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18 October 2024

Banyule City Council

Proposed Residential Development
3 Waverley Avenue, Ivanhoe
Transport Impact Assessment Letter

Dear Sir / Madam,

Ratio Consultants has assessed the vehicular access arrangements and car parking layout of the proposed residential development at 3 Waverley Avenue, Ivanhoe. Accordingly, we report as follows.

1. The Proposal

It is proposed to demolish the existing dwellings on the subject site at 3 Waverley Avenue, Ivanhoe to construct a three-storey residential development with associated on-site car parking. More specifically, the application proposes the following:

— Construction of 10 x 3-bedroom dwellings.

— A total of 20 car parking spaces are provided within a basement car park.

— Vehicular access to the site is provided via a new single-width crossover connecting to/from Waverley Avenue.

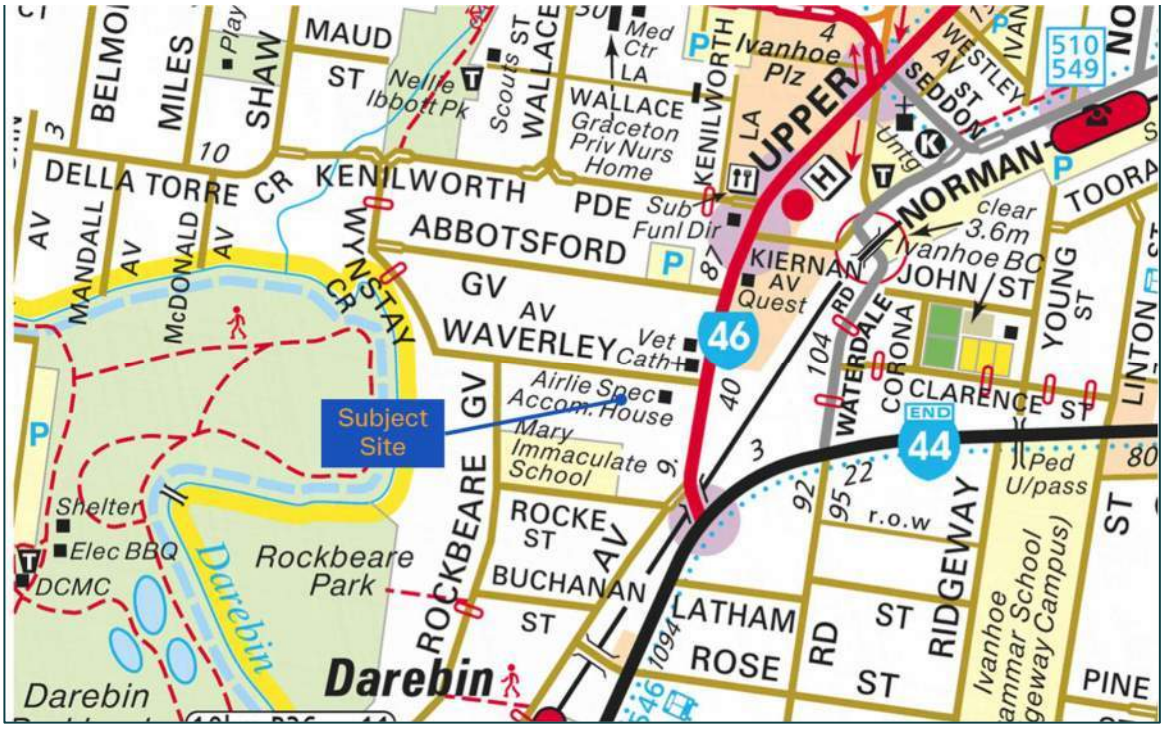
— A total provision of 11 bicycle spaces, arranged as double-sided 'hoop' style bicycle rails (such as the Arc de Triomphe rail or similar) in the northeast corner of the ground floor for visitors and 9 vertical bicycle rails (such as the Ned Kelly rail or similar) located within the basement car park for residents.

— Pedestrian access to the site will be via a pedestrian pathway connecting to/from Waverley Avenue located along the eastern boundary of the site.

2. Existing Conditions

The subject site is located on the southern side of Waverley Avenue between Rockbeare Grove and Upper Heidelberg Road, in Ivanhoe. Figure 2.1 illustrates the location of the site relative to the surrounding road network.

Figure 2.1: Location of the Subject Site



Source: online.melway.com.au/melway/

The site is currently occupied by two residential buildings. Vehicular access to the site is currently provided via a single-width crossover located at the north-eastern boundary of the subject site.

The site is located within a General Residential Zone – Schedule 1 (GRZ3) and is subject to the following overlays:

— A Development Contributions Plan Overlay – Schedule 1 (DCPO1);

— A Design and Development Overlay – Schedule 12 (DDO12); and

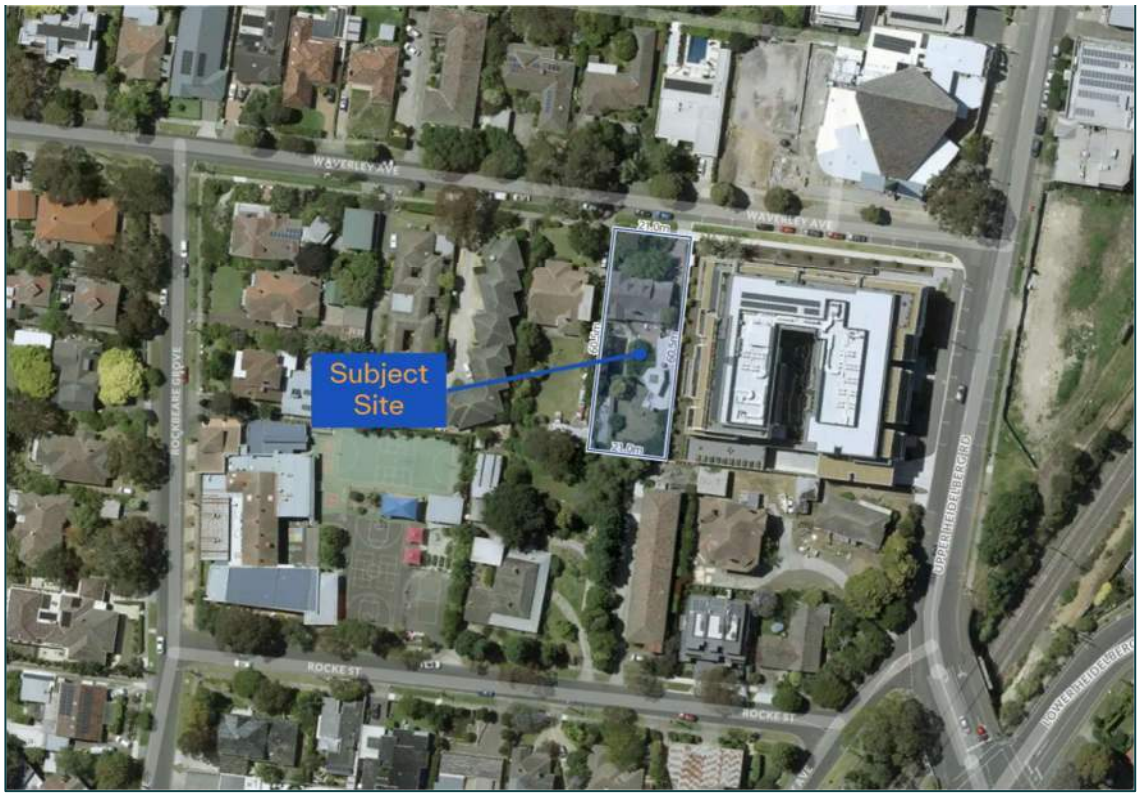
— A Vegetation Protection Overlay – Schedule 3 (VPO3).

Waverley Avenue is a Council managed Local Road that runs in an east-west alignment, continuing as Wynstay Crescent in the west and terminates at Upper Heidelberg Road in the east. It has a carriageway width of approximately 7.2 metres accommodating two-way vehicle movements. Kerbside parallel parking is permitted along the southern side of the road only fronting the site, with kerbside parallel parking permitted on both sides of the road further to the west.

Waverley Avenue has a default speed limit of 50km/hr characteristic of built-up areas and concrete footpaths are provided on both sides of the road.

Figure 2.2 provides an aerial photograph of the site and its surrounds.

Figure 2.2: Aerial View of the Site



Source: app.landchecker.com.au/

3. Car Parking Assessment

Car parking requirements for Dwelling use are set out under Clause 52.06 of the Banyule Planning Scheme.

The subject site is located within the Principal Public Transport Network Area (State Government of Victoria, 2018) and therefore the Column B rates outlined in Table 1 of Clause 52.06-5 apply to the proposed development. Accordingly, the statutory car parking requirements of the proposed development have been assessed against these rates and are summarised at Table 3.1.

