URBIS

BENOWA GARDENS PLAN OF DEVELOPMENT

1. PURPOSE

This “Benowa Gardens Plan of Development” forms part of the common material for a development application seeking a Preliminary Approval (Variation Request) to vary the effect of Gold Coast *City Plan* (Version 11) (**City Plan**). If the Variation Request is approved it becomes a Variation Approval and this Benowa Gardens Plan of Development becomes a categorising instrument, as defined in section 43 of the *Planning Act 2016* (Qld) (**Planning Act**).

1.1. LAND TO WHICH THE VARIATION APPROVAL APPLIES

This Variation Request applies to land that formerly hosted the Benowa Gardens Shopping Centre, described in January 2025 as:

- 203 Ashmore Road, Benowa (Lot 8 on RP 839746) (‘**the site**’)

1.2. RELATIONSHIP TO THE PLANNING ACT

In accordance with subsection 43(1) of the Planning Act, this categorising instrument:

(a) categorises development as either assessable or accepted development;

(b) specifies the categories of assessment required for different types of assessable development; and

(c) sets out the matters (the **assessment benchmarks**) against which an assessment manager must assess assessable development.

1.3. STRUCTURE OF THE BENOWA GARDENS DEVELOPMENT CODE

The Benowa Gardens Development Code comprises:

- Part 1 – Purpose
- Part 2 – Application
- Part 3 – Tables of Assessment that categorise development as assessable or accepted development and specify the categories of assessment for Material Change of Use within 203 Ashmore Road, Benowa (Lot 8 on RP 839746)
- Part 4 – The Benowa Gardens Development Code, which sets out:
  - The compliance criteria in the case of development categorised as ‘accepted development subject to requirements’; and
  - The assessment benchmarks against which an assessment manager must assess assessable development against; and
- Part 5 – The Benowa Gardens Development Code Maps, including:
  - Map 1 – Building Heights – Towers and Podium; and
  - Map 2 – Residential Density Plan.

2. APPLICATION

1. As a categorising instrument forming part of a variation approval, Benowa Gardens Development Code varies the following parts of City Plan:

   (a) Table 5.5.5: MCU –Neighbourhood Centre Zone:

   - Categories of development assessment for Short-term accommodation, Shop and Building height and Residential density assessment triggers.

   (b) Section 6.2.5 Neighbourhood centre zone code:

   - Section 6.2.5.2 – Purpose:
     - Overall outcome (a)(vii);
     - Overall outcome (a)(ix);
     - Overall outcome (d)(i);
     - Overall outcome (e)(i);
   - Section 6.2.5.3 – Specific benchmarks for assessment:
     - Required outcome 8 – Land use;
     - Acceptable Outcome/Performance Outcome 1 – Setbacks;
     - Acceptable Outcome/Performance Outcome 2 – Site cover;
     - Acceptable Outcome/ Performance Outcome 3 – Height;
     - Acceptable Outcome/Performance Outcome 4 – Density;
     - Acceptable Outcome/Performance Outcome 11 – Land uses;

   (c) Section 9.3.9.3 High-rise accommodation design code:

   - Section 9.3.9-1 – Specific benchmarks for assessment
     - Acceptable Outcome/Performance Outcome 1.1

   (d) Replaces the Building height overlay map – map 17, applicable to the site;

   (e) Replaces the Residential density overlay map – map 17, applicable to the site.

2. All remaining parts of City Plan remain applicable to future development within the Benowa Gardens Development Area, to the extent they are relevant to and not inconsistent with the Benowa Gardens Plan of Development.

3. The Benowa Gardens Plan of Development is to be read in conjunction with any conditions imposed upon the granting of the Variation Approval.

2.1. DEVELOPMENT THAT IS THE SUBJECT OF THE VARIATION APPROVAL

For the purposes of subsection 43(7) of the Planning Act, development that is the subject of the variation approval is a Material Change of Use listed in Table 1 – Tables of Development Assessment Benowa Gardens.

2.2. WHERE A CONFLICT ARISES

In the event of a conflict between the Benowa Gardens Plan of Development and City Plan – the Benowa Gardens Development Code prevails to the extent of that inconsistency.

2.3. TIME LIMIT FOR THE DEVELOPMENT

In accordance with subsection 88(2) of the Planning Act, this Variation Approval will lapse fifteen (15) years after the approval takes effect, to the extent that development is not completed.

3. TABLES OF ASSESSMENT

Table 1 – Tables of Development Assessment for Material Change of Use Benowa Gardens

ACTIVITY GROUPS	USES	ASSESSMENT BENCHMARKS AND REQUIRED OUTCOMES
All activities	**Impact assessment**	
	Height	**City Plan (Version 11)**
	If involving building work and height exceeds: (a) the height identified on **Map 1 – Building Heights – Towers and Podium** ; or (b) where not identified on **Map 1 – Building Heights – Towers and Podium** 14 metres, with no more than 2 storeys	
	Impact assessment	
	Density	**City Plan (Version 11)**
	For all uses other than: (a) **Caretaker's accommodation**; or (b) **Residential care facility** If density exceeds the density identified on the **Map 2 - Residential Density Plan**	

Business activities	**Accepted subject to requirements**	
	The following uses if establishing in an existing non-residential premises and either; involving no building work (other than an internal fit-out); or involving only minor building work: (a) **Food and drink outlet** if involving (i) no consumption of alcohol; or (ii) consumption of alcohol between the hours of 10am and 10pm (b) **Hardware and trade supplies** if GFA of the use does not exceed 300m^2; (c) **Health care services**; (d) **Office** if not a real estate agency or a call centre; (e) **Shop** if – (i) GFA of any single shop does not exceed 1,500m^2; or (ii) Where involving an anchor tenancy, does not introduce more than one anchor tenancy on site, nor exceeds a GFA of 4,000m^2 (f) **Showroom** if GFA of the use does not exceed 300m^2 (g) **Sales office**	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Commercial design code** **Fire services in developments accessed by common private title code** **General development provisions code** **Healthy waters code** **Sales office code** **Transport code** **General development provisions code** **Healthy waters code** **On-site sewerage facilities code** **Solid waste management code** **Transport code** **Vegetation management code**
	Code assessment	

	(a) **Shop** if, where involving an anchor tenancy, and – (i) does not introduce more than one anchor tenancy on site; and (ii) Does not exceed a GFA of 4,000m²	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Commercial design code** **Fire services in developments accessed by common private title code** **General development provisions code** **Healthy waters code** **Sales office code** **Transport code** **General development provisions code** **Healthy waters code** **On-site sewerage facilities code** **Solid waste management code** **Transport code** **Vegetation management code**
Recreation and environmental activities	**Code assessment**	
	Indoor sport and recreation if GFA of the use does not exceed 500m²	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Commercial design code** **Driveways and vehicle crossings code Fire services in developments accessed by common private title code** **General development provisions code** **Healthy waters code** **On-site sewerage facilities code** **Solid waste management code**

		Transport code **Vegetation management code**
Residential activities	**Accepted**	
	Home based business if home based child care	Any overlay code triggered by an overlay map
	Accepted subject to requirements	
	Community residence	As specified in Schedule 6 of the Regulation

	Caretaker's accommodation **Dwelling unit** **Home based business** n.e.i **Residential care facility** if establishing in an existing Retirement facility premises and: (a) does not involve building work; or (b) involves building work that does not increase the existing GFA; or (c) involves minor building work **Retirement facility** if establishing in an existing Residential care facility premises and: (a) does not involve building work; or (b) involves building work that does not increase the existing GFA; or (c) involves minor building work **Rooming accommodation** if establishing in an existing building: (a) accommodating no more than four unrelated people; and (b) involves no building work; (c) involves minor building work	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Caretaker's accommodation code** **Driveways and vehicle crossings code** **Dwelling unit code** **Fire services in developments accessed by common private title code** **General development provisions code** **Healthy waters code** **Home based business code** **Multiple accommodation code** **Transport code** **Vegetation management code**
	Code assessment	

	Home based business if bed and breakfast **Multiple dwelling** **Residential care facility** n.e.i **Retirement facility** n.e.i **Rooming accommodation** n.e.i	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Bed and breakfast and farm stay code** **Commercial design code** **Driveways and vehicle crossings code Fire services in developments accessed by common private title code** **General development provisions code** **Healthy waters code** **Benowa Gardens High-rise accommodation design code** **Multiple accommodation code** **On-site sewerage facilities code** **Solid waste management code** **Transport code** **Vegetation management code**
Rural activities	**Accepted**	
	Permanent plantation	Any overlay code triggered by an overlay map
	Code assessment	
	Agricultural supplies store	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Commercial design code** **Driveways and vehicle crossings code Fire services in developments accessed by common private title code** **General development provisions code** **Healthy waters code** **On-site sewerage facilities code** **Solid waste management code**

		Transport code **Vegetation management code**
Tourism and entertainment activities	**Code assessment**	
	Bar if: (a) contained within a building and TUA of the use does not exceed 100m^2; and (b) involves the consumption of alcohol between the hours of 10am and 10pm **Club** if excluding the sale of liquor **Function facility** if GFA of the use does not exceed 150m^2 **Short-term accommodation**	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Bed and breakfast and farm stay code** **Commercial design code** **Driveways and vehicle crossings code Fire services in developments accessed by common private title code** **General development provisions code** **Healthy waters code** **Benowa Gardens High-rise accommodation design code** **Multiple accommodation code** **On-site sewerage facilities code** **Solid waste management code** **Surf life saving club code** **Transport code** **Vegetation management code**
	Accepted	

Transport and infrastructure activities	**Landing** if associated with a non-commercial use **Substation** **Utility installation** if: (a) not a waste transfer station or a refuse disposal; or (b) TUA of a waste transfer station does not exceed 50m^2	Any overlay code triggered by an overlay map
	Code assessment	
	Parking station if only located at ground level **Port services** if associated with a residential use **Telecommunications facility** if:	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Commercial design code**
	(a) located more than 200 metres from a sensitive land use; and (b) located more than 400 metres from an established or approved facility; or (c) for a broadcasting station or a television station	**Driveways and vehicle crossings code Fire services in developments accessed by common private title code** **Flood overlay code** **General development provisions code** **Healthy waters code** IDAS Code for development applications for prescribed tidal work **On-site sewerage facilities code** **Ship-sourced pollutants reception facilities in marinas code** **Solid waste management code** **Telecommunications and broadcasting facilities code** **Transport code** **Vegetation management code**
Accepted subject to requirements		

Any use if a Temporary use and: (a) where located on public land, the temporary use does not occur for more than 14 consecutive days in any one calendar year; or where located on land other than public land, the temporary use does not occur for more than seven consecutive days in any one calendar year; (b) the temporary use does not occur for more than 28 days in any one calendar year; (c) the temporary use does not include any industrial or residential activities or a Party house; and (d) the temporary use does not require works such as vegetation clearing or other operational work.	Any overlay code triggered by an overlay map **Benowa Gardens Code** **Market and temporary use code** **Transport code**
Impact assessment	
Any use listed in this table and not meeting the description listed in the use column Any other use not listed in this table Any other undefined use	**City Plan (Version 11)**

4. ZONE CODE

4.1. BENOWA GARDENS DEVELOPMENT CODE

(1) The purpose of the Benowa Gardens Development Code is to provide essential goods and services, diverse business opportunities including an anchor tenancy, and residential uses, while leveraging its strategic location on the key Ashmore Road corridor. The code supports an intense built form that allows for the delivery of a mixed use development that mitigates impacts on residential amenity through appropriate design and siting, ensuring a vibrant and functional neighbourhood centre that directly supports the community.

(2) The purpose of the code will be achieved through the following overall outcomes:

(a) Land uses:

(i) provide day-to-day goods and services and diverse business opportunities without exceeding the needs of the immediate neighbourhood, detracting from the residential amenity of the area or undermining the viability of mixed use or specialist centres;

(ii) include retail facilities such as neighbourhood stores and newsagents, cultural uses, medical and community facilities, small scale entertainment premises, educational establishments, indoor sport and recreation, service stations and local services such as post offices;

(iii) may include Food and drink outlets (without drive-through facilities) and Bars (with a total use area up to 100m^2);

(iv) involving commercial activities cease by 10pm to limit potential social and amenity impacts arising from these uses to nearby residents;

Note: It is acknowledged that on an individual basis it may be appropriate to review and adjust these operating hours based on the specific circumstances, roles and function of some centres.

(v) involving external patron areas, particularly where alcohol is consumed, are designed and orientated to mitigate any potential residential amenity impacts;

(vi) do not detract from the amenity of nearby sensitive land uses or land zoned for sensitive land uses;

(vii) include **multiple dwelling and short-term accommodation** residential development where integrated with business activities;

(viii) operate in a manner that do not cause nuisance to sensitive land uses; and

(ix) may include a Shop, providing the GFA of any single shop does not exceed 1,500m², **or where a single anchor tenancy, does not exceed 4,000m²**

(b) Housing is provided at a form, scale and intensity that is appropriate for the zone and each particular locality it is in where the following outcomes are satisfied:

Orderly and economically efficient settlement pattern

(i) degree of public transport service within a 400 metre walking distance, being the most desirable distance for pedestrian access, and the ease and safety of pedestrian access to that service;

(ii) proximity to major employment concentrations, centres, social and community infrastructure facilities and important amenity features, including the coast, recreational waterways and parkland;

(iii) capacity of available infrastructure to support the development, including water, sewer, transport and social and community facilities;

Housing needs

(iv) delivery of a generous mix of housing form, sizes and affordability outcomes that meet housing needs (including housing needs of the future) for the locality;

Design and amenity

(v) whether intended outcomes for building form/city form and desirable building height patterns are negatively impacted, including the likelihood of undesirable local development patterns to arise if the cumulative effects of the development are considered;

(vi) retention of important elements of neighbourhood character and amenity, and cultural heritage;

(vii) whether adjoining residential amenity is unreasonably impacted;

(viii) achievement of a high quality urban design through highly functional, accessible, attractive, memorable and sustainable buildings and public spaces;

Environment

(ix) the impacts of any site constraints, including natural hazard and environmental-based constraints; and

Community Benefit

(x) where the development:

(A) is appropriate having regard to overall outcome (b) (i) to (ix);

(B) meets all other overall outcomes for the zone; and

(C) incorporates community benefits in addition to those that could be lawfully conditioned to be provided (i.e. that are required to be provided by this City Plan or reasonably required in relation to the development or use of premises as a consequence of the development), development bonuses are applied in accordance with the **SC6.5 City Plan policy – Community benefit bonus elements**.

Note: SC6.5 City Plan policy – Community benefit bonus elements provides guidance on what might constitute additional community benefits and the supporting material that may be required to demonstrate the degree of benefit.

Note: Development is not required to incorporate community benefits in order to demonstrate that housing has been provided at a form, scale and intensity that is appropriate having regard to overall outcome (b) (i) to (ix).

(c) Character consists of:

(i) a variety of mixed use neighbourhood centre sizes which are determined by the needs of the immediate neighbourhood within a 1000m walking distance;

(ii) distinctive ground floor businesses that provide a convenient and diverse shopping experience, complemented by discrete office or residential units above;

(iii) a streetscape that is pedestrian friendly, with ample parking and framed by awning covered, attractive shop frontages;

(iv) a high level of accessibility by walking and cycling; and

(v) integration with existing neighbourhood focal points such as public transport services, parks and other community facilities, wherever possible.

(d) Built form for non-residential land uses:

(i) is of a height and density consistent with **Map 1 – Building Heights – Towers and Podium** and **Map 2 – Residential Density Plan**

(ii) on the ground floor allows for activation with the street, a flexible range of commercial opportunities and flexible re-use of non-residential space;

(iii) is setback from road frontages to complement the streetscape character and allow for activation of the street;

(iv) is setback from side and rear boundaries to protect the amenity of adjoining properties;

(v) has a site cover to maximise the use of the land while providing adequate space for facilities and landscaping;

(vi) creates strongly defined building edges and an attractive, safe and pedestrian-focused environment; and

(vii) is not dominated by supermarkets or bulky and large built form.

(e) Built form for residential land uses:

(i) is of a height and density consistent with **Map 1 – Building Heights – Towers** and **Podium Map 2 – Residential Density Plan**

(ii) is setback from side and rear boundaries to protect the amenity of adjoining uses;

(iii) is setback from road frontages to promote an urban setting and interface with the street; and

(iv) has varying site cover to reduce building dominance and provide areas for landscaping.

PART A – ACCEPTED DEVELOPMENT SUBJECT TO REQUIREMENTS

Table 1: Benowa Gardens Code – for accepted development, subject to requirements

REQUIRED OUTCOMES

Setbacks

RO1

Setbacks for non-residential land uses are as follows:

Setback	**Minimum distances measured in metres (m)**	
	Building height	**Setback**
Frontage	up to 9.5m and not more than 2 storeys	0m (maximum 2m)
	for that part exceeding 9.5m or 2 storeys	2m
Side	up to 9.5m and not more than 2 storeys	0m where the site abuts the Centre zone, Neighbourhood centre zone or Mixed use zone

		2m otherwise
	for that part exceeding 9.5m or 2 storeys	2m plus an extra 0.5m for every 3m in height or part thereof over 9.5m
Rear	up to 9.5m and not more than 2 storeys	2m
	for that part exceeding 9.5m or 2 storeys	6m

OR

AO1.2

Setbacks for residential uses are as follows:

Setback	**Minimum distances measured in metres (m)**	
	Height	**Setback**
Front for covered car parking (excluding a basement)	all	6m
Front (excluding covered car parking)	up to 23m	4m
	for that part exceeding 23m	6m
Side and rear	up to 4.5m	1.5m
	for that part between 4.5m – 7.5m	2m
	for that part exceeding 7.5m	an extra 0.5m is added for every 3m in height or part thereof over 7.5m
Between on site habitable buildings (where not attached)	Double the applicable side setback	

Site cover

RO2

Site cover does not exceed 80% for non-residential development

OR

For residential land uses, site cover does not exceed a cumulative total of :

(a) 50% of net site area up to 8 storeys;

(b) 40% of net site area from 9 to 15 storeys; and (c) 30% of net site area or 750m^2 per building, whichever is the lesser, above 15 storeys.
Height
RO3 Building height does not exceed 2 storeys with a maximum height of 14m or that shown on the **Map 1 – Building Heights – Towers and Podium** AND Structures do not exceed a height of 14m or that shown on the Building height overlay map.
Density
RO4 Density does not exceed one dwelling per 400m^2. OR Density does not exceed that shown on the **Map 2 – Residential Density Plan**
Amenity
RO5 Business hours of non-residential activities are between 6am to 10pm.
Land use
RO6 Residential uses are located above ground floor.
RO7 The design of the ground floor services and utilities allow for easy reconfiguration of commercial tenancies.
RO8 A single tenancy does not dominate the retail GFA of the neighbourhood centre area and does not exceed 1,500m^2 OR

Where involving a single anchor tenancy on site, does not exceed 4,000m² in GFA.

PART B – ASSESSABLE DEVELOPMENT

Table 2: Benowa Gardens Code – for assessable development

<table>
<tr><th>PERFORMANCE OUTCOMES</th><th>ACCEPTABLE OUTCOMES</th></tr>
<tr><td colspan="2">Setbacks</td></tr>
<tr><td>PO1.1
Setbacks for non-residential land uses:
(a) allow buildings to address and actively interface with streets and public spaces;
(b) provide additional width to the public realm and additional space for road side dining opportunities; and
(c) assist in the protection of adjacent amenity.

PO1.2
Setbacks for residential land uses:
(a) assist in the protection of adjacent amenity;
(b) allow for access around the building;
(c) contribute to streetscape character;
(d) allow for on-site car parking; and
(e) provide separation between buildings to maintain view corridors.
Note: Building setbacks may also be influenced by the shadow provisions in 9.4.4 General development provisions code.</td><td>AO1.1
Setbacks for non-residential land uses are as follows:
<table><tr><th rowspan="2">Setback</th><th colspan="2">Minimum distances measured in metres (m)</th></tr><tr><th>Building height</th><th>Setback</th></tr><tr><td rowspan="2">Frontage</td><td>up to 9.5m and not more than 2 storeys</td><td>0m (maximum 2m)</td></tr><tr><td>for that part exceeding 9.5m or 2 storeys</td><td>2m</td></tr><tr><td rowspan="2">Side</td><td>up to 9.5m and not more than 2 storeys</td><td>0m where the site abuts the Centre zone, Neighbourhood centre zone or Mixed use zone
2m otherwise</td></tr><tr><td>for that part exceeding 9.5m or 2 storeys</td><td>2m plus an extra 0.5m for every 3m in height or part thereof over 9.5m</td></tr><tr><td rowspan="2">Rear</td><td>up to 9.5m and not more than 2 storeys</td><td>2m</td></tr><tr><td>for that part exceeding 9.5m or 2 storeys</td><td>6m</td></tr></table></td></tr>
</table>

OR

AO1.2

Setbacks for residential uses are as follows:

Setback	**Minimum distances measured in metres (m)**	
	Height	**Setback**
Front for covered car parking (excluding a basement)	all	6m
Front (excluding covered car parking)	up to 23m	4m
	for that part exceeding 23m	6m
Side and rear	up to 4.5m	1.5m
	for that part between 4.5m – 7.5m	2m
	for that part exceeding 7.5m	an extra 0.5m is added for every 3m in height or part thereof over 7.5m
Between on site habitable buildings (where not attached)	Double the applicable side setback	

Site cover

PO2.1

Site cover:

(a) ensures adequate space for storage and other necessary facilities required to support the land use;

(a) allows for areas of high quality landscaping and streetscaping treatments; and

(b) contributes to neighbourhood character.

PO2.2

For residential uses, site cover:

AO2.1

For non-residential land uses, site cover does not exceed 80%.

AO2.2

For residential land uses, site cover does not exceed a cumulative total of :

(d) 50% of net site area up to 8 storeys;

(e) 40% of net site area from 9 to 15 storeys; and

(f) 30% of net site area or 750m^2 per building, whichever is the lesser, above 15 storeys.

(a) is balanced between built form and green areas for landscaped private open space; (b) contributes to neighbourhood character and amenity; (c) promotes slender bulk form; (d) promotes an open, attractive and distinct skyline; and (e) facilitates small, fast moving shadows.	
Height	
PO3 Development is of a height that: (a) promotes the intended character of the zone; and (b) does not impact on the amenity of adjoining uses.	**AO3** Building height does not exceed 2 storeys with a maximum height of 14m or that shown on the **Map 1 - Building Heights - Towers & Podium.**
Density	
PO4 Density does not exceed that shown on **Map 3 - Residential Density Plan.**	**AO4** No acceptable outcome provided.
Design and appearance	
PO5 Commercial buildings present well to the street and provide awnings for the comfort of pedestrians.	**AO5.1** Development provides awnings which are a minimum width of 1.5m over the pedestrian access/footpath.
	AO5.2 Footpath awnings are designed to complement and integrate with the façade and the streetscape.

Amenity	
PO7 Non-residential activities operate within appropriate hours to minimise nuisance to nearby, existing or intended sensitive land uses.	**AO7** Business hours of non-residential activities are between 6am to 10pm.
Land uses	
PO8 Residential land uses do not compromise the activation of ground floor storeys.	**AO8** Residential uses are located above ground floor.
PO9 Ground floor spaces are designed to enable the flexible reuse of non-residential floor area to support changing community and business needs.	**AO9** The design of the ground floor services and utilities allow for easy reconfiguration of commercial tenancies. **Note: To facilitate the flexible re-use of the ground floor, Council recommends an internal floor to ceiling height of 4.5m.**
PO10 Non-residential development: (c) serves the needs of the immediate neighbourhood catchment – generally calculated as the planned population and jobs within a 1,000 metre walk from the centre; (d) supports a range of neighbourhood centre uses and enterprise opportunities; and (e) provides a range of goods and services to satisfy the day to day convenience needs of the immediate neighbourhood catchment.	**AO10** No acceptable outcome provided.
PO11	**AO11** The GFA of a single shop does not exceed 1,500m2.

A single tenancy does not dominate the retail GFA of the neighbourhood centre area and does not exceed 1,500m^2 OR Where involving a single anchor tenancy on site, does not exceed 4,000m^2 in GFA.

5. DEVELOPMENT CODE

5.1. BENOWA GARDENS HIGH-RISE ACCOMMODATION CODE

(1) The purpose of the High-rise accommodation design code is to responsibly encourage diverse, innovative and engaging sub-tropical high-rise forms that enhance the city skyline.

(2) The purpose of the code will be achieved through the following overall outcomes:

- (a) Development is designed to create attractive, high-quality visually appealing buildings and protect the privacy and amenity of neighbouring residential premises.
- (b) Slender towers relate to existing high-rises and enhance views of the city skyline.
- (c) Tower development mitigates negative visual and physical impacts through appropriate setbacks and design.
- (d) Where they occur (in accordance with zone intentions), podiums are designed to engage with the street and be of a scale that is complementary to adjoining and nearby buildings.
- (e) Development provides a high-standard of amenity and visual interest for users and neighbours, including a high-standard of communal and private open space.
- (f) Development is designed and orientated to promote a safe environment within the site, adjoining streets and public realm.
- (g) Development is complemented by high-quality landscaping that contributes to the desired character of the area.
- (h) Development is designed to promote safe and convenient pedestrian and vehicle access to and from the site.
- (i) Development supports the provision of diversity of housing for various types of households within the city to meet the needs of existing and future residents.
- (j) Residential care facilities and retirement facilities are provided with self contained services and recreational facilities to meet the needs of residents.
- (k) Development provides private and communal open spaces that respond to the subtropical climate, maximise outdoor living opportunities, enhance amenity for residents and provide engagement with streets and public open spaces.

PART A – ASSESSABLE DEVELOPMENT

Table 3: Benowa Gardens High-Rise Code – for assessable development

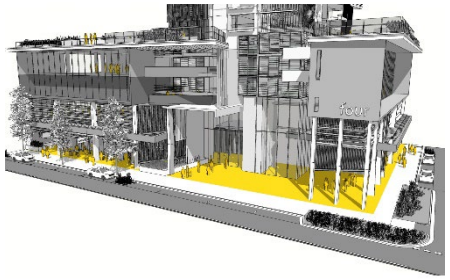
PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
Tower base (podium)	

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
PO12 Where podiums are envisaged by the zone, tower base form respects the framework of established built form, adjacent streets, parks and public or private open spaces.	**AO12** Tower base heights: (a) are well-proportioned to frame adjacent park land and on-site open space; (b) match neighbouring low-set built form; or (c) are no greater than 22 metres in height where no neighbouring built form exists.
	AO1.2 Tower base setbacks: (d) match adjacent established setbacks; and (e) continue public open space areas provided along street frontages.

