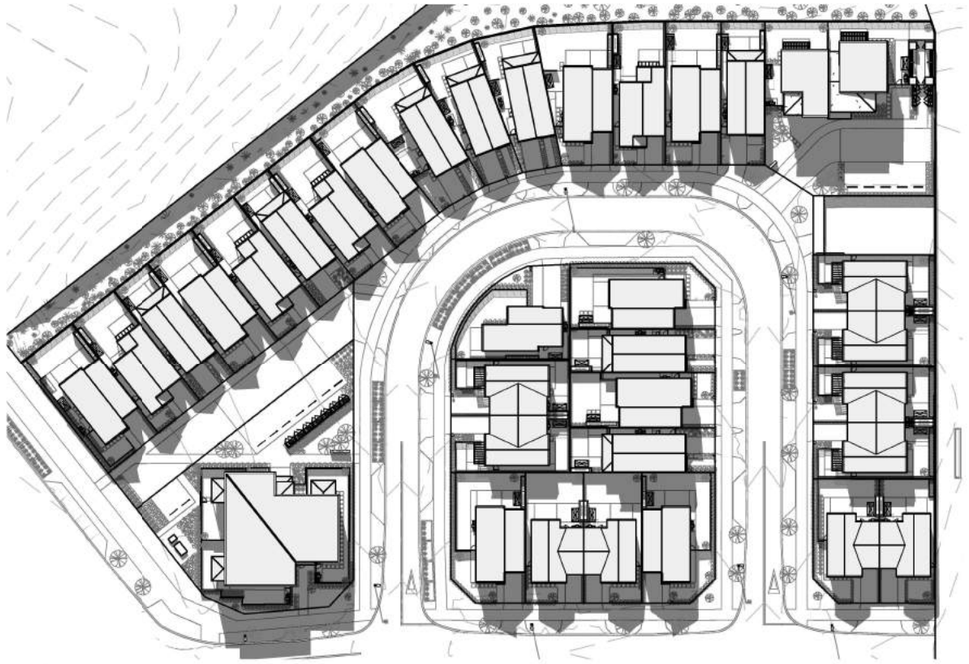
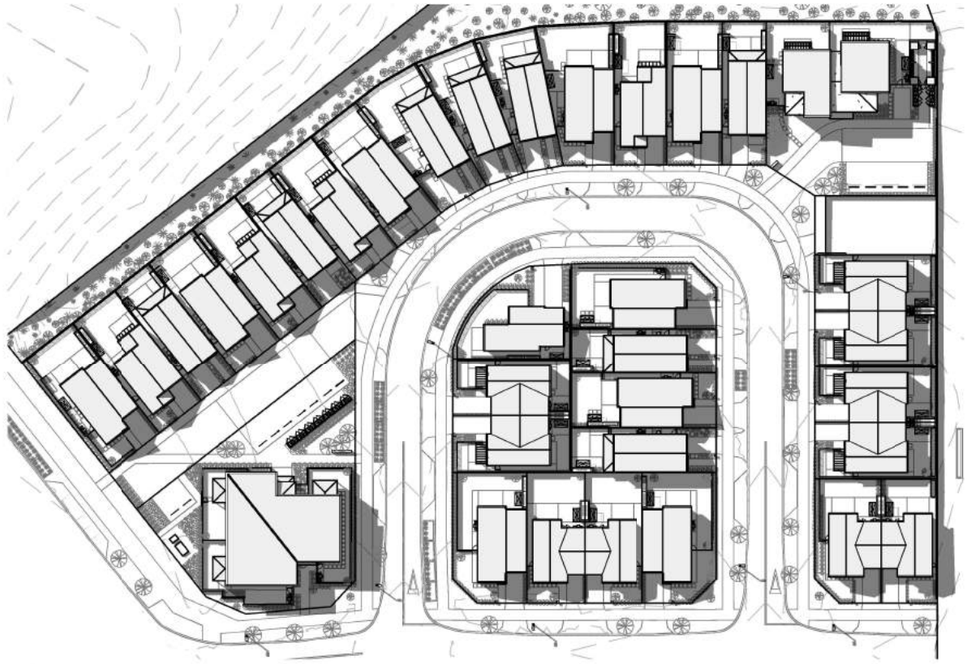


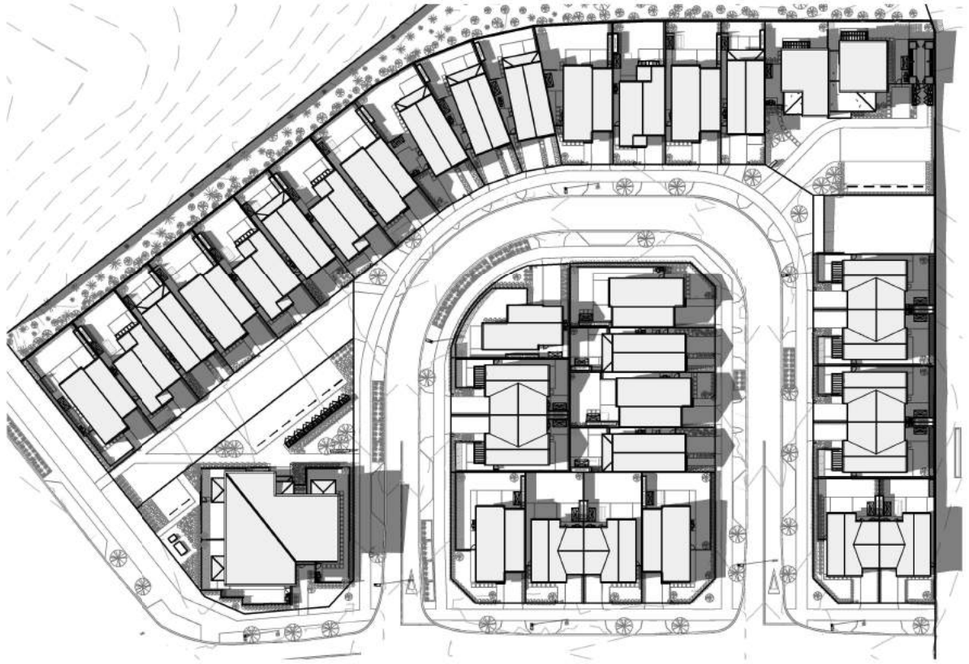
1 **Solar Studies - Spring Z1 10am**

1 : 1000



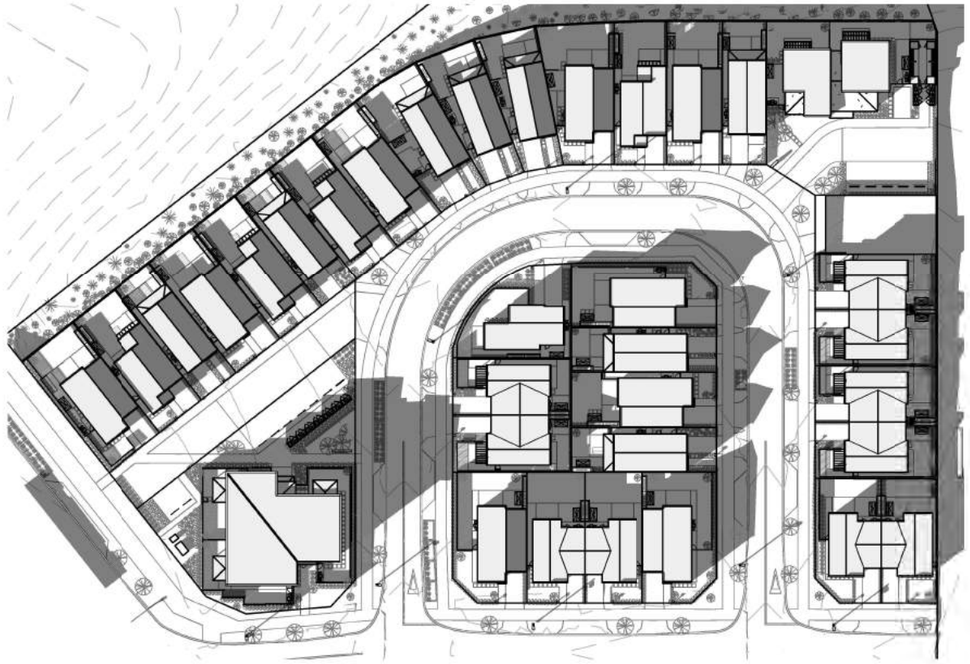
2 **Solar Studies - Spring Z1 12pm**

1 : 1000



3 **Solar Studies - Spring Z1 2pm**

1 : 1000



4 **Solar Studies - Spring Z1 4pm**

1 : 1000

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520 GSR

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.81**	Solar Studies - Spring Z1	28/08/20

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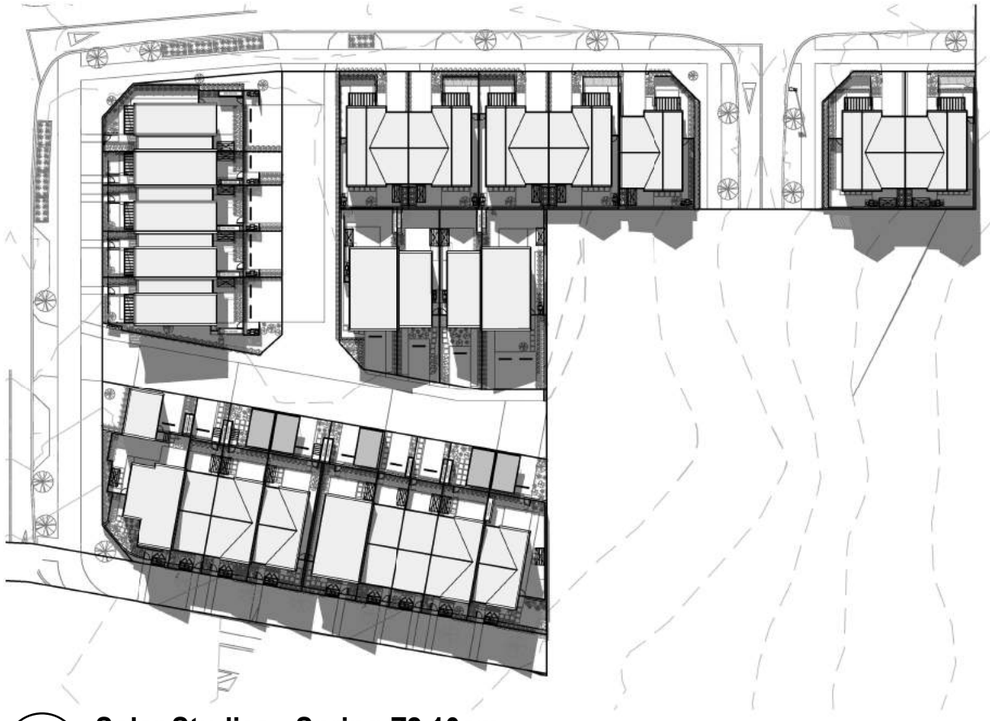
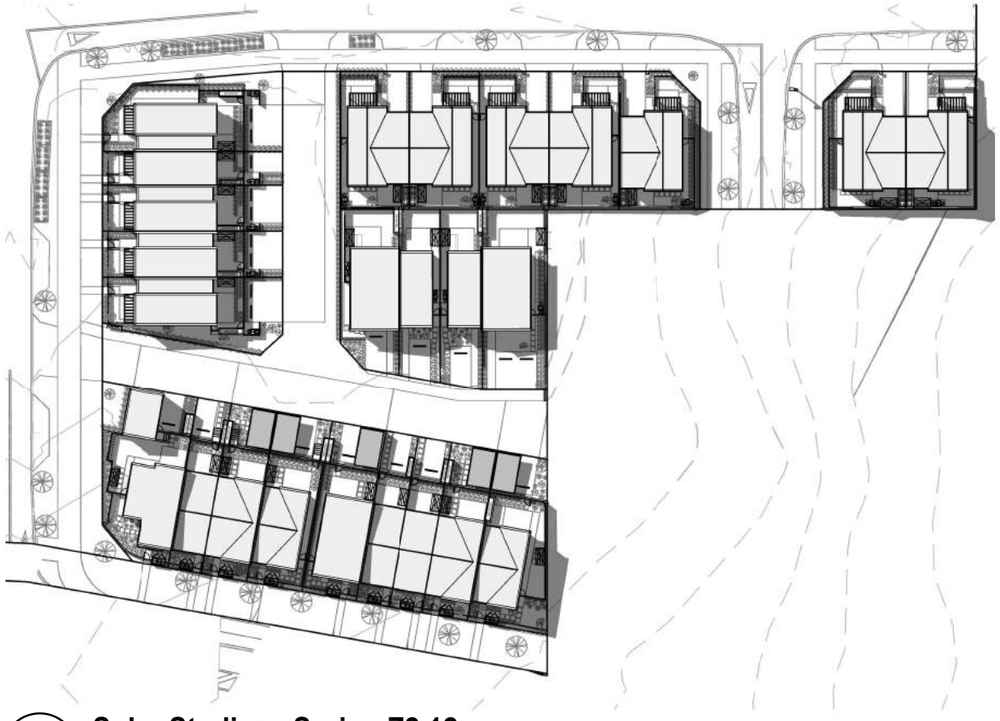


1 **Solar Studies - Spring Z2 10am**
1 : 800



2 **Solar Studies - Spring Z2 12pm**
1 : 800

3 **Solar Studies - Spring Z2 2pm**
1 : 800

4 **Solar Studies - Spring Z2 4pm**
1 : 800

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Job No.	Scale (A3):	Sheet no.	Solar Studies - Spring Z2	DATE
4167	As indicated	**5.82**		28/08/20

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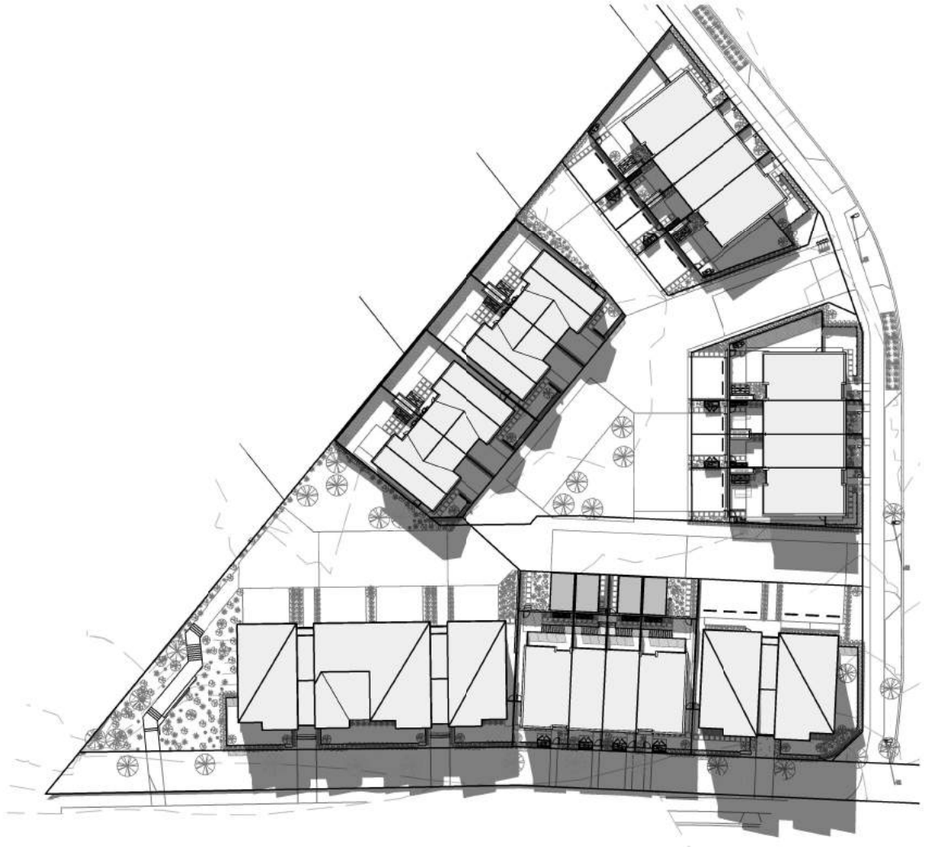
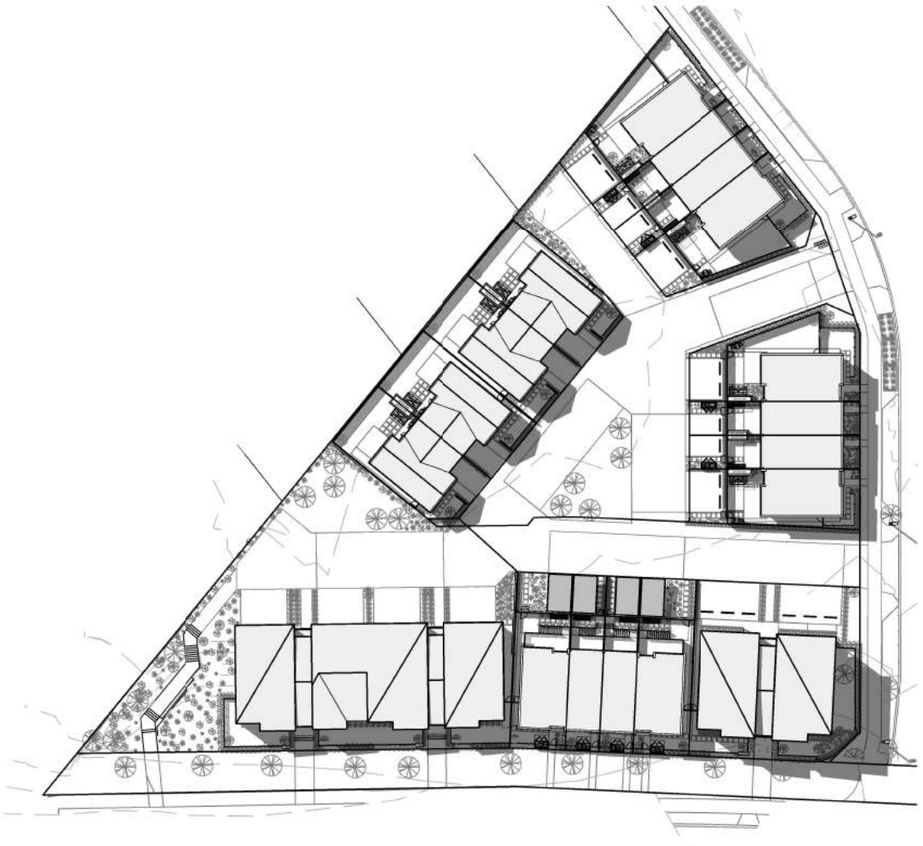