Table 3.1: Statutory Parking Requirement

Use	Type	Size and number	Statutory Parking Rate	Statutory Requirement
Dwelling	Three-Bedroom	10 x Three-Bedroom Dwelling	2 spaces to each three or more-bedroom dwelling	20 spaces
TOTAL				**20 spaces**

On the basis of the above, the proposal has a statutory requirement to provide a total of 20 car parking spaces. The proposal has a total provision of 20 car spaces. Accordingly, the proposal meets the statutory requirement of the Banyule Planning Scheme requirements for car parking and is therefore considered satisfactory.

4. Access and Car Parking Layout

The proposed vehicular access arrangements and car parking layout have been designed in accordance with the objectives and design requirements of Clause 52.06-9 of the Banyule Planning Scheme and in accordance with the relevant sections of AS/NZS 2890.1:2004.

An assessment against the relevant standards of Clause 52.06-9 of the Banyule Planning Scheme is provided below:

Design Standard 1 – Accessways

Vehicular access to the site is provided via a new single-width crossover connecting to/from Waverley Avenue.

Design Standard 1 of Clause 52.06-9 relates to the design of accessways. The requirements of Design Standard 1 are assessed against the proposal in Table 4.1 below:

Table 4.1: Design Standard 1 Assessment – Accessways

Requirement	Comments
Must be at least 3m wide.	**Satisfied** – The accessway has been designed with a minimum width of 3.6 metres (inclusive of 300mm wide kerbs on both sides of the ramp), exceeding this requirement.
Have an internal radius of at least 4m at changes of direction or intersection or be at least 4.2m wide.	**Satisfied** – There are no changes of direction within the basement car park. Nevertheless, the accessway is in excess of 4.2m at all points.
Allow vehicles parked in the last space of a dead-end accessway in public car parks to exit in a forward direction with one manoeuvre.	**N/A** - The proposed car park is not a public car park. Nevertheless, all vehicles can exit in a forward direction with one manoeuvre.
Provide at least 2.1m headroom beneath overhead obstructions, calculated for a vehicle with a wheel base of 2.8m.	**Satisfied** – A minimum headroom clearance of 2.1 metres has been provided beneath the overhead obstruction and within the basement car park.
If the accessway serves four or more car spaces or connects to a road in a Transport Zone 2 or Transport Zone 3, the accessway must be designed so that cars can exit the site in a forward direction.	**Satisfied** – All vehicles can enter and exit the site in a forward direction.
Provide a passing area at the entrance at least 6.1m wide and 7m long if the accessway serves	N/A - Given that the accessway is less than 50 metres where passing can occur and does not

ten or more car parking spaces and is either more than 50m long or connects to a road in a Transport Zone 2 or Transport Zone 3.	connect to a road in Transport Zone 2 or Transport Zone 3, a passing bay is not required at the entrance to the site.
Have a corner splay or area at least 50% clear of visual obstructions extending at least 2m along the frontage road from the edge of an exit lane and 2.5m along the exit lane from the frontage, to provide a clear view of pedestrians on the footpath of the frontage road. The area clear of visual obstructions may include an adjacent entry or exit lane where more than one lane is provided, or adjacent landscaped areas, provided the landscaping in those areas is less than 900mm in height.	**Satisfied** – A corner splay of 2.0m x 2.5m is provided along both sides of the ramp. The area is clear of visual obstructions or has landscaping less than 900mm in height.
If an accessway to four or more car parking spaces is from land in a Transport Zone 2 or Transport Zone 3, the access to the car spaces must be at least 6m from the road carriageway.	**N/A** – Access is not from land in Transport Zone 2 or Transport Zone 3. Notwithstanding, the access to the car spaces is located at least 6 metres from the road carriageway.
If entry to the car space is from a road, the width of the accessway may include the road.	**N/A** - Entry to the car spaces is not accessed directly from a road.

Design Standard 2 – Car Parking Spaces

Design Standard 2 of Clause 52.06-9 relates to the design of car parking spaces. The requirements of Design Standard 2 are assessed against the proposal in Table 4.2:

Table 4.2: Design Standard 2 Assessment – Car Parking Spaces

Requirement	Comments
Car parking spaces and accessways must have the minimum dimensions as outlined in Table 2 of Design Standard 2.	**Satisfied** – All car parking spaces have been designed in accordance with Table 2 of Design Standard 2 i.e. a width of 2.8 metres, length of 4.9 metres, accessed from a minimum 5.8-metre-wide aisle.
A wall, fence, column, tree, tree guard or any other structure that abuts a car space must not encroach into the area marked 'clearance required' on Diagram 1 of Design Standard 2, other than: - A column, tree or tree guard, which may project into a space if it is within the area marked 'tree or column permitted' on Diagram 1. - A structure, which may project into the space if it is at least 2.1m above the space.	**Satisfied** – Car spaces located next to a wall or object that impacts the car parking envelope have been provided with an additional clearance of 300mm in accordance with Diagram 1 of Design Standard 2. Column locations also comply with Diagram 1.

Car spaces in garages or carports must be at least 6m long and 3.5m wide for a single space and 5.5m wide for a double space measured inside the garage or carport.	**N/A** – No car parking spaces are provided in garages.
Where parking spaces are provided in tandem (one space behind the other) an additional 500mm in length must be provided between each space.	**N/A** – No car parking spaces are proposed to be provided in tandem.
Where two or more car parking spaces are provided for a dwelling, at least one space must be under cover.	**Satisfied** – All resident car parking spaces are provided within a basement car park.

Design Standard 3 – Gradients

Design Standard 3 of Clause 52.06-9 relates to the design of gradients. The requirements of Design Standard 3 are assessed against the proposal in Table 4.3.

Table 4.3: Design Standard 3 Assessment – Gradients

Requirement	Comments
Accessway grades must not be steeper than 1:10 (10%) within 5m of the frontage to ensure safety for pedestrians and vehicles. The design must have regard to the wheelbase of the vehicle being designed for; pedestrian and vehicular traffic volumes; the nature of the car park; and the slope and configuration of the vehicle crossover at the site frontage. This does not apply to accessways serving three dwellings or less.	**Satisfied** – Accessway grades are not steeper than 1:10 within 5 metres of the site frontage.
Ramps (except within 5 metres of the frontage) must have the maximum grades as outlined in Table 3 of Design Standard 3 and be designed for vehicles travelling in a forward direction.	**Satisfied** – The proposed grades are in accordance with Table 3 of Design Standard 3, with grades no steeper than 1:4.
Where the difference in grade between two sections of ramp or floor is greater than 1:8 (12.5%) for a summit grade change, or greater than 1:6.7 (15%) for a sag grade change, the ramp must include a transition section of at least 2 metres to prevent vehicles scraping or bottoming. Plans must include an assessment of grade changes of greater than 1:5.6 (18%) or less than 3 metres apart for clearances, to the satisfaction of the responsible authority.	**Satisfied** - Appropriate transition sections have been provided to prevent scraping or bottoming.

Other Considerations – Stop-Go Signal Operation

To minimize the potential for any conflict along the single width basement ramp, a 'stop/go' signal system will be installed. The signal system will operate in the following manner:

— A two-aspect signal lantern will be installed at the site entry point and within the basement car park.

— At all times, motorists entering the site will be given priority, i.e. the signal in the basement will show a default red lantern, whereas the signal at the site entry point will show a default green lantern unless the red lantern is activated by a departing vehicle from the basement. This is to minimise the chance of any queuing vehicles on Waverley Avenue.

— Drivers seeking to exit the site will be required to trigger a detector loop or trigger a remote-control-unit to trigger the sequence. The signal at the entry point will turn red. There will then be a delay of approximately 15 seconds before the signal in the basement changes to green, to allow for any vehicles on the ramp at that time to enter the basement. The exact amount of green time provided for the vehicles to exit the basement will be determined at a later stage.

— In the event that a vehicle seeking to enter the site encounters a red lantern, they will temporarily need to prop on Waverley Avenue until the departing vehicle clears the ramp and the red signal lantern ceases. The wait time for a vehicle on Waverley Avenue could be anywhere between 0 and 15 seconds (conservatively based on a vehicle travelling 5km/hr). This is considered to be acceptable noting the relatively short wait time, the very rare occurrence of a conflict and low through traffic on Waverley Avenue.

The stop/go signal operation, as described above, will minimize the relatively low probability of conflict for vehicles entering/exiting the site (given the relatively low number of car parking spaces and therefore the modest level of traffic generated by the development).

Swept Path Assessment

An assessment (refer to Appendix A) of the accessibility to/from the site using the 'Autodesk Vehicle Tracking' software has been conducted. The B99 (99.8th percentile car) was used in the assessment and it was found that this vehicle could access the site in a suitable manner. Further, all vehicles will be able to enter / exit the site in a forward direction.