Figure 9.3.9-1

Illustration showing High-rise accommodation design outcome where the tower base (podium) height matches neighbouring low-set built form and match adjacent established setbacks

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
PO2 Tower base façades reinforce the intended neighbourhood character and enhance the pedestrian experience.	**AO2** Tower base façades avoid blank, featureless walls by patterning high-quality architectural elements, like window bays, canopies, and fenestration.
 Figure 9.3.9-2 Illustration showing High-rise accommodation design outcomes where the tower base facades reinforce the intended neighbourhood character and enhance the pedestrian experience with high quality architectural elements and windows	
PO3 Tower base form animates the street level by engaging primary and secondary street frontages appropriately.	**AO3.1** Where entirely residential development is proposed: (f) along the primary street frontages ground floor units are grade-separated (up to 600mm high) with soft screening landscaping and direct individual entrances; and (g) private and communal open space areas provide casual surveillance to all street frontages.
	AO3.2 Short-term accommodation uses locate grand lobbies or other signature features along primary street frontages and prominent street corners.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
 **Figure 9.3.9-3** Illustration showing High-rise accommodation design outcomes where the tower base form animates the street by engaging primary and secondary street frontages through the use of grand lobbies or other signature features	
Tower form design	
PO4 Slender tower form promotes: (h) open, attractive and distinct skyline; (i) small, fast moving shadows; (j) view corridors between nearby towers; (k) efficient interior climate control; and (l) balconies as an extension of indoor living space.	**AO4.1** Tower floor plate is limited to 750m^2 per tower (includes all services, lift and stairwell annex, etc.). **Note: Balconies are excluded from calculations to encourage larger private outdoor space areas.**
	AO4.2 Tower form provides a unique profile when compared to nearby existing and proposed towers of similar height.
PO5	**AO5.1** Tower form (including balconies) along:

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
Tower form mitigates negative visual and physical impacts, including impacts on privacy, by setting back from streets, parks, open space and adjacent properties and tower forms.	(m) single frontages step in at least 3m from the base (podium); or (n) corner frontages can have up to 1/3 tower width extend straight down at the corner point to reinforce the intersection if negative ground level wind effects are mitigated.
	AO5.2 New towers are separated a minimum distance of 25m from any existing or approved adjacent and on-site tower(s).
	AO5.3 Tower form is coordinated to off-set with adjacent existing and proposed towers to ensure: (a) prominent tower views to natural features like the beach and rivers are not obstructed; and (b) views of the sky and access to sunlight from the public realm and private open space areas are maximised.

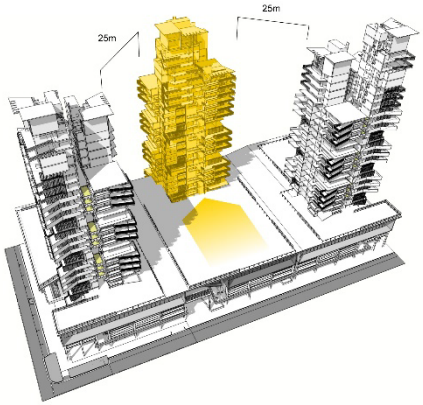


Figure 9.3.9-4

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
Illustration showing High-rise accommodation outcomes for separation between towers.	
 Figure 9.3.9-5 Illustration showing High-rise accommodation design outcomes where the tower form mitigates negative visual and physical impacts by setting back from streets	
PO6 Tower form orientation and articulation promotes sub-tropical design excellence and innovation.	**AO6.1** Tower form is orientated to: (a) reduce the perceived mass of the building; and (b) provide privacy for both communal and private open space amenity areas.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
	AO6.2 Tower façades are: (a) articulated to manage passive solar gain in summer; (b) well-glazed with functional windows where possible to reduce reliance on artificial cooling; (c) designed with high-quality sustainable materials and finishes that promote building longevity; and (d) varied in design and articulation to promote visual interest.

Figure 9.3.9-6

Illustration showing High-rise accommodation design outcome where tower facades are articulated to manage passive solar gain in summer and varied in design and articulated to promote visual interest

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
PO7 Balconies maximise building performance while minimising negative impacts on the building mass and public realm.	**AO7** Balconies: (a) are not made with materials susceptible to solar gain; (b) are not made with transparent materials that spill light from the dwellings; and (c) integrate into the building profile.
Tower cap design	
PO8 Tower caps reinforce the Gold Coast skyline. **Note: building height incorporates allowance for plant and equipment, attractive building caps and rooftop features.**	**AO8** Where building height creates an identifiable protrusion in the skyline or the site terminates a viewpoint, the following are provided: (a) a signature cap strengthening the identity as a landmark; and (b) decorative lighting that highlights key architectural features. OR Where lower building height forms part of the urban backdrop a subtle cap that integrates with the overall design is provided.
PO9 Tower cap design attractively integrates all signage, telecommunications, service structures, lift motor rooms and mechanical plants.	**AO9** No acceptable outcome provided.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES

Figure 9.3.9-7

Illustration showing High-rise accommodation outcomes for building caps and rooftops

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES

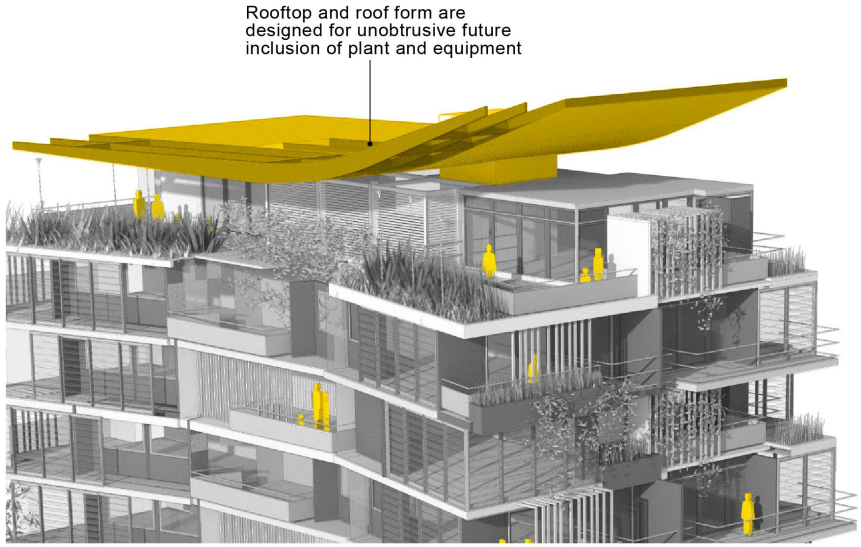


Figure 9.3.9-8

Illustration showing High-rise accommodation outcomes for roof top and roof form

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
Housing need and choice	
PO10 Development provides a mix of housing sizes and affordability outcomes to meet housing needs.	**AO10** No acceptable outcome provided.
Communal and private space areas	
PO11 Communal space areas: (a) are accessible, useable and safe; (b) are designed for the subtropical climate, maximising outdoor living opportunities and enhancing amenity for residents; (c) enhance the attractiveness of the development; (d) provide opportunities for social interaction; and (e) create pleasantly shaded outdoor areas.	**AO11.1** Communal space is provided at a rate of 6.5m^2 per dwelling and is designed for simultaneous use by individuals and groups.
	AO11.2 Landscaping in open communal space areas: (a) have minimum and average widths of 1.5m and 3m; (b) are at-grade with adjacent footpaths; (c) comprises 50% deep planting; and (d) do not screen views to the street or entries.
	AO11.3 Where the communal open space is for a residential care facility or retirement facility, the open space is provided with outdoor facilities for the health and wellbeing of residents such as sheltered gardens, circuit walkways, gardening beds and a space of sufficient size for a resident to take a visiting family with young children.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
PO12 Development provides attractive, accessible and functional private open space for residents, which are designed for the subtropical climate to maximise outdoor living opportunities and enhance amenity for residents.	**AO12.1** Above ground private open space for each dwelling: (a) mitigates negative wind effects on intended users; (b) has a minimum area of 3m x 3m; (c) is accessible from the living room; and (d) has a maximum gradient not exceeding one in ten.
	AO12.2 Ground floor private open space for each dwelling: (a) has a minimum area of 25m²; (b) has a minimum width of 5m; (c) is accessible from the living room; and (d) has a maximum gradient not exceeding one in ten.
Privacy	
PO13 Privacy for users and neighbouring properties is accomplished by windows that are appropriately obscured by glazing, shuttering, location or other similar treatments.	**AO13** Habitable room windows do not 'directly face': (a) private open space of adjoining dwellings; (b) another habitable room window within 10m; and (c) an at-grade access way, footpath or communal open space area within 3m. OR Where habitable room windows must face, the privacy is achieved through windows that:

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
	(a) have fixed obscure glazing in any part of the window below 1.5m above floor level; and (b) have privacy screens that cover a minimum of 50% window view. **Note: 'directly facing' means an angle within 45° either horizontally or vertically.**

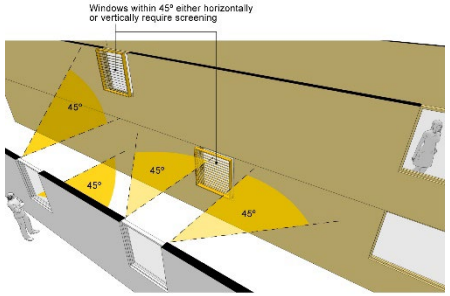


Figure 9.3.9-9

Illustration showing High-rise accommodation design privacy outcomes where windows and doors are appropriately obscured by screening

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES

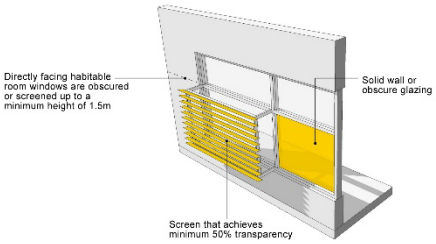


Figure 9.3.9-10

Illustration showing High-rise accommodation outcomes for privacy.

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
Safety and security	
PO14 Building design enhances safety and security for intended users.	**AO14.1** Above ground floor windows and balconies overlook all on-site pedestrian paths and communal open spaces.
	AO14.2 Lighting at 4m intervals is provided along all on-site pedestrian paths and communal open spaces.
	AO14.3 Entrances and exits to the street are directly accessible, illuminated and highly visible.
	AO14.4 Dead-end corridors, alleyways, pathways and refuse areas are signed and secured to prevent unauthorised access.
Services	
PO15 Servicing, utilities, loading and other ‘back of house’ activities are either located underground, screened or hidden away from public view.	**AO15** No acceptable outcome provided.
Services and recreational facilities for residential care facilities and retirement facilities	
PO16	**AO16**

PERFORMANCE OUTCOMES	ACCEPTABLE OUTCOMES
A range of self-contained services and recreational facilities are provided.	Developments that have between 11 and 25 units include a community meeting room. OR Developments that have 26 units or more include a community meeting room and one or more of the following: (a) community vehicle; (b) on-site personal care; (c) on-site meal service; and (d) recreational facilities, in addition to the open space requirements in **PO11.**

BENOWA GARDENS MASTER PLAN

SITE INFORMATION

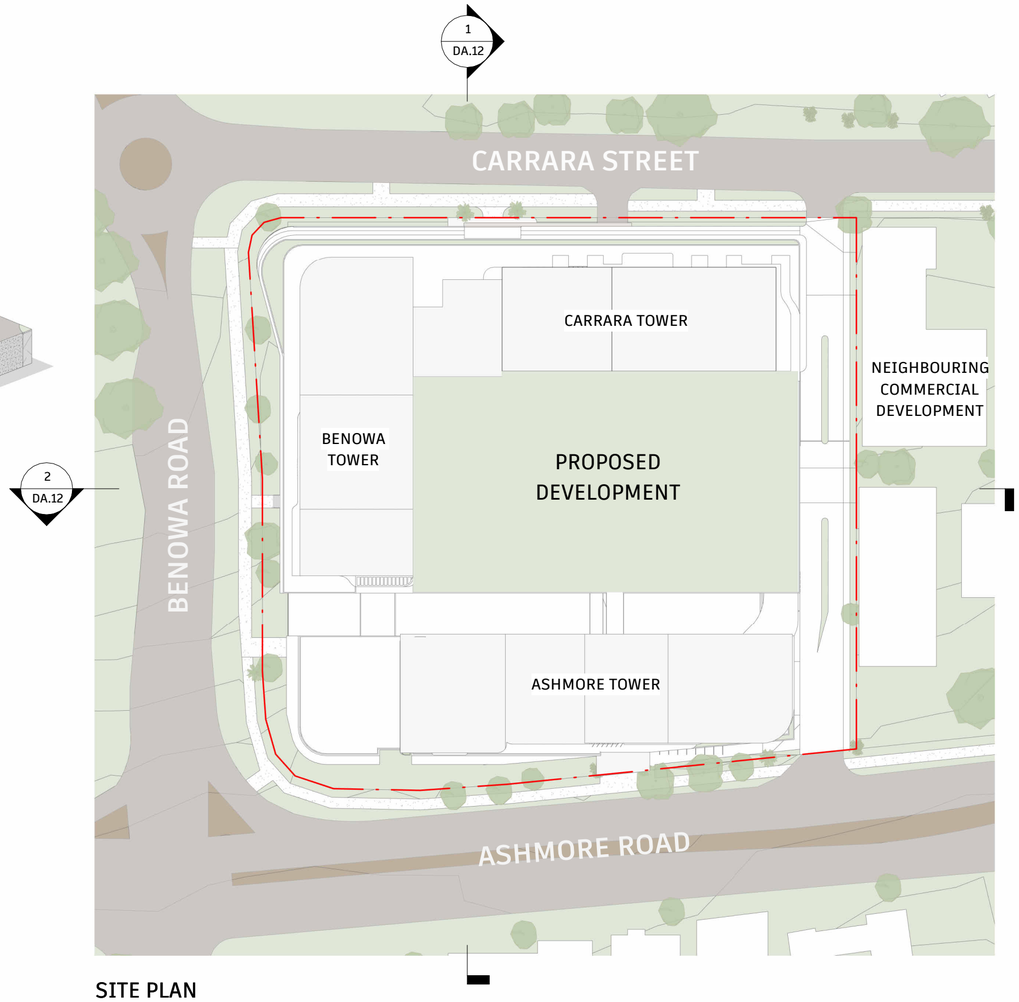
ADDRESS 203 ASHMORE ROAD
BENOWA QLD 4217

RPD LOT/DP: RP839746

SITE AREA 17,658m^2

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE



SITE PLAN

1 : 1000

APARTMENT TYPES

	LEVELS	2 x BED	3 x BED	TOTAL
CARRARA TOWER	PER LEVEL (x 9)	12	3	15
	TOTAL PER TOWER	108	27	135
BENOWA TOWER	PER LEVEL (x 8)	12	4	16
	TOTAL PER TOWER	96	32	128
ASHMORE TOWER	PER LEVEL (x 7)	14	4	18
	PER HALF LEVEL (x 1)	4	4	8
	TOTAL PER TOWER	102	32	134
TOTAL APARTMENTS		**306**	**91**	**397**

PERIMETER USE: 8,400m^2

	SHORT STAY ACCOMMODATION	RESIDENTIAL 1 BED		HEALTH CARE
BASEMENT 2	130m^2 TUA (LOBBY)	-		-
BASEMENT 1	11	-		1,200m^2 TUA
GROUND (SHOPPING CENTRE)	15	-		1,200m^2 TUA
CARRARA LEVEL 1	15	-	**OR**	1,200m^2 TUA
CARRARA LEVEL 2	-	22		2,400m^2 TUA
CARRARA LEVEL 3	-	22		2,400m^2 TUA
TOTAL	**41**	**44**		**8,400m^2**

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

AREA CALCULATIONS

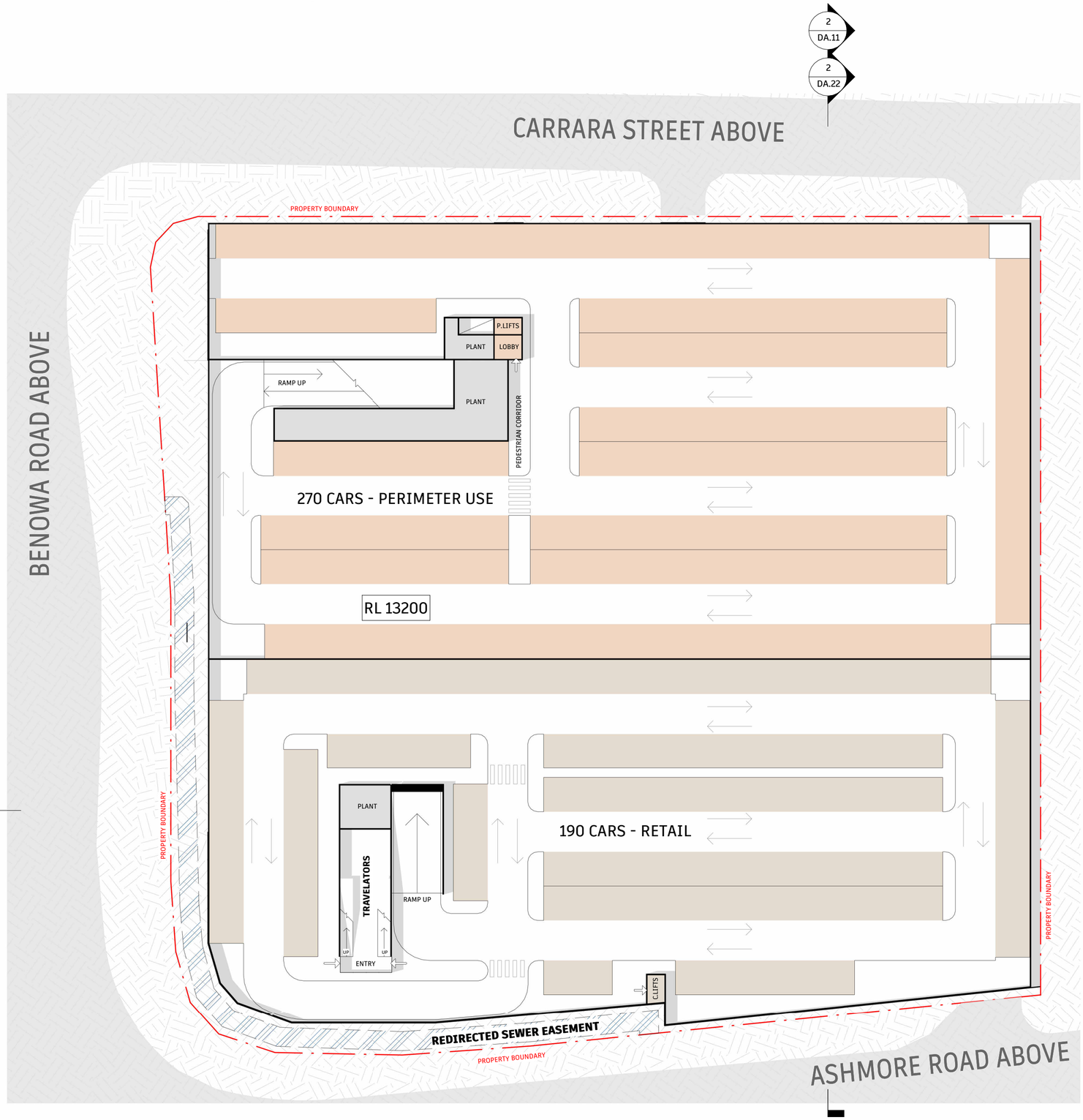
RETAIL AREA

SUPERMARKET	**4,000m^2**
SPECIALTY SHOPS:	**6,000m^2**
RETAIL BASEMENT 2 LEVEL:	**700m^2**
RETAIL BASEMENT 1 LEVEL:	**300m^2**
SHOPPING CENTRE LEVEL:	**5,000m^2**
TOTAL RETAIL	**10,000m^2**

COMMERCIAL AREA

LEVEL 1:	**2,500m^2**
LEVEL 2:	**500m^2**
TOTAL COMMERCIAL	**3,000m^2**

FLOOR PLAN-BASEMENT 3 (RETAIL)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

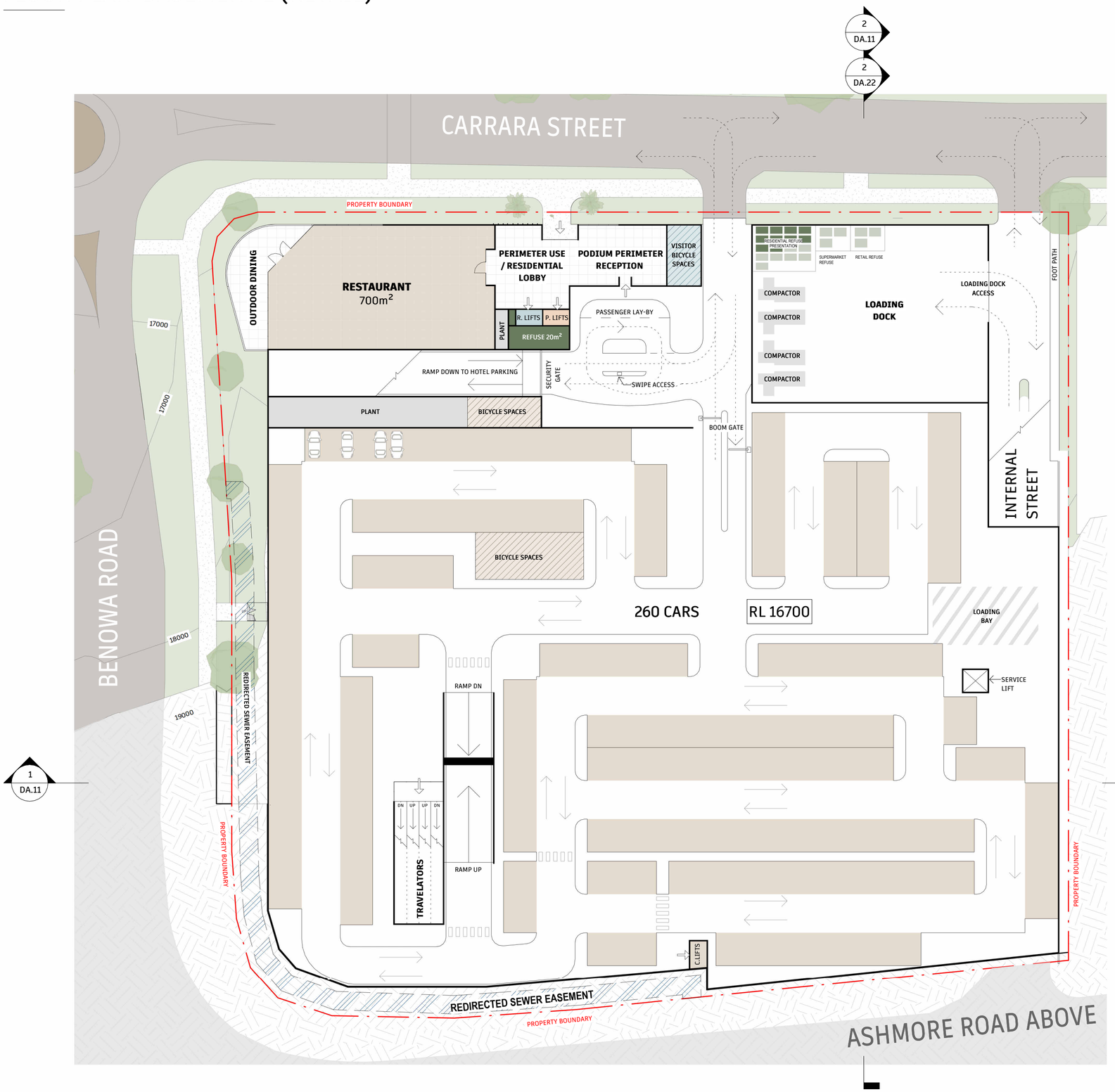
TOTAL CARPARKS	1,460

BASEMENT 3 CARPARK - RETAIL / HOTEL

1 : 500

0 5 10 25 45m

FLOOR PLAN-BASEMENT 2 (RETAIL)



BASEMENT 2 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

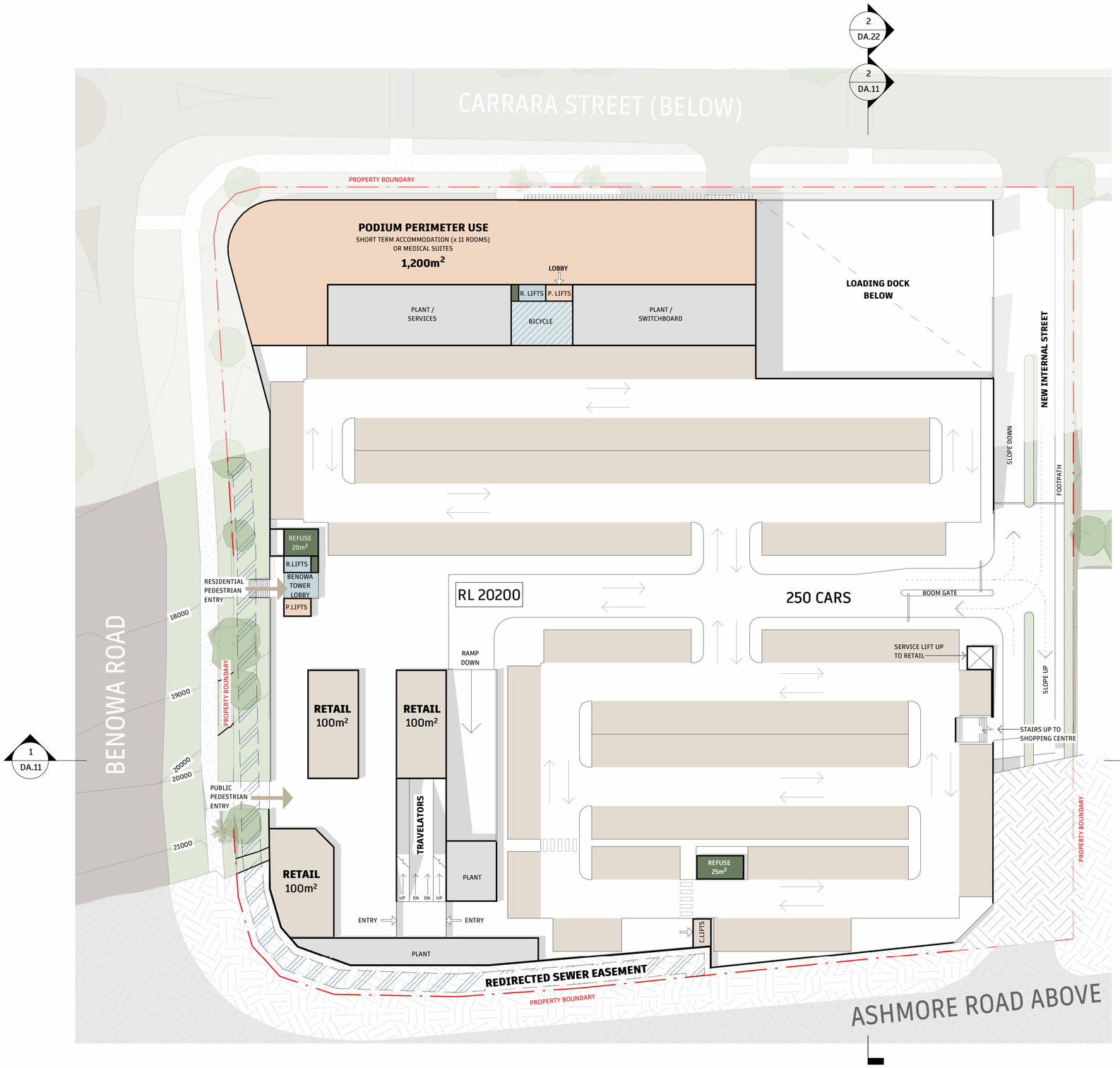
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-BASEMENT 1 (RETAIL)