1 **Solar Studies - Spring Z3 10am**
1 : 800



2 **Solar Studies - Spring Z3 12pm**
1 : 800

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.83**	Solar Studies - Spring Z3	28/08/20

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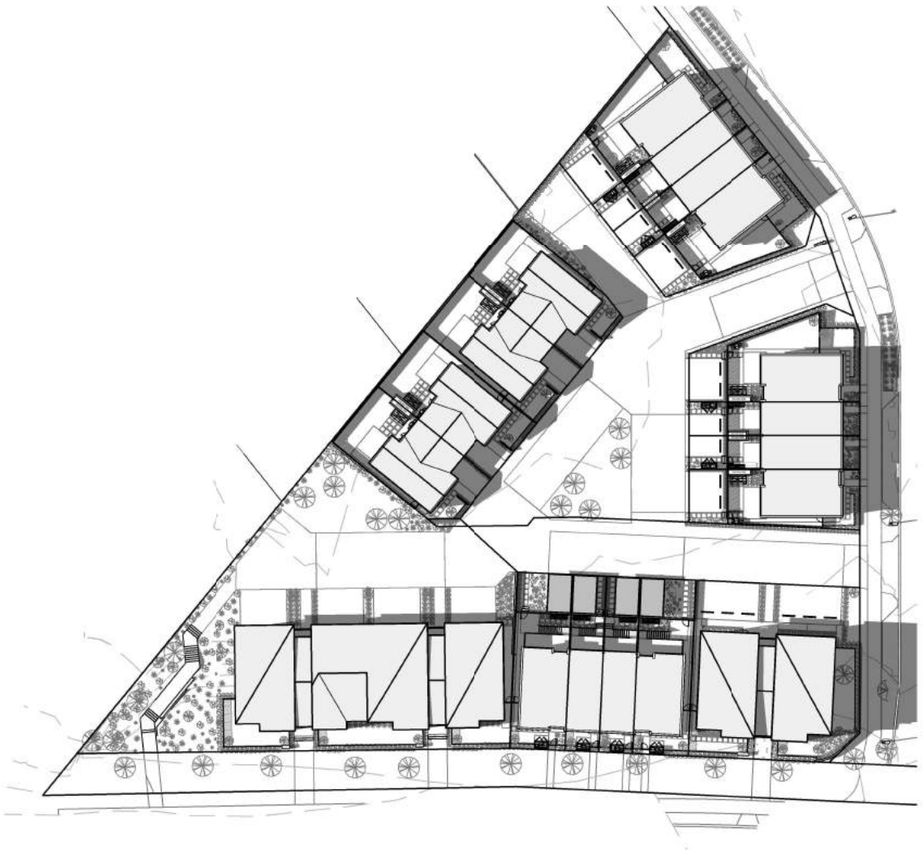
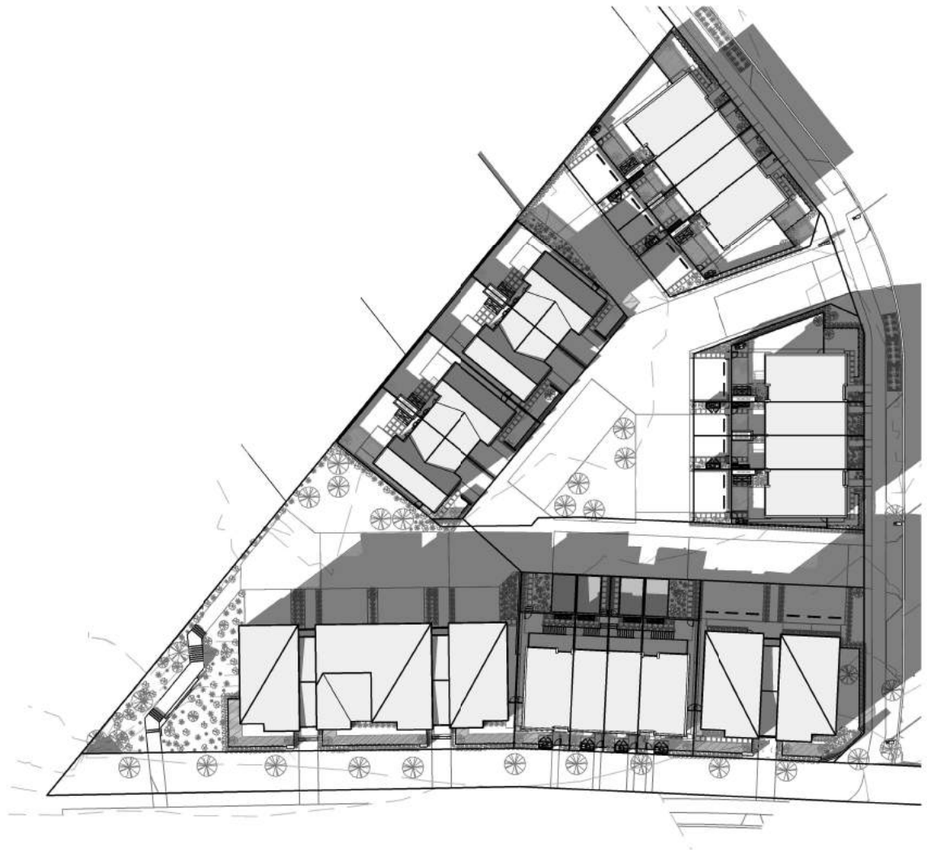


1 **Solar Studies - Spring Z3 2pm**
1 : 800



2 **Solar Studies - Spring Z3 4pm**
1 : 800

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.83A**	Solar Studies - Spring Z3	28/08/20

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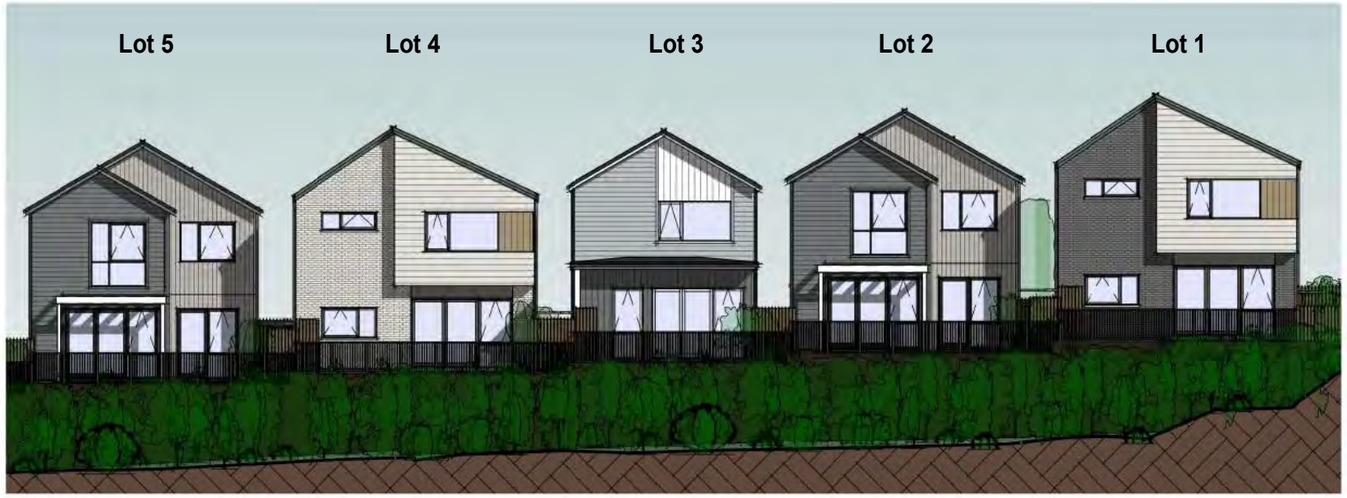
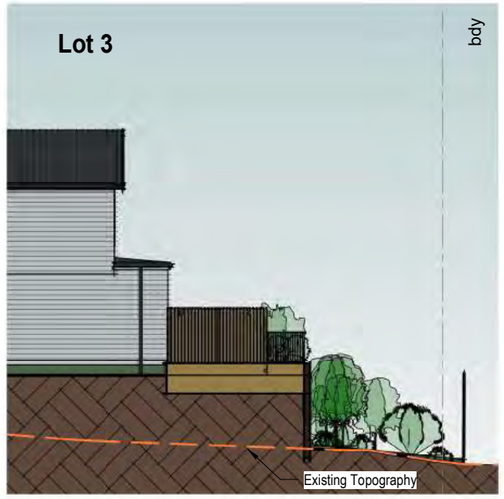
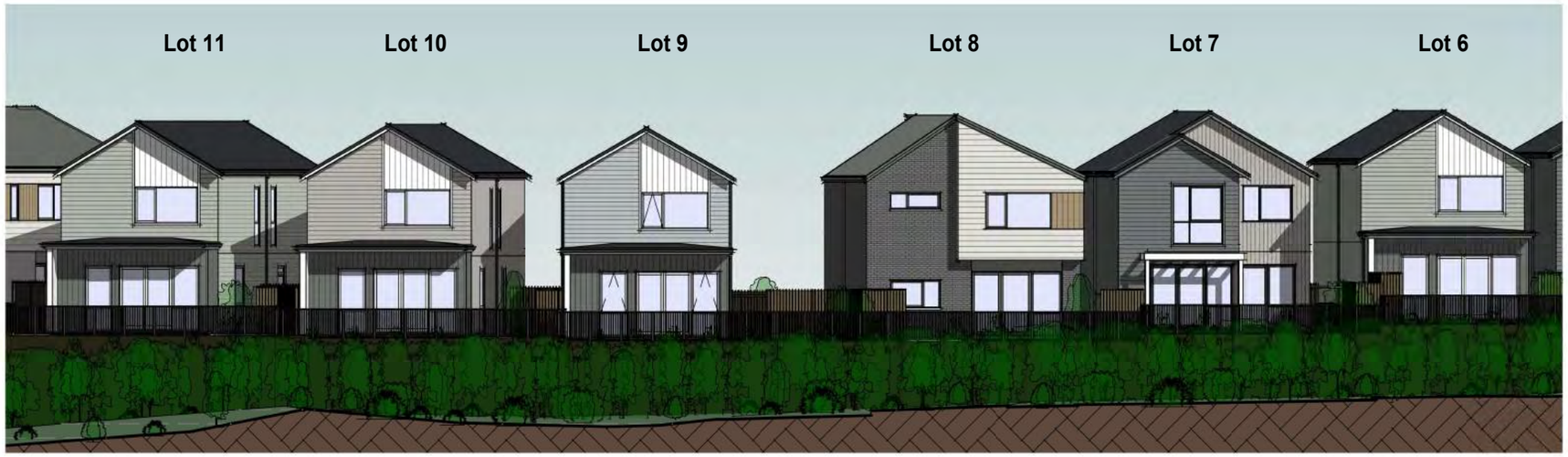


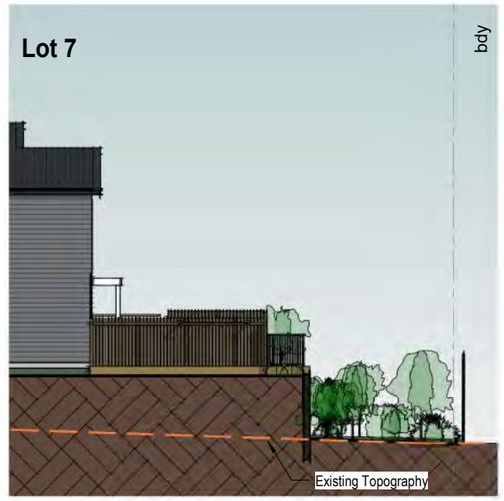
1 **Reserve Boundary Treatment - Lots 1-5**
1 : 200



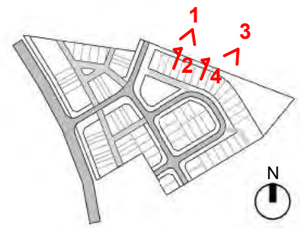
2 **Reserve Boundary Treatment - Lot 3**
1 : 200



3 **Reserve Boundary Treatment - Lots 6-11**
1 : 200



4 **Reserve Boundary Treatment - Lot 7**
1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.100**	Reserve Boundary Treatment	28/08/20

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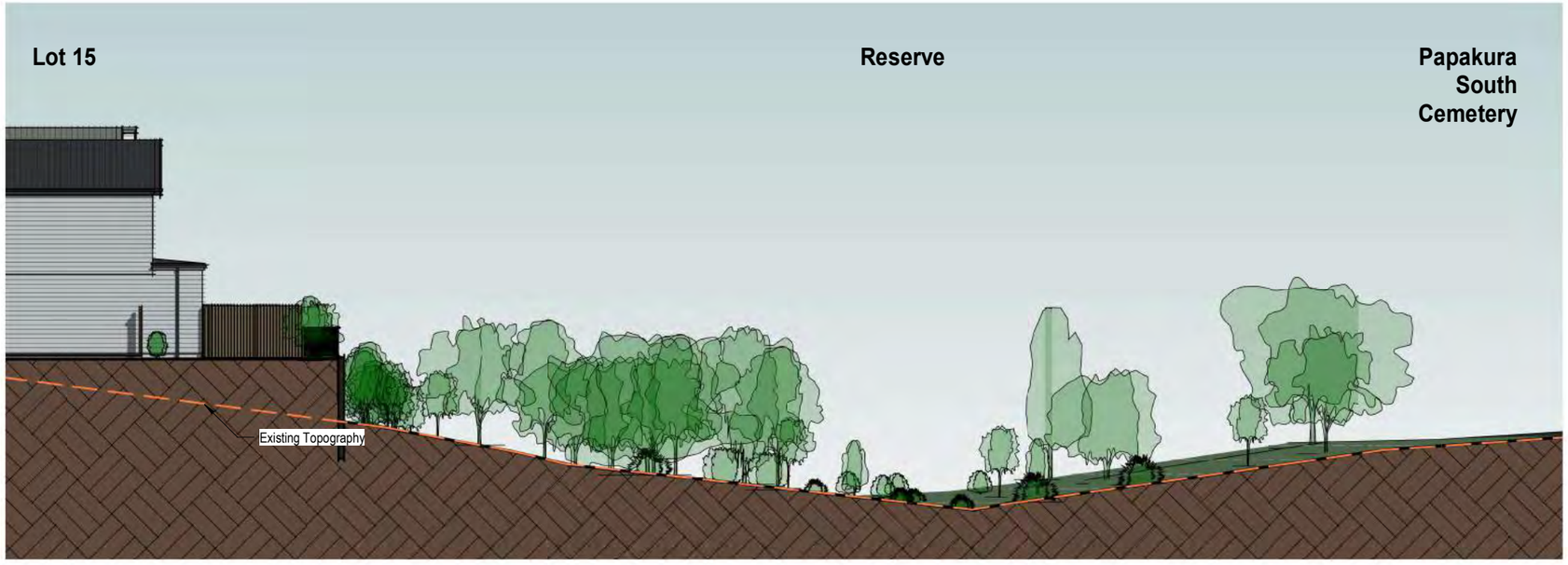
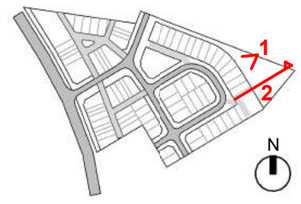
1 **Reserve Boundary Treatment - Lots 12-16**