An assessment of the accessibility to/from the car parking spaces was also undertaken using the B85 (85th percentile car) and it was found that each of the car spaces could be accessed (ingress and egress) in a satisfactory manner.

Some corrective manoeuvres may be required, which is in accordance with AS/NZS2890.1:2004 (Table 1.1), which specifies that three-point turn movements to enter and exit 90-degree parking spaces are permitted for regular users (such as residents).

An assessment of the ground clearance (refer to Appendix A) along the basement ramp has been undertaken using the 'Autodesk Vehicle Tracking' software. The B85 'Vertical Clearance Model' (vehicle with a height of 2.1 metres and a wheelbase of 2.80 metres as detailed in the Banyule Planning Scheme) was used in the vertical clearance assessment and it was found that the vehicles could gain access (ingress and egress) in a satisfactory manner without scraping any overhead obstructions.

The assessment indicates that the vehicular access arrangements and car parking layout have been designed appropriately and in accordance with the requirements of the Banyule Planning Scheme, and/or AS/NZS 2890.1:2004.

5. Bicycle Parking

The provisions set out under Clause 52.34-3 of the Banyule Planning Scheme establish the requirement for bicycle parking spaces. The relevant rates are applied to the development are shown in Table 5.1.

Table 5.1: Bicycle Parking Requirements

Land Use	Numbers	User	Statutory Parking Rate	Statutory Requirement
Dwelling use	10 dwellings	Residents	1 space to each 5 dwellings (for developments of four or more storeys)	0 spaces
		Visitors	1 space to each 10 dwellings (for developments of four or more storeys)	0 spaces
TOTAL				**0 spaces**

The development is only three storeys in height and therefore there is no statutory requirement under Clause 52.34 of the Banyule Planning Scheme to provide any bicycle parking.

Notwithstanding, it is proposed to provide in total of 11 bicycle spaces, two visitor spaces within a single double-sided 'hoop' style bicycle rail (such as the Arc de Triomphe rail or similar) in the northeast corner of the ground floor and nine (9) resident spaces within 9 vertical bicycle rails (such as the Ned Kelly or similar) within the basement car park. Refer to Appendix B for details of the bicycle parking specifications.

6. Waste Collection Arrangements

It is understood that waste and recycling material will be collected on-site within the basement car park by a private contractor. Swept paths shown in Appendix A demonstrate the ability of a mini-rear loader to access the basement car park and exit in a forward direction. Refer to the Waste Management Plan prepared by Ratio Consultants for further information.

It is considered that the proposed waste collection arrangement is acceptable from a traffic engineering perspective.

7. Traffic Generation

In consideration of the locality of the site, the level of accessibility to public transport and the parking provision, the development is estimated to generate traffic at a daily rate of up to six vehicle movements per dwelling.

Application of this rate to the proposed dwellings results in a daily traffic volume of 60 vehicle movements per day, including approximately six (6) vehicle movement (10%) per hour during periods of peak activity. This equates to one vehicle movement being generated every 10 minutes on average during peak hours.

The majority of the traffic generated by the residential development during the AM peak period will be residents departing the site (80 percent out and 20 percent in) and the majority of the traffic during the PM peak period will be residents returning to the site (40 percent out and 60 percent in).

Accordingly, the estimated residential trip generation for typical weekday AM and PM peak hours, is estimated as shown in Table 7.1.

Table 7.1: Estimated Residential Traffic Generation

Direction	AM Peak	PM Peak
Arriving Trips	1 vph	4 vph
Departing Trips	5 vph	2 vph
Total Trips	6 vph	6 vph

The low level of additional traffic generated by the proposed residential development will flow directly onto Waverley Avenue and then onto the surrounding road network. The surrounding road network has the ability to accommodate the minor increase in traffic generated by the proposed development.

On the basis of the above, it is expected that proposed residential development will not create adverse traffic safety or operational impacts along the Waverley Avenue and/or the surrounding road network.

8. Conclusion

The proposal seeks to develop a three-storey residential development with associated on-site car parking at 3 Waverley Avenue, Ivanhoe. Based on the preceding assessment, it is considered the development is appropriate for the following reasons:

- The proposed development has a statutory requirement to provide 20 resident car spaces. the application has a provision to provide 20 resident car spaces and therefore meets the statutory car parking requirement and is considered satisfactory.
- The proposed car parking layout and vehicular access arrangements have been designed suitably and in accordance with the dimensional requirements of Clause 52.06 of the Banyule Planning Scheme and the relevant sections of AS/NZS 2890.1:2004.
- The swept path assessment demonstrates that vehicle access to/from the site and car spaces is satisfactory.
- The development is only three storeys in height and therefore there is no statutory requirement under Clause 52.34 of the Banyule Planning Scheme to provide any bicycle parking. Notwithstanding, it is proposed to provide 11 bicycle spaces, i.e., two visitor spaces on the ground floor and nine resident spaces within the basement car park.

— Waste is proposed to be collected on-site via the basement carpark by a private contractor. This is considered to be acceptable form a traffic engineering perspective.

— The volume of peak hour traffic generated by the development is estimated to be low and in the order of six vehicle movement for each of the AM and PM peak hour periods. It is considered that this low level of traffic can be accommodated by Waverley Avenue the surrounding road network.

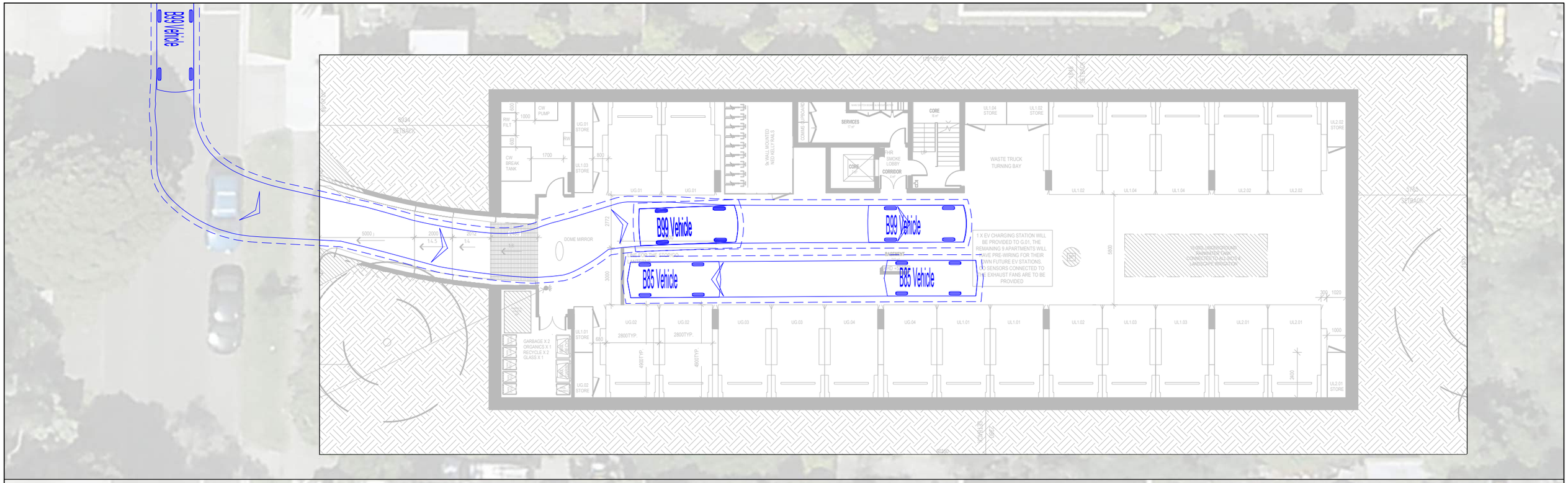
Overall, the proposed development is not expected to create any adverse traffic or parking impacts in the precinct and is therefore considered acceptable.