BASEMENT 1 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

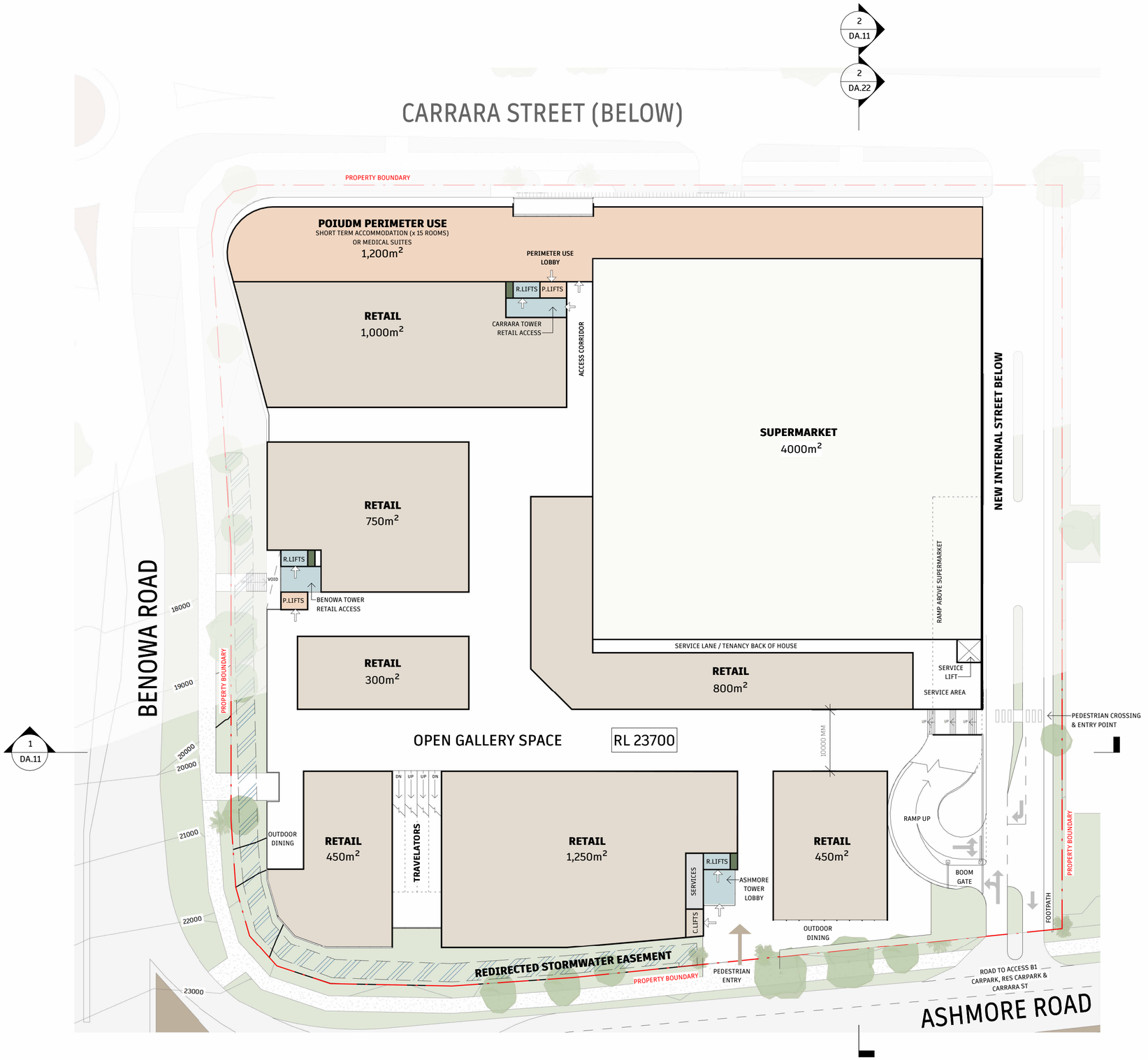
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-SHOPPING CENTRE



LEGEND

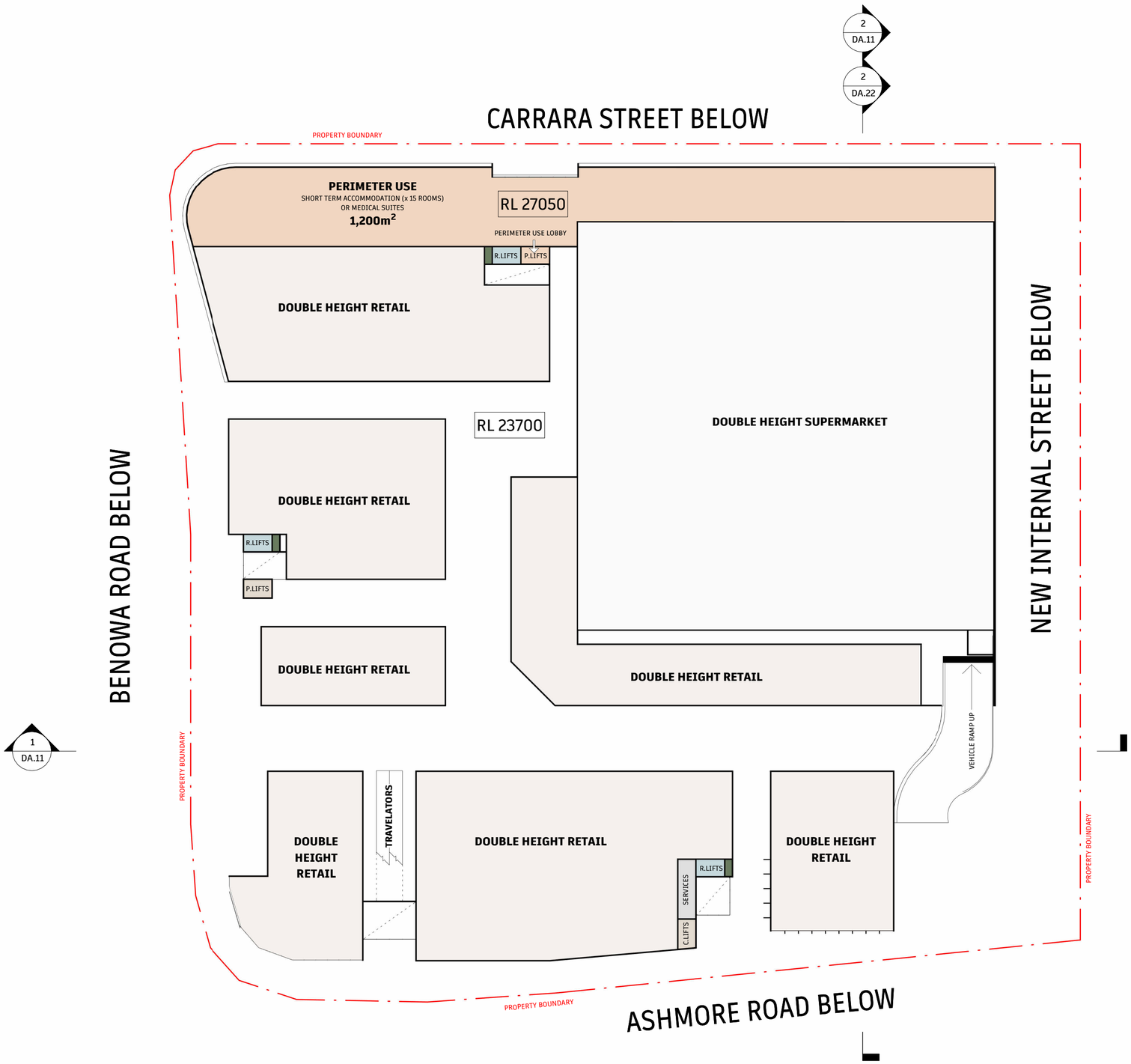
- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

SHOPPING CENTRE

1 : 500

0 5 10 25 45m

FLOOR PLAN LEVEL 1 - PERIMETER USE MEZZANINE



LEVEL 1 - MEZZANINE

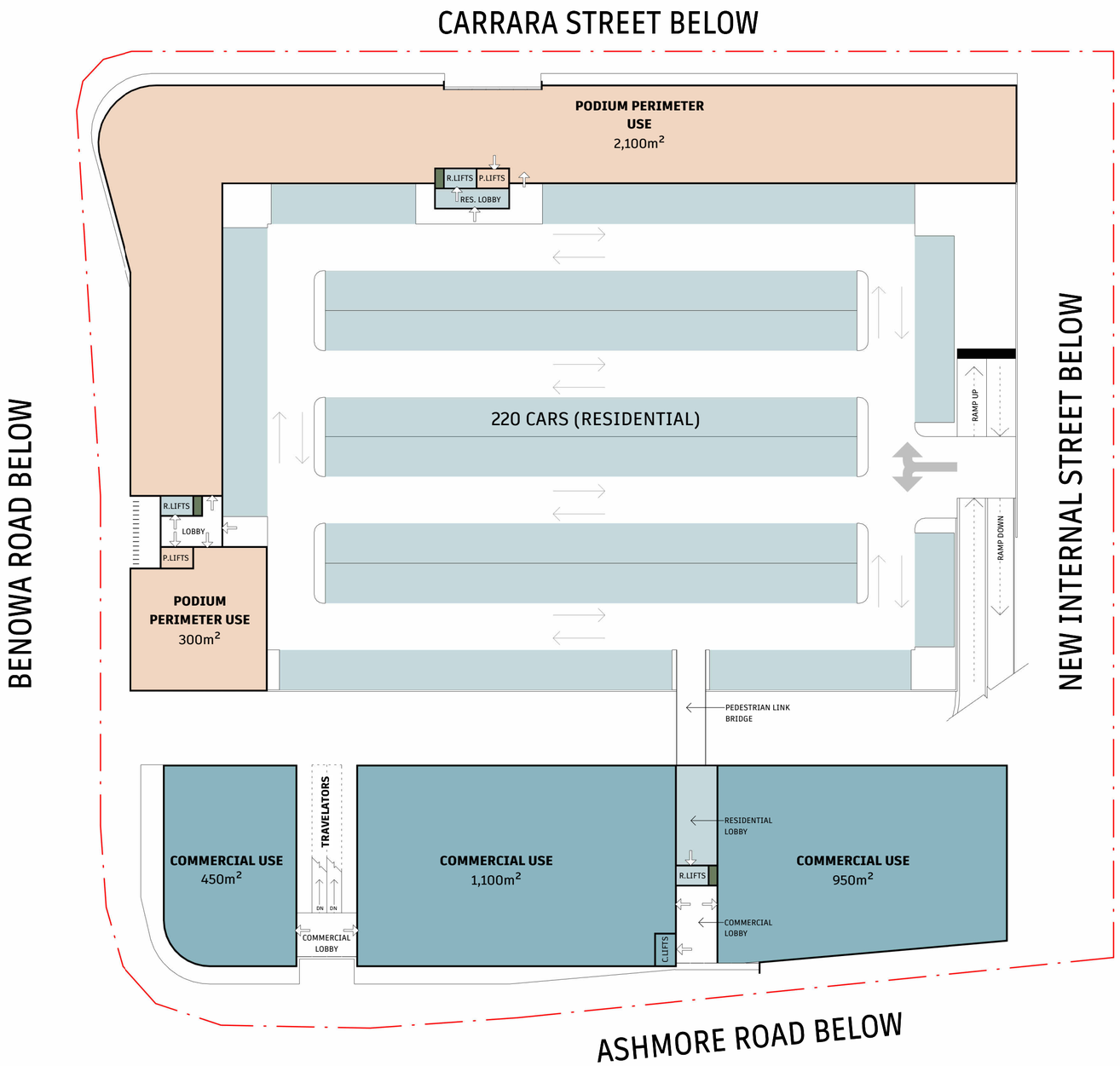
1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

0 5 10 25 45m

FLOOR PLAN-LEVEL 2 (RESIDENTIAL CARPARK)



L2_CARARRA

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

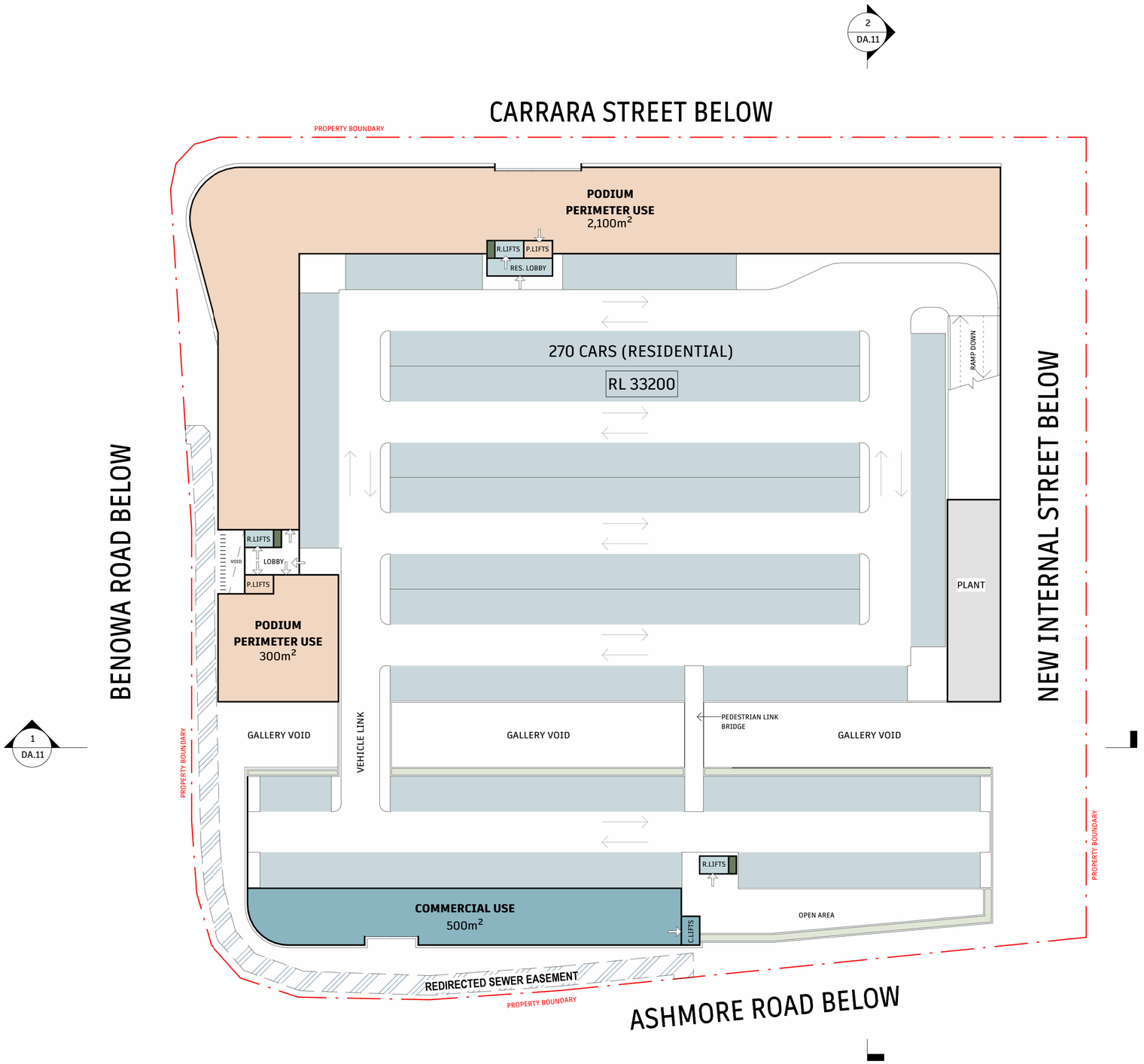
PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

0 5 10 25 45m

FLOOR PLAN-LEVEL 3 (RESIDENTIAL CARPARK)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

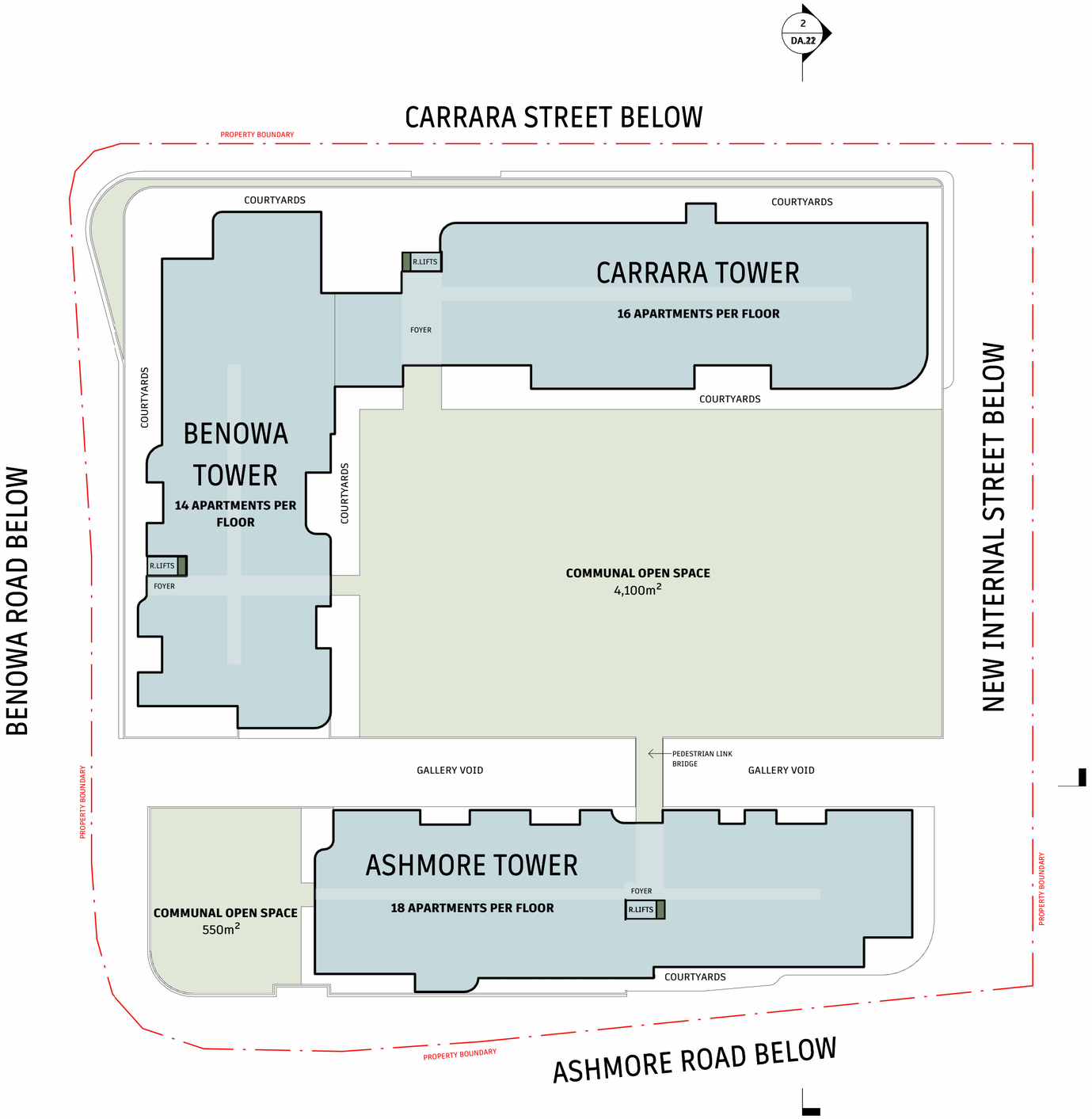
TOTAL CARPARKS	1,460

L3_RESIDENTIAL CAR PARK

1 : 500

0 5 10 25 45m

FLOOR PLAN-LEVEL 4 - TOWERS+COMMUNAL SPACE



LEGEND

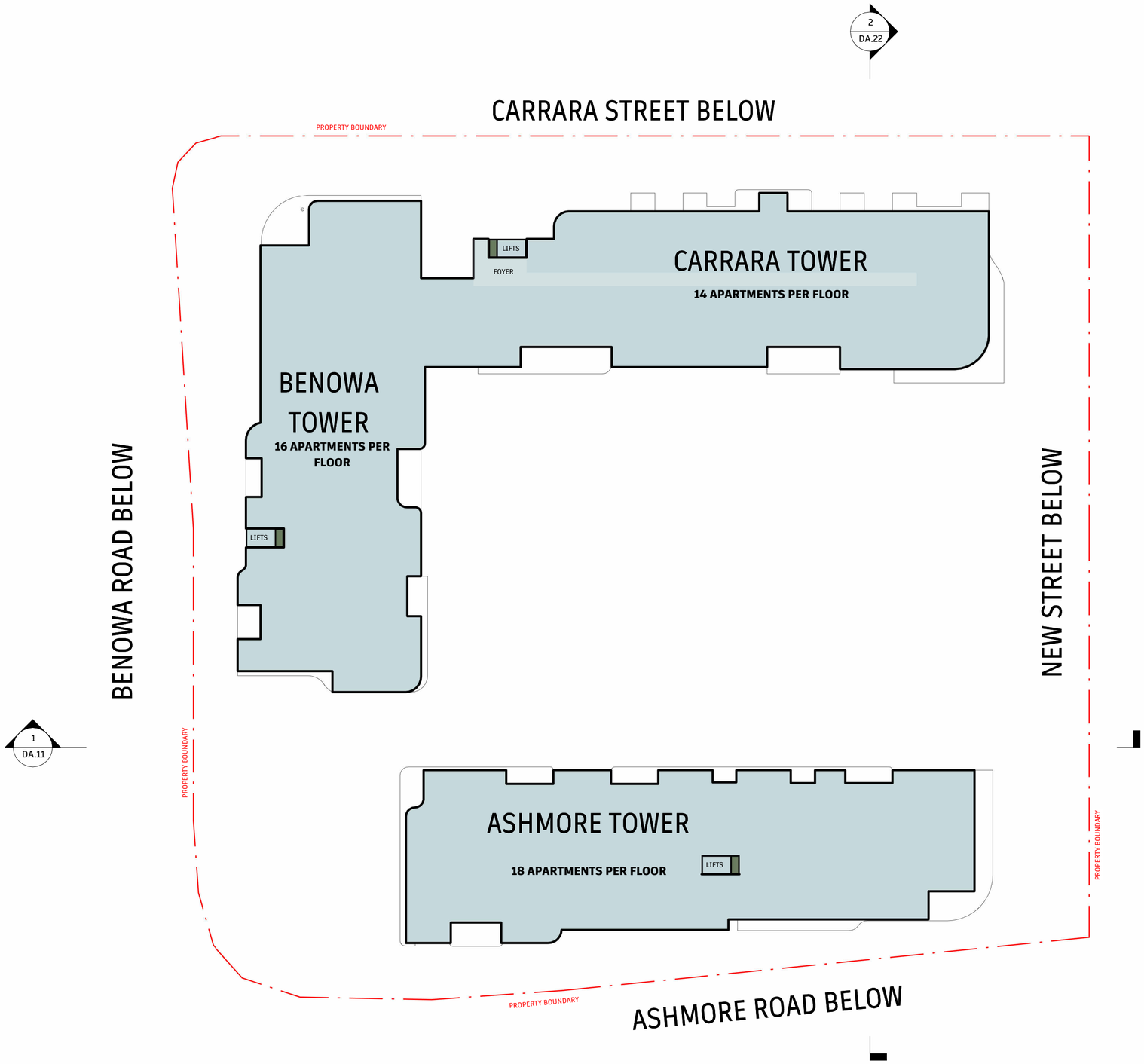
- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

L4_RESIDENTIAL

1 : 500

0 5 10 25 45m

FLOOR PLAN-TYPICAL TOWER PLAN



LEGEND

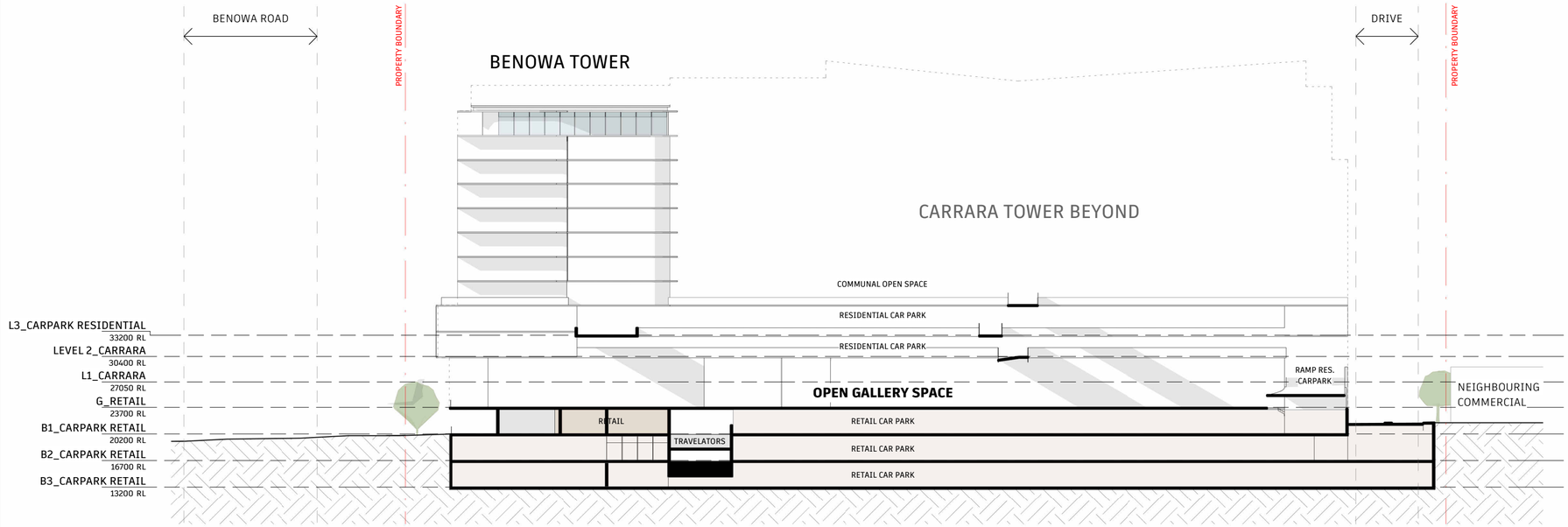
- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