1 : 200



2 **Reserve Boundary Treatment - Lot 15**

1 : 200



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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.101**	Reserve Boundary Treatment	28/08/20

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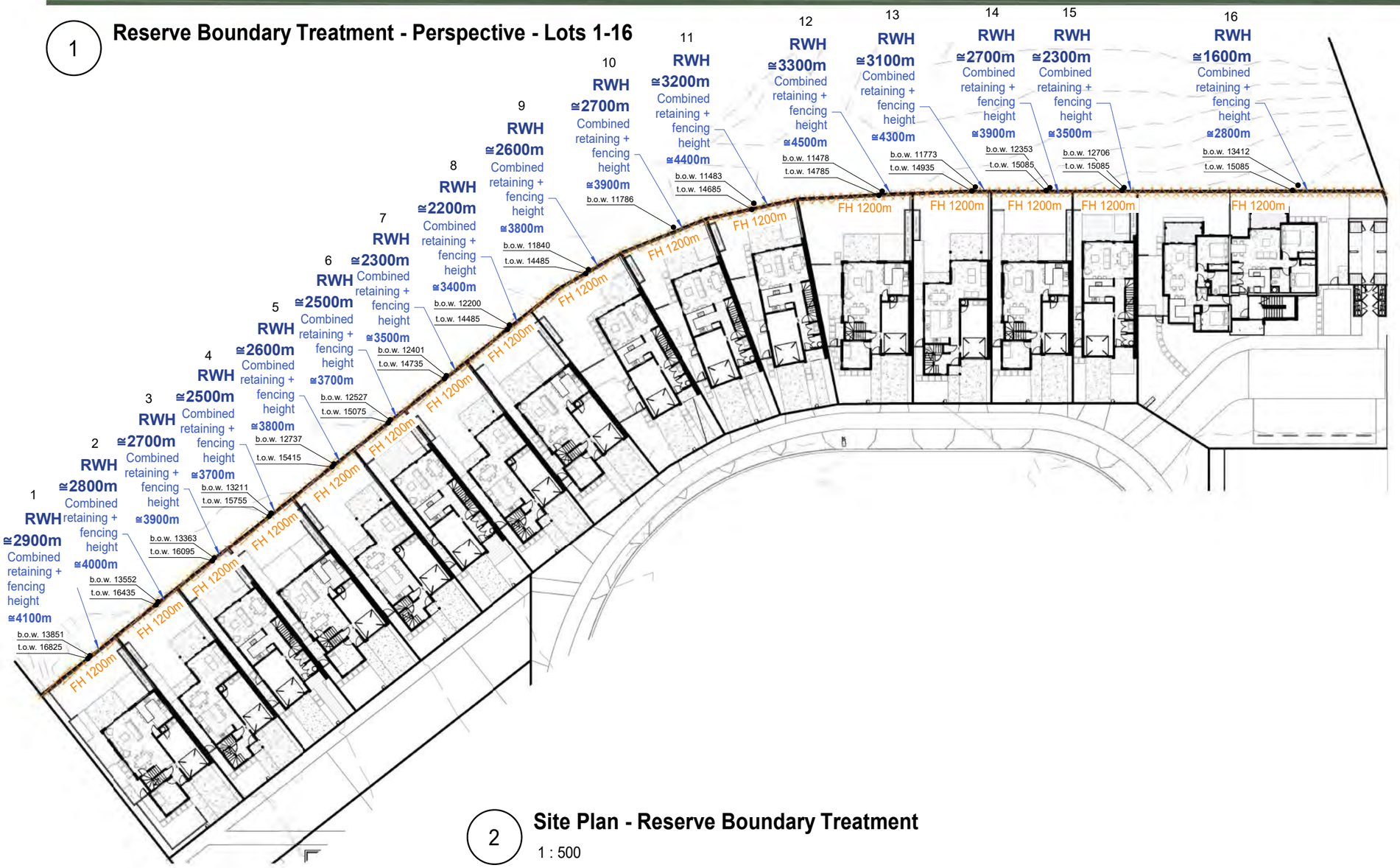
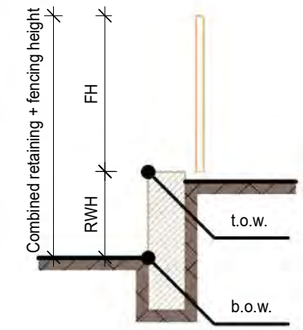
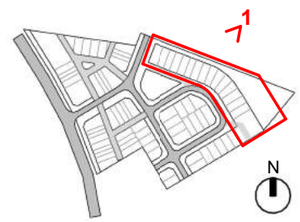
1 **Reserve Boundary Treatment - Perspective - Lots 1-16**



RWH - Retaining Wall Height (Refer to Retaining Wall Plan)
FH - Fence Height (refer to Fencing Plan and Fence Types)
t.o.w.- Top of Wall
b.o.w.- Bottom of Wall





2 **Site Plan - Reserve Boundary Treatment**
1 : 500

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.102**	Reserve Boundary Treatment	28/08/20

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1 **S92 Landscape Key Plan**

1 : 1000

Note: All topography shown outside 520 GSR boundaries is based on the Auckland Council GIS Map

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520 GSR

520 Great South Road, Drury

N

Job No.	Scale (A3):	Sheet no.	S92 Landscape Key Plan	DATE
4167	As indicated	**5.103**		28/08/20

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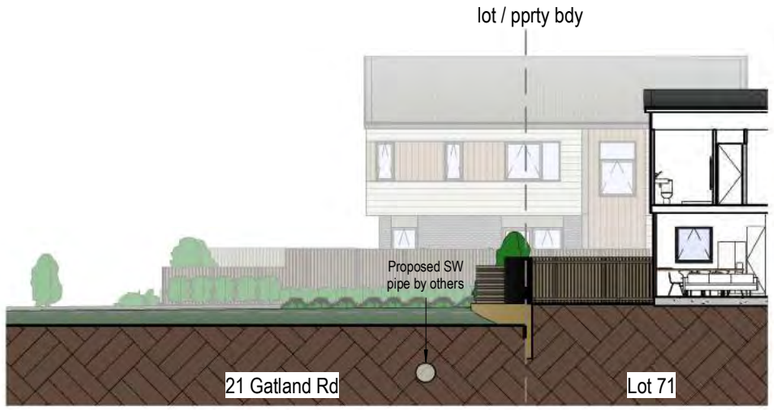
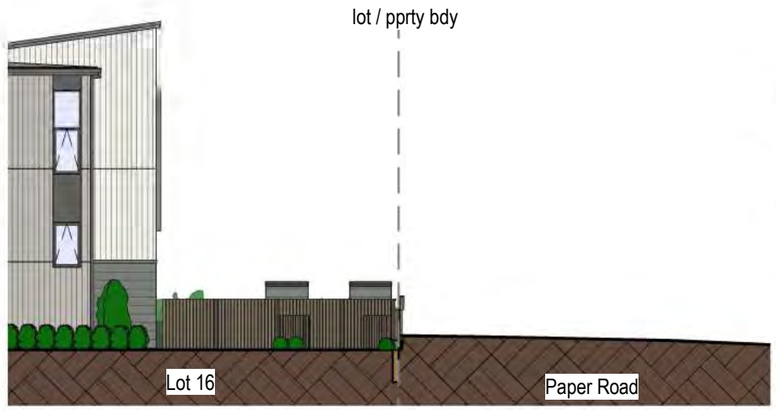
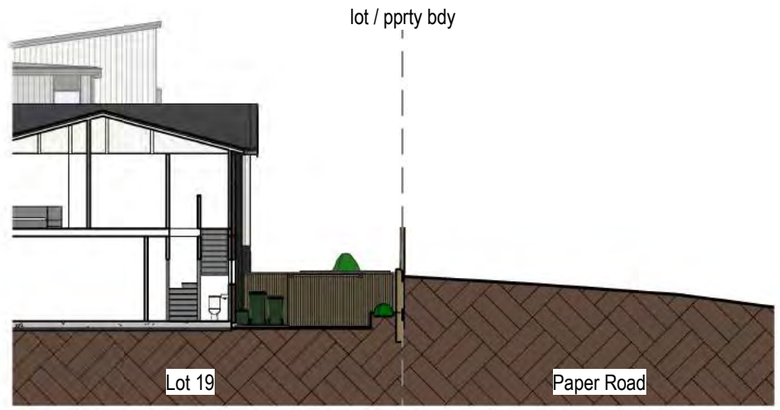


1 **L Section F - Lot 71 with 21 Gatland Road**
1 : 200

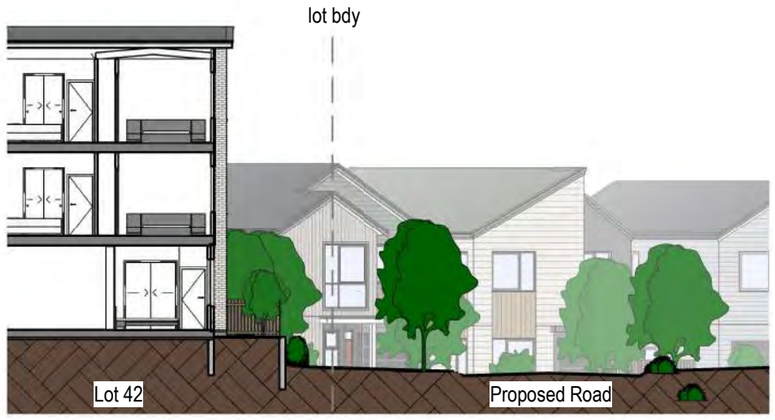


2 **L Section A - Lot 16 through Southern Boundary**
1 : 200



3 **L Section B - Lot 19 through Southern Boundary**
1 : 200

4 **L Section E1 - Lot 42**
1 : 200



5 **L Section E2 - Lot 42**
1 : 200

Note: All topography shown outside 520 GSR boundaries is based on the Auckland Council GIS Map

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520 GSR
520 Great South Road, Drury

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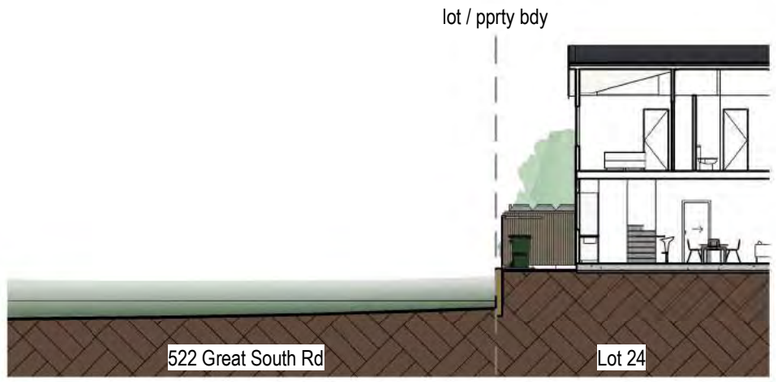

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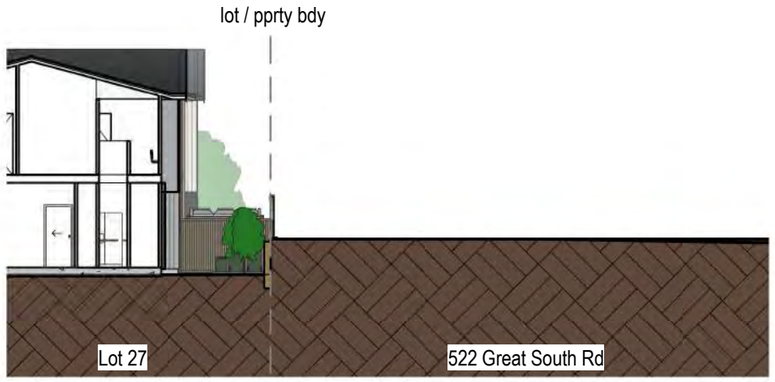

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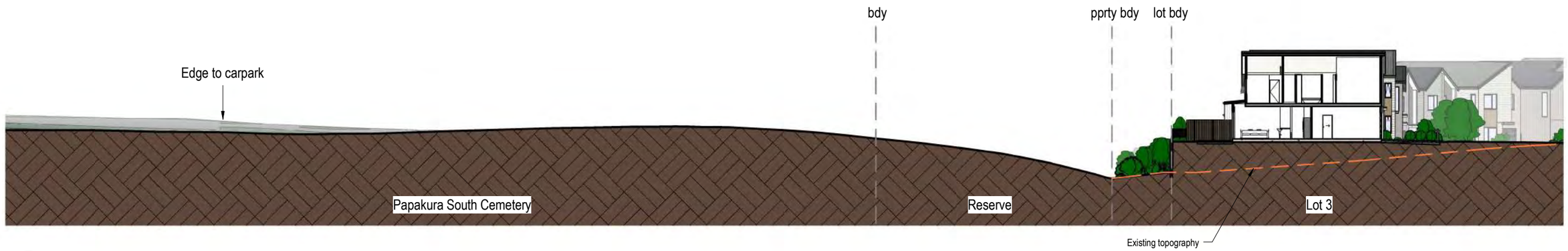

3 **L Section G1 - Long Section between Lot 3 and adjacent Cemetery**

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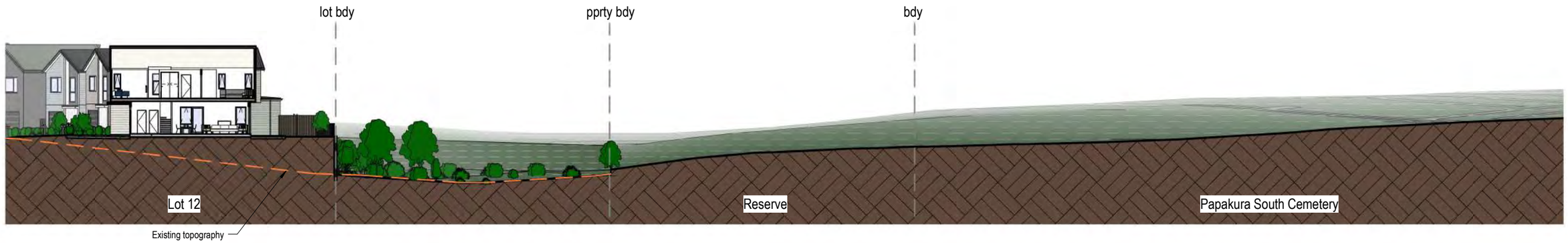

4 **L Section G2 - Long Section between Lot 12 and adjacent Cemetery**

1 : 350

Note: All topography shown outside 520 GSR boundaries is based on the Auckland Council GIS Map

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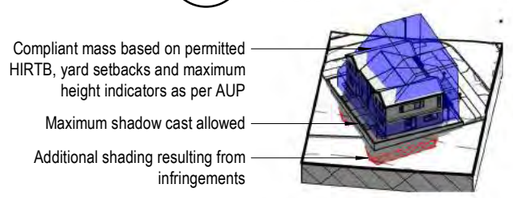
1 Overshadowing Studies - Southern Bottom Corner - Spring 10 am

1 : 500

2 Overshadowing Studies - Southern Bottom Corner - Spring 12pm

1 : 500



Overshadowing Studies

- Maximum permitted shadow cast extension (based on mass)
- Mass footprint
- Additional shading resulting from infringements

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4167	As indicated	**5.107**	S92 Overshadowing Studies	28/08/20

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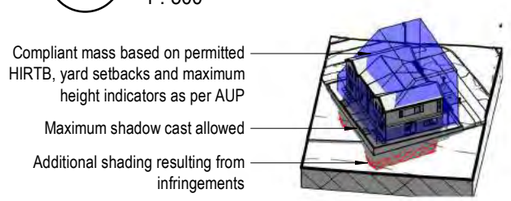
1 **Overshadowing Studies - Southern Bottom Corner - Spring 2pm**

1 : 500

2 **Overshadowing Studies - Southern Bottom Corner - Spring 4pm**

1 : 500



Overshadowing Studies

- Maximum permitted shadow cast extension (based on mass)
- Mass footprint
- Additional shading resulting from infringements