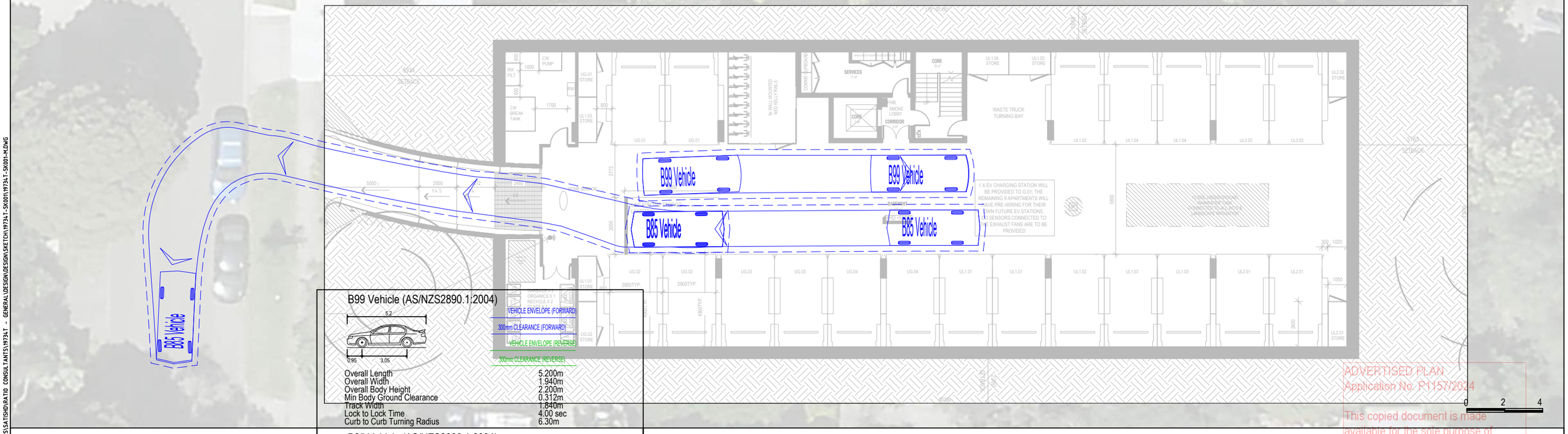
If you have any queries, please feel free to contact the undersigned on 9429 3111.

Yours sincerely,

Brett Young
Director: Transport
Ratio Consultants

Appendix A : Swept Path Assessment and Vertical Clearance Assessment



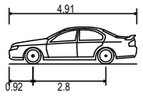


B99 Vehicle (AS/NZS2890.1:2004)

VEHICLE ENVELOPE (FORWARD)
300mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
300mm CLEARANCE (REVERSE)

Overall Length	5.200m
Overall Width	1.940m
Overall Body Height	2.200m
Min Body Ground Clearance	0.312m
Track Width	1.840m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	6.30m

B85 Vehicle (AS/NZS2890.1:2004)



VEHICLE ENVELOPE (FORWARD)
300mm CLEARANCE (FORWARD)
VEHICLE ENVELOPE (REVERSE)
300mm CLEARANCE (REVERSE)

Overall Length	4.910m
Overall Width	1.870m
Overall Body Height	1.421m
Min Body Ground Clearance	0.159m
Track Width	1.770m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	5.80m

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Residential Development
3 Waverly Avenue, Ivanhoe
Swept Path Assessment

NOTE:
1) Base Plan Supplied By KUD on 15/10/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
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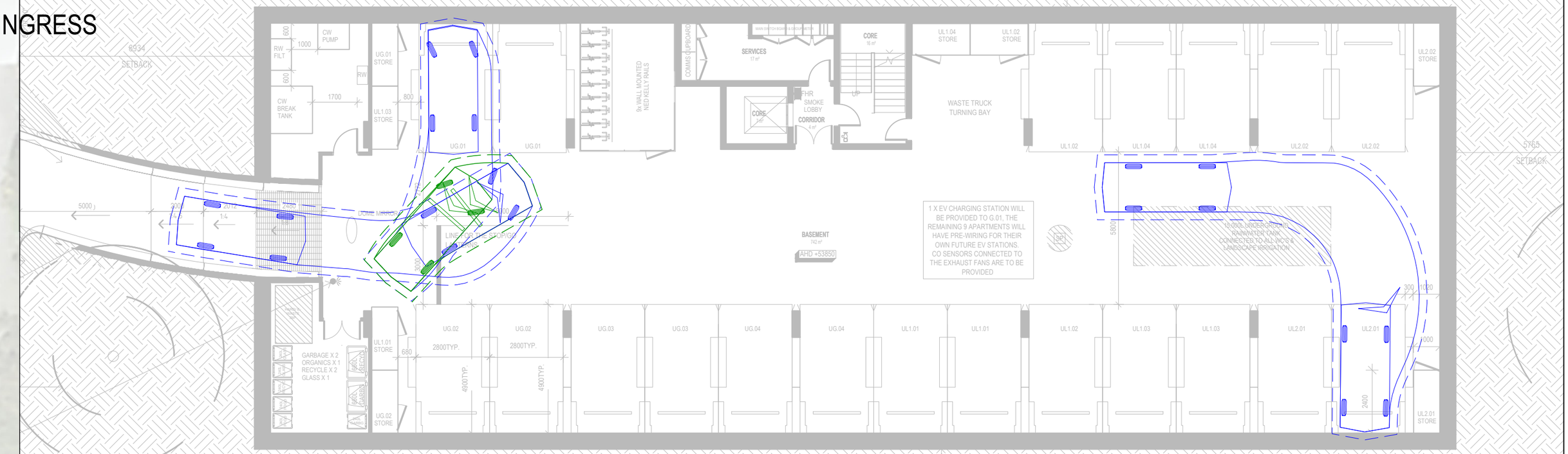

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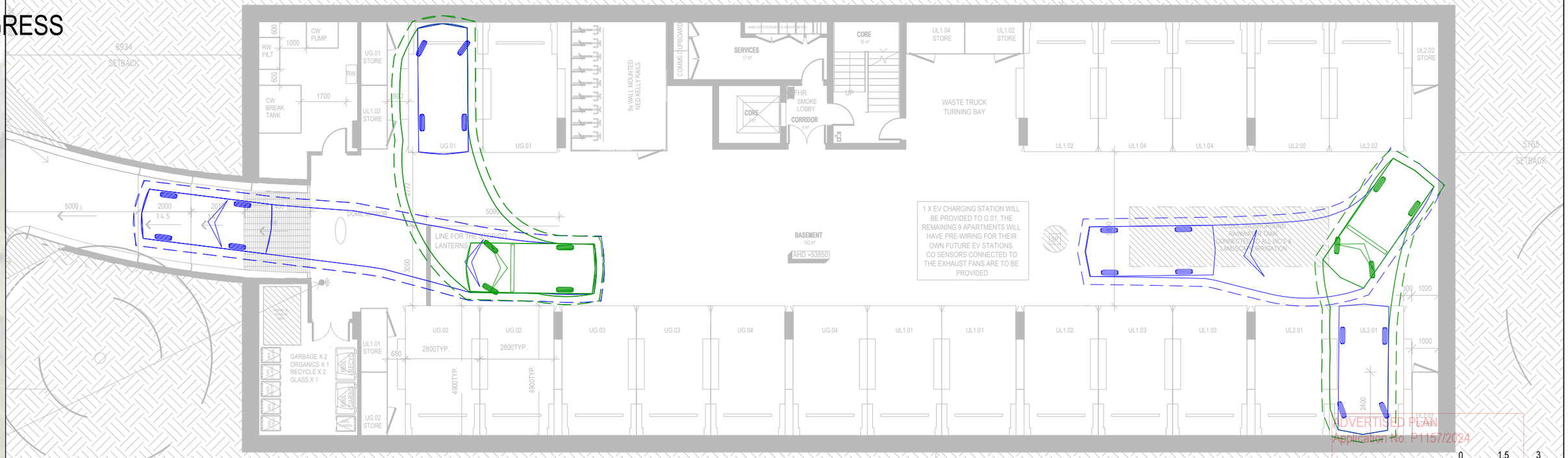

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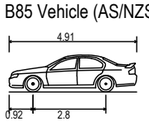

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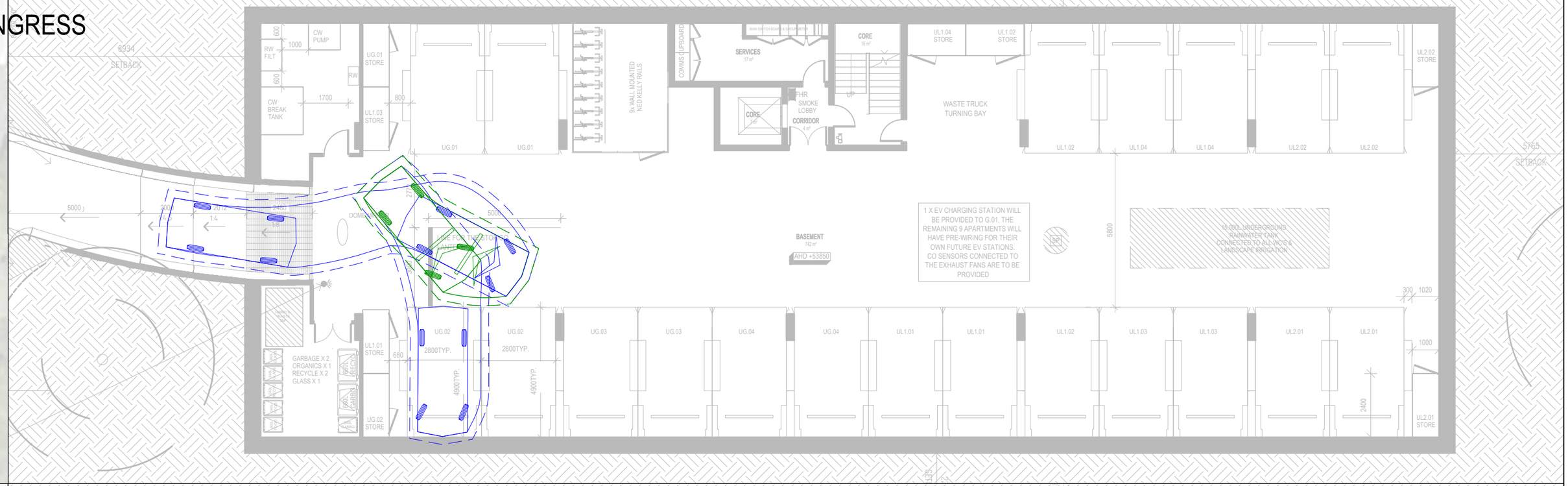