TYPICAL RESIDENTIAL FLOOR

1 : 500

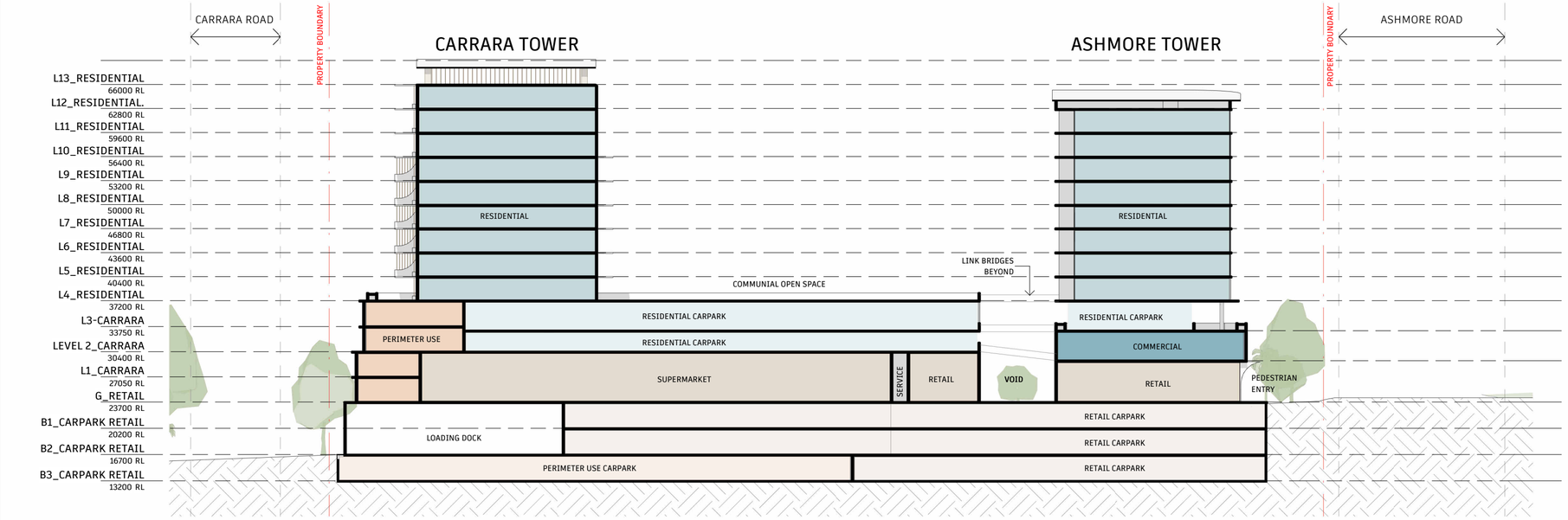
0 5 10 25 45m

SECTION



EAST - WEST SECTION

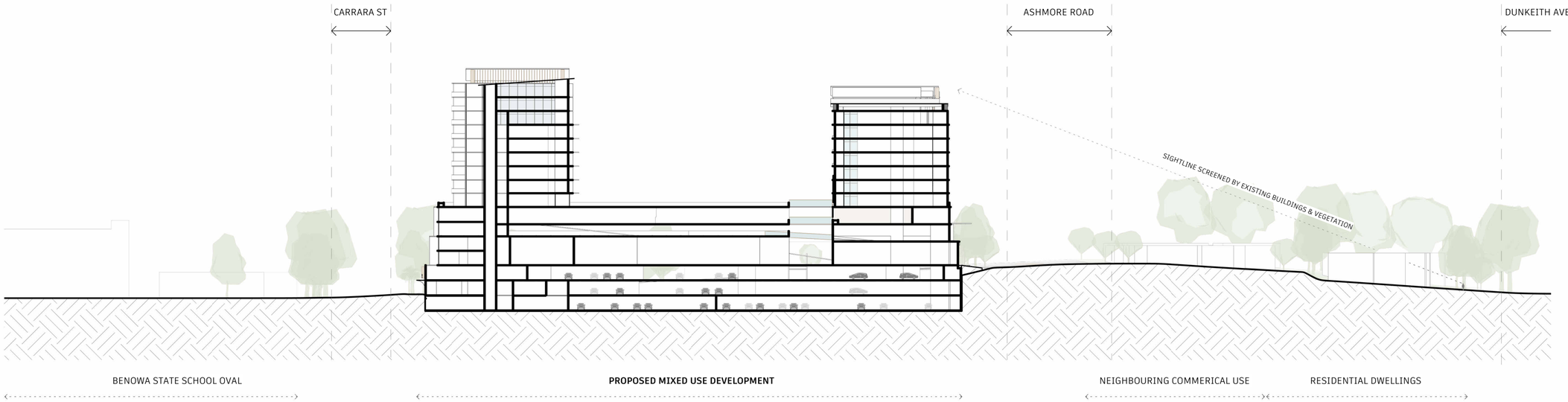
1:500 REFER 1 - 05



NORTH - SOUTH SECTION

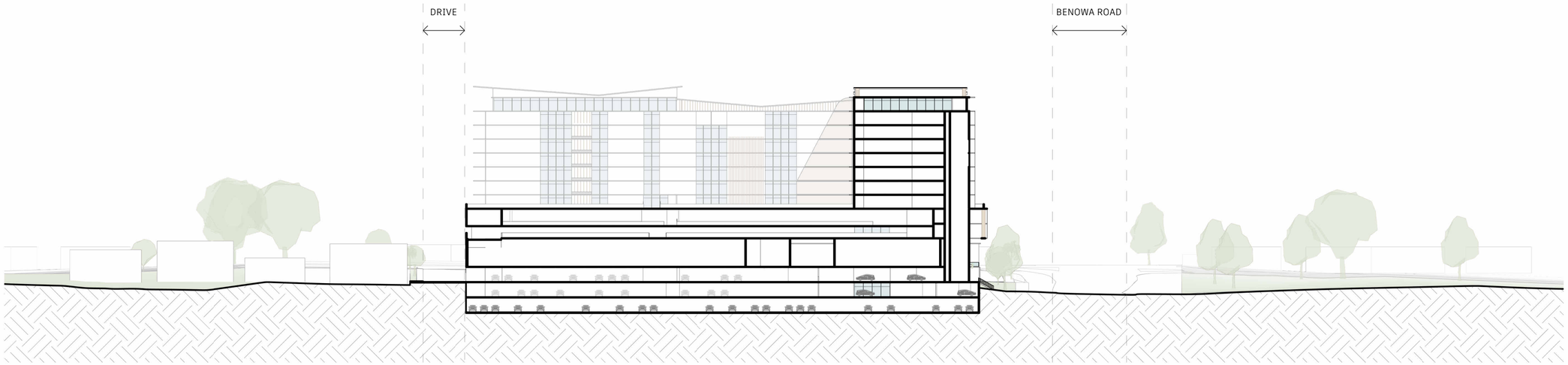
1:500 REFER 2 - 05

URBAN SECTIONS



URBAN SECTION 01 - NORTH TO SOUTH

1 : 750



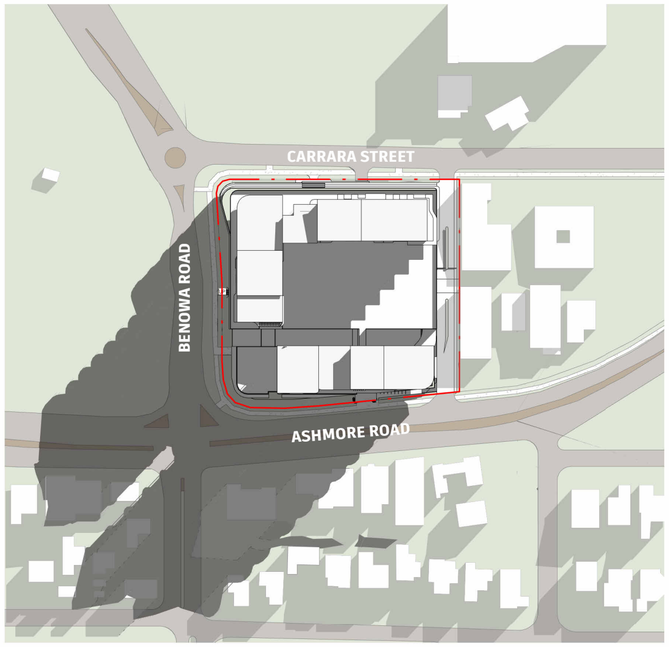
URBAN SECTION 02 - EAST TO WEST

1 : 750

0 5 10 25 45m

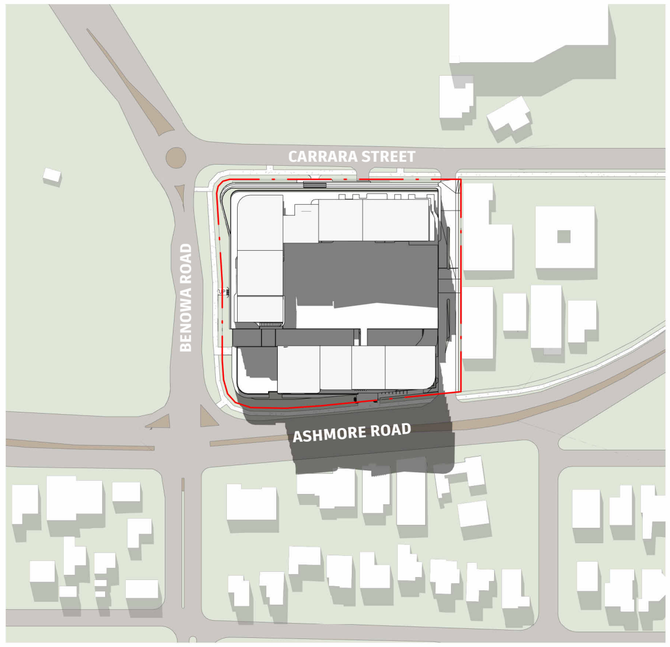
1:750

SOLAR STUDIES & SHADOWING



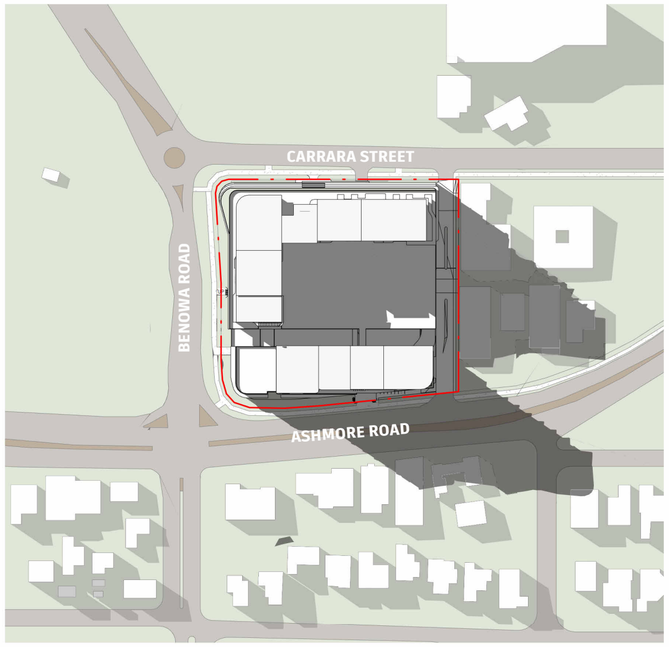
SOLAR STUDY - WINTER, 8AM

1 : 2500



SOLAR STUDY - WINTER, 12PM

1 : 2500



SOLAR STUDY - WINTER, 3PM

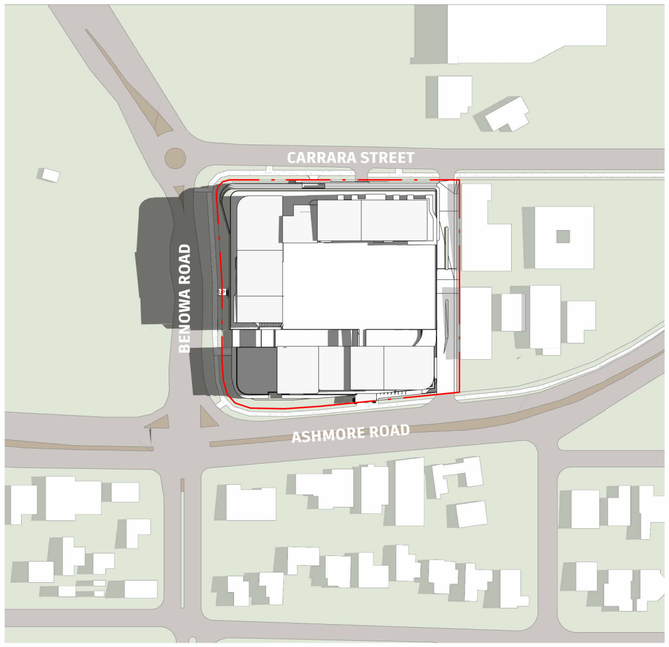
1 : 2500

LEGEND

PROPOSED SHADOWS

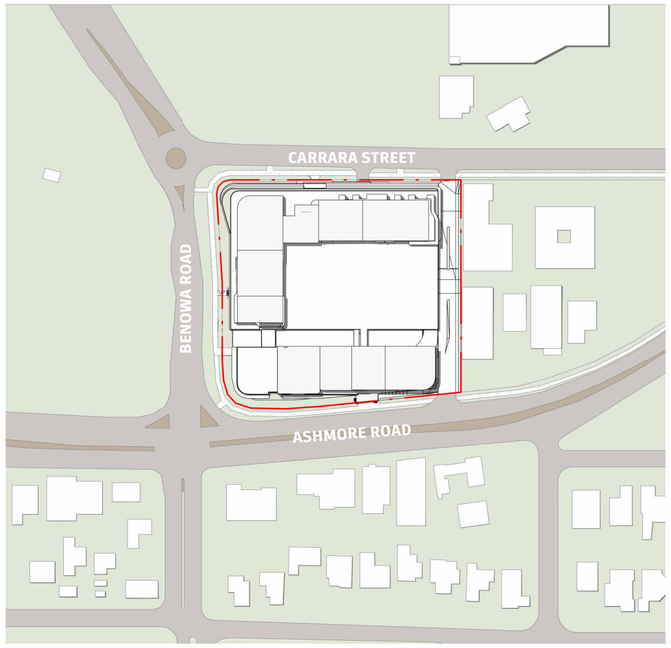
EXISTING SHADOWS

OVERLAP



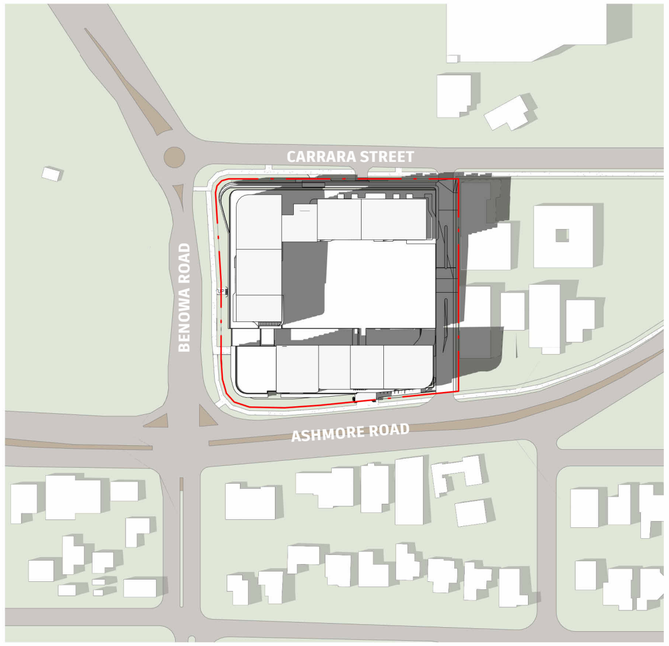
SOLAR STUDY - SUMMER, 8AM

1 : 2500



SOLAR STUDY - SUMMER, 12PM

1 : 2500



SOLAR STUDY - SUMMER, 3PM

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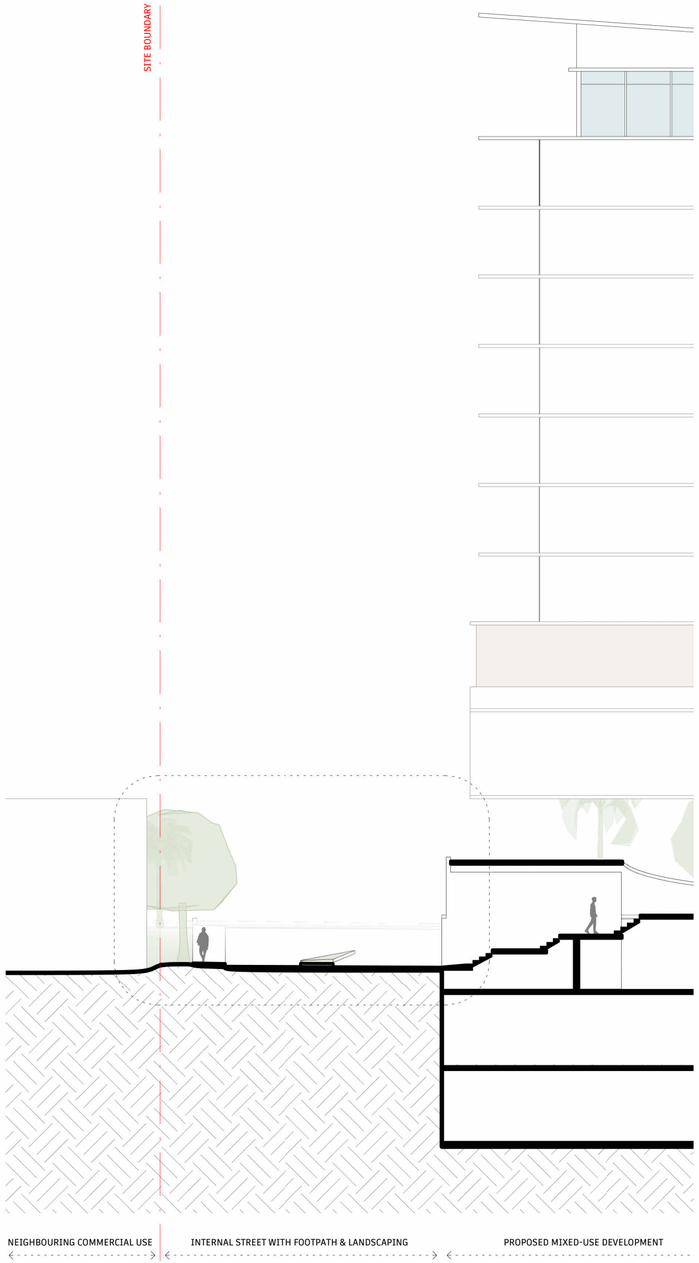
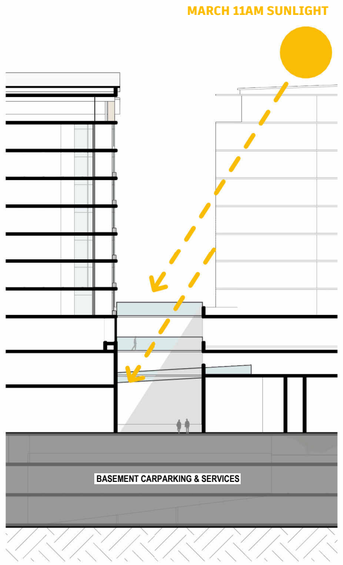
GALLERY SPACE & INTERNAL STREET



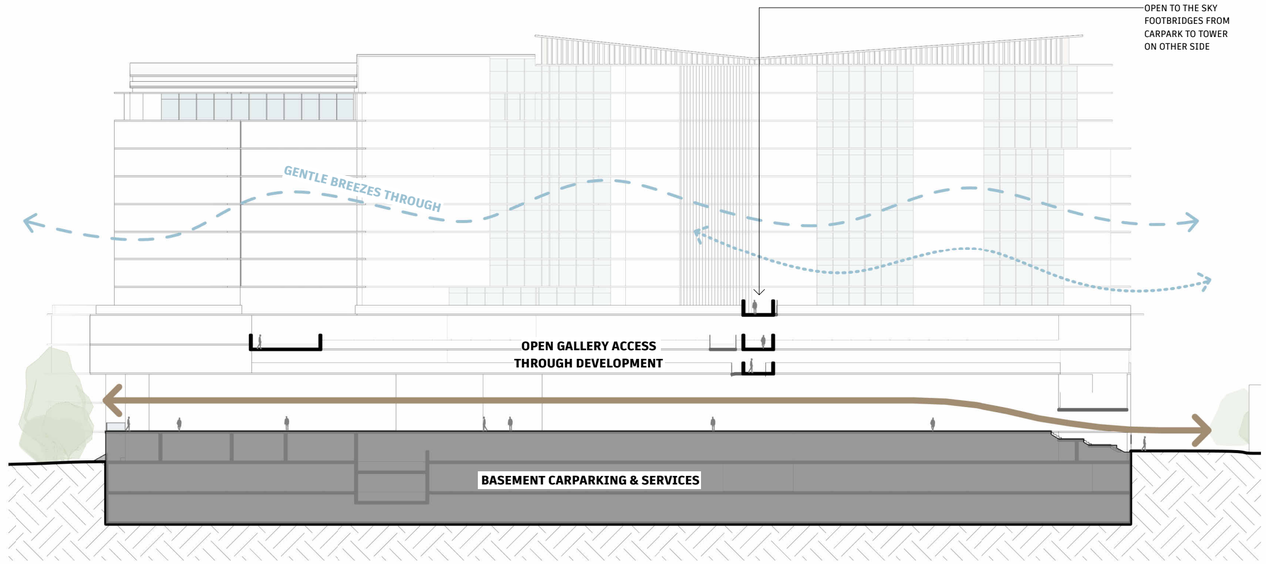
INTERNAL STREET SECTION

1 : 200



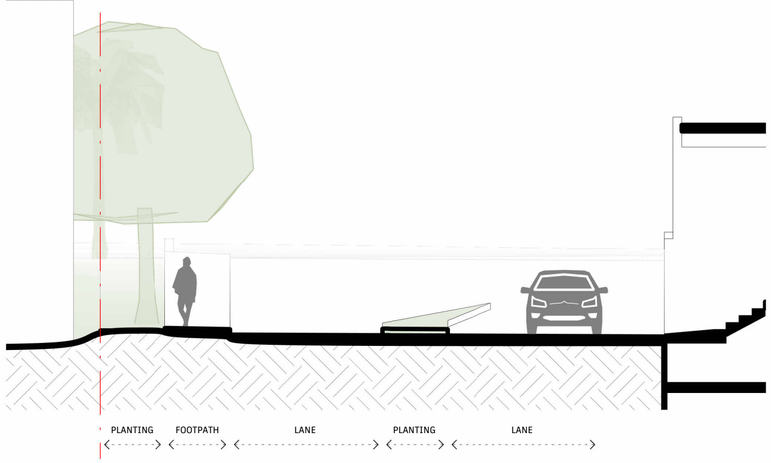
GALLERY SECTION - NORTH TO SOUTH

1 : 500



GALLERY SECTION - EAST TO WEST

1 : 500



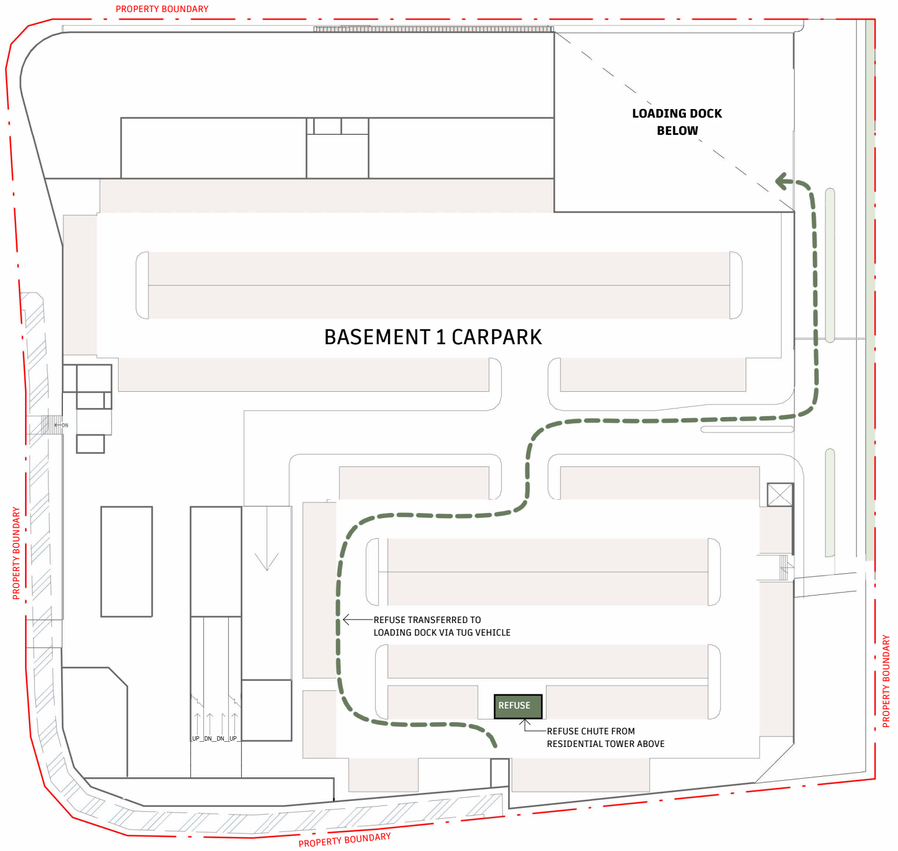
INTERNAL STREET SECTION - LANES

1 : 100

REFUSE STRATEGY DIAGRAMS

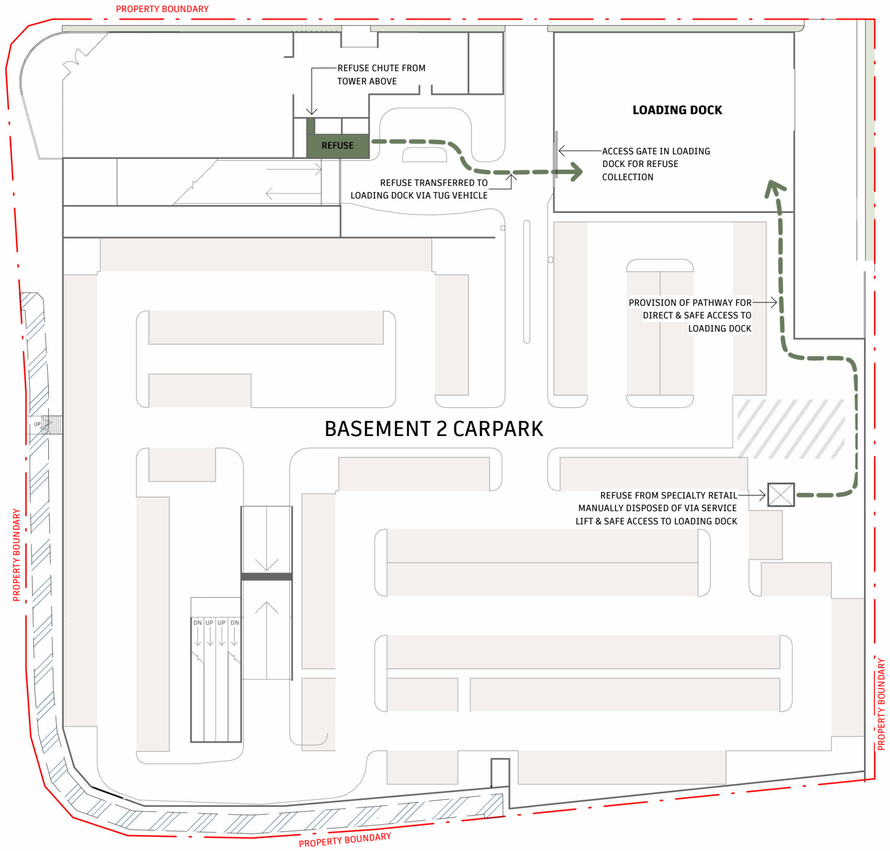
REFUSE STRATEGY - ASHMORE TOWER RESIDENTIAL