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Job No.	Scale (A3):	Sheet no.		DATE
4167	As indicated	**5.108**	S92 Overshadowing Studies	28/08/20

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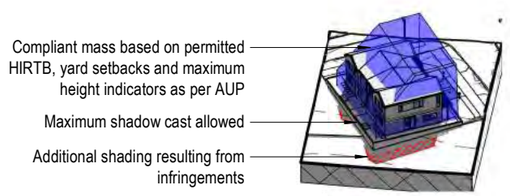
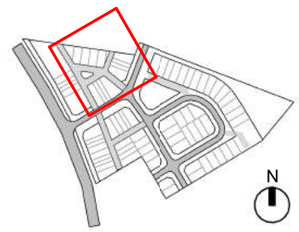
2 **Overshadowing Studies - Lots 67-70 - Spring 12pm**

1 : 500



Overshadowing Studies

- Maximum permitted shadow cast extension (based on mass)
- Mass footprint
- Additional shading resulting from infringements



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Job No.	Scale (A3):	Sheet no.		DATE
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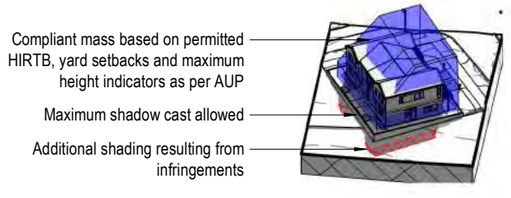
1 **Overshadowing Studies - Lots 67-70 - Spring 2pm**

1 : 500

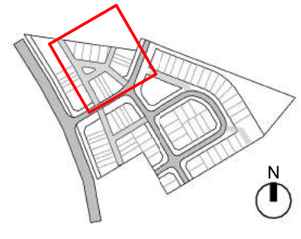
2 **Overshadowing Studies - Lots 67-70 - Spring 4pm**

1 : 500



Overshadowing Studies

- Maximum permitted shadow cast extension (based on mass)
- Mass footprint
- Additional shading resulting from infringements



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Job No.	Scale (A3):	Sheet no.		DATE
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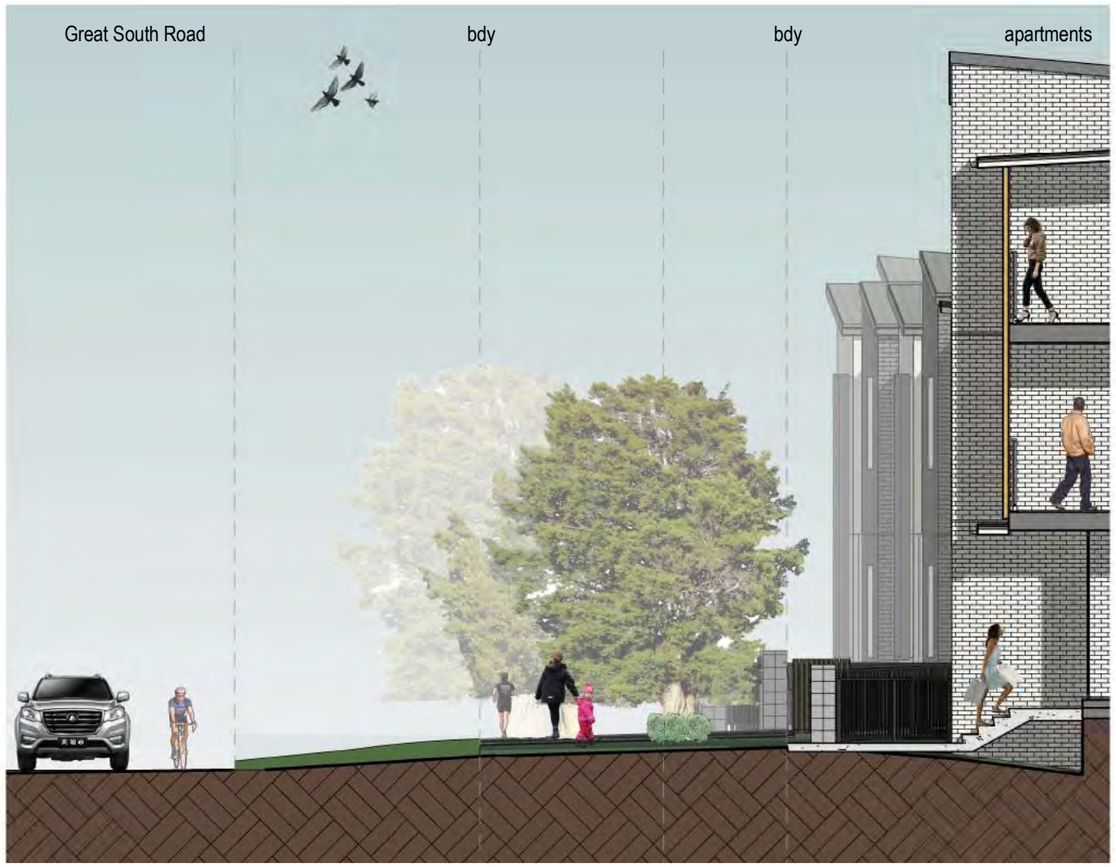

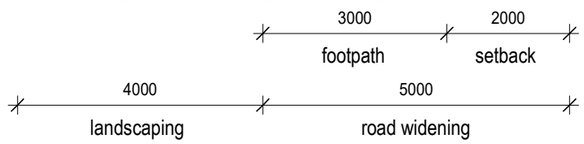

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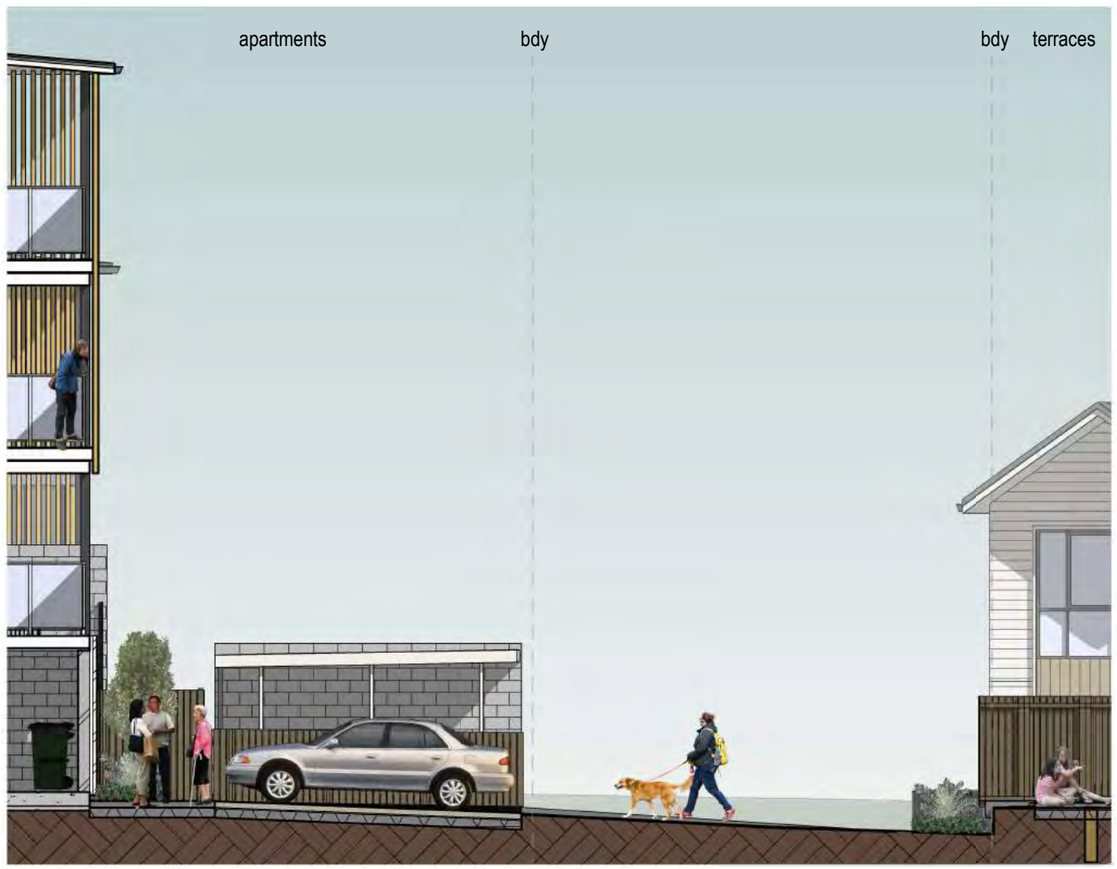

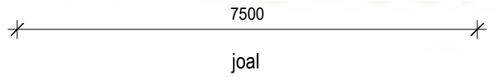

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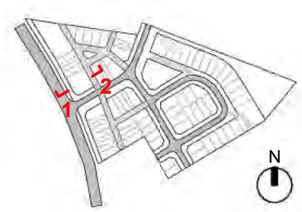

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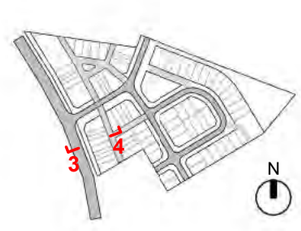
2 **S92 Streetscape Quality Section 4**

1 : 100



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Job No.	Scale (A3):	Sheet no.		DATE
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1 : 100

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Job No.	Scale (A3):	Sheet no.	S92 Streetscape Quality	DATE
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1 **S92 Streetscape Quality Section 6**

1 : 100

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4167	As indicated	**5.114**		28/08/20

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1

S92 Streetscape Quality Section 7

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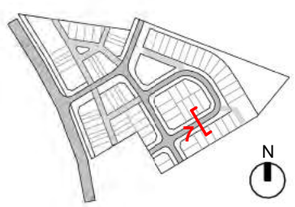

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Job No.	Scale (A3):	Sheet no.		DATE
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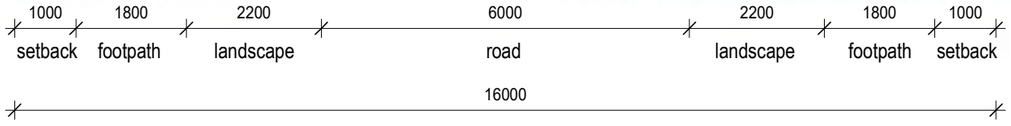

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1 **S92 Streetscape Quality Section 9**

1 : 100

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1 **S92 Streetscape Quality Section 10**

1 : 100

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Job No.	Scale (A3):	Sheet no.		DATE
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Appendix C1: T+T Stormwater Management and Flooding Assessment

Tonkin+Taylor

Job No: 1009613.000
28 June 2019

520 GSR Limited
c/- Barker and Associates
PO BOX 1986
Shortland Street
Auckland 1140

Attention: Ms M Wong

Dear Mary

520 Great South Road, Papakura
Stormwater Management and Flooding Assessment

1 Introduction

Tonkin + Taylor was engaged by 520 GSR Limited to provide a high-level assessment of flood and stormwater management for the proposed development at 520 Great South Road, Papakura.

We understand it is proposed to apply for plan change to re-zone the property in the Auckland Unitary Plan. We also understand that two adjoining properties (21 Gatland Road and 522 Great South Road) will be included in the proposed Plan Change Area (PCA). A location plan of the PCA is shown on Figure A1 in the Appendices.

This assessment includes technical information regarding stormwater management for the proposed new land use to support the Plan Change application.

We have received the following information in relation to the proposed development:

- Preliminary Engineering Feasibility Assessment for a 75 Lot Development at 520 Great South Road, Papakura for Newhaven, Airey Consultants, ref 12530-07, February 2018.
- 520 Great South Road, Phase One. Feasibility Study. Draft for Discussion. Isthmus, January 2018
- Proposed Masterplan, 520 Great South Road, Barker and Associates, ref 17104, dated 8 March 2019.

2 Site characteristics

The following subsections address specific characteristics of 520 Great South Road and the PCA insofar as they relate to the management of stormwater and flooding.

The property lies within the Papakura Local Board Area of Auckland Council, and is zoned for Future Urban land use in the Auckland Unitary Plan (AUP).

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PO Box 5271, Wellesley St, Auckland 1141 P +64-9-355 6000 F +64-9-307 0265 E akl@tonkintaylor.co.nz

2.1 Topography and catchment

The PCA is located in the Slippery Creek catchment, and has frontage to Gatland Road to the north and Great South Road to the west. The PCA comprises three separate titles, namely 520 Great South Road, 21 Gatland Road and 522 Great South Road.

The topography of the site is generally characterised by broad slopes with elevations ranging from 9.4 m RL to 19.2 m RL.

The PCA is approximately 4.6 ha, and comprises two distinct subcatchments draining separately to the south and east, as shown on Figure A2. The contributing area is approximately 0.1% of the greater Slippery creek catchment.

The northern subcatchment drains to an unnamed stream along the north-eastern boundary of 520 Great South Road, which flows to Slippery Creek. Runoff from the southern subcatchment flows overland towards and along State Highway 1 to discharge into the lower reaches of Drury Creek.

2.2 Existing land use

The proposed PCA is located on the edge of a predominantly rural area and is zoned for future urban land use. The 520 Great South Road property comprises empty open greenspace with one commercial building. The neighbouring properties hold residential buildings. The Land Cover Database Version 4.1 (LCDB v4.1) classifies most of the site area as high producing exotic grassland, with the south-western corner classified as built-up area.

2.3 Geology

The GNS Auckland geological map classifies the geology of the PCA as part of the Puketoka formation. This is described as consisting of pumiceous mud, sand and gravel with muddy peat and lignite. S-MAP Landcare Research describes the soil as primarily well-drained clay and loam. This suggests the soil drainage may be receptive of infiltration, however, site-specific soakage tests are required to confirm this.

2.4 Existing drainage system

There is no public stormwater infrastructure within the properties. However, Auckland Council piped systems run along Gatland and Great South Roads. The Gatland Road system discharges into the open channel along the north-eastern boundary of the properties. This channel is classified as a permanent stream by Auckland Council, however, it was noted by T+T staff during a site visit that the stream was dry, as shown on Figure 1. The unnamed stream features an embankment approximately 60 m upstream of the south eastern property boundary. It is considered that this may have been constructed to detain upstream runoff on the neighbouring cemetery property. The locations of these features are shown on Figure A3.

2.5 Receiving environment

The unnamed open watercourse within the site drains to the Slippery Creek, which flows into Drury Creek. The ultimate receiving environment is the Manukau Harbour. The properties are not located above any high-use aquifers, and are not in any designated management areas in the Auckland Unitary Plan (AUP).

Figure 1 Unnamed stream on the north-eastern boundary of the 520 Great South Road property.

3 Proposed development

The proposed development for 520 Great South Road is presented in the masterplan[1] prepared by Barker and Associates. The development will create 83 individual lots, comprising variously terrace, duplex, stand-alone, and zero-lotted house types. The impervious cover of the site will thus increase, with greater runoff volumes and higher flows as a result.

It is expected that following the Plan Change, the re-zoned properties at 522 Great South Road and 21 Gatland Road will also ultimately be developed for residential purposes, creating another 30 lots.

4 Previous investigations

Two earlier investigations for development of the property were carried out for Newhaven Property Limited. Report for these have been provided to T+T, as noted in Section 1.

The Isthmus report included a site analysis, development layout options testing, and presented a structure plan and indicative development details.

The Airey report considered infrastructure requirements and civil engineering aspects for the 75 lot development. With regard to stormwater, Airey proposed a new stormwater network as part of the development, with stormwater mitigation on each of the individual sites. The overall stormwater management concept included for a stormwater pond to provide detention and mitigation for roading and accessways. The report includes runoff calculations for the 2 year ARI and 10 year ARI storm events, and water quality and extended detention storms.

5 Auckland Council flood hazard mapping

5.1 Existing flood risk

Auckland Council has mapped the 100 year average recurrence internal (ARI) flood plain, including for climate change and maximum probable development in the catchment (MPD). The floodplain

[1] Proposed Masterplan, 520 Great South Road, Barker & Associates, ref 17104, 8 March 2019.

currently extends generally along the open channel into the 520 Great South Road property and partially onto the 21 Gatland Road property. A major overland flow path is also mapped along the north-eastern boundary of 520 Great South Road, representing the stream on the property.

5.2 Auckland Council flood model

Auckland Council has developed a Rapid Flood Hazard Assessment (RFHA) model for the Slippery Creek catchment from which T+T has obtained result data for the following scenarios:

- Existing Development (ED) Climate Change (CC) 100 year ARI scenario
- Maximum Probable Development (MPD) CC 100 year ARI scenario.