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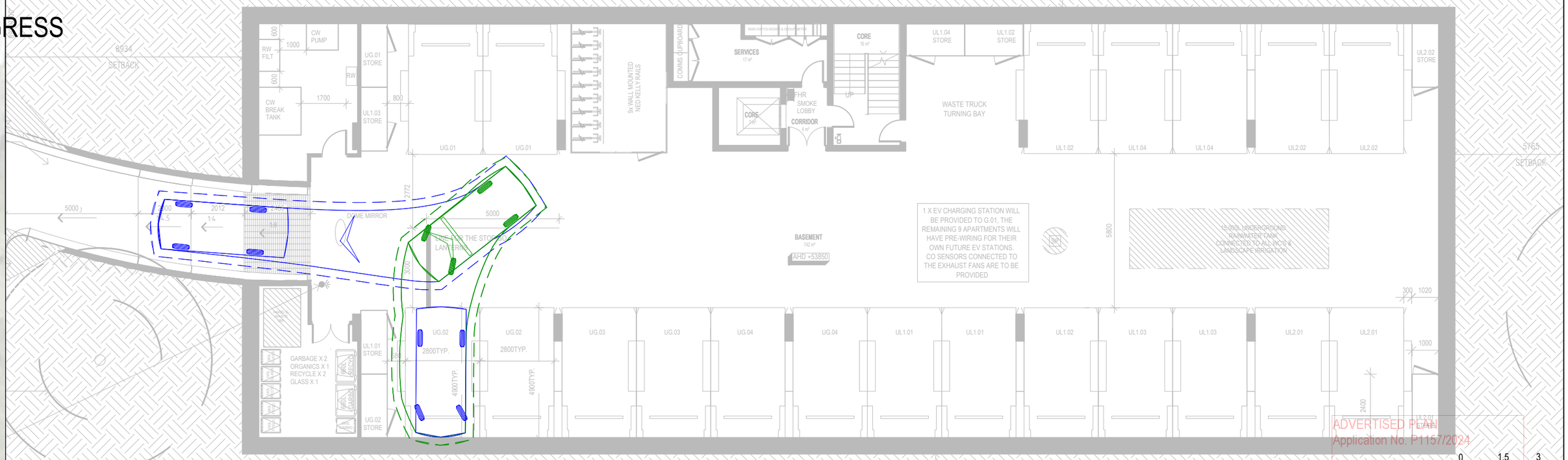

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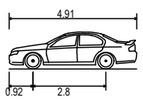

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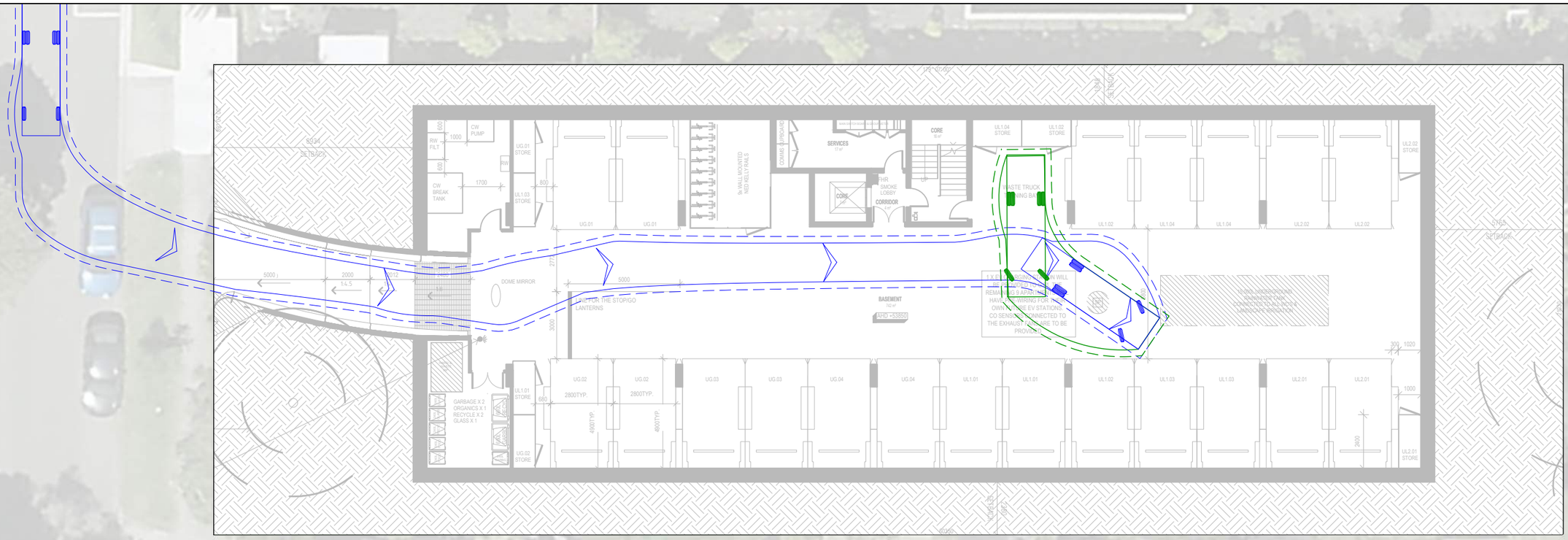

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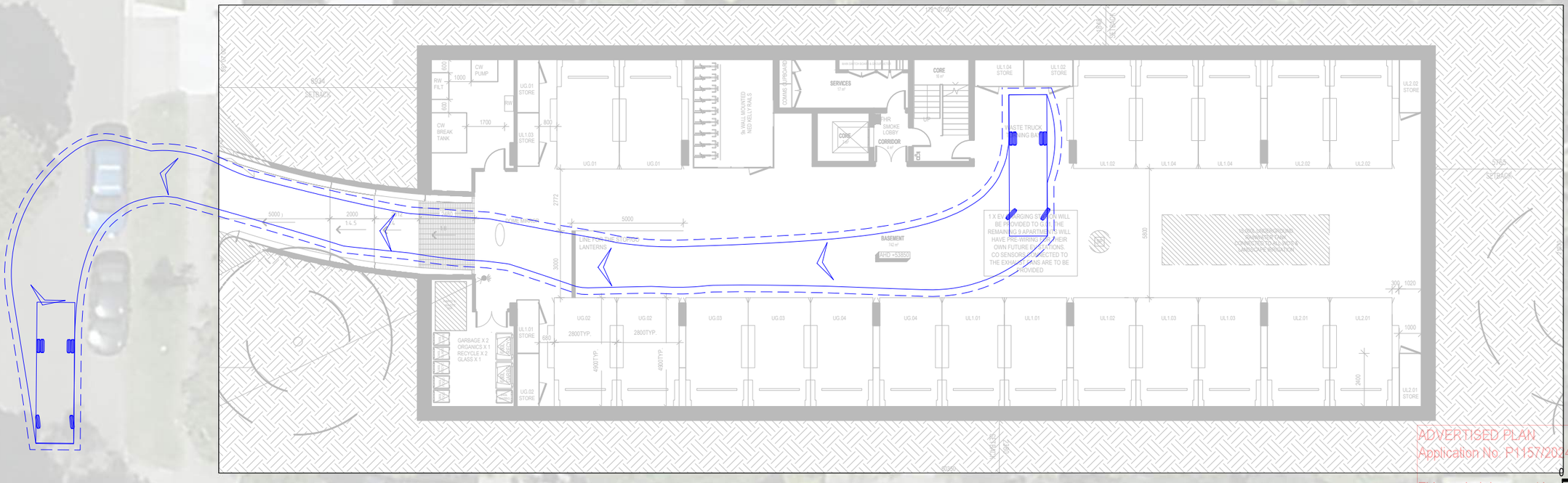

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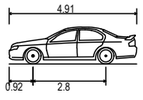