BASEMENT 1



REFUSE STRATEGY - CARRARA / BENOWA TOWER & RETAIL

BASEMENT 2



BUILT FORM CHARACTER

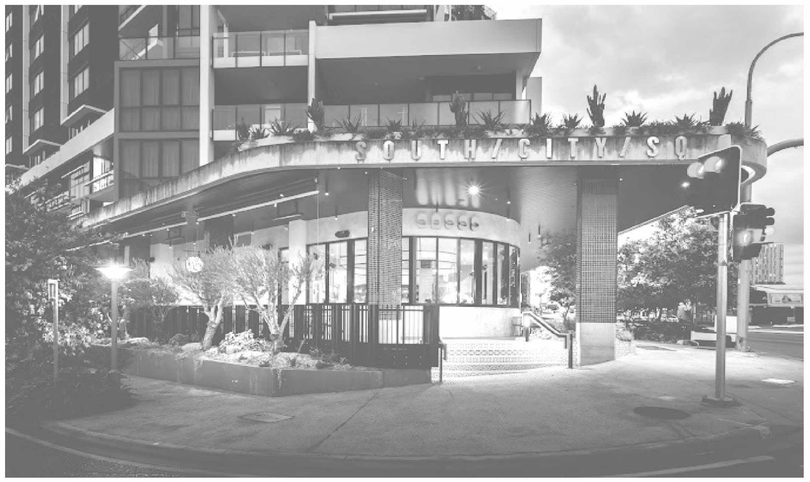
CORNER OF CARRARA STREET & BENOWA ROAD

OUTDOOR DINING & PERIMETER USE

CORNER OF ASHMORE & BENOWA ROAD

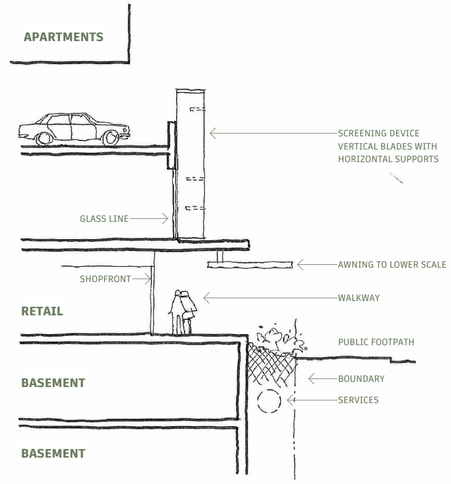
RETAIL, COMMERCIAL & APARTMENTS ABOVE

DESIGN FRAMEWORK: PRECEDENTS



DESIGN FRAMEWORK: PRECEDENTS

DESIGN FRAMEWORK: SECTION



BUILT FORM CHARACTER

INTERNAL STREET & CARPARK ENTRY RAMP

VIEW FROM ASHMORE ROAD

SHOPPING GALLERY

VIEW FROM EASTERN END

DESIGN FRAMEWORK: STREET VIEW

DESIGN FRAMEWORK: PRECEDENTS

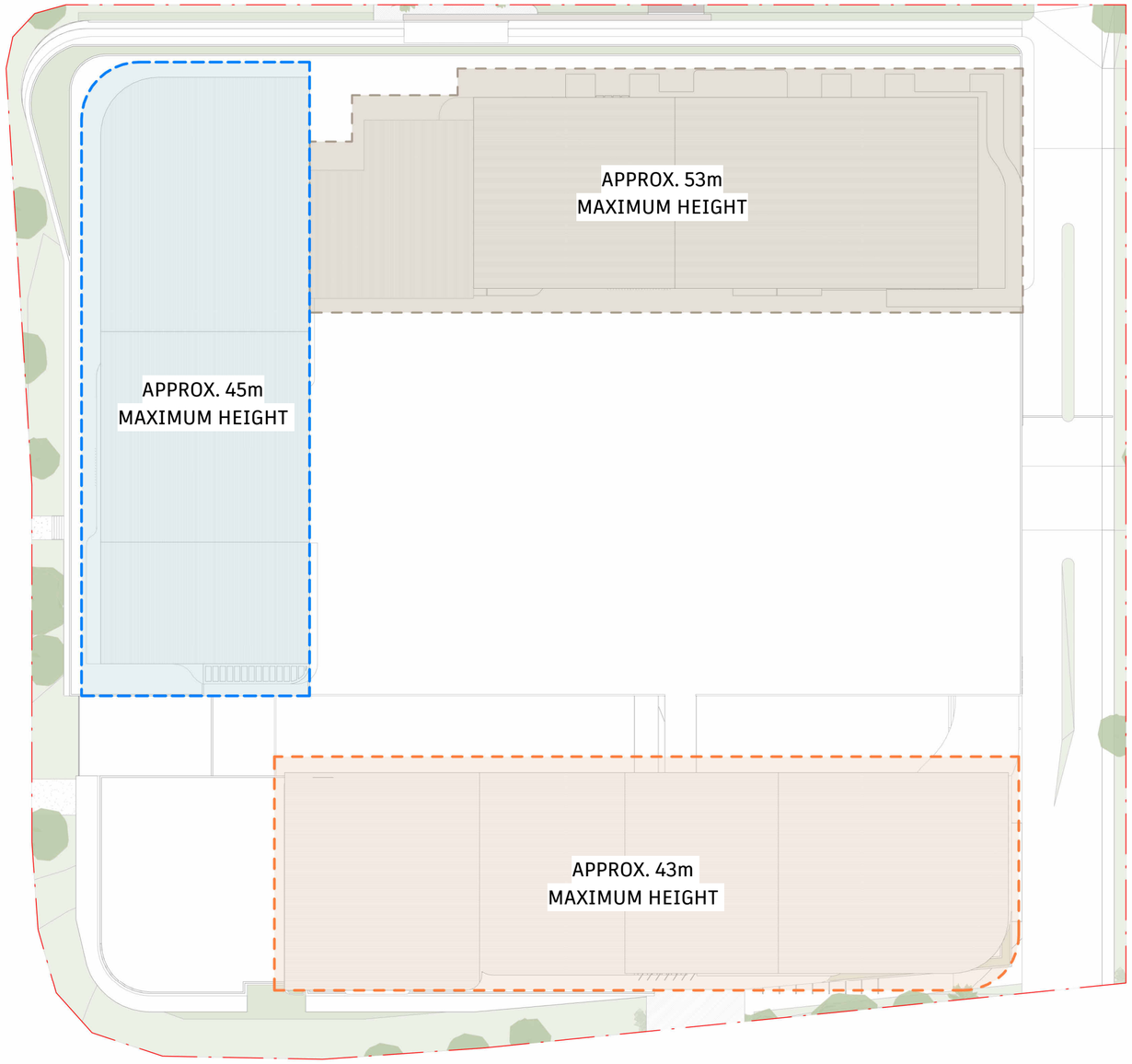
BUILDING HEIGHTS - TOWERS & PODIUM

CARRARA TOWER

BENOWA TOWER

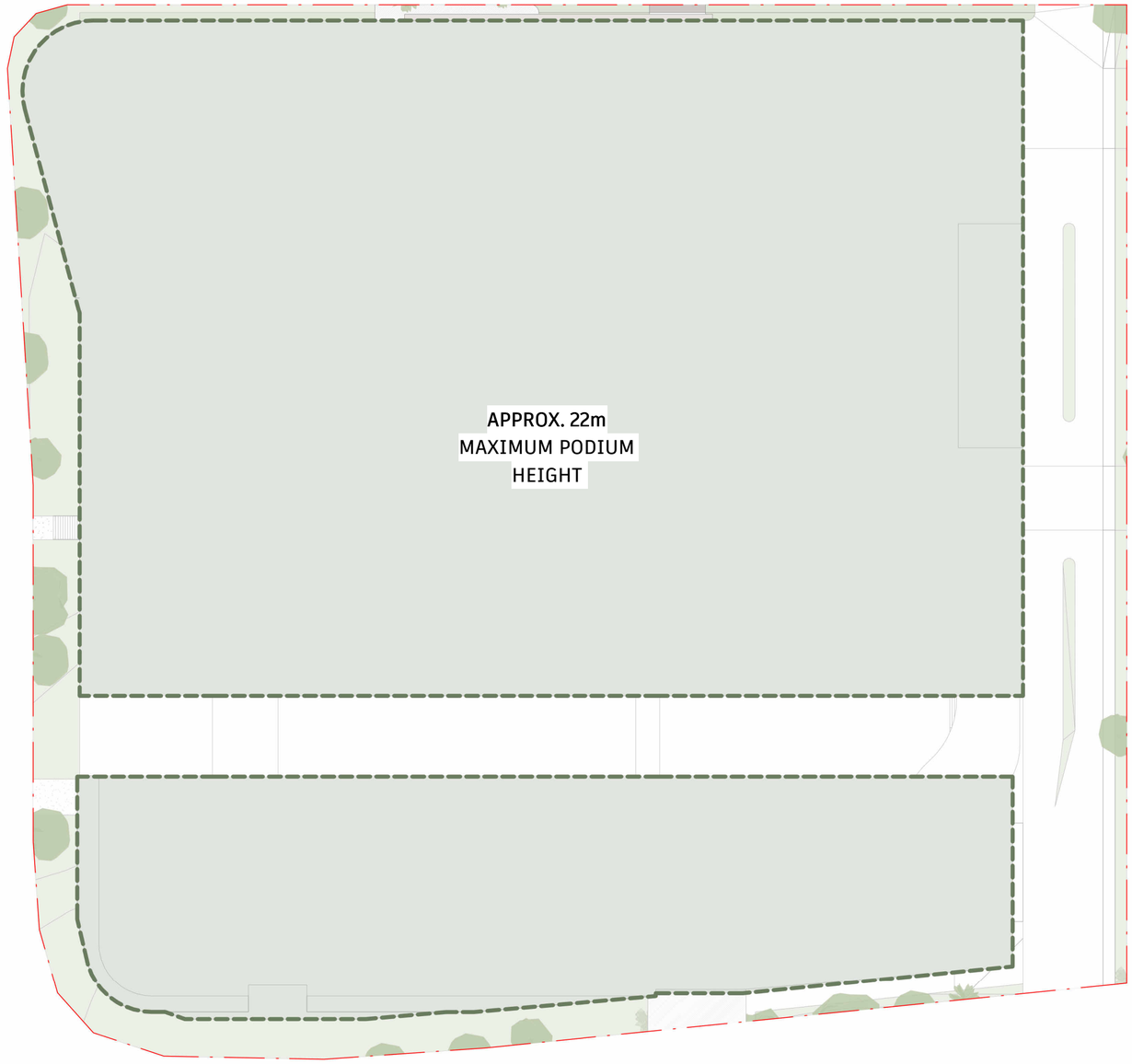
ASHMORE TOWER

PODIUM



BUILDING HEIGHTS - TOWERS

1 : 500



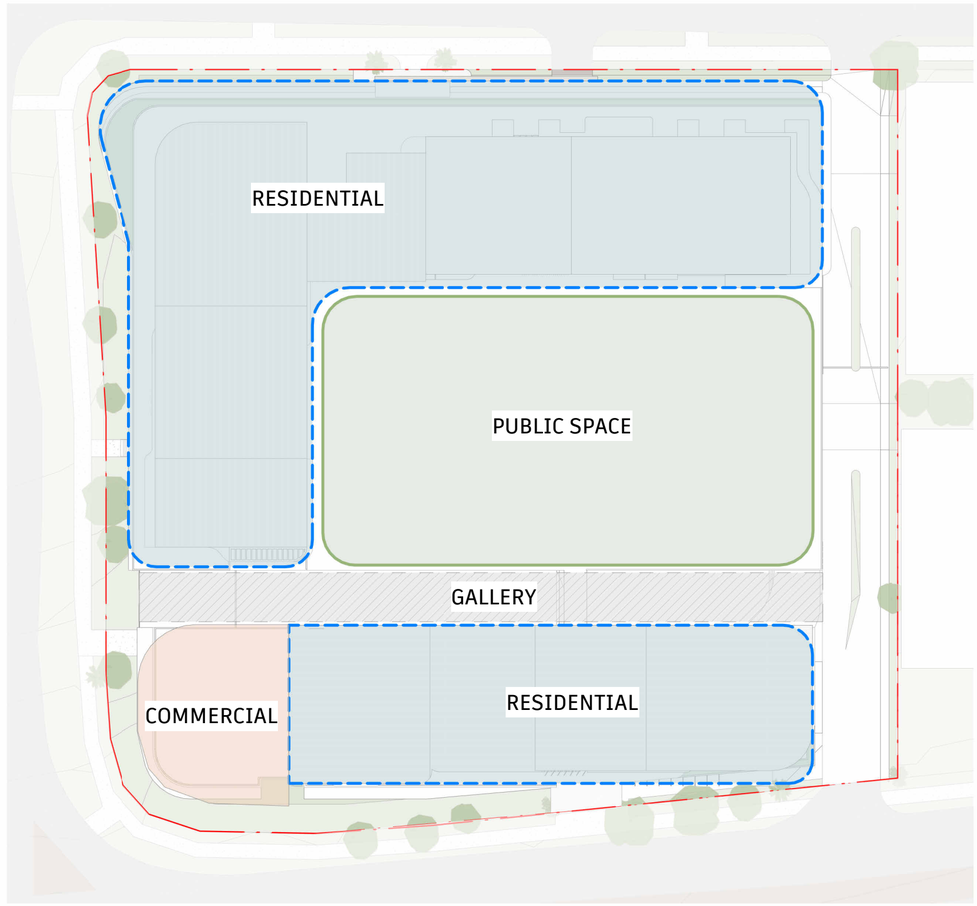
BUILDING HEIGHTS - PODIUM

1 : 500

PRECINCT ZONES

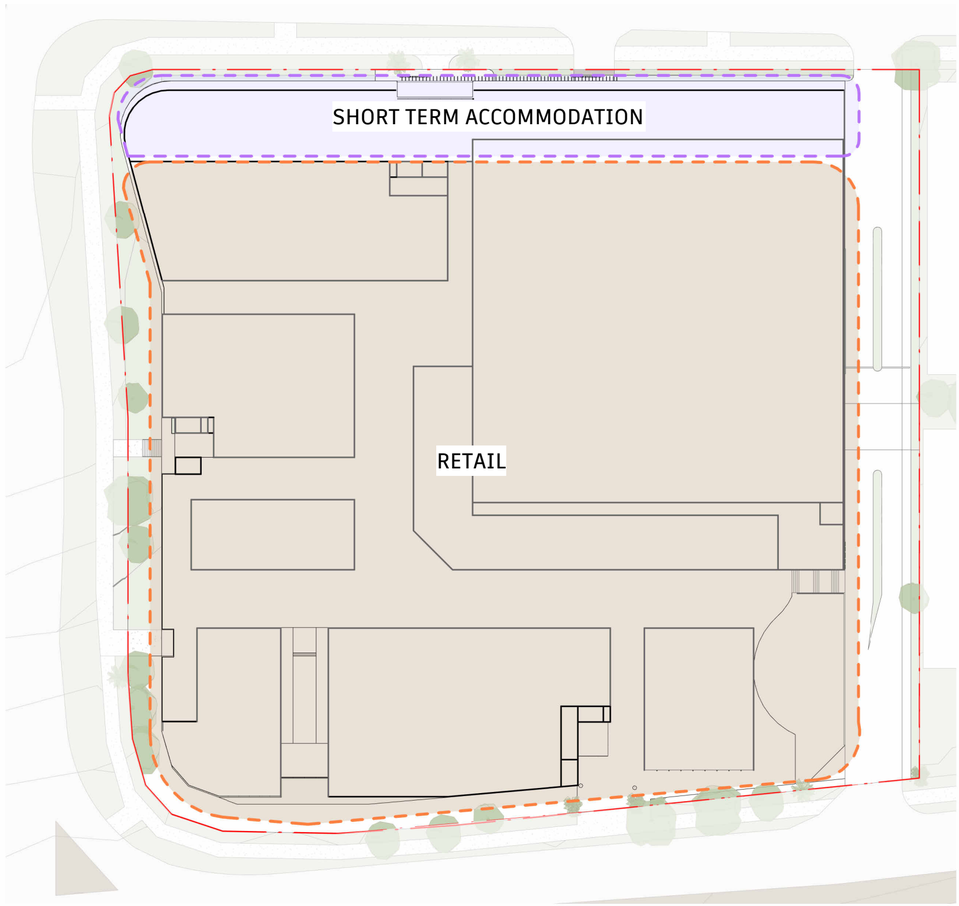
LEGEND

- COMMERCIAL
- RESIDENTIAL
- COMMUNAL RECREATION SPACE
- INTERNAL GALLERY VOID
- RETAIL
- SHORT TERM ACCOMMODATION



SITE PLAN - PRECINCTS

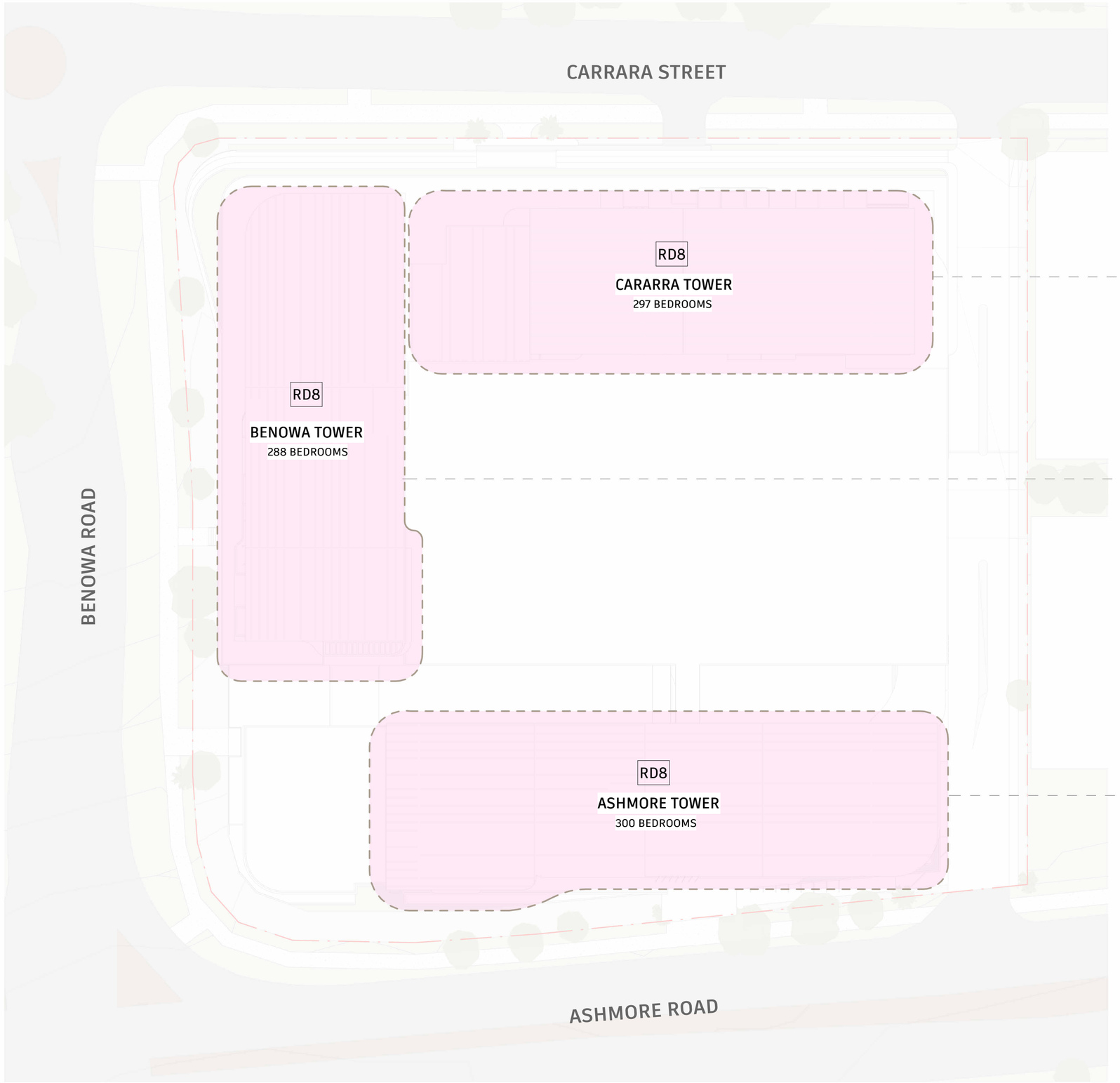
1 : 750



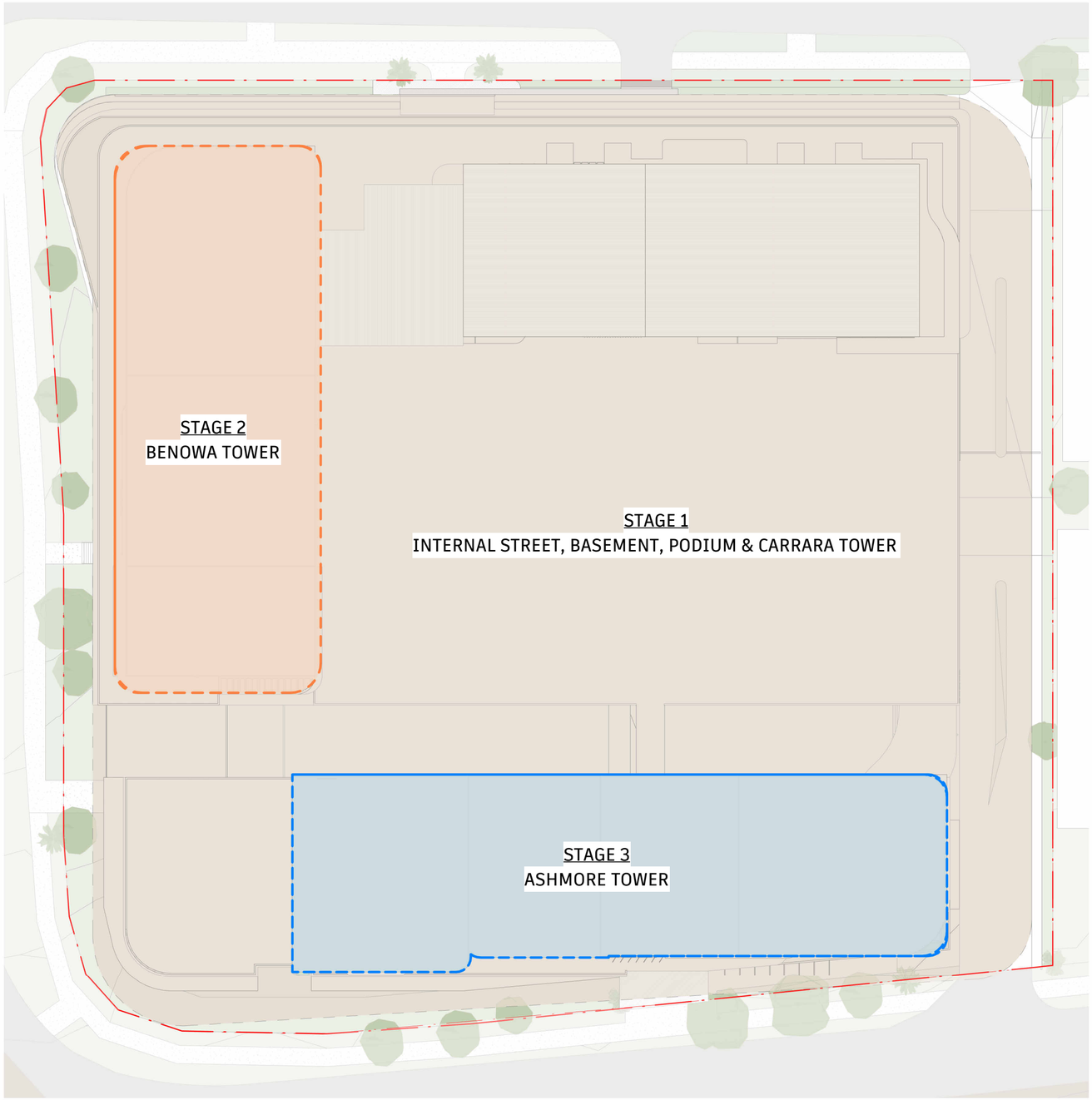
GROUND FLOOR PLAN - PRECINCTS

1 : 750

RESIDENTIAL DENSITY PLAN

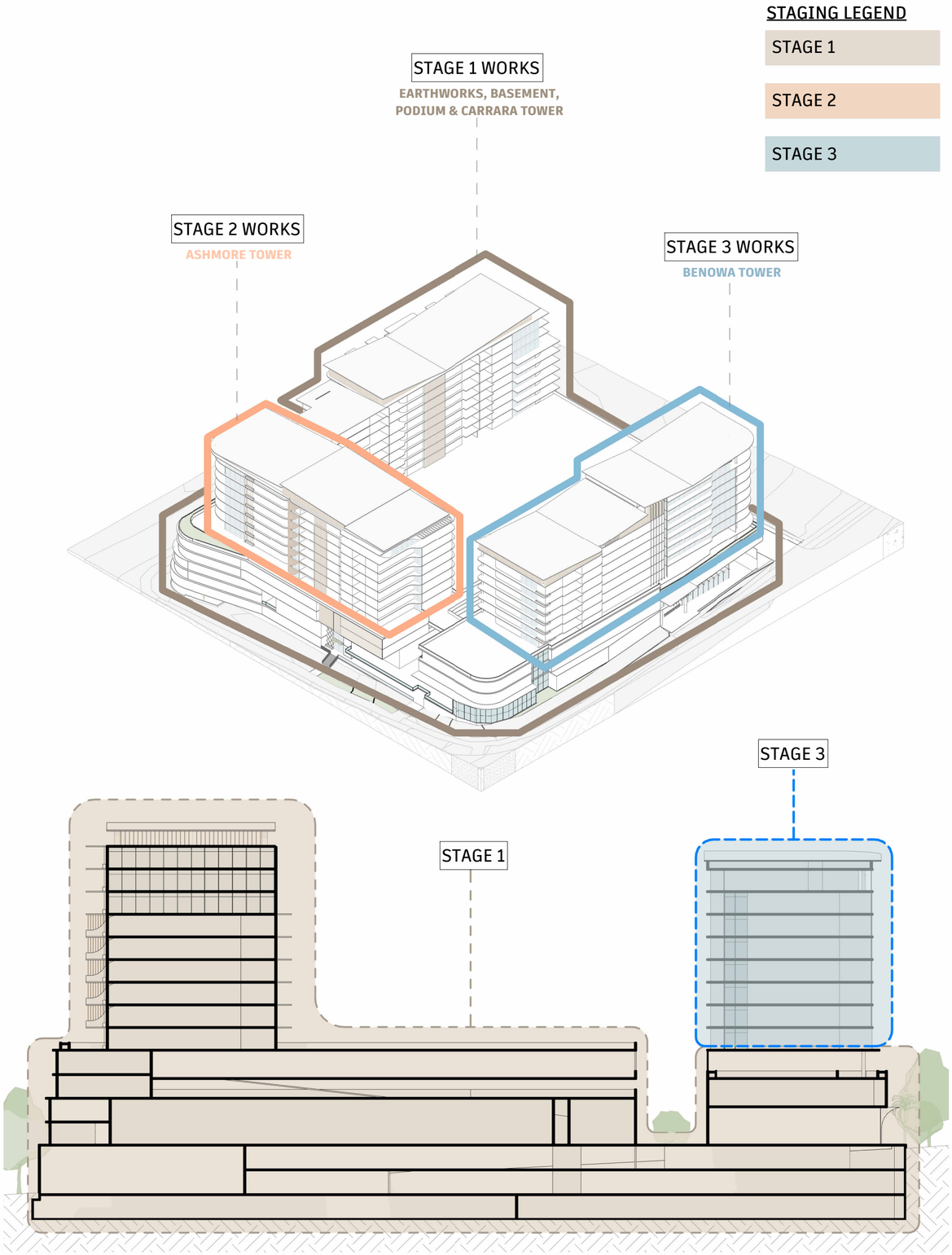


STAGING OF WORKS



STAGING PLAN

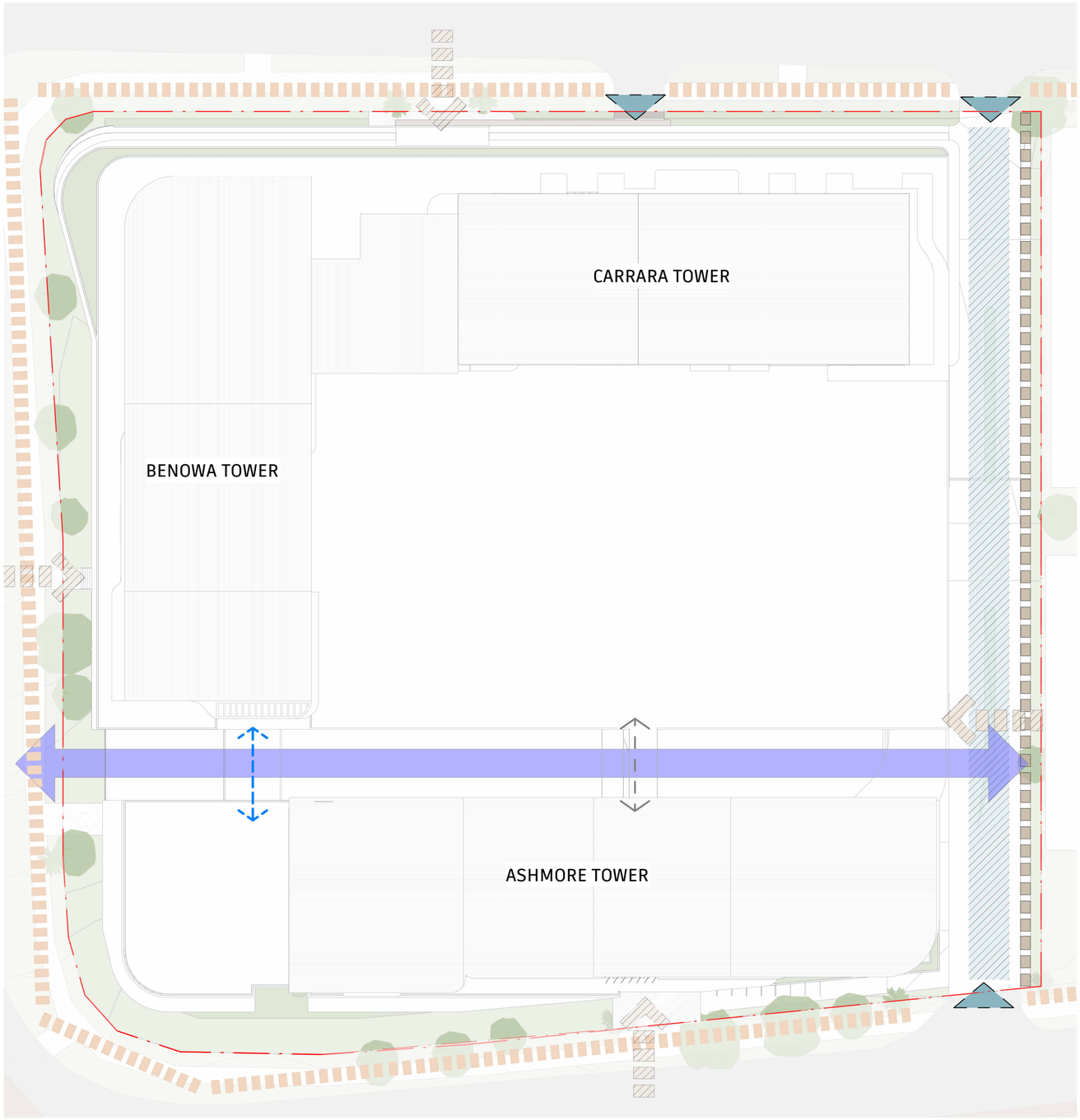
1 : 500



STAGING SECTION

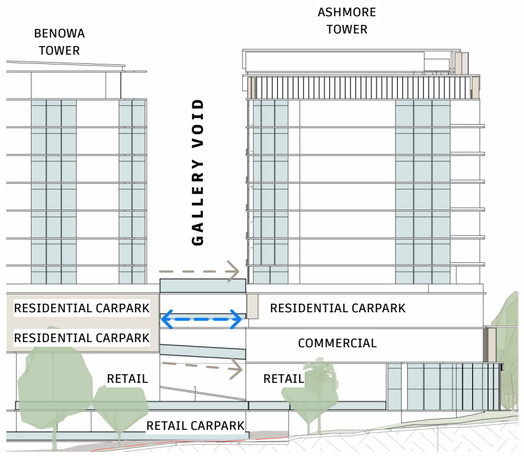
1 : 500

PEDESTRIAN / VEHICULAR MOVEMENT AND LINKAGES



PEDESTRIAN MOVEMENT AND LINKAGES PLAN

1 : 500

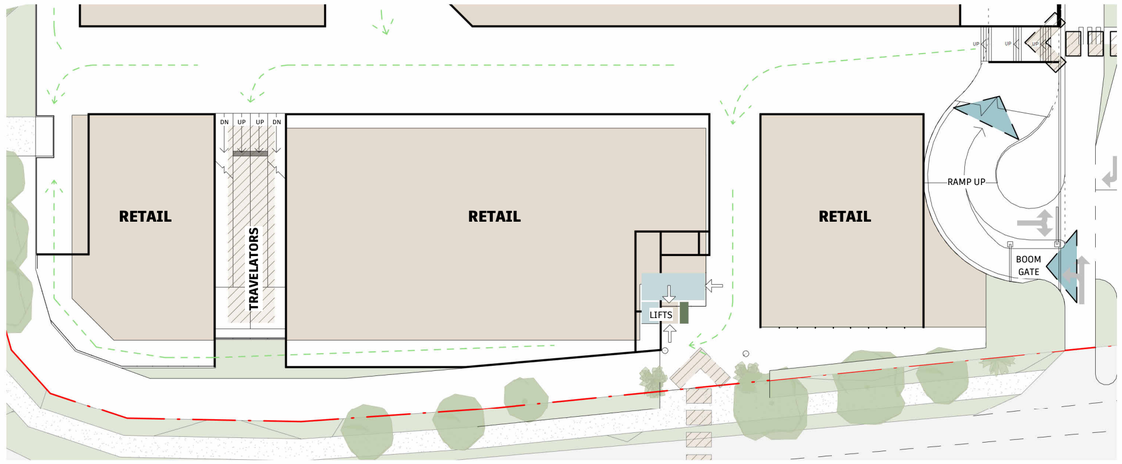


LINK BRIDGES

1 : 500

MOVEMENT AND LINKAGES LEGEND

- INTERNAL GALLERY VOID
- PEDESTRIAN ENTRY POINTS