The model does not represent Auckland Council's stormwater pipe network within the catchment. It assumes all water flows overland, excluding that which flows through modelled stream structures. The Slippery Creek flood model includes nine bridges within the catchment, including the Great South Road bridge located downstream of the PCA.

The MPD scenario does not represent any specific development on the PCA, however, it incorporates the general nature of future development in the Slippery Creek catchment including the site. It is assumed in the MPD scenario that the impervious coverage in the rural areas increases by 20% compared to the ED scenario. Both models have incorporated a 16.8% increase in 24-hour Design Rainfall Depth for the 1 in 100 year ARI to represent future climate change.

5.3 Model results

The comparison of 100 year ARI flood extents in the vicinity of the PCA properties for the ED and MPD scenarios is shown on Figure A4. The MPD flood extent is not significantly greater than the ED flood extent, with no previously unaffected areas flooding for the MPD scenario.

The differences in 100 year ARI flood levels for the ED and MPD scenarios are shown on Figure A5. The modelling results show that the MPD flood levels within the PCA are higher than the ED flood levels by 10 mm to 30 mm.

Peak flows and flood levels have also been extracted at the following locations downstream of the PCA (refer Figure A6):

- Location A – PCA downstream property boundary
- Location B – 1st point along Slippery Creek tributary
- Location C – 2nd point along Slippery Creek tributary
- Location D – 3rd point along Slippery Creek tributary
- Location E – at Great South Road bridge.

The peak flow and peak flood level results at these locations for the two models are shown in Tables 5.1 and 5.2 respectively.

Table 5.1 Slippery Creek model 100 year ARI peak flows

Location	Modelled Peak Flow (m^3/s)	
	ED	MPD
A	4.9	5.3
B	6.5	7.2
C	6.1	6.7
D	336	361
E	332	350

Table 5.2 Slippery Creek model 100 year ARI peak flood levels

Location	Modelled Peak Flood Levels (mRL)	
	ED	MPD
Location A	10.39	10.41
Location B	9.49	9.63
Location C	7.11	7.17
Location D	6.46	6.63
Location E	5.66	5.91

5.4 Impact of future urbanisation of upstream catchments

The 100 year ARI peak flow from the modelled 24 hour storm occurs at approximately 12 hours for Location A (PCA downstream property boundary) and 14.5 hours for Location E (Great South Road Bridge). This indicates that the flow response of the PCA catchment peaks approximately 2.5 hours the peak of the main catchment, refer Figure 1 and Figure 2. This indicates that flows from the PCA should be passed forward rather than detained, as detention to delay runoff could lead to coincidence of peaks and worsen downstream flooding.

Furthermore, the 100 year ARI MPD peak flow from the PCA at Location A is 5.3 m^3/s compared to 350 m^3/s at the Great South Road bridge (Location E). The additional runoff volume from the future development of the PCA is negligible compared to the greater catchment volumes.

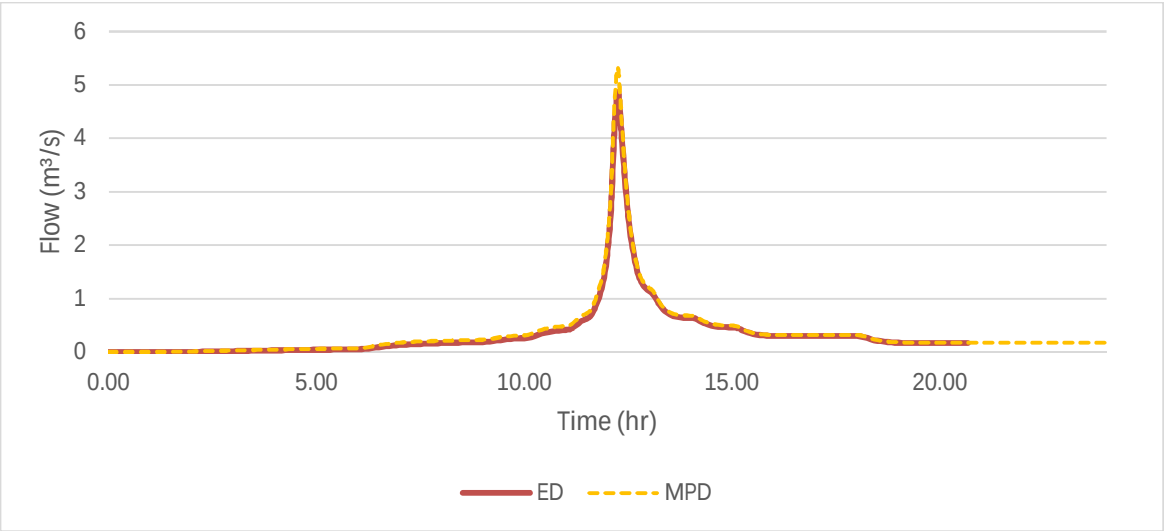

Figure 1 Modelled flow hydrograph at Location A (PCA downstream property boundary)

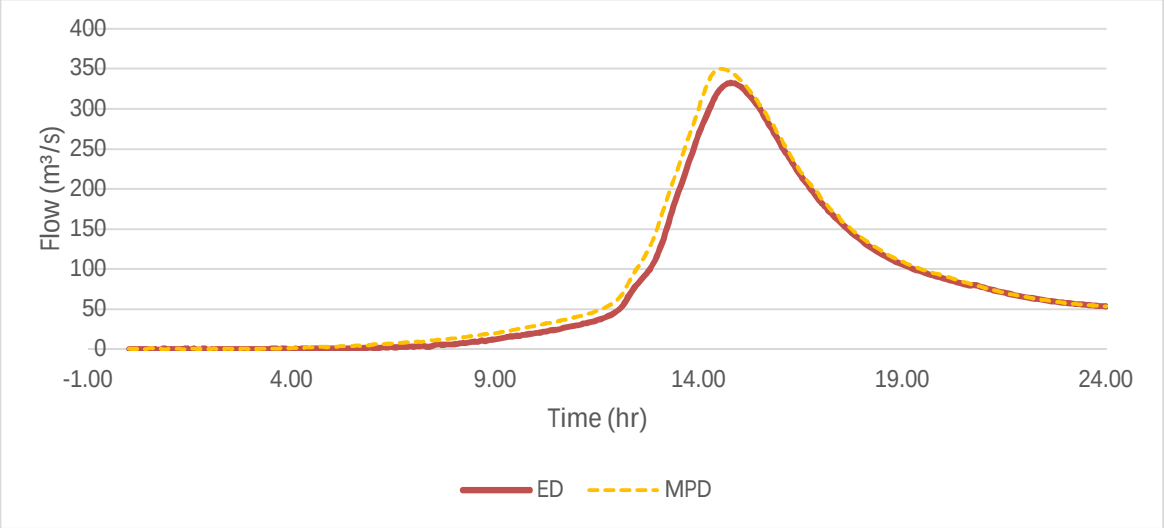

Figure 2 Modelled flow hydrograph at Location E (Great South Road Bridge)

6 Hydrological assessment

The hydrological assessment of the existing and proposed development is provided below. The proposed development is based on the masterplan prepared by Barker and Associates.

6.1.1 TP108 Hydrological Assessment

The hydrology of two subcatchment areas has been assessed, based on the topography of the PCA. The catchment area draining to Location A includes all of the 21 Gatland Road property and part of the 520 Great South Road property, and the natural catchment upstream of the properties. The balance of the PCA drains downstream of the Great South Road Bridge (refer Figure A7).

The catchment runoff for various storms has been calculated using the Auckland Council TP108 guidelines. Peak flows have been determined for the following scenarios:

- Existing development – Catchment A
- Proposed development – Catchment A
- Existing development – Catchment B
- Proposed development – Catchment B.

The calculations are included in Appendix B.

6.1.2 Assumptions

The hydrological assessment assumes the general drainage patterns will remain largely unchanged in the proposed development, i.e. that following development the two existing discharge points from the PCA identified on Figure A2 will be maintained.

Design rainfall has been obtained from NIWA HIRDS v4.1 database. A Representative Concentration Pathway (RCP) of 8.5 has been applied to represent climate change as this corresponds to a 2.1 °C increase in temperature, as specified in Auckland Council's guidelines.

A curve number (CN) of 98 was adopted for impervious surfaces such as roofs and paved areas. The pervious areas within the site were assumed to be pasture cover in good hydrologic condition. A curve number of 80 has been used, as the site soil has been classified as hydrologic soil group D. A minimum time of concentration of ten minutes was adopted given the relatively short drainage paths and probable piped drainage system for the development.

6.1.2.1 Results

The peak runoff results from the TP108 calculations are summarised in Table 6.1.

Table 6.1 Peak flows from the 520 Great South Road Plan Change Area

Catchment	Scenario	Peak flow (m^3/s)		
		2 year ARI	10 year ARI	100 year ARI
Catchment A	Existing development	0.67	1.27	2.33
	Proposed development	0.79	1.41	2.48
Catchment B	Existing development	0.07	0.13	0.24
	Proposed development	0.09	0.15	0.26

The difference between the calculated runoff and the Auckland Council modelled flows in the 100 year ARI event is due to the flood model setup, where no conveyance network has been modelled. That is, the model neglects the conveyance contribution of the stormwater infrastructure in the upstream catchment.

6.1.3 Impact of proposed development

The proposed development will increase the impervious area within the catchments. As a result, there is an increase in the magnitude and volume of the peak runoff generated from the PCA. The TP108 assessment indicates that the 100 year ARI peak flows will increase by 0.15 m^3/s and 0.02 m^3/s for Catchments A and B respectively. These are significantly smaller than the 18 m^3/s increase in 100 year ARI peak flow at Great South Road Bridge, refer Table 6.1. Therefore the impact of the proposed development at the PCA should be minor in comparison to the impact of the zoned future urbanisation of the greater Slippery Creek catchment.

It is proposed that the peak flows generated by the proposed development in the PCA can be passed forward without attenuation. Given the longer response time of the greater catchment, the PCA peak flows will discharge into the catchment streams before the peak flows from the greater catchment arrive. Thus, there will be no increase in peak flows downstream or significant adverse impact on downstream flood risk, noting that the increased peak flow from the PCA is anyway negligible compared to the greater catchment peak. It is also noted that the Drury-Opāheke Structure Plan Summary Report (Auckland Council, April 2019) suggests that "*the best way to manage flooding in the future urban areas is to pass flows forward or get the water to the Manukau as quickly as possible*", notwithstanding AUP requirements for stormwater detention.

An integrated stormwater management approach is proposed to provide water quality treatment and mitigation for hydrological volume. This is discussed further in Sections 6 and 7.

7 Stormwater management approach

7.1 Auckland Unitary Plan (AUP)

The AUP includes objectives and policies that relate to stormwater management. These are generally found in the following chapters:

- E.1 Water quality and integrated management
- E.8 Stormwater – discharge and diversion

- E.9 Stormwater quality – High contaminant generating car parks and high use roads
- E.36 Natural hazards and flooding.

In general, the objectives and policies seek to ensure that stormwater management for greenfield sites should avoid and/or minimise effects on the environment (especially for sensitive receiving environments) as far as is practicable.

The integrated stormwater management approach adopted for the proposed PCA has been aligned with the objectives and policies set out in the AUP, and are summarised in the following sections.

7.2 Water-Sensitive Design

Water-Sensitive Design (WSD) philosophies should be integrated within the proposed stormwater management approach to ensure that the AUP objectives are met. Water-sensitive design can be defined as an

> "*approach to freshwater management, it is applied to land use planning and development at complementary scales including region, catchment, development and site. Water sensitive design seeks to protect and enhance natural freshwater systems, sustainably manage water resources, and mimic natural processes to achieve enhanced outcomes for ecosystems and our communities"* (GD04, Auckland Council, 2015).

WSD principles are further detailed in the Water Sensitive Design for Stormwater (GD04) guideline document produced by Auckland Council. A summary of key principles for water sensitive design are as follows:

- Promoting inter-disciplinary planning and design
- Protecting and enhancing the values and functions of natural ecosystems
- Addressing stormwater effects as close to source as possible
- Mimicking natural systems and processes for stormwater management.

7.3 Water quality

The general approach to water quality management is summarised below:

- Provide near-source water quality treatment of runoff for all roads and High Contaminant Generated Carparks. Water quality treatment to target sediment, metals and gross pollutants
- Use "inert" building materials to prevent generation of contaminant-laden runoff, or otherwise provide site-specific treatment
- Minimise or mitigate the effects on freshwater systems arising from changes in water temperature caused by stormwater discharges
- Provide erosion protection in the stormwater systems including discharges to streams. Consider green outfalls for discharges to streams.

7.4 Hydrological mitigation

The general approach to water quantity management as outlined in the AUP is summarised below:

- Utilise stormwater infiltration for retention where it is possible to do so in a safe and effective manner. Where infiltration is not feasible, retention and detention volumes can be combined to provide hydrological mitigation.
- Utilise rainfall harvesting for retention for residential buildings where there is re-use demand

7.5 Flood management

The general approach to flood risk management within the PCA is summarised below:

- Avoid locating buildings or infrastructure within the 100 year ARI modified floodplain unless it can be design to be resilient to flood related damage
- Ensure all development and changes within the 100 year floodplain do not increase adverse effects or increased flood depths or velocities to other properties upstream or downstream of the site
- Identify overland flow paths and ensure that they remain unobstructed to convey runoff safely.

8 Stormwater management options

The following options for stormwater management have been identified, in line with the AUP principles stated in Section 6 above.

8.1 Water quality

Water quality requirements as stated in the AUP and outlined within Section 3.1.1 of this report can be met through the following stormwater management devices:

- Treatment of runoff from roads and high contaminant generating car parks (over 30 spaces) using vegetated bio-retention devices such as swales, rain gardens and tree pits. Vegetated devices provide benefits of green infrastructure along road corridors as well as proximity to source.
- Bio-retention devices also can provide hydrological mitigation as well as water quality treatment.
- Within residential lots, it is proposed that inert building materials are used (e.g. not copper or zinc), and therefore no contaminants will be generated within the lots. If building materials that generate contaminants are used, site-specific water quality treatment will be required.

Multi-disciplinary engagement is recommended to ensure that road corridors are designed with landscaping provisions to incorporate vegetated bio-retention devices.

8.2 Hydrological mitigation

To meet the AUP water quantity hydrological mitigation requirements, the following stormwater management devices can be considered:

- Rainwater tanks for roof runoff. Rainwater tanks promote recycling and reuse of rainwater, while mitigating stormwater runoff at source.
- Pervious pavements can be included as part of the driveway / lot access, and can be designed to minimise land take and reduce runoff.
- Raingardens and swales designed to provide hydrological mitigation along road corridors and within public impervious spaces, while adding to the landscape value of the PCA.

Soakage tests for the PCA soils are recommended site, to confirm the effectiveness of infiltration devices. The Barker masterplan indicates stormwater treatment and amenity planting spaces. These are generally aligned with the existing stream.

8.3 Conveyance

The following measures are proposed to convey stormwater runoff within the PCA:

- Primary flows generated by all storm events up to a 1 in 10 year ARI storm to be conveyed through a new piped network to follow the proposed road network, and to discharge into the stream. If southern subcatchment is not reshaped to drain towards the stream, flows from this will to discharge into the existing Great South Road stormwater infrastructure.
- Runoff in excess of the 1 in 10 year ARI flows to be conveyed overland along the road carriageways towards the existing stream along the northern boundary of the site.
- Green outfalls and energy dissipation structures for outlets to the existing stream, to minimise stream disturbance and minimise outfall velocities.

9 Recommendations

Based on the regulatory requirements of the AUP and the Barker masterplan, a summary of the proposed integrated stormwater management approach is provided below. This should be confirmed and incorporated as the masterplan is developed further.

A more detailed design of the proposed stormwater management approach, including device sizing will be addressed as part of subdivision design once a site layout has been finalised.

Table 9.1 Proposed stormwater treatment and flood mitigation options

Activity	Proposed device	Comment
Residential lots (hydrological mitigation only)	· Raingardens · Rainwater tanks for roof runoff · Permeable pavements · Infiltration (where feasible)	· Raingardens provide flood mitigation and natural aesthetics. · Permeable pavements can be included as part of the site impervious area. · Rainwater tanks promote recycle and re-use of water.
Roads and high contaminant generating car parks (water quality and hydrological mitigation)	· Vegetated bio-retention devices: · Raingardens · Tree pits · Vegetated swales (where feasible)	· Vegetated swales provide conveyance, natural aesthetics and treatment close to source. · Raingardens and tree pits provide at-source treatment.
Public open spaces and amenity areas	· Riparian buffer planting and re-vegetation · Green outfalls	· Green outfalls provide erosion protection at downstream environments. · Buffer planting and re-vegetation increase ecological amenity within the PCA.