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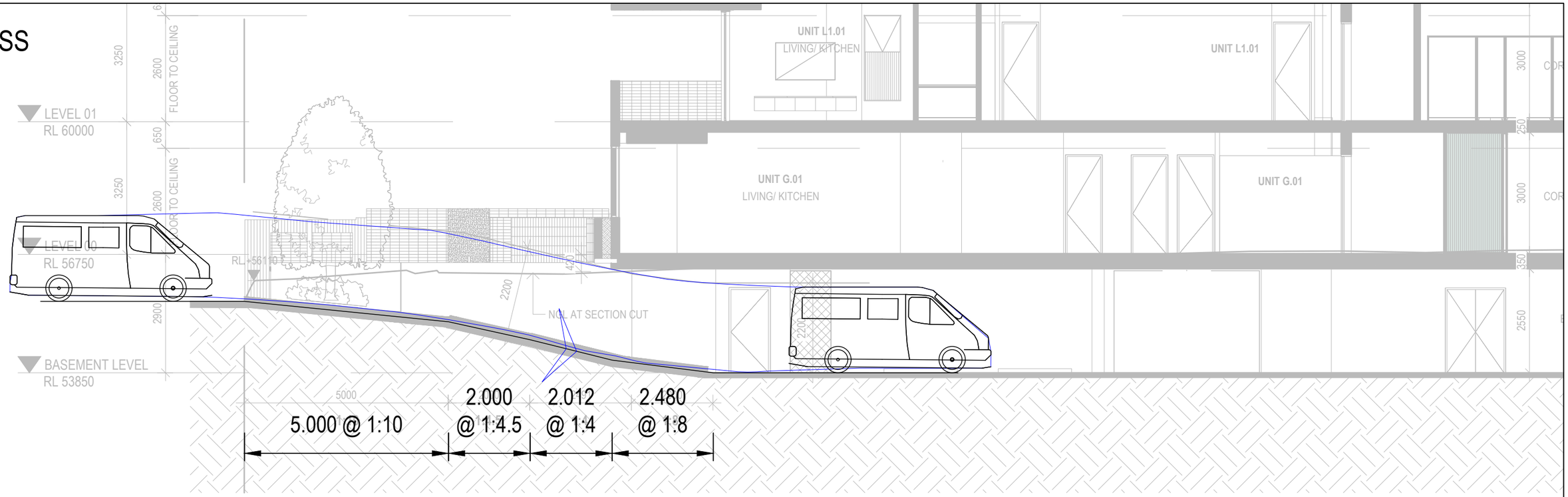

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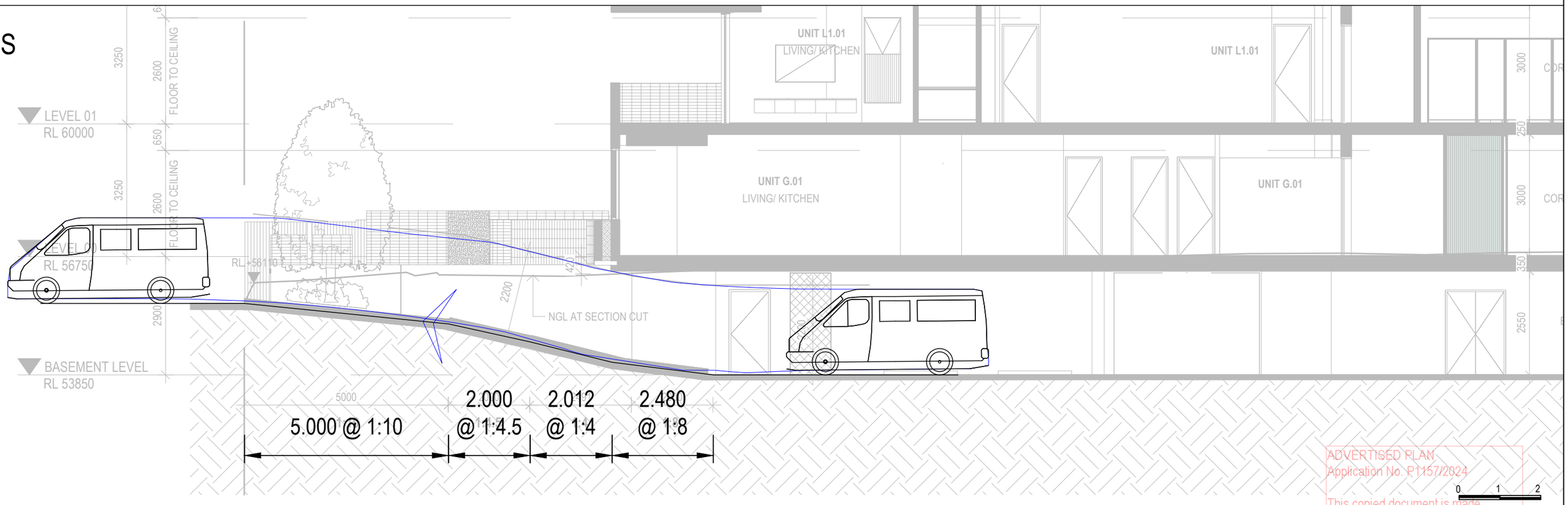
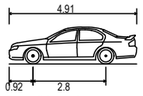


0 1 2

ratio:
RATIO CONSULTANTS PTY LTD
ABN 005 422 104
8 GWYNNE STREET
CREMORNE, VICTORIA 3121
TELEPHONE (03)9429 3111
FACSIMILE (03)9429 3011

B85 Vertical Model (AS/NZS2890.1:2004)



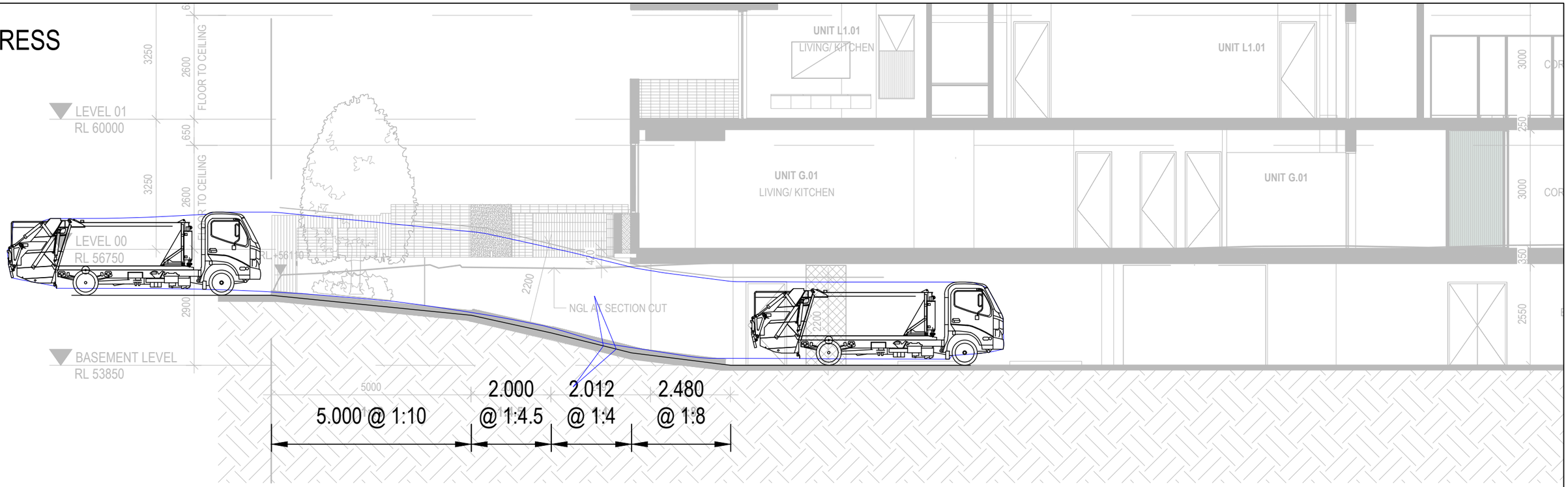
Overall Length	4.910m
Overall Width	1.870m
Overall Body Height	1.421m
Min Body Ground Clearance	0.120m
Track Width	1.770m
Lock to Lock Time	4.00 sec
Curb to Curb Turning Radius	8.000m

Residential Development
3 Waverly Avenue, Ivanhoe
Vertical Clearance Assessment

NOTE:
1) Base Plan Supplied By KUD on 15/10/2024
2) Maximum Design Speed 10km/h

RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
19734T-SK001-M	5 of 6	S.D.	1:100 @A3	18/10/2024