- NEW PEDESTRIAN FOOTPATH
- STREETSCAPE UPGRADES
- VEHICULAR AND SERVICE ACCESS POINTS
- PRIMARY VEHICULAR MOVEMENT CORRIDOR
- TRAVELATORS
- BOUNDARY LINE
- CARPARK LINK BRIDGE
- PEDESTRIAN LINK BRIDGE
- PEDESTRIAN MOVEMENT

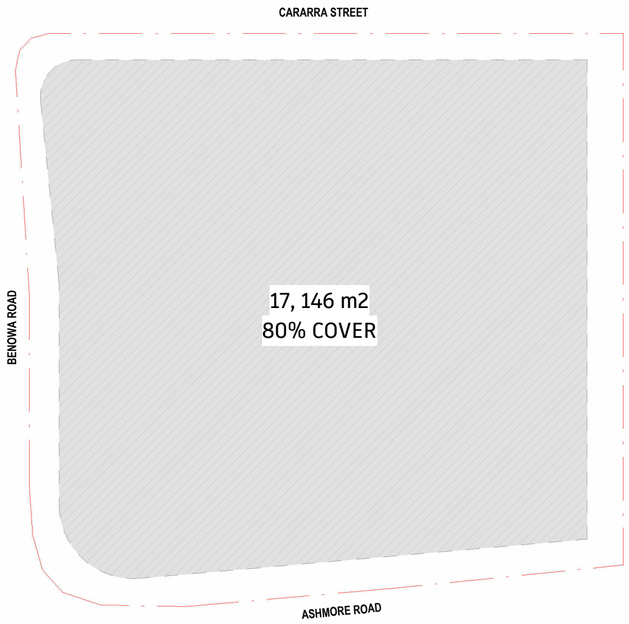


INTERNAL PEDESTRIAN CIRCULATION PLAN

1 : 500

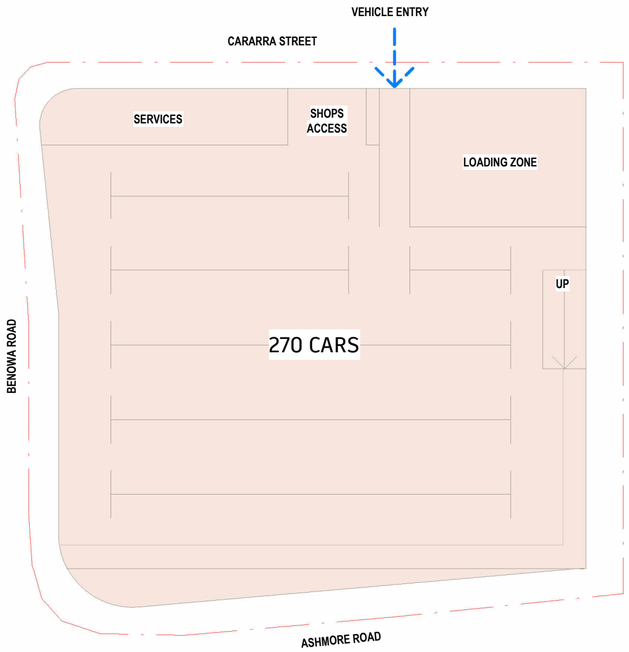
RETAIL SPACE & CARPARKING DEMAND TESTING DIAGRAMS

TOTAL SITE AREA = 17, 658 m^2
80% = 14, 126 m^2



SITE COVER

1 : 1000



BASEMENT 1

1 : 1000

TESTING OF CARPARK DEMAND AND SITE COVERAGE/HEIGHT REQUIRED IN ORDER TO ACCOMMODATE 10,000 GFA OF RETAIL (4000M^2 SUPERMARKET + 6000M^2 SPECIALTY RETAIL). FIGURES ARE BASED ON THE FOLLOWING PARAMETERS: 80% TOTAL SITE COVER, 14M ABOVE NGL MAXIMUM HEIGHT & 10,000M^2 OF RETAIL GFA.

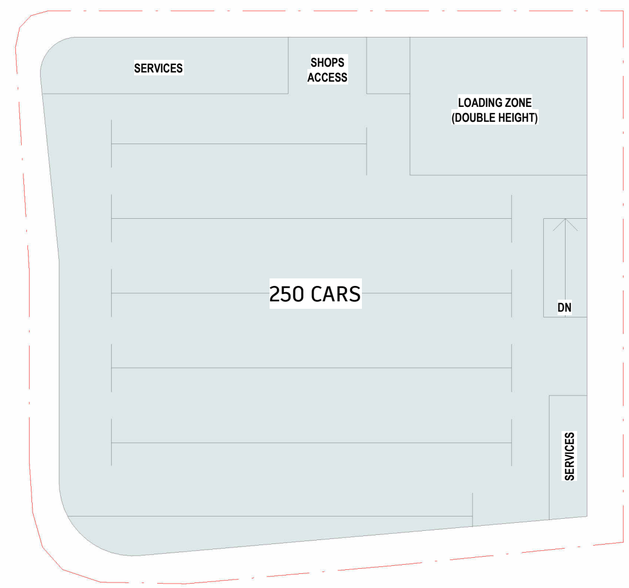
PARAMETERS

80% SITE COVER	14, 126 m^2
BASEMENT 1	270 CARS
BASEMENT 2	250 CARS
SHOPPING CENTRE	10,000 m^2

CARPARKING

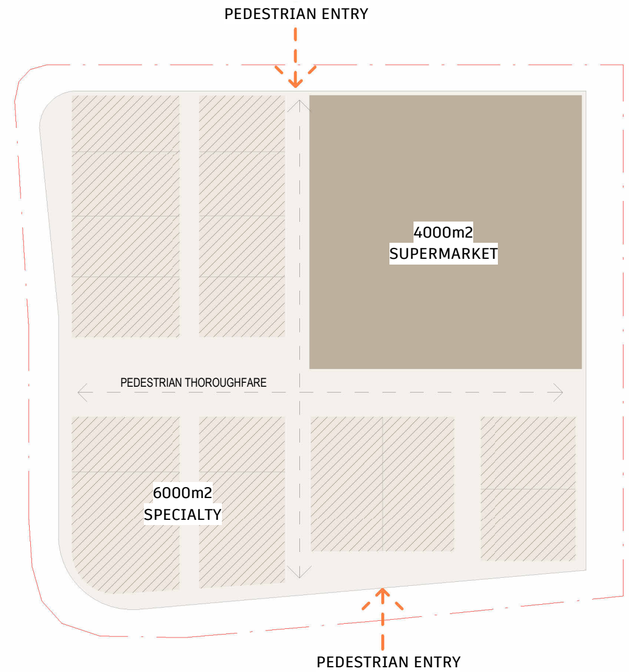
5 CARS PER 100m^2

TOTAL REQUIRED = 500 CARS



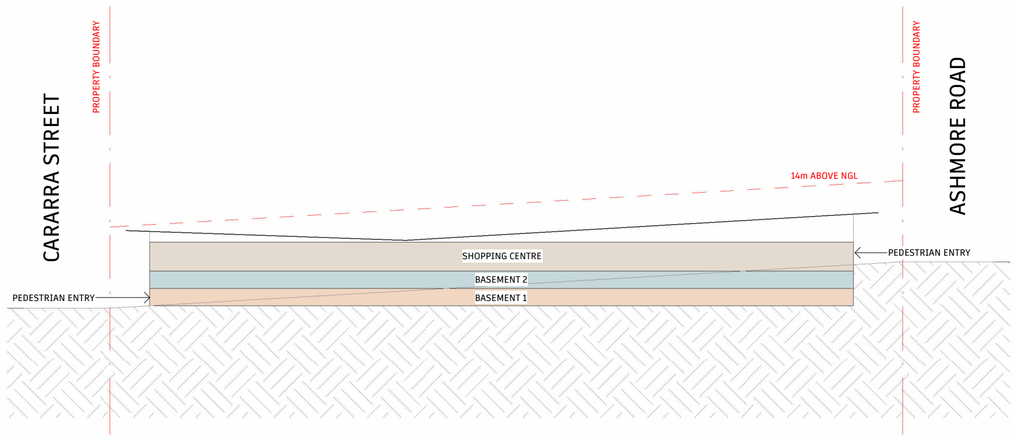
BASEMENT 2

1 : 1000



SHOPPING CENTRE

1 : 1000



SECTION

1 : 750

BENOWA GARDENS

LANDSCAPE ANALYSIS

Client
Neylan Architecture

Project Address
203 Ashmore Road,
Benowa, QLD 4217

Contact
02 Landscape Architecture
(07) 3831 0681

Document Number
716 SD_LR001_B
Date: 4/02/25

Acknowledgements
This document presents work
from 02 Landscape Architecture in
association with Neylan Architecture.

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Internal Street Plan. **06**
Gallery Plan - Level 2 . . . . . **07**
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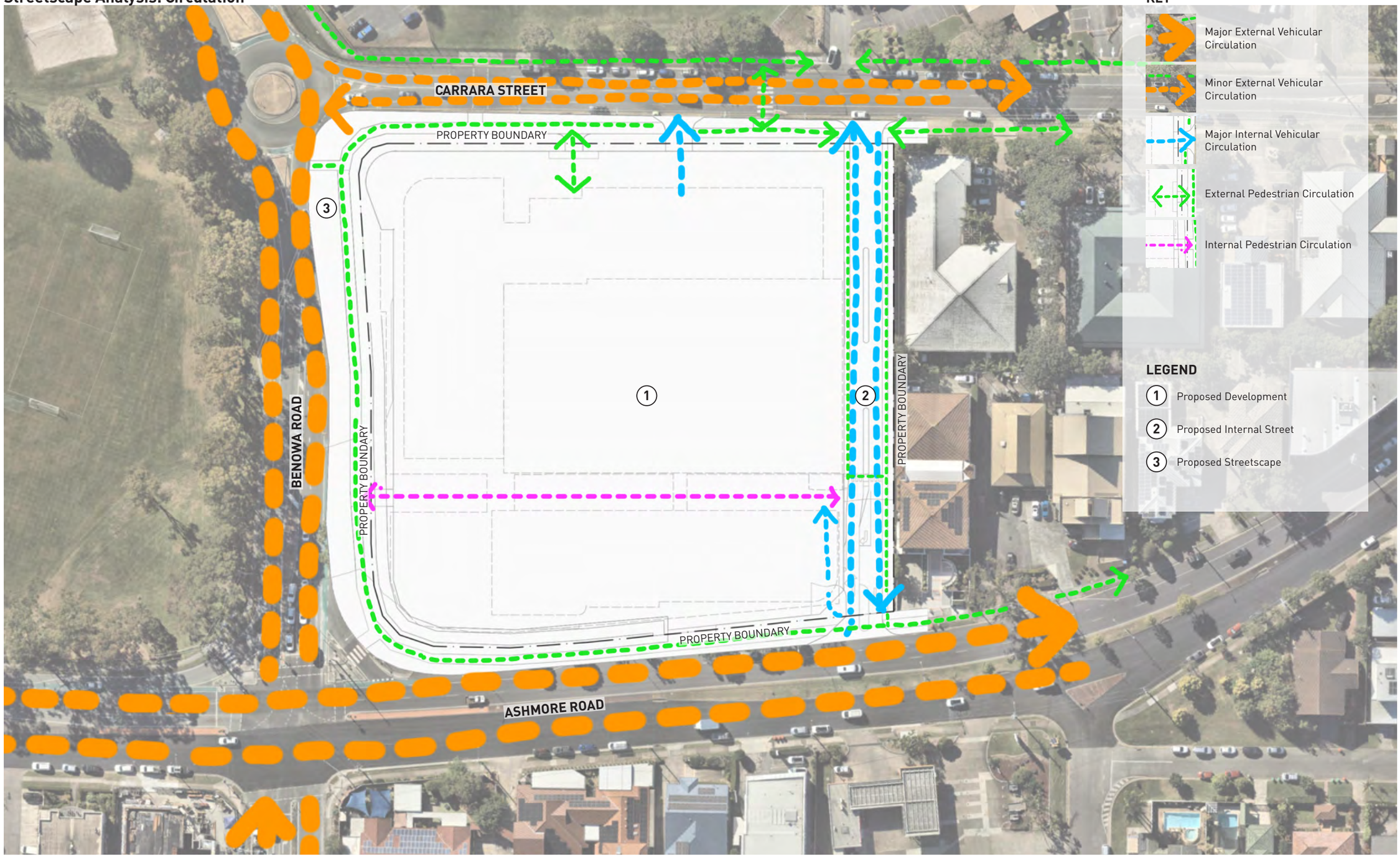
Conceptual Process