10 Applicability

This report has been prepared for the exclusive use of our client, 520 GSR Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

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Authorised for Tonkin & Taylor Ltd by:

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Dr Tim Fisher
PROJECT DIRECTOR

Report reviewed by:

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PROJECT MANAGER

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Appendix C2: Maven Infrastructure Report

Appendix D1: Cause 23 RMA

- **520 Great South Road Plan Change Stormwater Management Plan meeting minutes**
- **Healthy Waters Response to Stormwater and flooding matters**

  Address: 520 Great South Road, Papakura

  Chloe Trenouth - Healthy Waters Consultant

Stormwater and flooding matters				
#	**Category of Information**	**Specific Request**	**Reason for request**	**Addressed**
HW1	Stormwater Management Plan (SMP)	Please provide a Stormwater Management Plan to support the plan change. Note: It is recommended that a meeting between the applicant and Healthy Waters be arranged to discuss the requirements of the SMP.	The plan change land is in the Future Urban zone and seeks to apply live zonings. An assessment of effects and proposed mitigations should be included in a SMP as part of the AEE and Section 32 Assessment to demonstrate how the Regional Policy Statement and regional plan provisions in Chapter E1 will be met, in particular policies E.1.3(3), E1.3(8) and E1.3(10). The SMP should: • Address the Drury-Opaheke SMP and also discuss downstream effects; and • Assess why the proposed stormwater treatment and flood mitigation is the Best Practicable Option.	A meeting with representatives from Healthy Waters and T+T was held on 3 April 2020. This SMP has been prepared in support of the Plan Change for all three developments.
HW2	Network Discharge Consent (NDC)	Please confirm whether it is intended that the plan change come under the Council's Global NDC for stormwater discharges.	It is unclear from the plan change documents whether it is intended for the stormwater discharges from the site to come under the Council's global NDC. This should be clearly identified in the SMP. The Stormwater Assessment supplied does not constitute a SMP in accordance with the Council's NDC. A clear statement on the methods that are intended to be used to meet Schedule 4 NDC performance requirements is needed in the SMP and these should be tied to the proposed land use. It is recommended that a meeting between the applicant and Healthy Waters be arranged to discuss what is required to come under the NDC.	A meeting with representatives from Healthy Waters and T+T was held on 3 April 2020. Refer to: Executive summary Section 1 Section 3.1.8 Section 5
HW3	Precinct	Please explain why precinct provisions have not been proposed to achieve the outcomes of the proposed stormwater management approach.	Section 8 of the stormwater assessment identifies options, including use of inert building materials, green outfalls, and quality treatment of all roads. These are not currently requirements of the AUP and therefore may not be implemented without precinct provisions. Further discussions regarding appropriate precinct provisions will be required once an SMP is provided.	N/A

Stormwater and flooding matters				
#	**Category of Information**	**Specific Request**	**Reason for request**	**Addressed**
HW4	SMAF Control	Please confirm whether Stormwater Management Area (SMAF) - Flow Control is to apply to the site.	The stormwater assessment appears to require hydrological mitigation but it is unclear whether the plan change proposes to apply the SMAF Control to the site. Further assessment of the erosion risks should be undertaken to understand whether the SMAF Control will adequately mitigate potential effects. Additional mitigation may be required. The SMP should identify whether this is the best practicable option. Advice note (non-Clause 23): If hydrological mitigation is proposed then it is recommended that the SMAF Control be applied to the land through this PPC.	Refer to: Section 3.1.6. Section 8.2.4.1 Section 8.2.6.2
HW5	Stormwater Modelling	Please provide further information is on the modelling to be included within the SMP including: • more description on the modelling undertaken to support the development, in particular where there are discrepancies between the Council model and the TP108 graphical assessment. • demonstrate that the Council Rapid Model is suitable for undertaking the assessment of impacts from a specific site. • confirmation that Tonkin & Taylor have not amended the HW model as part of this work. • provide clarification of the MPD imperviousness used for the rural areas.	Modelling information is required to understand the effects of the plan change in terms of increased stormwater runoff, peak flows and effects on the flood plain both upstream and downstream. It appears that the HW model has been used to assess flows within the watercourse through 520 Great South Road and TP108 graphical has been used to assess the local discharge from 520 Great South Road. However, there does not appear to be any commentary around how the development would impact the catchment flows. Even if this is negligible then this should still be worked through. Section 5.2 states that '…rural areas increase by 20% compared to the ED scenario…' Is this correct, or has the rural imperviousness increased to 20%? This clarification is required to confirm the model that is being used and the accuracy of flow volumes assumed through the site.	Refer to Section 7
HW6	New asset ownership	Please provide discussion on the future ownership of the proposed stormwater devices.	It is unclear whether the proposed stormwater management approach will result public assets to be vested in Healthy Waters, or whether they would remain private assets. The vesting of	Refer to: Section 5

Stormwater and flooding matters				
#	**Category of Information**	**Specific Request**	**Reason for request**	**Addressed**
			stormwater devices in Healthy Waters has implications for the design of these assets and future maintenance costs for Council.	Section 8.4
HW7	Proposed stormwater management	Please clarify the proposed stormwater management principles that have been adopted and explain what stormwater management is considered to be the Best Practicable Option.	It is unclear what the actual principles for this development are. Greater discussion needs to be provided in relation to what could be considered and why the proposed stormwater management is considered to be the Best Practicable Option. Swales are mentioned as being possible (Section 8.1 and 8.2); however, it is then proposed to convey runoff in a new pipe network (Section 8.3).	Refer to Section 8.2
HW8	SMP	Please provide a location plan of the plan change area to demonstrate how it fits in with the local Slippery Creek catchment.	Section 2.1 of the Stormwater Assessment discusses the catchment. However, it does not consider the site location in the context of the wider catchment. The site is located upstream of a very large floodplain associated with flows from the urban Papakura catchment. It is important to understand the effects of the plan change on the wider catchment.	Refer Figure 2.3 in Section 2.3
HW9	SMP	Please address the impact of the embankment approximately 60 m upstream of the south eastern property boundary.	It is unclear from Section 2.4 of the Stormwater Assessment what the impact of the identified embankment would have on the environment. Does it create ponding water above the embankment, or does it impact the floodplain? This issue needs to be identified in order to determine the extent of effects and potential mitigation required.	This embankment is a pond feature to be removed as part of the landscaping to rehabilitate the watercourse. Refer to Section 8.2.5.1
HW10	SMP	Please include further discussion about the receiving environment identified as a Significant Ecological Area (SEA) and implications to stormwater management because it is identified as a SEA.	Section 2.5 of the Stormwater Assessment discusses the receiving environment but does not identify the importance of it as a Significant Ecological Area. This is a relevant consideration in terms of effects on the environment and in determining the Best Practicable Option for stormwater management, particularly quality.	Refer to Section 2.8

Stormwater and flooding matters				
#	**Category of Information**	**Specific Request**	**Reason for request**	**Addressed**
HW11	SMP	Please clarify the extent of impervious coverage anticipated by the plan change.	Section 3 of the Stormwater Assessment identifies that the impervious coverage will increase, with greater runoff volumes and higher flows. However, the document is confusing with regard to what area it actually covers. This needs to be clarified.	Refer to Section 8.2.4
HW12	SMP	Clarify that Table 5.2 identifies 100-year ARI peak flow levels rather than flood levels.	Table 5.2 indicates flood levels but they are not necessarily flood levels. This appears to be an error.	N/A
HW13	SMP	Confirm whether the 24 hour rainfall depth was used for the TP108 graphical assessment.	Section 6.2.1 discusses the assumption for runoff. Although HW assumes that the 24 hour rainfall depths was used this is not explicitly identified in the document.	N/A
HW14	Flooding	Clarify how it is proposed to manage discharges from each sub-catchment when flows will be passed forward into a floodplain.	Discharges to the south currently enter a floodplain area across 530 GSR. Will unattenuated flows increase the extent, depth or frequency of this flooding? Will it be affected by the Slippery Creek Catchment? Further information is required to determine the proposal not to require attenuation is the Best Practicable Option.	Refer to Section 7
HW15	Flooding	Confirm how Sub-catchment B will work in relation to passing forward flows. This would need to rely on overland flow paths because there no pipe network	Section 6.1.3 discusses the proposal to pass forward flows without attenuation. Depending on what development area you consider, No. 522 GSR could be significantly affected with flows passed to the property every time there is rainfall. Insufficient information is provided to understand the downstream effects of passing flows forward without attenuation.	Refer to Section 7

Appendix D2: Section 92 Further Information Request

- **Healthy Waters Response to Development Engineering Enquiry**

  Address: 520 Great South Road, Papakura

  Paula Vincent – Regulatory review

  Katja Huls – Waterways Planning

  Danny Curtis – Catchment Planning

Healthy Waters Response to Development Engineering Enquiry			
#	**Reference**	**HW Response**	**Addressed**
General comments			
HW16	SMP	The SMP by T&T may be adequate for a private plan change process as it only provides principles and a toolbox for the stormwater management methods/devices. However, since the resource consent and plan change applications are underway simultaneously, it is expected for the SMP to provide more details for the stormwater aspects of development including: • Sets out expected timing /staging of construction and upgrades • Identifies specific stormwater devices and their function • Hydraulic connectivity • Identifies the on-going operation and maintenance of devices including O&M and decommissioning	Refer to: • Section 8.2.7 • Section 8.2.3, 8.2.4.1 and 8.2.4.2 • Section 8.3 and • Section 8.5, respectively.
Specific comments			
HW17	SMP Mana Whenua Matters	How does the proposed stormwater management set out in this SMP meet the requirements of mana whenua?	Refer to Section 4
HW18	SMP Fig 7.1 Stormwater Management Strategy	This is not the same as what the toolbox is presenting. Suggest the toolbox and this diagram are amended to inform what is proposed correctly. Bioretention option to check for on-site infiltration rates > 2mm/hour Wetlands do not provide retention and should be removed. For detention the wetlands should feature higher up in the device hierarchy.	N/A
HW19	SMP Table 1.1: Stormwater management requirements and toolbox of BPO for stormwater management within the PCA	WQ/Inert building materials for the roofs left out. Wetlands are not specifically bioretention devices and we would like to see these higher up in the toolbox hierarchy Private lots left out for SW conveyance Riparian margins and planting is primarily a stream protection function, not a stormwater management function therefore should not be included, or this section of the table updated to reflect what stormwater management devices will be constructed / incorporated within the margins.	See Table 1.1 and 8.1

Healthy Waters Response to Development Engineering Enquiry			
HW20	Revised Engineering Calculations Revision C by Maven Associates Rain garden Retention and Detention at Source Summary	Infiltration rates are assumed at 2mm/hour, not acceptable need to provide actual infiltration rates. If actual infiltration rates less than 2mm/hour, other options to be explored.	Refer to Section 2.4
HW21	Revised Engineering Calculations Revision C by Maven Associates Post - development 100YR Overland Flowpath,	Please clarify the location of Road 3 as Plan C451 shows two Road 3. Please confirm the depth of flow.	Maven Response: *The overland flowpath section shown on plan C447 is identified as section 7. Maven Plan C440 illustrates where on Road 3, Section 7 has been taken. Please refer to Plan C440 for location.* *Flow depth at the kerb is 100mm for the subject section.*
HW22	Revised Engineering Calculations Revision C by Maven Associates	Need corrections for typo (100yr &10yr interchanged). 136mm for 10 year does not include climate change.	Maven Response: *10YR Pre-Development Calculation sheet has now been corrected to read 10 (yr) on page 2 of 4 instead of 100 (yr). The 100YR Post Development Calculation sheet has also been corrected to read 100 (yr) instead of 10 (yr) on Page 4 of 4.*

Healthy Waters Response to Development Engineering Enquiry			
HW23	Revised Engineering Drawings C400- C421 revision C by Maven Associates	As per this plan, the rain gardens appear to be clustered boxes, but the typical detail just shows a single rain garden, or two in series. If rain gardens clusters are proposed more details are required on the working of interlinked boxes, or (preferably) provide a bespoke design to provide the necessary stormwater management. This could actually be through dry detention basins which could be more economic than rain gardens and provide the relevant detention and treatment functions.  	Maven Response: *Rain gardens are proposed to be series of rain garden boxes clustered together, this is not uncommon. The interlink between the rain gardens have been shown on the typical rain garden elevation detail on Maven Plan C421. It is proposed that ponding will occur across all rain gardens at once due to the cut out between the rain gardens. The slotted PVC perforated flexible pipe also connects between rain gardens to allow interlink between rain gardens. See image below which demonstrates the proposed arrangement of rain gardens. Should further details be provided to demonstrate this, it will be provided at EPA stage.*
Stormwater Management Plan Healthy Waters - adoption review report			
HW24	SMP and development scope	Scope of SMP unclear - is it for the entire plan change area? Page 3 SMP notes that 520 GSR will result in 80 lot development and then states that after the plan change 522 GSR and 21 Gatland RD will result in another 30 lots. Not clear if the SMP covers all the plan change area and thus all lots and associated stormwater management. The SMP needs to clarify if the proposed effects management covers the entire plan change area.	Refer to Executive Summary, Section 1 and 6
HW25	Receiving environment	Receiving environment is too brief. Immediate plan change location not subject to overlays, however it is a fairly short stretch of stream before reaching Drury Creek which is a marine SEA. This should be noted as this is the ultimate receiving environment. Manukau Harbour as a receiving environment is too broad.	Refer to Section 2.8

Healthy Waters Response to Development Engineering Enquiry			
HW26	Sub-catchment B	Confirmation of southern catchment drainage is required, although this relates to adjacent property 522 Great South Road; however, there may be implications to the proposed development's stormwater network.	Refer to Sections 2.6.2, 2.7,6.3 and 8.2.5.2
HW27	Flood modelling	Lack of clarity on assumptions and info used in flood model.	Refer to Section 7
HW28	Stormwater Management	Additional investigations are identified in the SMP text and may need to be strengthened through precinct provisions.	N/A
HW29	Auckland Transport and treatment of roads	Clarification of treatment for roads to be provided within the toolbox itself and within the text. This will probably be best to confirm in direct discussions with Auckland Transport where traffic volumes can be discussed, and appropriate treatment devices incorporated. Recommended that Auckland Transport be allowed to comment on the SMP and also provide input into the Resource Consent stage to ensure that devices located within the road corridor are acceptable and optimised.	Meeting with Auckland Transport and Healthy Waters representatives on 18 August 2020. Maven has subsequently revised the layout for road-side treatment devices to amalgamate treatment into larger devices, in recognition of Auckland Transport's preferences. Refer to Section 5
HW30	Further investigations	There is further work that would need to carried out prior to subdivision applications to confirm the BPO, including: • Site specific infiltration tests • Engagement with AT over appropriate treatment for the internal subdivision roads • Drainage investigation of 522 Great South Road and inclusion of this area in the proposed drainage network, if applicable.	Refer to: • Section 2.4 • Section 5 • Section 8.2.5.2