INGRESS



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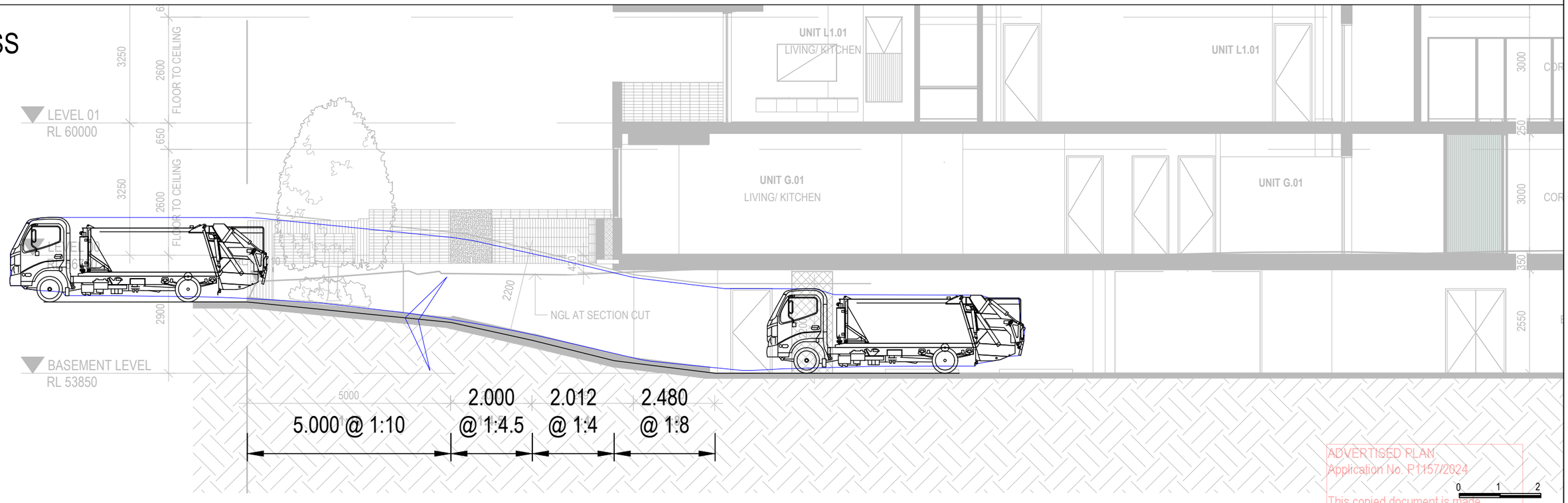

0 1 2

ratio:
RATIO CONSULTANTS PTY LTD
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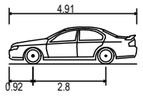

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Residential Development
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Vertical Clearance Assessment

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RATIO REFERENCE	SHEET No.	PREPARED BY	SCALE	DATE
19734T-SK001-M	6 of 6	S.D.	1:100 @A3	18/10/2024

Appendix B : Bicycle Specifications

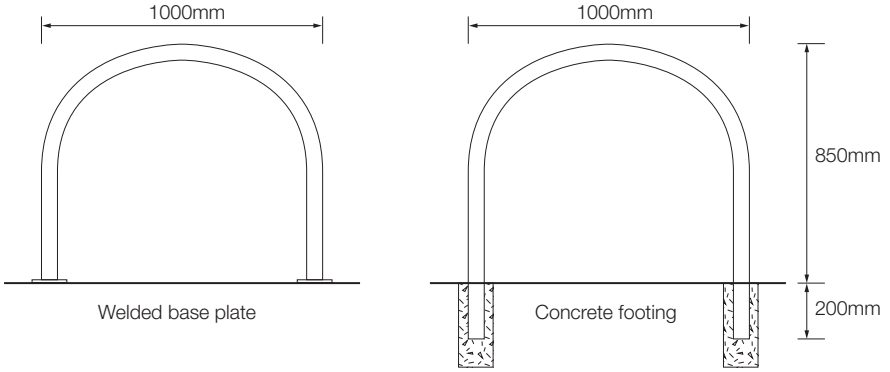
Arc de Triomphe™

Galvanised finish / Stainless Steel finish

Features

- Each rail supports two adult bikes in an upright position
- Can be either bolted to a concrete slab or concreted in situ
- Available in stainless steel or galvanised steel
- Provides the ability to lock both wheels and frame
- Suitable for foyers and entry areas

Dimensions



Specifications

Material options

- Galvanised (Duragal)
- 316 Marine grade stainless steel

Fixing options

- Welded flange - Bolt on
- In situ

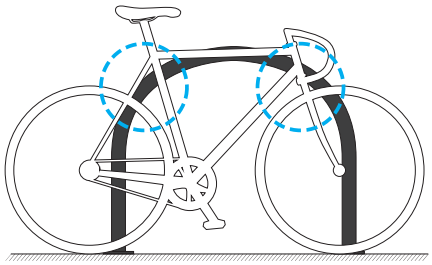
Recommended fasteners

- Galvanised Dynabolts (M10 x 65mm)
- Stainless Dynabolts (M10 x 65mm)
- Shear Nut security fasteners

Dimensions

1000mm [w] x 850mm [h]

Locking Points



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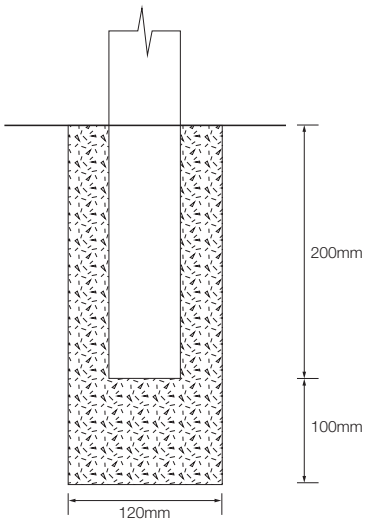
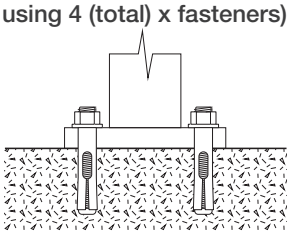
Fixing options

In situ (Concrete footing)

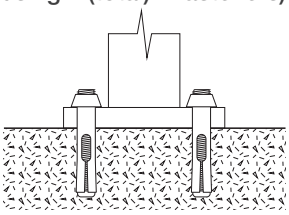


Welded flange (Bolt on)
using 4 (total) x fasteners)



Shown with M10 x 65mm fastener

Welded flange (Security heads)
using 4 (total) x fasteners)

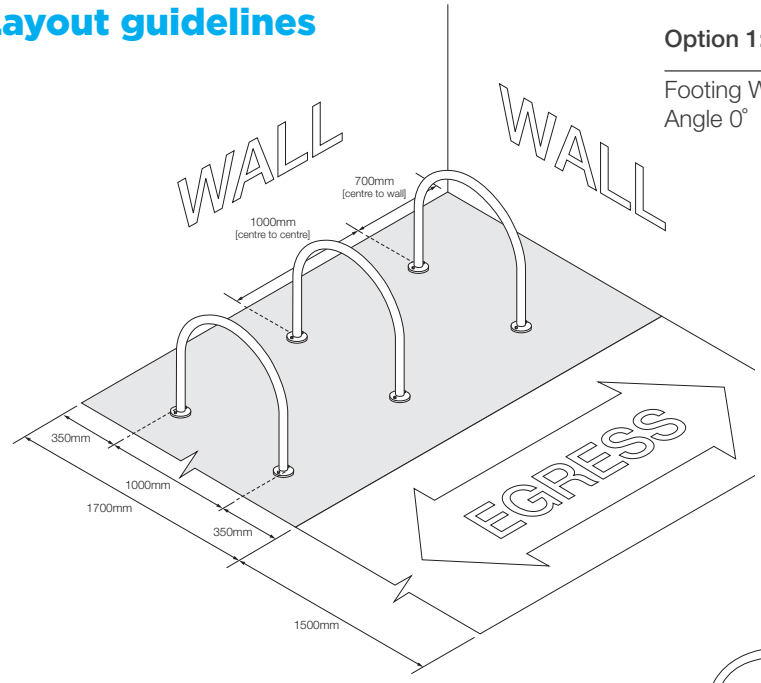


Shown with M10 x 65mm Shear Nuts

Layout guidelines

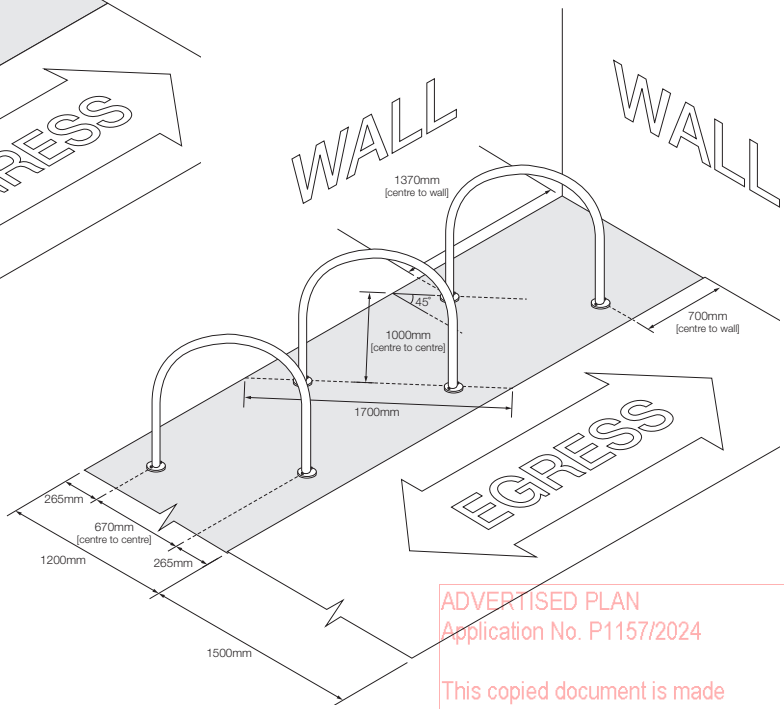
Option 1:

Footing Width 1700mm
Angle 0˚

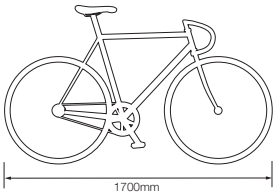


Option 2:

Footing Width 1200mm
Angle 45˚



Typical Bicycle Length



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Ned Kelly™

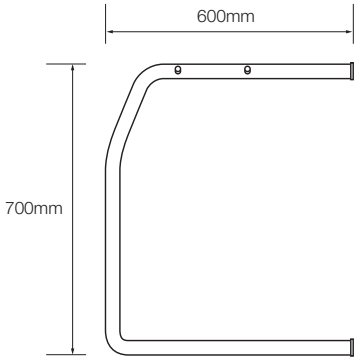
Zinc finish

Black powder coat finish

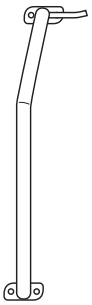
Features

- Each rail provides storage for a single bike
- Suits bikes with full length mud guards
- Available in Zinc finish or Black powder coat over mild steel
- Provides the ability to lock the main frame and one wheel
- Support prongs with protective coating prevent damage to rim
- Can be used with custom framing – no wall needed

Dimensions



SIDE



FRONT

Specifications

Material options

- Zinc finish
- Black powder coat over mild steel
- Stainless steel - *Pre-order only*

Fixing options

- Bolt on to wall
- Fixed to support framing

Recommended fasteners – wall

- Dynabolts (M8 x 40mm)
- Shear Nut security fasteners

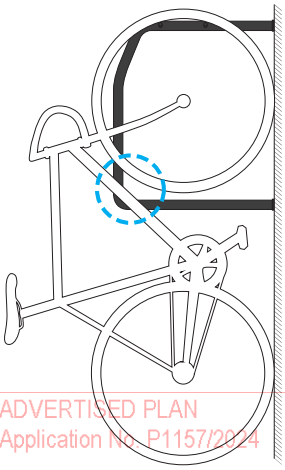
Recommended fasteners – framing

- Bolt and nut (M10 x 60mm)
- Tek screws

Dimensions

125mm [w] x 700mm [h] x 600mm [d]

Locking Points



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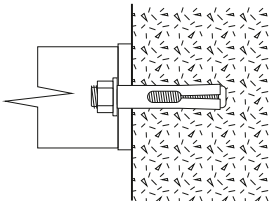
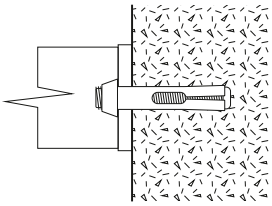
Fixing options

Fix to a wall using 4x fasteners or Shear Nuts

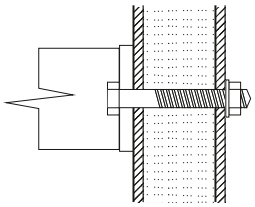


Shown with M8 x 40mm fastener

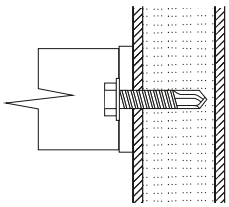


Shown with M8 x 40mm Shear Nuts

Fix to a frame using 4x bolts or Tek Screws

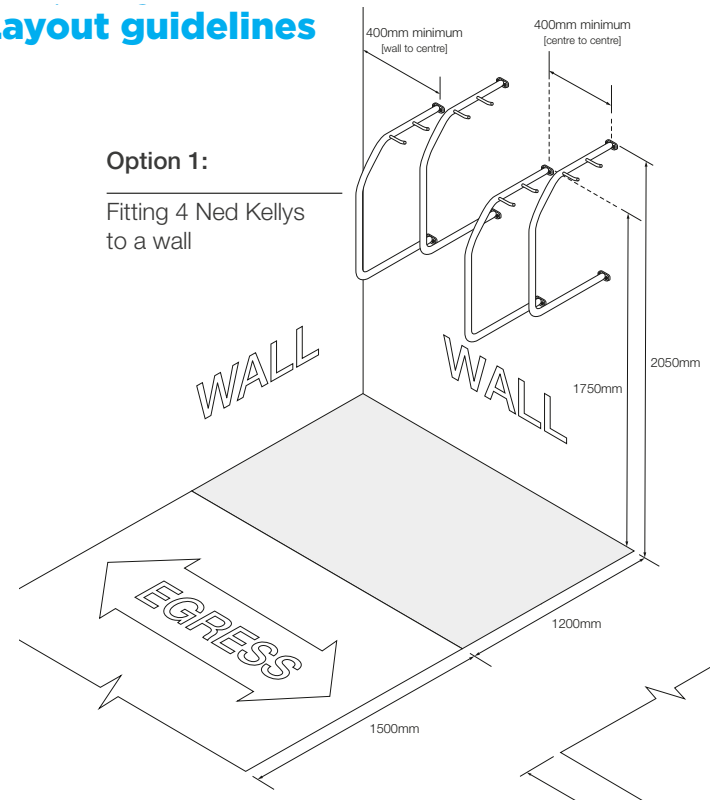


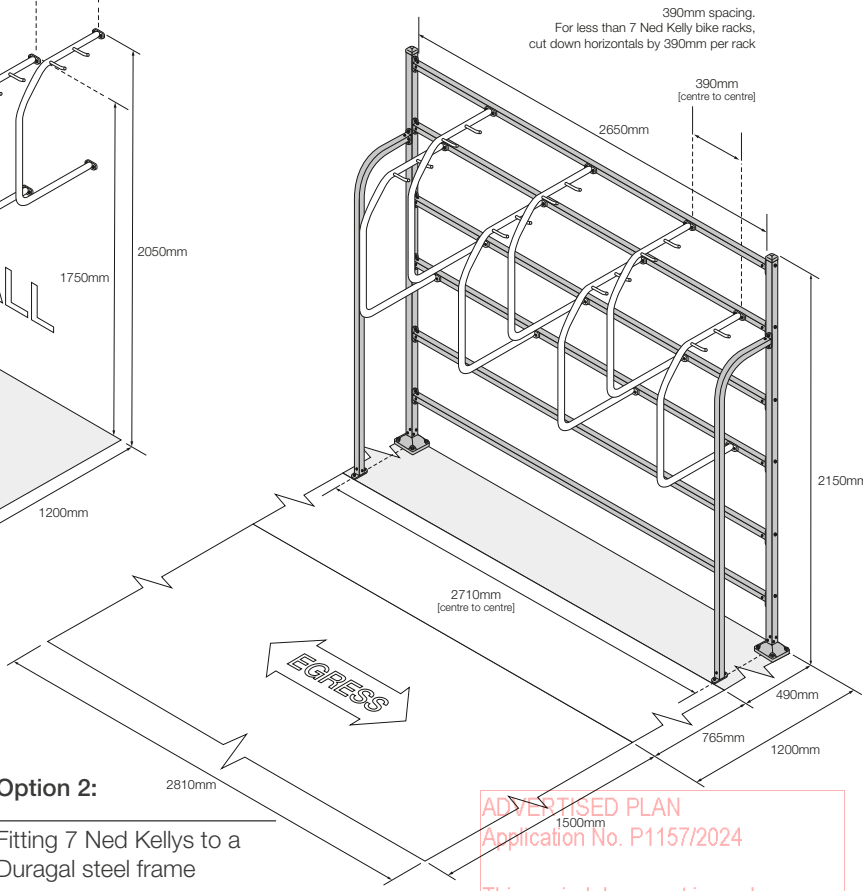
Shown with M10 x 60mm Bolt, Washer & Nut

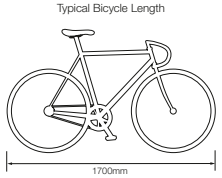


Shown with Tek Screw

Layout guidelines







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