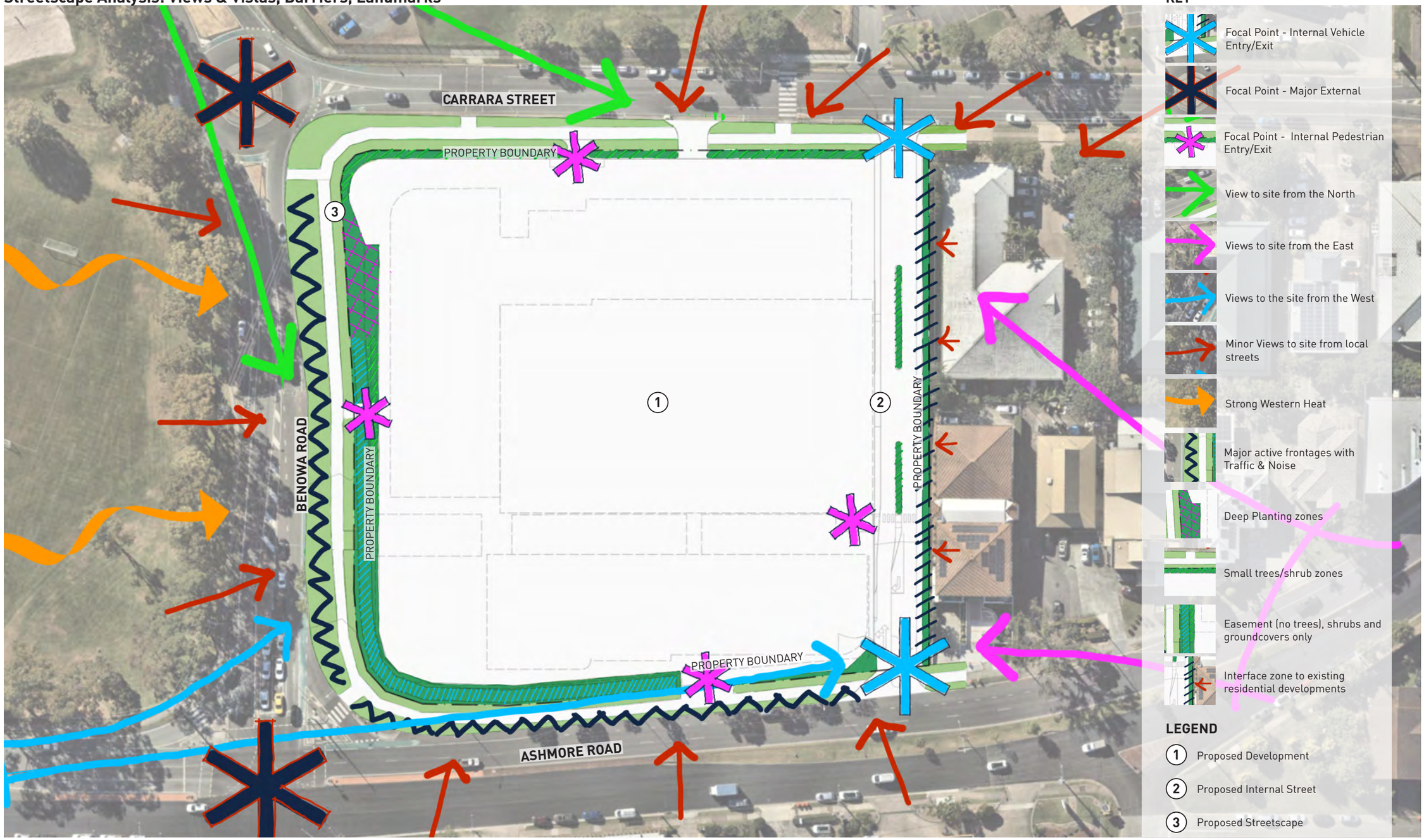
Streetscape Analysis: Circulation



1:1000 - A3 0 5 10 20 50 75m

Conceptual Process

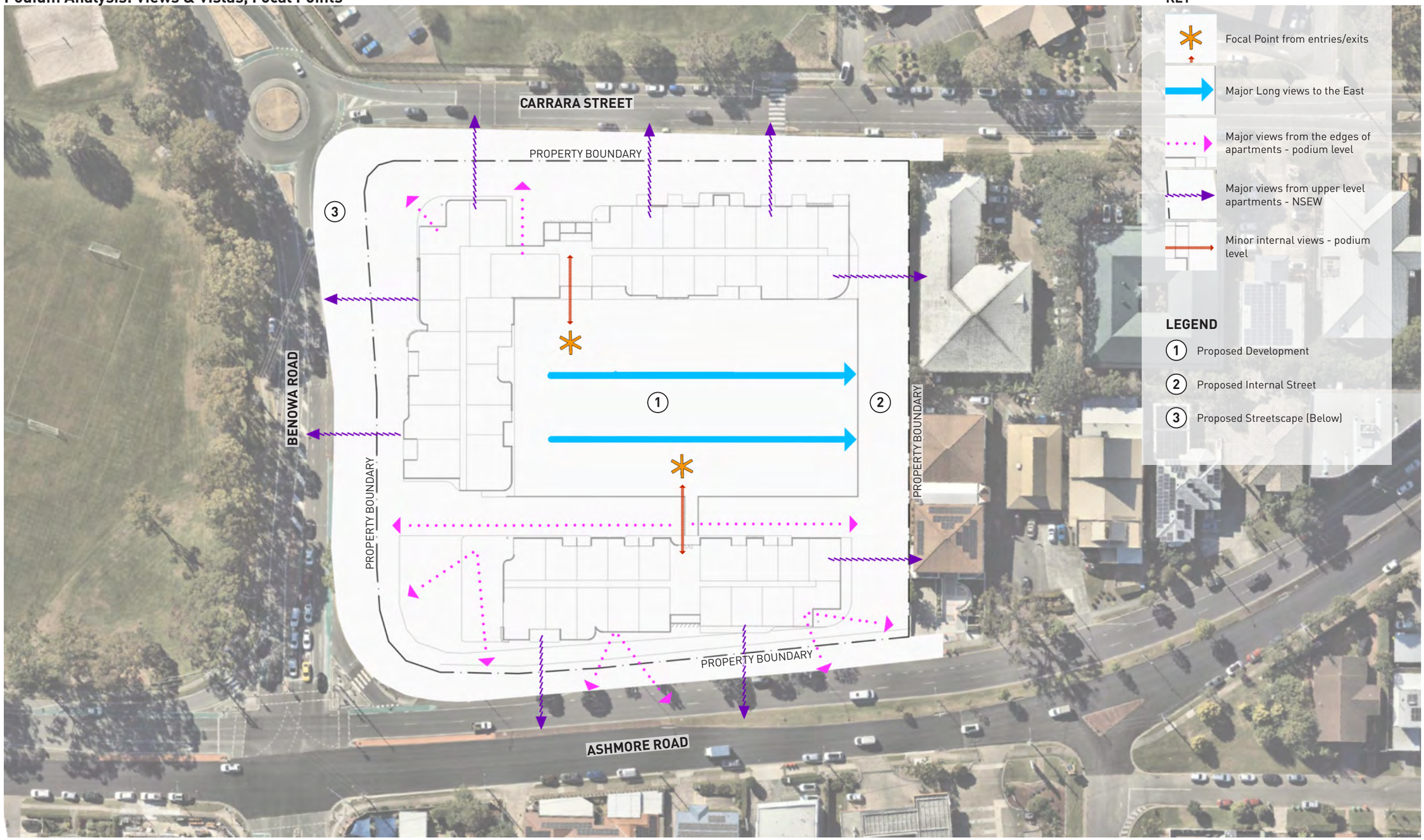
Streetscape Analysis: Views & Vistas, Barriers, Landmarks



1:1000 - A3
0 5 10 20 50 75m

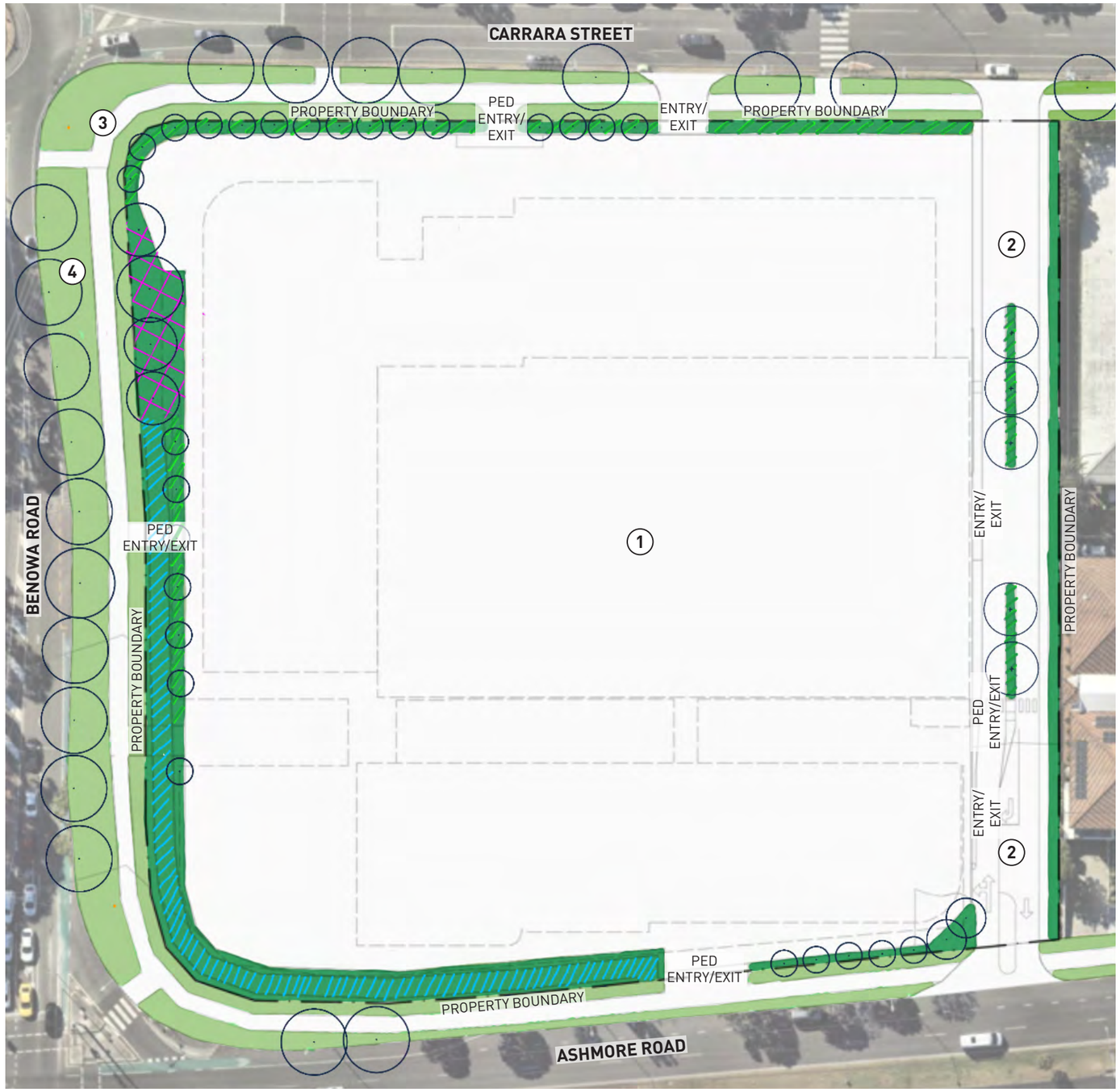
Conceptual Process

Podium Analysis: Views & Vistas, Focal Points

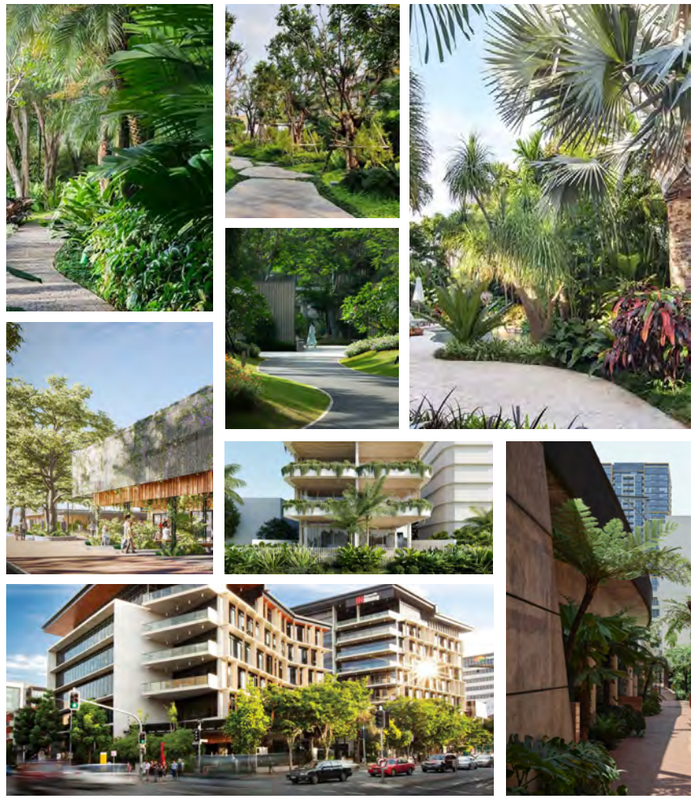


Plans

Streetscape Plan



Streetscape Character Images



KEY

- Proposed Tree
- Deep Planting zones
- Small trees/shrub zones
- Easement (no trees), shrubs and groundcovers only
- Streetscape Verge Zone

LEGEND

1. Proposed Building
2. Proposed Internal Street
3. Proposed Footpath
4. Proposed Verge

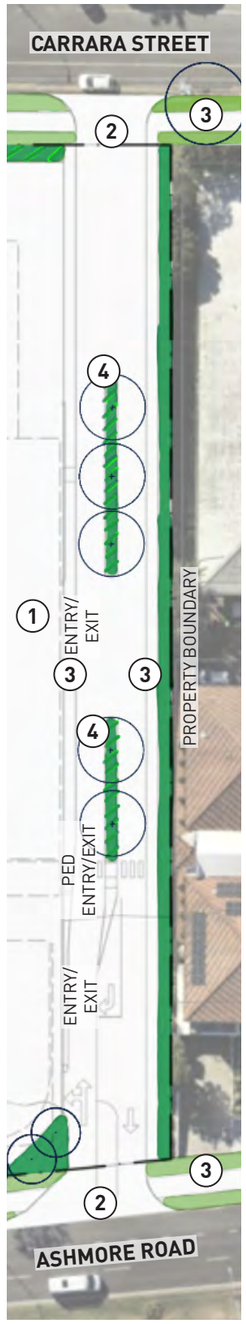
1:750 - A3

0 3 7.5 15 30 60m

Plans

Internal Street Character Images

Internal Street Plan

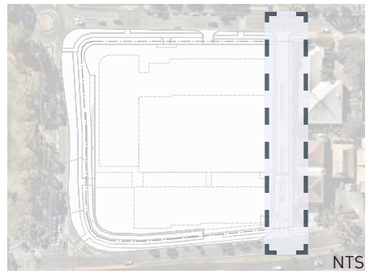


KEY

LEGEND

1. Proposed Building
2. Proposed Internal Street Driveway
3. Proposed Footpath
4. Proposed Medians

KEY PLAN

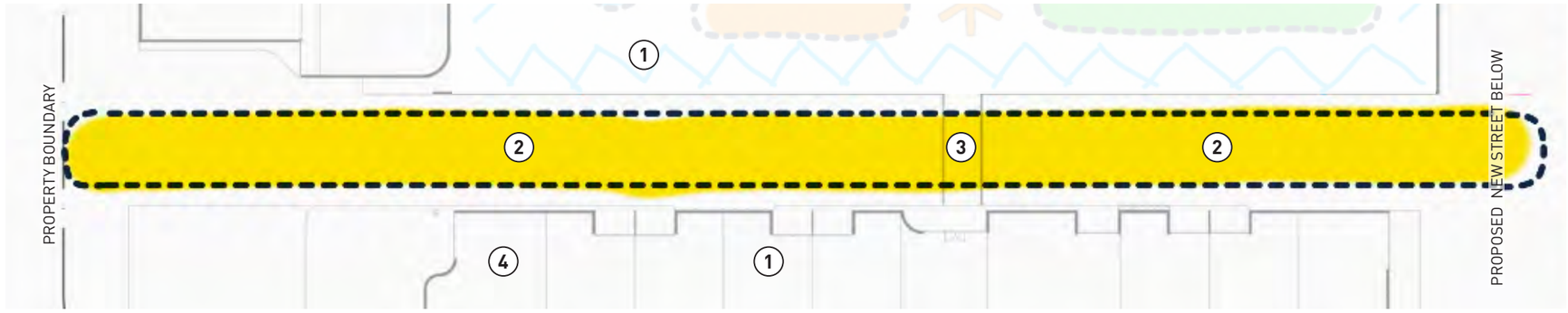


1:750 - A3

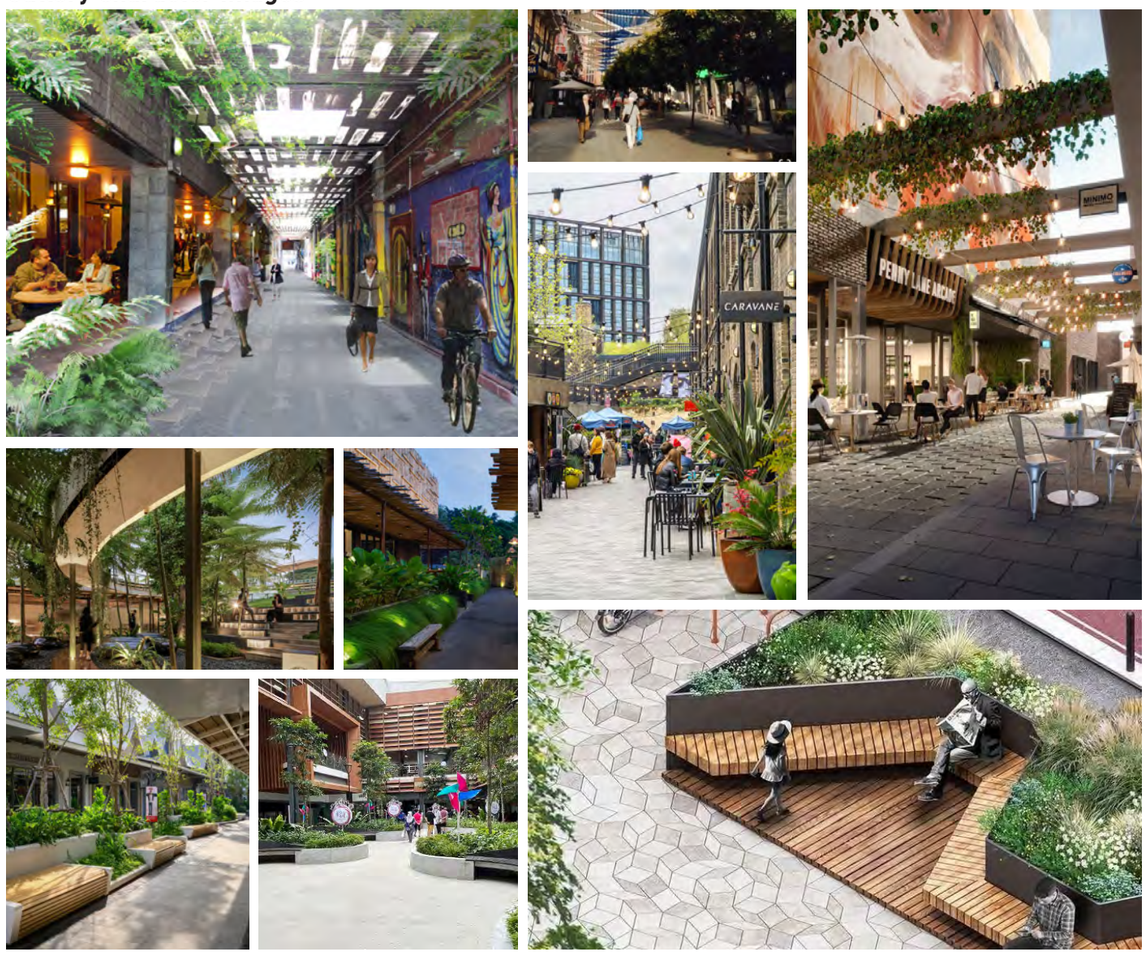
0 3 7.5 15 30 60m

Plans

Gallery Plan - Level 2



Gallery Character Images



KEY

Publically Accessible Open Space
Gallery Zone - High pedestrian amenity

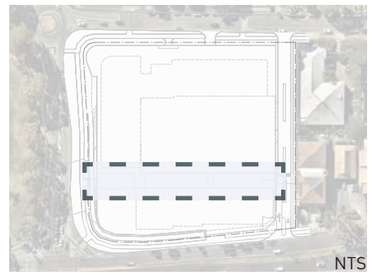
Private Residents Open Space - Pedestrian Promenade (On Podium Above)

Activity Zones (On Podium Above)

LEGEND

1. Proposed Building
2. Proposed Gallery
3. Pedestrian Link - above on podium level
4. Travelators - to and from Retail and Carparking

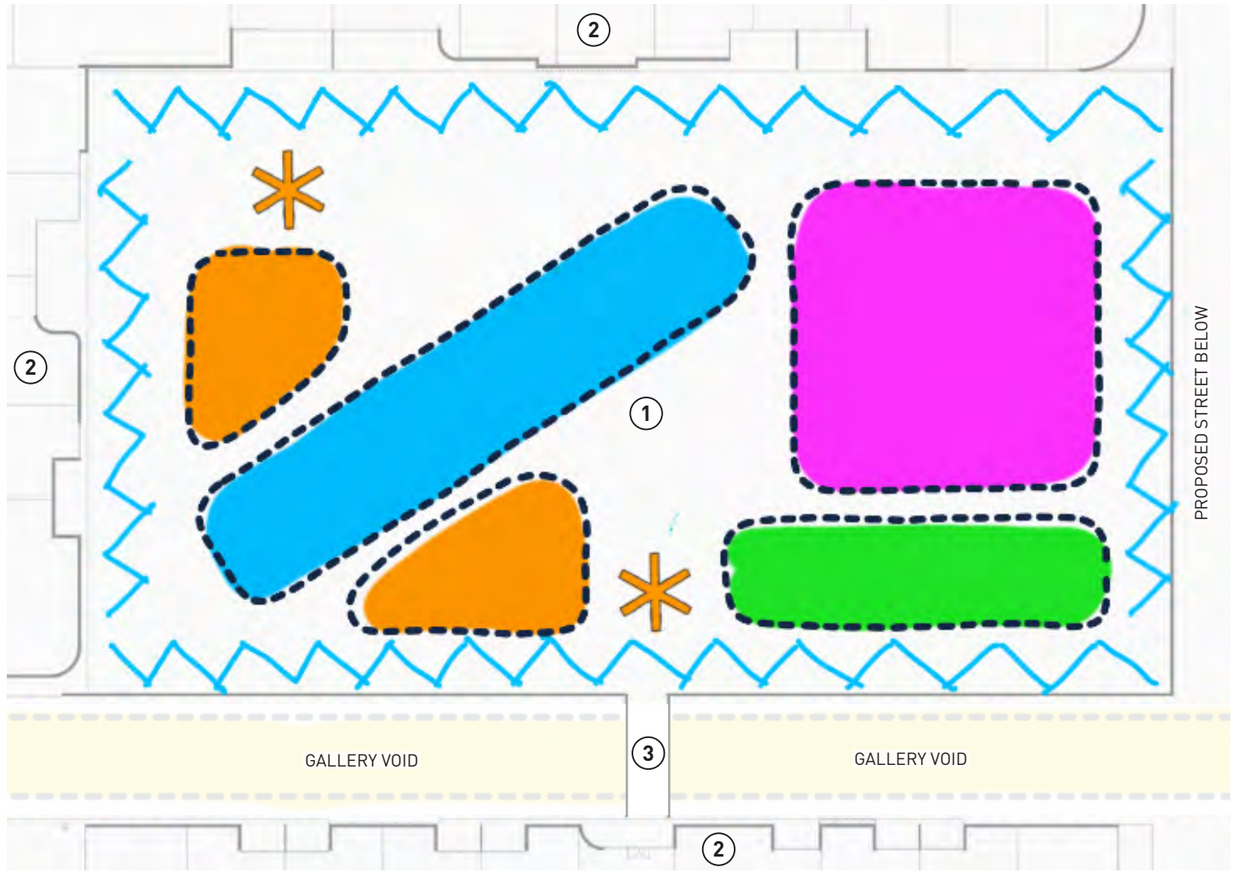
KEY PLAN



1:500 - A3
0 2 5 10 20 35m

Plans

Podium Plan - Level 4 - Activity Zones



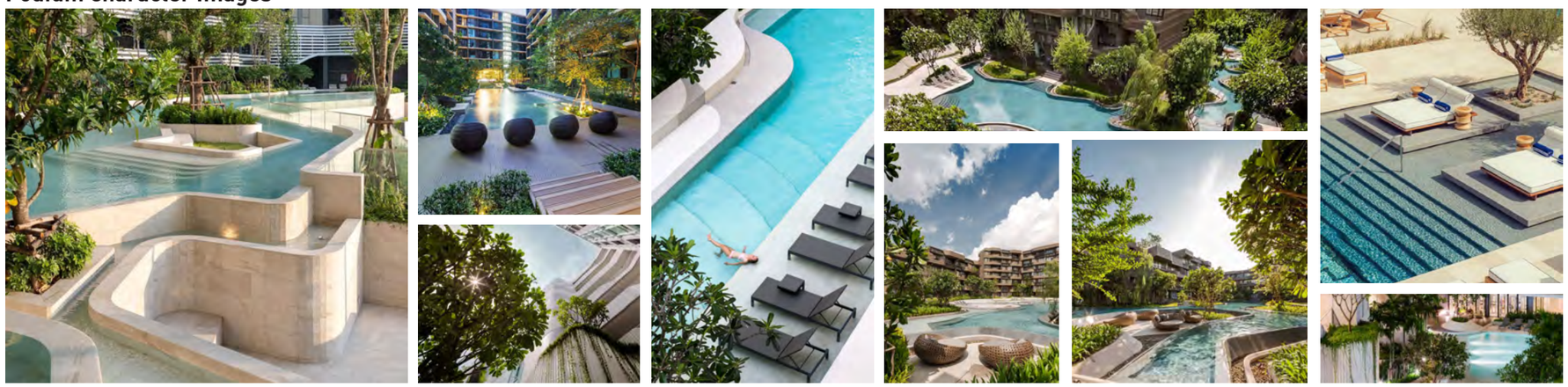
KEY

- Focal Point from Apartment Entry Foyers
- Pedestrian Promenade - Min 3m around the perimeter of the Podium and Running Track
- Activity Zone - Water
- Activity Zone - Pets
- Activity Zone - BBQs, Shelters
- Activity Zone - Yoga, PT, Exercise Equipment
- Landscape Zone - Across Remaining Areas
- Gallery Zone (Below)

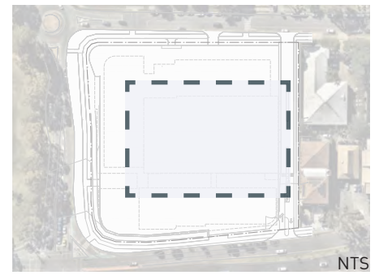
LEGEND

1. Proposed Communal Open Space
2. Proposed Residential Tower
3. Pedestrian Link

Podium Character Images



KEY PLAN



02 Landscape Architecture
ABN 22 704 400 505

Shop 3/42 Cordelia Street,
South Brisbane, QLD 4101
(07) 3831 0681

mail@o2la.com.au
www.o2la.com.au

Industry Affiliations

Australian Institute of
Landscape Architects

interplan | va

Visual Impact Assessment

Benowa Gardens Master Plan,
203 Ashmore Road,
Benowa, QLD

February 2025

Document Information

Client: **Benowa Gardens Holding Pty Ltd ATF Benowa**

Title: **Visual Impact Assessment:**
Benowa Gardens Master Plan
203 Ashmore Road, Benowa, QLD

Version: 2.0 **Issue date: 13 February 2025**

Reference: 24047

Prepared by:

interplan | va

PO Box 290, Sanctuary Cove, QLD 4212
Phone: 0434 213 771
email: leslie.curtis@icloud.com

ABN 82 081 632 797

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EXECUTIVE SUMMARY

1 This Visual Impact Assessment has been prepared by Interplan VA for Benowa Gardens Holding Pty Ltd ATF Benowa to assist the Council of the City of Gold Coast with its assessment of a Preliminary Approval Application for a Variation Request to the Gold Coast City Plan that seeks to establish a framework for the future development of a mixed-use, community-focussed development to allow for Food and drink outlets, Health care services, Indoor Sport and Recreation, Multiple dwellings, Office , Shop, including a single anchor tenancy with a GFA of up to 4,000m^2, and Short-term accommodation uses on land at 203 Ashmore Road, Benowa.

The Site and Local Area

2 The Site has an area of 17,660m^2 with road frontages to Ashmore Road, Benowa Road and Carrara Street where it set down approximately 2m from the road frontage at its southwest corner to the intersection of Ashmore Road and Benowa Road.

3 The Site currently accommodates the Benowa Gardens Shopping Centre. A free-standing Food and Beverage outlet is located on the corner of Ashmore Road and Benowa Road. Carparking occupies much of the building setback to the site's frontages and vehicle access is provide to the Site from Ashmore Road and Carrara Street. Landscaping along the Benowa Road frontage and the Site's set down from the Ashmore Road frontage provides partial screening to the carparking.