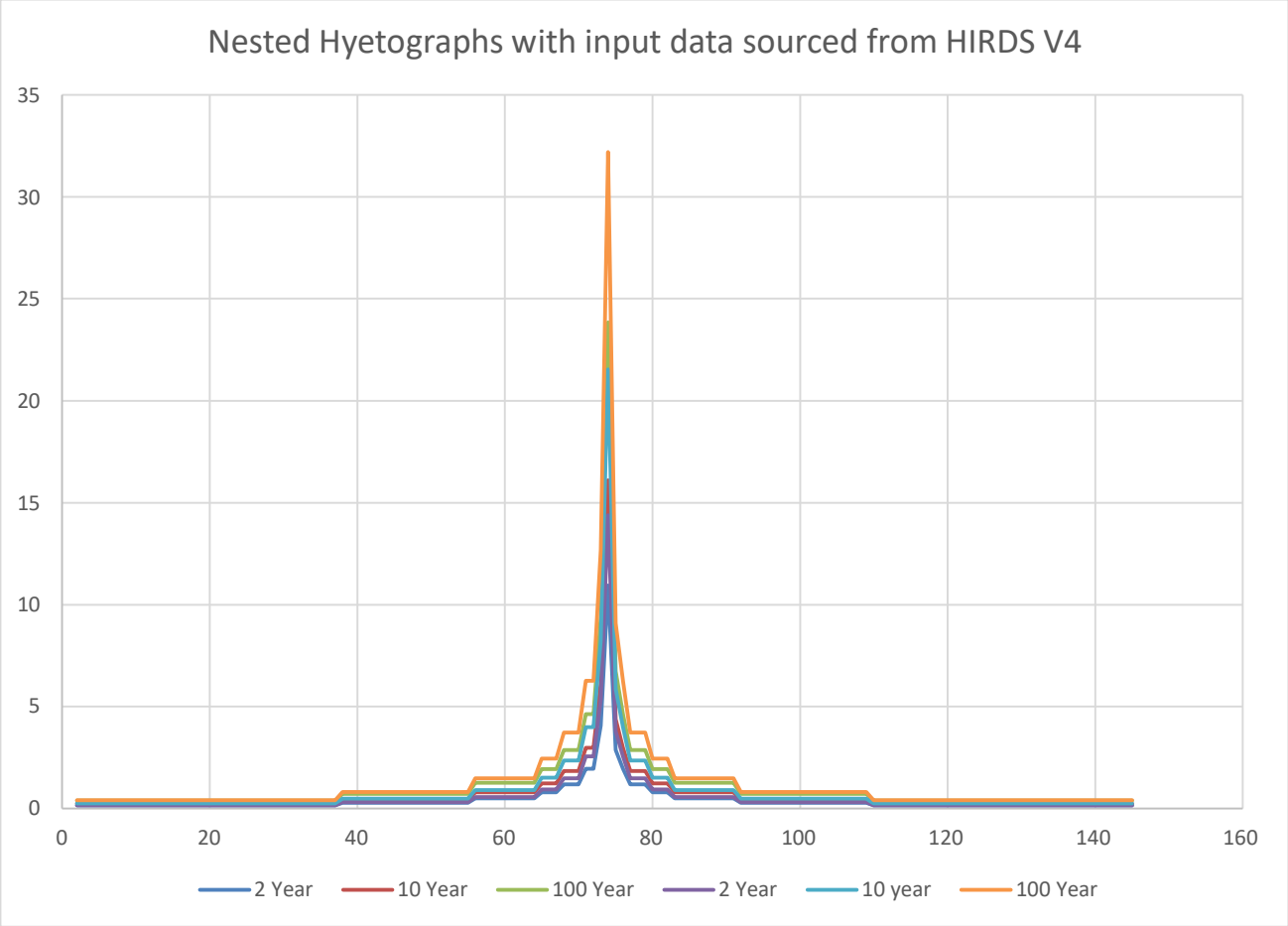
Appendix E1: Calculations

HEC HMS Inputs

CEMP 23/04/2020

Generated from HIRDS V4 hyetograph Generation (april 2020)

		Nested Hyetograph					
		Historical Data			RCP8.5 for the period 2081-2100		
Check - total depth		65.555	101.422	159.715	77.732	122.617	195.153
Check - peak		10.936	16.102	23.840	14.378	21.545	32.205
Time (10 minute intervals)		2 Year	10 Year	100 Year	2 Year	10 year	100 Year
01Jan2000, 00:00	0						
01Jan2000, 00:10	0.17	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 00:20	0.33	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 00:30	0.50	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 00:40	0.67	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 00:50	0.83	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 01:00	1.00	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 01:10	1.17	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 01:20	1.33	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 01:30	1.50	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 01:40	1.67	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 01:50	1.83	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 02:00	2.00	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 02:10	2.17	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 02:20	2.33	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 02:30	2.50	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 02:40	2.67	0.151	0.241	0.396	0.153	0.250	0.413
01Jan2000, 02:50	2.83	0.151	0.241	0.396	0.153	0.250	0.413



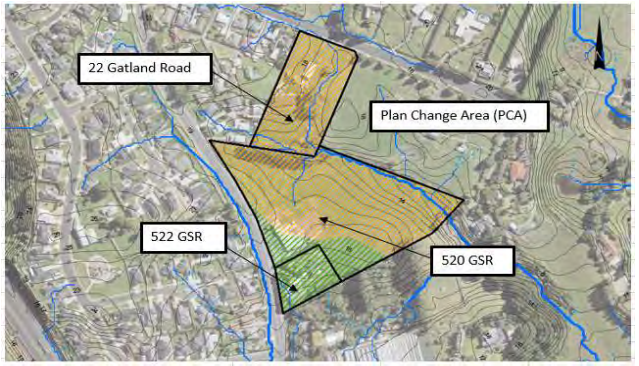
Northern sub-catchment (A)

	Total area m²	Pervious area m²	Impervious area m²	% Impervious	Weighted curve number	Weighted Ia
Sub-catchment A Total Existing	98,126	68,172	29,954	30.5	85.49	
Sub-catchment A Total Proposed	102,847	47,898	54,949	53.4	89.62	
Existing						
Cemetery ED & MPD	23,535	22,420	1,115	4.7	80.85	
Residential 1 ED & MPD	19,850	7,940	11,910	60.0	90.80	
Residential 2 ED & MPD	3,250	3,097	153	4.7	80.85	
Road & footpath (outside PCA)	13,907	-	13,907	100.0	98.00	
	60,542	**33,457**	**27,085**		**88.05**	2.76
21 Gatland Road existing	12,115	10,615	1,500	12.4	82.23	
520 Great South Road existing (partial)	24,100	24,100	-	0.0	80.00	
Road & footpath (inside PCA)	1,369	-	1,369	100.0	98.00	
	37,584	**34,715**	**2,869**	**112**	**81.37**	4.62
Proposed						
Cemetery ED & MPD	23,535	22,420	1,115	4.7	80.85	
Residential 1 ED & MPD	19,850	7,940	11,910	60.0	90.80	
Residential 2 ED & MPD	3,250	3,097	153	4.7	80.85	
Road & footpath (outside PCA)	13,907	-	13,907	100.0	98.00	
	60,542	**33,457**	**27,085**		**88.05**	2.76
21 Gatland Road	12,115	4,135	7,980	65.9	91.86	
520 GSR (Lots)	15,452	3,863	11,589	75.0	93.50	
520 GSR (pervious areas)	6,442	6,442	-	0.0	80.00	
520 GSR (paved footpath/road)	8,296	-	8,296	100.0	98.00	
	42,305	**14,440**	**27,865**		**91.86**	1.71

Southern sub-catchment (B)

	Total area m²	Pervious area m²	Impervious area m²	% Impervious	Weighted curve number	Weighted Ia
Sub-catchment B Total Existing	8,721	5,633	3,088	35	86.37	
Sub-catchment B Total Proposed	4,000	1,360	2,640	-	91.88	
Existing						
520 GSR + 522 GSR	8,721	5,633	3,088	35.4	86.37	
	8,721	**5,633**	**3,088**	**35**	**86.37**	3.23
Proposed						
522 GSR	4,000	1,360	2,640	66.0	91.88	
	4,000	**1,360**	**2,640**		**91.88**	1.70

Total imperviousness of 520 GSR = 66%



	Pervious area m²	Impervious area m²	Total area m²	
Existing	73,805	33,042	106,847	**31%**
Proposed	49,258	57,589	106,847	**54%**

Latest masterplan recieved from client saved here:
1009613.1000 GSR Master Plan dated 03042020

Note 1:
Based on the latest proposed development masterplan, the impervious coverage within in a given Lot ranges from 60% for spacious end sections to 85% for narrow terrace sections. For this calculation, the average lot impervious is assumed to be 75%.

Note 2:
For properties within the PCA but not included in the proposed development masterplan, an average imperviousness of 66% has been used. This is based on the total imperviousness % of the 520 GSR property

Note 3:
It is assumed all runoff within 520 Great South road will discharge to Watercourse A in the post-development case. This means an additional 4,721 m2 of 520 Great South Road will be catered for in sub-catchment A.

Runoff Hydrographs from the Northern Catchment extracted from HEC HMS model

Design Storm		2 Year		10 Year		100 Year	
Peak flow		0.791	1.368	1.390	2.283	2.326	3.649
Volume		3626	5587	6696	9948	12029	17206
Date	Time	Pre-development	Post-development	Pre-development	Post-development	Pre-development	Post-development
1-Jan-00	0:00	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:01	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:02	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:03	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:04	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:05	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:06	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:07	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:08	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:09	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:10	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:11	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:12	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:13	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:14	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:15	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:16	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:17	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:18	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:19	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:20	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:21	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:22	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:23	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:24	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:25	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:26	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:27	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:28	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:29	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:30	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:31	0.000	0.000	0.000	0.000	0.000	0.000
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1-Jan-00	0:33	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:34	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:35	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:36	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:37	0.000	0.000	0.000	0.000	0.000	0.000
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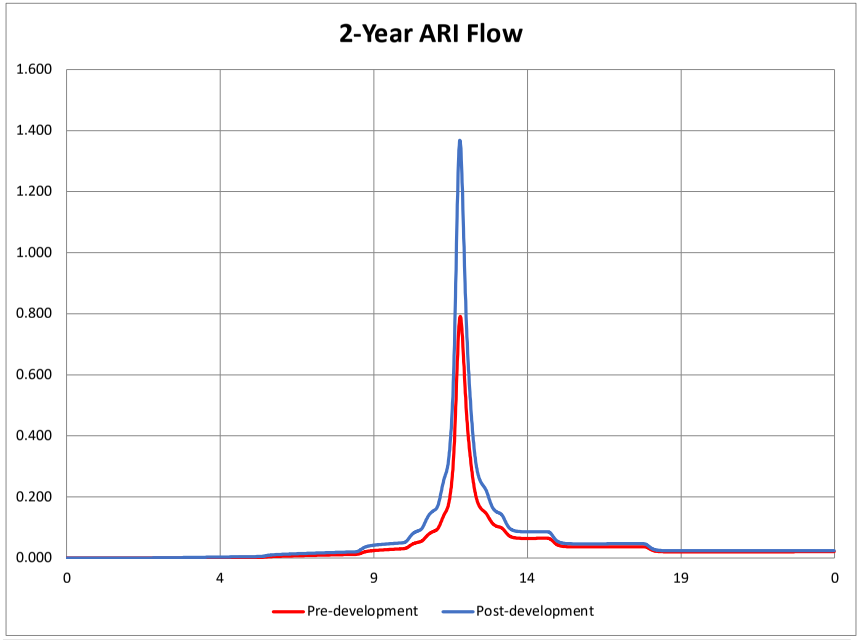
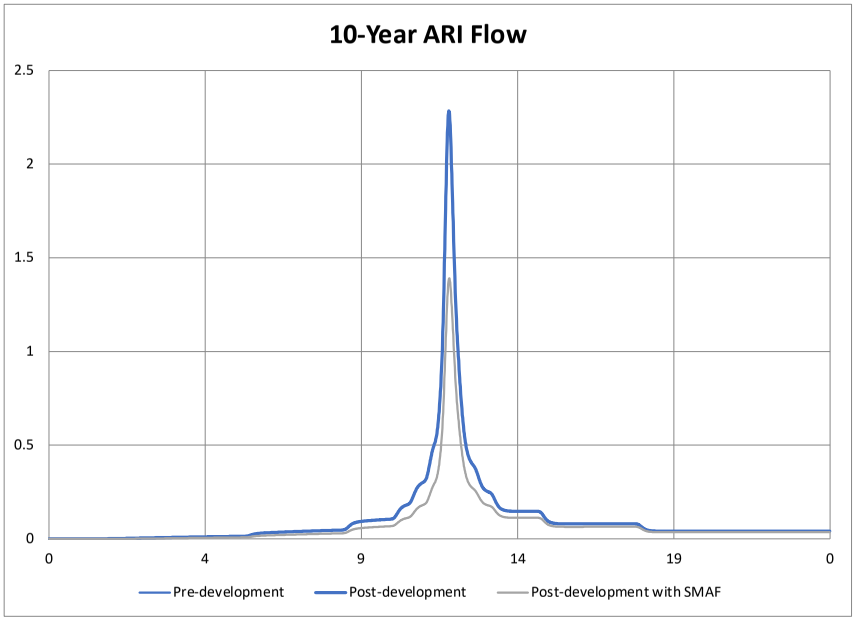
1-Jan-00	0:45	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:46	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:47	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:48	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:49	0.000	0.000	0.000	0.000	0.000	0.000





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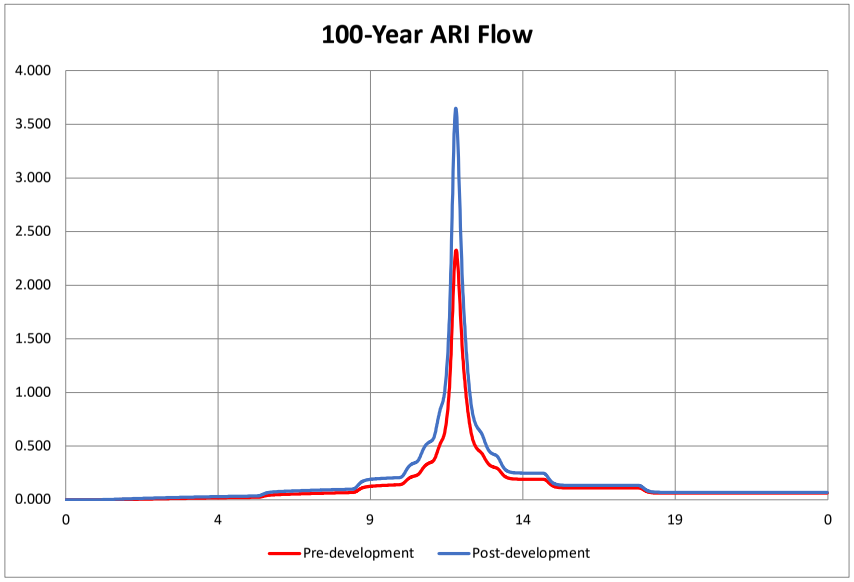
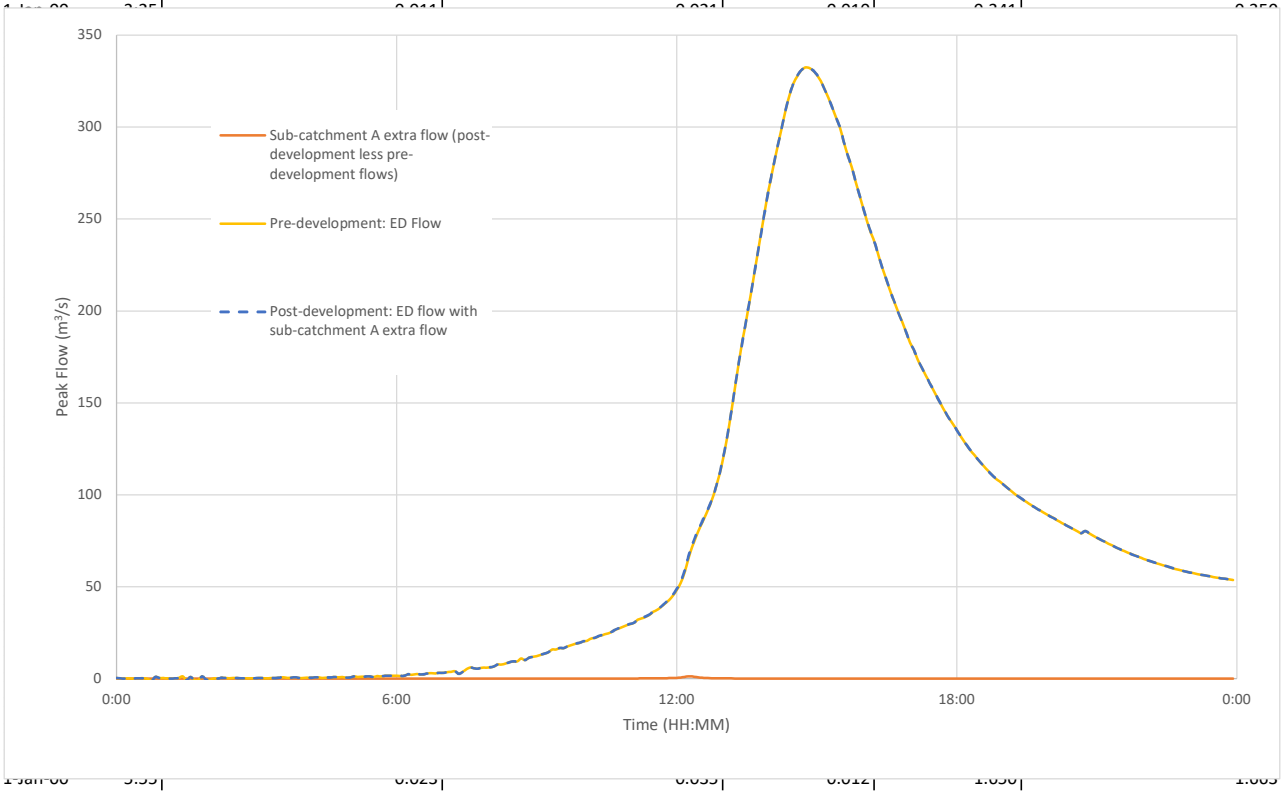
1-Jan-00	0:53	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:54	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:55	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:56	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:57	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:58	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	0:59	0.000	0.000	0.000	0.000	0.000	0.000
1-Jan-00	1:00	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:01	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:02	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:03	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:04	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:05	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:06	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:07	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:08	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:09	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:10	0.000	0.000	0.000	0.000	0.000	0.001
1-Jan-00	1:11	0.000	0.000	0.000	0.000	0.000	0.002
1-Jan-00	1:12	0.000	0.000	0.000	0.000	0.000	0.002
1-Jan-00	1:13	0.000	0.000	0.000	0.000	0.000	0.002
1-Jan-00	1:14	0.000	0.000	0.000	0.000	0.000	0.002
1-Jan-00	1:15	0.000	0.000	0.000	0.000	0.000	0.002



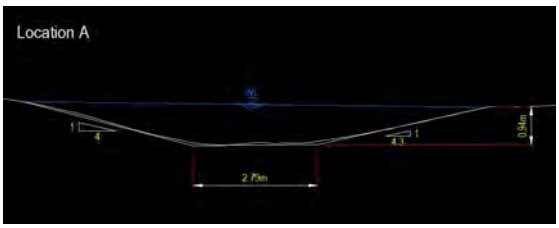
100 Year runoff at Great South Road Bridge

		HEC HMS outputs			From AC models	
Date	Time	Pre-development	Post-development	Extra flow	ED at GSR Bridge	ED at GSR Bridge + Extra Flow
1-Jan-00	0:00	0.000	0.000	0.000	0.377	0.377
1-Jan-00	0:05	0.000	0.000	0.000	0.219	0.219
1-Jan-00	0:10	0.000	0.000	0.000	0.079	0.079
1-Jan-00	0:15	0.000	0.000	0.000	0.287	0.287
1-Jan-00	0:20	0.000	0.000	0.000	0.027	0.027
1-Jan-00	0:25	0.000	0.000	0.000	0.232	0.232
1-Jan-00	0:30	0.000	0.000	0.000	0.270	0.270
1-Jan-00	0:35	0.000	0.000	0.000	0.276	0.276
1-Jan-00	0:40	0.000	0.000	0.000	-0.119	-0.119
1-Jan-00	0:45	0.000	0.000	0.000	-1.011	-1.011
1-Jan-00	0:50	0.000	0.000	0.000	0.985	0.985
1-Jan-00	0:55	0.000	0.000	0.000	0.405	0.405
1-Jan-00	1:00	0.000	0.001	0.001	0.330	0.331
1-Jan-00	1:05	0.000	0.001	0.001	0.219	0.220
1-Jan-00	1:10	0.000	0.001	0.001	0.020	0.022
1-Jan-00	1:15	0.000	0.002	0.002	0.191	0.193
1-Jan-00	1:20	0.000	0.003	0.002	0.393	0.395
1-Jan-00	1:25	0.000	0.003	0.003	1.207	1.210
1-Jan-00	1:30	0.001	0.004	0.004	-0.818	-0.814
1-Jan-00	1:35	0.001	0.005	0.004	0.916	0.921
1-Jan-00	1:40	0.001	0.006	0.005	-0.686	-0.681
1-Jan-00	1:45	0.002	0.007	0.005	-0.856	-0.851
1-Jan-00	1:50	0.002	0.008	0.005	1.234	1.239
1-Jan-00	1:55	0.003	0.008	0.006	-0.362	-0.356
1-Jan-00	2:00	0.003	0.009	0.006	-0.598	-0.591
1-Jan-00	2:05	0.003	0.010	0.007	0.196	0.202
1-Jan-00	2:10	0.004	0.011	0.007	0.060	0.067
1-Jan-00	2:15	0.004	0.012	0.007	0.507	0.514
1-Jan-00	2:20	0.005	0.012	0.008	0.375	0.382
1-Jan-00	2:25	0.005	0.013	0.008	0.261	0.269
1-Jan-00	2:30	0.006	0.014	0.008	0.473	0.481
1-Jan-00	2:35	0.006	0.015	0.008	0.327	0.336
1-Jan-00	2:40	0.007	0.015	0.008	0.218	0.226
1-Jan-00	2:45	0.007	0.016	0.009	0.266	0.274
1-Jan-00	2:50	0.008	0.017	0.009	0.285	0.294
1-Jan-00	2:55	0.008	0.017	0.009	0.203	0.212
1-Jan-00	3:00	0.009	0.018	0.009	0.319	0.329
1-Jan-00	3:05	0.009	0.019	0.009	0.455	0.464
1-Jan-00	3:10	0.010	0.019	0.009	0.213	0.222
1-Jan-00	3:15	0.010	0.020	0.010	0.247	0.257
1-Jan-00	3:20	0.011	0.021	0.010	0.342	0.352



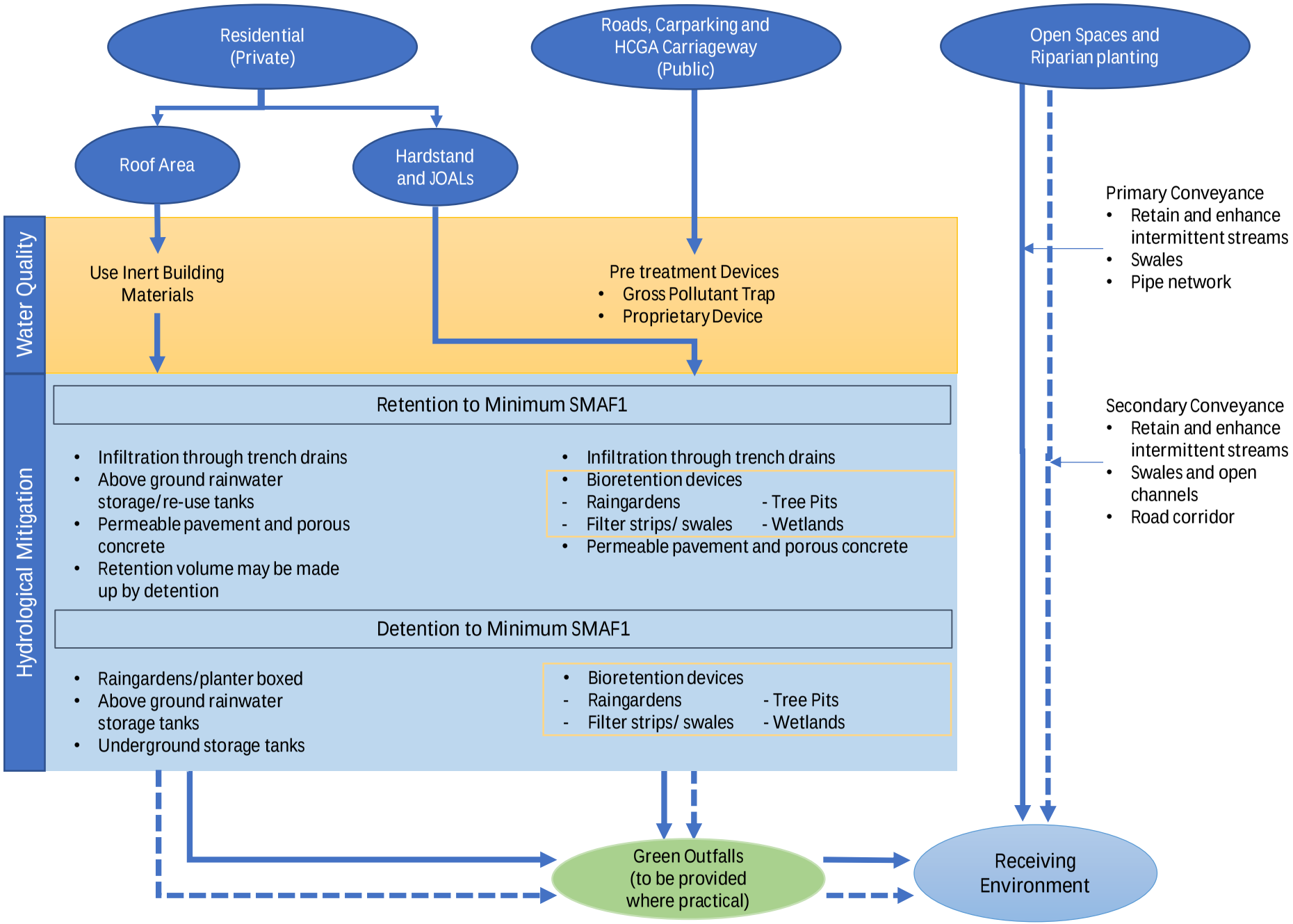
Slippery Creek Discharge point

	Input parameters	
	Pre-development	Post-development
Longitudinal slope S	0.01	
Mannings roughness n	0.04	
Side slope 1:X_1	1.5	
Side slope 1:X_2	1.5	
Bottom Width B	6	
Critical shear stress Ts	32.6	



	2 Year Pre-development					
TIME	CHANNEL FLOW	NORMAL DEPTH	BOUNDARY SHEAR (ds)	BOUNDARY SHEAR (R)	EXCESS SHEAR (dS)	EXCESS SHEAR (RS)
t	Q	d	t_o	t_o	t_e	t_e
minutes	m^3/s	m	Pa	Pa	gamma DS	gamma RS
Peak shear stress	0.79	0.17	16.47	15.59	0.51	0.48
<1					1440	1440
>1 & <2					0	0
>2 & <10					0	0
>10					0	0
0:00	0.00	0.000	0.00	0.00	0.00	0.00
0:01	0.00	0.000	0.00	0.00	0.00	0.00
0:02	0.00	0.000	0.00	0.00	0.00	0.00
0:03	0.00	0.000	0.00	0.00	0.00	0.00
0:04	0.00	0.000	0.00	0.00	0.00	0.00
0:05	0.00	0.000	0.00	0.00	0.00	0.00
0:06	0.00	0.000	0.00	0.00	0.00	0.00
0:07	0.00	0.000	0.00	0.00	0.00	0.00
0:08	0.00	0.000	0.00	0.00	0.00	0.00
0:09	0.00	0.000	0.00	0.00	0.00	0.00
0:10	0.00	0.000	0.00	0.00	0.00	0.00
0:11	0.00	0.000	0.00	0.00	0.00	0.00
0:12	0.00	0.000	0.00	0.00	0.00	0.00
0:13	0.00	0.000	0.00	0.00	0.00	0.00
0:14	0.00	0.000	0.00	0.00	0.00	0.00
0:15	0.00	0.000	0.00	0.00	0.00	0.00
0:16	0.00	0.000	0.00	0.00	0.00	0.00
0:17	0.00	0.000	0.00	0.00	0.00	0.00
0:18	0.00	0.000	0.00	0.00	0.00	0.00
0:19	0.00	0.000	0.00	0.00	0.00	0.00
0:20	0.00	0.000	0.00	0.00	0.00	0.00
0:21	0.00	0.000	0.00	0.00	0.00	0.00
0:22	0.00	0.000	0.00	0.00	0.00	0.00
0:23	0.00	0.000	0.00	0.00	0.00	0.00
0:24	0.00	0.000	0.00	0.00	0.00	0.00
0:25	0.00	0.000	0.00	0.00	0.00	0.00
0:26	0.00	0.000	0.00	0.00	0.00	0.00
0:27	0.00	0.000	0.00	0.00	0.00	0.00
0:28	0.00	0.000	0.00	0.00	0.00	0.00
0:29	0.00	0.000	0.00	0.00	0.00	0.00
0:30	0.00	0.000	0.00	0.00	0.00	0.00
0:31	0.00	0.000	0.00	0.00	0.00	0.00
0:32	0.00	0.000	0.00	0.00	0.00	0.00
0:33	0.00	0.000	0.00	0.00	0.00	0.00
0:34	0.00	0.000	0.00	0.00	0.00	0.00
0:35	0.00	0.000	0.00	0.00	0.00	0.00
0:36	0.00	0.000	0.00	0.00	0.00	0.00
0:37	0.00	0.000	0.00	0.00	0.00	0.00
0:38	0.00	0.000	0.00	0.00	0.00	0.00
0:39	0.00	0.000	0.00	0.00	0.00	0.00
0:40	0.00	0.000	0.00	0.00	0.00	0.00
0:41	0.00	0.000	0.00	0.00	0.00	0.00
0:42	0.00	0.000	0.00	0.00	0.00	0.00
0:43	0.00	0.000	0.00	0.00	0.00	0.00
0:44	0.00	0.000	0.00	0.00	0.00	0.00
0:45	0.00	0.000	0.00	0.00	0.00	0.00
0:46	0.00	0.000	0.00	0.00	0.00	0.00
0:47	0.00	0.000	0.00	0.00	0.00	0.00
0:48	0.00	0.000	0.00	0.00	0.00	0.00
0:49	0.00	0.000	0.00	0.00	0.00	0.00
0:50	0.00	0.000	0.00	0.00	0.00	0.00
0:51	0.00	0.000	0.00	0.00	0.00	0.00
0:52	0.00	0.000	0.00	0.00	0.00	0.00
0:53	0.00	0.000	0.00	0.00	0.00	0.00

Appendix F1: Proposed stormwater management


Residential (Private)
Roads, Carparking and HCGA Carriageway (Public)
Open Spaces and Riparian planting
Roof Area
Hardstand and JOALs
Water Quality
Use Inert Building Materials
Pre treatment Devices
• Gross Pollutant Trap
• Proprietary Device
Primary Conveyance
• Retain and enhance intermittent streams
• Swales
• Pipe network
Hydrological Mitigation
Retention to Minimum SMAF1
• Infiltration through trench drains
• Above ground rainwater storage/re-use tanks
• Permeable pavement and porous concrete
• Retention volume may be made up by detention
• Infiltration through trench drains
• Bioretention devices
- Raingardens - Tree Pits
- Filter strips/ swales - Wetlands
• Permeable pavement and porous concrete
Secondary Conveyance
• Retain and enhance intermittent streams
• Swales and open channels
• Road corridor
Detention to Minimum SMAF1
• Raingardens/planter boxed
• Above ground rainwater storage tanks
• Underground storage tanks
• Bioretention devices
- Raingardens - Tree Pits
- Filter strips/ swales - Wetlands
Green Outfalls (to be provided where practical)
Receiving Environment

Activity	Component	Minimum requirements	Recommended approaches	Guidelines
Residential lots – Roof Area	Hydrological mitigation only	Retention of at least 5 mm of runoff depth from impervious surfaces. Detention and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from a 95th percentile, 24-hour rainfall event minus the achieved retention volume, over the impervious area for which hydrology mitigation is required.	• Infiltration through trench drains • Above ground rainwater storage/re-use tanks • Permeable pavement and porous concrete • Raingardens/planter boxed • Underground storage tanks	• Auckland Council GD01
Residential lots – Hardstand and jointly owned access lanes Roads, Carparking and HCGA Carriageway	Water quality Hydrological mitigation	Stormwater management of runoff from all impervious surfaces before discharging into the receiving environment. Minimise the generation of contaminants as much as possible. Where contaminants are generated, the preferred approach is to use green infrastructure to treat runoff at-source or as close to the source as practicable. Retention of at least 5 mm of runoff depth from impervious surfaces. Detention and a drain down period of 24 hours for the difference between the pre-development and post-development runoff volumes from a 95th percentile, 24-hour rainfall event minus the achieved retention volume, over the impervious area for which hydrology mitigation is required.	• Pre-treatment Devices - Gross Pollutant Trap - Proprietary Device • Infiltration through trench drains • Bioretention devices - Raingardens - Tree Pits - Filter strips/ swales - Wetlands • Permeable pavement and porous concrete	• Auckland Council GD01 • Auckland Council GD04 • Auckland Council Unitary Plan stormwater management provisions TR2013/35
Public spaces only i.e. Roads, Carparking, HCGA Carriageway, Open Spaces and Riparians	Stormwater conveyance	Convey runoff generated from the 10 year ARI through a public piped stormwater network. Allowance for runoff flows greater than the 10 year ARI should be made in overland flow paths. Existing overland flow paths should be protected.	**Primary Conveyance** • Retain and enhance intermittent streams • Swales • Pipe network **Secondary Conveyance** • Retain and enhancestreams • Swales and open channels • Road corridor	• Auckland Council GD01 • Auckland Council GD04 • Auckland Council Stormwater Code of Practice
Open Spaces and Riparians	Stream hydrology and erosion protection	Enhance water quality, flows, stream channels and their margins and other freshwater values where the current condition is below the relevant thresholds.	• Green outfall (where practicable) • Riparian margin enhancement and planting	• Auckland Council GD01 • Auckland Council TR2013/018 • Assessment of Ecological Effects

Appendix F2: Stormwater management selection process

*****Not applicable within this SMP*****

Appendix G1: Draft operation and maintenance

*****Not applicable within this SMP*****