4 More generally, the Site's Local Area is bisected by Ashmore Road, which creates two differentiated character areas to its north and south. Ashmore Road provides a visual continuum passing through the Local Area and extending through the adjoining areas to the east and west. This continuum varies in its visual character. While the southern side of the road has a relatively continuous building edge, the northern side of the road, which includes the Site has a discontinuous character comprised of dominant open space and a limited extent of building edge.

5 This fragmented character extends to the north from Ashmore Road to include Benowa State High School, Benowa State Primary School, the Pindara Private Hospital, and the Benowa Gardens Shopping Centre. The area extending to the south of Ashmore Road while accommodating commercial uses along the road frontage is characterised by a highly consistent and cohesive low density residential character.

6 While in a relatively prominent location on the northeast corner of Benowa Road and Ashmore Road, which is one of the city's most trafficked roads, the existing Benowa Garden's Shopping Centre is not highly dominant due to the Site's set down from the corner and the Ashmore frontage, and its 2-storey scale. This set down and the location of carparking along the Benowa Road and Carrara Street frontage minimises any direct engagement along the frontage interface with the pedestrian environment.

7 The Benowa Garden's Shopping Centre relationship to the frontages contributes to the fragmented and discordant character of the Site's adjoining streetscapes arising from the varied adjoining land uses. While the sports fields of the Benowa State High School and the Benowa State Primary School are highly visible along the road frontages and contribute to a coherent land use and open space character, they prevent the streetscape from having a cohesive spatial character.

8 The discordance is exacerbated by the on-grade car parking within the grounds of the Pindara Private Hospital along the northern side of Carrara Street. The two-storey built form of the commercial propertied adjoining the Site to the east along Carrara Street opposite the Pindara Private Hospital are the most cohesive elements of the existing streetscape. The properties are enhanced by established landscaping that assists to mitigate the impact of the carparking within most properties' frontages.

The Proposed Development's Visual Impact

9 The visual impact of the Proposed Development was assessed in relation to the receiving Environment's structured by:

a) The Streetscape Context, which typically relates to the potential change that a proposed development may have in relation to the Site's frontage, the adjoining properties, and the neighbouring streetscape.

b) The Neighbourhood Context, which is more broadly comprised of the Local Area.

c) The Citywide Context, which relates to the potential effects and change a new development may have upon the city's image and identity.

10 The Proposed Development's change to the **Streetscape Context** will be of **HIGH magnitude** and of **MODERATE significance**. The significance of the change primarily relates to the dominant scale and bulk of the proposed development in relation to the adjoining streetscapes, and its potential positive engagement with the adjoining pedestrian environments along Ashmore Road, Benowa Road and Carrara Street.

11 The Proposed Development's change to the **Neighbourhood Context** will be of **HIGH magnitude** of **MODERATE significance** to the local community and of **LOW significance** to visitors to the Local Area. The significance of the change primarily relates to the dominant scale and bulk of the proposed development in relation to the existing neighbouring area but is balanced by the Site's open setting and will be experienced within a relatively discordant existing local character.

12 The Proposed Development's change to the **Citywide Context** will be of **LOW magnitude** and of **LOW significance**. The significance of the change primarily relates to the dominant scale and bulk of the proposed development on the corner of Ashmore Road and Benowa Road. where the proposed development is likely to become a local landmark that will contribute to the legibility of the city's urban form and structure.

Mitigation of Visual Impacts

13 The Proposed Development's change to the Streetscape Context and Neighbourhood Context will be of **MODERATE** significance. The significance of this impact primarily relates to the high magnitude of change with respect to the bulk of the proposed development's built form.

14 The modulation provided to the overall building bulk by the differentiation of the podium and tower components will provide an effective break in the proposed development's height to achieve a transition in scale from the full height of the towers to the pedestrian scale of the streetscape environment.

15 This transition is most effective along the Site's Ashmore Road frontage, where the exposed height of the podium appears to be in the order of 10.05m. The podium's height provides a visual reference and focus that will be compatible with and complement existing and potential future neighbouring development along the Ashmore Road frontage.

16 The podium's height projects further above ground level as Benowa Road extends to the north from the Ashmore Road intersection and falls in elevation towards the Carrara Street intersection, where the podium will have height of 20.50m at the corner of the intersection- approximately twice the height of its Ashmore Road frontage.

17 While the open character of the setting at the corner will assist to balance the scale of the podium's bulk, its form and appearance are likely to be overbearing in relation to the streetscape context unless appropriately mitigated by the podium's design with respect to its modulation and articulation. The conceptual drawings provide some indication of the potential mitigation that might be achieve.

18 The impacts of development are primarily regulated by applicable City Plan Codes. The development requirements of the applicable codes, inter alia, aim to facilitate desirable development outcomes and mitigate unacceptable impacts on the amenity and character of the existing or intended context.

19 The proposed 'Benowa Gardens Place Code' will vary the development requirements of the City Plan but is based upon Neighbourhood Centre Zone (NCZ) Code. The variations are implemented as revisions to the NCZ Code. The balance of the NCZ Code's requirements remain unchanged and the proposed revisions, will not alter the application or efficacy of these requirements.

20 In maintaining the majority of the NCZ Code's development requirements, the Preliminary Application will provide greater certainty to the MCU Development Application process with respect to the anticipated development outcomes and their impacts on the locality's existing character and amenity.

21 The proposed 'Benowa Gardens Place Code' and the applicable City Plan Codes are expected to effectively mitigate any adverse development impacts.

22

1 INTRODUCTION

1.1 Purpose

23 This Visual Impact Assessment (**VIA**) has been prepared by Interplan VA for Benowa Gardens Holding Pty Ltd ATF Benowa (the '**Applicant**') to assist the Council of the City of Gold Coast (**Council**) with its assessment of a Preliminary Approval Application (the **PA**) for a Variation Request to the Gold Coast City Plan that seeks to establish a framework for the future development of a mixed-use, community-focussed development to allow for Food and drink outlets, Health care services, Indoor Sport and Recreation, Multiple dwellings, Office , Shop, including a single anchor tenancy with a GFA of up to 4,000m^2, and Short-term accommodation uses (the **Proposed Development**) on land at 203 Ashmore Road, Benowa, described as Lot 822 on RP839746 (the **Site**).

24 The purpose of this VIA is to identify and assess the visual impact of the proposed development in relation to:

- The sensitivity of the context and the sensitivity of visual receptors to the changes to the existing visual context.
- The magnitude of the visual change to the visual context resulting from the proposed development.
- The significance of the visual change to the visual context for the sensitive receptors.
- The mitigation of the impacts and potential effects of the change to the existing visual context provided by the proposed *'Benowa Gardens Development Code'*

25 The VIA should be read in conjunction with other documents lodged with the PA.

1.2 Information Sources

26 The following information was primarily relied upon for the preparation of this report:

a) The Development Application Town Planning Report, prepared by URBIS, (**URBIS**).
b) The Architecture Drawings, prepared by Neylan Architecture, dated February 2025 (**NEYLAN**)
c) Gold Coast City Plan 2016 v11 (**CITY PLAN**)
d) Google Earth (**GE**), Google Maps (**GM**) and Queensland Globe (**QG**); and
e) Inspections of the site and its locality undertaken by the report's author.

27 Various images included in this report have been extracted and adapted from the abovementioned sources. The original reports should be referred to for larger and/or higher resolution versions of the images. The author's curriculum vitae is attached to this report at **Appendix A**

1.3 Key Concepts and Principles

28 The VIA has regard to the sensitivity of key receptors (people at key viewing locations), the sensitivity of the visual environment to change, and the magnitude of change to the visual environment that will result from the proposed development. The potential impacts and effects of the change are discussed in relation to the visual context including how they are mitigated by the design of the proposed development.

29 The assessment is based upon the following overarching principles:

a) The general public's common impressions of the visual environment including its character and identity are primarily based upon what can be seen from within the public realm. Priority is therefore given to the views available from public and semi-public spaces.
b) Most people prefer:
    - Views of natural elements such as the ocean or mountains as opposed to urban elements,
    - Views that are structured with focal elements, a mid-ground, and a background,
    - Variety over uniformity
c) Viewpoints may have primary views in one direction to an attractive or distinctive feature and secondary views in other directions. The distinction may relate to the relative attractiveness of the alternate views or the nature of the viewpoint location (whether, for example, it is from a principal living space or from a bedroom).
d) Discordant elements that contrast markedly with their otherwise attractive settings can have a detrimental impact upon amenity.

30 The methodology utilised for the preparation of this VIA is outlined at **Appendix B**, however, not all elements of the methodology were necessarily required and utilised for the VIA. The methodology includes, inter alia, recommendations set out in the Landscape Institute and Institute of Environmental Management & Assessment Guidelines for Landscape and Visual Impact Assessment[1], and the Australian Institute of Landscape Architects Guidance Note for Landscape and Visual Assessment[2].

[1] Landscape Institute and Institute of Environmental Management & Assessment. (2013). Guidelines for Landscape and Visual Impact Assessment, 3rd Ed
[2] Australian Institute of Landscape Architects, (2018) Guidance Note for Landscape and Visual Assessment

2 THE SITE AND CONTEXT

2.1 The Subject Site

31 The subject site is located at 203 Ashmore Road Benowa, has an area of 17,660m^2 with road frontages to:

- Ashmore Road – approximately 132 metres
- Benowa Road – approximately 130 metres
- Carrara Street – approximately 135 metres

32 The Site is set down approximately 2m from the road frontage at its southwest corner to the intersection of Ashmore Road and Benowa Road. It then falls diagonally from approximately 8m AHD to 4m AHD at is northeast corner to Carrara Street.

Figure 1 - Aerial photo of the subject site (in blue outline) (source: adapted from Qld Globe)

33 The Site currently accommodates the Benowa Gardens Shopping Centre, which includes a full-line Coles supermarket tenancy. A free-standing Food and Beverage outlet is located on the corner of Ashmore Road and Benowa Road. Carparking occupies much of the building setback to the site's frontages and vehicle access is provide to the Site from Ashmore Road and Carrara Street. Landscaping along the Benowa Road frontage and the

Site's set down from the Ashmore Road frontage provides partial screening to the carparking.

2.1.1 Ashmore Road Interface

34 Ashmore Road is an important and highly trafficked transport corridor providing connectivity between the city's inner western suburban residential areas to the intensive urban strip that adjoins the beaches to the east. The expanse of the road reserve area occupied by the intersection of the Ashmore Road and Benowa Road carriageways is visually dominant. The dual intersecting frontages increases the visibility of the Site; however, the width of the intersecting road reserves also provides a more open character to the Site's setting (refer to **Figure 2** below).

35 The built form of the existing shopping centre is partially visible on the northeast corner of the intersection but is not particularly dominant to visual receptors in vehicles when passing the Site along Ashmore Road due to it being set down in relation to the adjoining road reserves. The upper part of the free standing Food and Beverage building (the KFC) is relatively prominent at the corner, where its legibility is reinforced by a pylon sign.

36 Pedestrians walking past the Site's Ashmore Road frontage will have a clear view overlooking the on-grade carpark, which will be visually dominant in relation to the 2-storey built form that is setback behind it. The carpark's dominant appearance is not mitigated by landscaping and appears as an unattractive hardstand (refer to **Figure 3** below).

37 The modulation and articulation of the curved built form setback from the frontage behind the carpark addresses the carpark, has an animated appearance that provides activation to the carpark interface and mitigates the visual impact of the built form's length. It also partially screens the larger 'box' like form of the supermarket's building envelope and service area behind (refer to **Figure 4** below).

38 The free standing Food and Beverage building at the southwest corner of the Site adjacent to the Ashmore Road and Benowa Road intersection and its drive-thru facility are clearly visible to pedestrians from the footpath along the frontage (refer to **Figures 5** and **6** below). Other than for the stair adjacent to the Ashmore Road driveway entrance at the eastern end of the frontage, driveway, pedestrians are unable to conveniently access and engage with the existing development from the Ashmore Road frontage.

39 A service road extends from the Ashmore Road driveway entrance along the eastern boundary to a loading area behind the 2-storey shopping centre building and at the rear of the supermarket (refer to **Figure 7** below).

40 The Site's frontage is of a considerable length and of significance to the streetscape character of Ashmore Road and the northeast corner of its intersection with Benowa Road. The existing shopping centre does not contribute to a cohesive streetscape character along Ashmore Road and does not effectively contribute to the legibility and

attractiveness of the Site's corner at the intersection, which is an important visual node in the local street pattern.

Figure 2 – View looking to the northeast of the Site's frontage to Ashmore Road from the intersection with Benowa Road

Figure 3 – View looking to the northeast of the Site set down from the frontage of Ashmore Road

Figure 4 – View looking to the north of the shopping centre's activated pedestrian interface with the carpark

Figure 5 – View looking to the northwest of the Food and Beverage outlet set down from the frontage at the corner of the intersection of Ashmore Road and Benowa Road

Figure 6 – View of the Food and Beverage outlet drive-thru at the corner of the intersection of Ashmore Road and Benowa Road

Figure 7 – View looking to the north from the Ashmore Road vehicle access driveway of the service area and interface with the adjoining property to the east along Ashmore Road.

2.1.2 Benowa Road Interface

41 As discussed above in relation to the Ashmore Road frontage, the expanse of the road reserve at the intersection of the Ashmore Road and Benowa Road is visually dominant and the dual frontages increase the total visibility of the Site but contribute to a more open setting.

42 The carpark and built form on the Site are set down from Benowa Road at the corner of the intersection with Ashmore Road, which limits their visibility to traffic passing through the intersection. The elevation of Benowa Road falls to the north away from Ashmore Road towards the intersection with Carrara Street (refer to **Figure 8** below).

43 The established trees within the Benowa Road verge and within the site extending along the frontage from the Ashmore Road intersection are prominent and contribute to the landscape character of the streetscape while mostly screening the carpark and built form behind.

44 As the elevation of the Benowa Road falls towards the intersection with Carrara Street the car park and built form become increasingly more visible but remain partially screened by the vegetation adjoining the frontage (refer to **Figure 9** below)

Figure 8 – View looking to the northeast of the Site's frontage to Benowa Road

Figure 9 – View looking to the south along Benowa Road from the intersection with Carrara Street.

45 The existing shopping centre's built form building is set back from the frontage behind landscaping and carparking, which provide a human scale interface along the frontage. The landscape contributes to the amenity of the frontage and assist to screen the adverse impact of the carpark's appearance. The size and scale of the shopping centre's built form is compatible with the landscaping and while relatively prominent is not dominant in relation to the human scale and landscape character of the frontage. The glazed façade of the built form and the sheltered pedestrian walkway along the edge to the carpark animates the built form and contributes to the activation of the built form's interface with the carpark.

2.1.3 Carrara Street Interface

46 The carpark along the Site's Benowa Road frontage extends to the corner of the intersection with Carrara Street, where it is elevated above the Carrara Street frontage. A sandstone block retaining wall with integrated landscaping provides the interface to the footpath along the Carrara Street frontage (refer to **Figure 10** below).

47 The shopping centre's built form is more visible as it extends towards the frontage adjacent to the carpark where it is setback from the Carra Street frontage behind a driveway and landscaping. The built form addresses the frontage with a glazed façade. The retaining wall and landscaping extending from the corner to the east along the frontage do not accommodate pedestrian access to the Site.

48 The driveway that provides access to the corner carpark from Carrara Street falls to the east along the frontage where the car parking of the shopping centre's lower ground

floor/basement is then visible. The landscaping along the frontage partially screens the built form and assists to ameliorate the driveway's interface with the adjoining footpath (refer to **Figure 11** below).

Figure 10 - View looking to the southeast of the Site's frontage to Carrara Street from the intersection with Benowa Road

Figure 11 - View looking to the southwest of the Site's frontage to Carrara Street extending from the intersection with Benowa Road

49 The driveway extends to an entrance from Carrara Street midway along the frontage. Where the form and appearance of the shopping centre transitions to the blank walls of the supermarket 'big box' building envelope (refer to **Figure 12** below).

Figure 12 – Vehicle driveway access from Carrara Street

50 The dominant bulk of the supermarket's building envelope is partially mitigated by the landscaping that adjoins its interface with the driveway and then extends along Carrara Street frontage to the east within the building setback (refer to **Figure 13** below). The landscape within the setback also assists to mitigate the contrasting interface with the adjoining two-storey commercial building to the east (refer to **Figure 14** below).

Figure 13 - View looking to the southwest of the Site's frontage to Carrara Street with the supermarket building envelope adjoining the frontage

Figure 14 - View of the interface of the existing development with the adjoining property to the east along Carrara Street

2.2 Adjoining Properties

51 The Site is only adjoined by two properties, which are 2-storey commercial buildings. The Site is otherwise separated from the neighbouring properties to the north, west and south by Carrara Street, Benowa Road and Ashmore Road. The adjoining properties are discussed below, and the other neighbouring properties and streetscapes are discussed at **s2.2.2** below.

2.2.1 Ashmore Road

52 The Site is adjoined to the east along Ashmore Road by a two 2-storey commercial building that accommodates medical tenancies. The building includes a basement carpark that is visible from the frontage (refer to **Figure 15** below). The building is setback from the frontage behind a forecourt, portico structure, containerised landscaping and the driveway access ramp to the basement.

53 The property slopes down from the Ashmore Road frontage to the north adjacent to the Site's eastern boundary, where the 'basement' is visible from the Site as a carpark under-croft at the building's rear (refer to **Figure 16** below).

54 The adjoining building is setback from the common boundary with the Site behind landscaping. The west façade of the building that faces the Site includes fenestration at its lower and upper storeys.

Figure 15 – View of the adjoining property's frontage to Ashmore Road

Figure 16 - View of the adjoining property's side facade and rear under-croft adjoining the Site's eastern boundary.

2.2.2 Carrara Street

55 The Site adjoined to the east along Carrara Street by a 2-storey commercial building that accommodates medical tenancies (refer to **Figure 17** below). The building is set back from the frontage behind a driveway that provides access to the ground level car park under-croft. The balance of the setback includes established vegetation that partially screens the building's upper storey.

Figure 17 – View of the adjoining property's frontage to Carrara Street.

2.3 Neighbouring Streetscapes

56 The Site, the abovementioned adjoining properties, and the adjacent properties to the east along the southern side of Carrara Street occupy a consolidated 'island' area of land bounded around its perimeter by Carrara Street to the north and east, Ashmore Road to the south, and Benowa Road to the west (refer to **Figure 18** below).

57 The neighbouring properties and streetscapes along the adjoining perimeter roads are discussed below.

Figure 18 - Aerial photo of the subject site and neighbouring properties (source: adapted from Qld Globe)

2.3.1 Ashmore Road

2.3.1.1 Opposite the Site to the South

58 To the south, the Site is neighboured on the southern side of Ashmore Road by one and two-storey commercial buildings.

59 A childcare centre is located opposite the Site on the southeast corner of the intersection of Ashmore Road with Benowa Road (refer to **Figure 19** below). The Childcare centre is adjoined along the Ashmore Road frontage to the east by a variety of commercial buildings that vary in age and style and include older residential vernacular, modernist geometries, and perfunctory service station appearances (refer to **Figure 20** below).

60 The buildings are typically set back from the frontage behind landscaping and carparking. The central grassed median within the road reserve assists to mitigate the visual impact of the carriageways and complements the frontage landscaping.

Figure 19 – View looking southeast from the intersection with Benowa Road of existing commercial development opposite the Site along Ashmore Road.

Figure 20 – View looking southwest of existing commercial development opposite the Site along Ashmore Road.

2.3.1.2 To the East

61 Further to the east along Ashmore Road, the Site is neighboured by a mixed of one and two-storey commercial buildings that also vary in age but are typically characterised by residential vernacular style forms although of a commercial use. The buildings are typically setback from the road frontage behind varied extents landscaping and car parking. The Gold Coast Sculptors' Society and Potters' Association occupy two older 'timber and tin' buildings on the wedge of land at the acute corner of Carrara Street and Ashmore Road (refer to **Figures 21 and 22** below).

Figure 21 – View looking to the east from the intersection with Glynn Street of existing development neighbouring the Site along Ashmore Road (source; GE 11/2022)

Figure 22 – View looking to the west from the intersection with Carrara Street of existing development neighbouring the Site along Ashmore Road (source; GE 2/2023)

62 To the east of the intersection with Carrara Street, the streetscape on the northern side of Ashmore Road the frontage is dominated by the vegetated open space of Sir Bruce Small Park (refer to **Figure 23** below).

Figure 23 – View looking to the east from the intersection with Carrara Street of Sir Bruce Small Park along the southern frontage of Ashmore Road (source; GE 11/2022)

2.3.1.3 To the West

63 To the west of the intersection with Benowa Road, the frontages along the southern side of Ashmore Road are characterised by one and two storey commercial buildings (refer to **Figure 24** below). This character is contrasted by the open space character of the Benowa High School sports field on the northern side of Ashmore Road that extends from the northwest corner of the intersection with Benowa Road (opposite the Site) and extends along Ashmore Road to the west (refer to **Figures 25 and 26** below).

Figure 24 – View looking to the southwest from the intersection with Benowa Road of existing development along the southern side of Ashmore Road

Figure 25 – View looking to the northwest of the Benowa State High School sports field opposite the Site on the corner of the intersection with Benowa Road

Figure 26 – View looking to the east from the entrance to the Gold Coast Regional Botanical Gardens along Ashmore Road to the west of Benowa of the Benowa State High School sports fields along the northern frontage and commercial properties along the southern frontage (source GE 5/2024)

64 Further to the west, multiple dwelling development adjoin the Benowa State High School sports field on the northern side of Ashmore Road. The Gold Coast Regional Botanical Gardens are located opposite on the southern side of Ashmore Road (refer to **Figure 27** below).

Figure 27 – View looking to the west from the entrance to the Gold Coast Regional Botanical Gardens along Ashmore Road of Botanical Gardens along the southern frontage and medium density residential properties along the northern frontage (source GE 5/2024)

2.3.2 Benowa Road

2.3.2.1 Opposite the Site to the West

65 To the west, the Site is neighboured on the opposite side of Benowa Road by the sports fields of the Benowa State High School that extend to the north along the Benowa Road frontage from the intersection with Ashmore Road (refer to **Figure 28** below).

Figure 28 – View looking southwest from the intersection with Carrara Street of the Benowa State High School Sports field on the western side of Benowa Road opposite the Site

2.3.2.2 To the South

66 Benowa Road extends to the south from the intersection with Ashmore Road, where its elevation decreases, and the area is dominated by the typical suburban character of low density residential development (refer to **Figure 29** below). The area is otherwise characterised by a system of manmade canals that provide a great many properties with water frontages.

Figure 29 – View looking south along Benowa Road from the intersection with Ashmore Road.

2.3.2.3 To the North

67 Benowa Road extends to the north from the intersection with Carrara Street, where the open character of the Benowa State High School spots field continues to dominate the western frontage and is complement by the open space of the Benowa State Primary School carpark and sports field along the eastern frontage. (refer to **Figures 30 and 31** below).

Figure 30 – View looking northwest of the Benowa State High School sports field extending along the frontage to Benowa Road from the intersection with Carrara Street

Figure 31 – View looking northeast of the Benowa Primary School carpark and sports field extending along the frontage to Benowa Road from the intersection with Carrara Street

2.3.3 Carrara Street

2.3.3.1 Opposite the Site

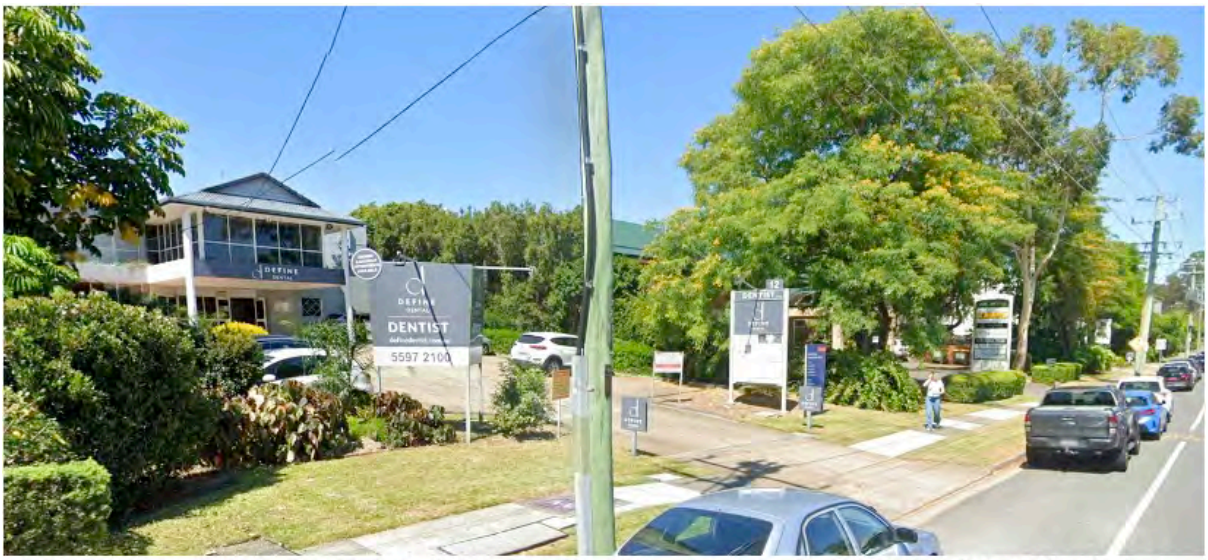
68 To the north the Site is neighboured on the opposite northern side of Carrara Street by the sports field and carparking of the Benowa Primary School that extend from the intersection with Benowa Street to the east along Carrara Street and the north along Benowa Road opposite the sports field of the Benowa High School (refer to **Figures 32 and 33** below). The Benowa Primary School sports field complements the Benowa High School sports field to reinforce the open character at the intersection and opposite the Site along Carrara Street.

Figure 32 – View looking to the northeast of the Benowa Primary School grounds opposite the Site along Carrara Street from the intersection with Benowa Road.

Figure 33 – View looking to the northwest of the Benowa Primary School grounds opposite the Site along Carrara Street.

2.3.3.2 To the East

69 The streetscape neighbouring the Site extending to east along Carrara Street is comprised of one and two-storey commercial buildings that are mostly occupied by medical related tenancies. The buildings are typically set back from the frontage behind landscaping and often carparking. The landscaping generally mitigates the impact of the carparking to contribute to the streetscape's landscape character and amenity (refer to **Figure 34** below).



Looking southwest of the streetscape adjoining the Site to the east opposite the Pindara Private Hospital

Looking southeast of the streetscape neighbouring the Site to the east opposite Sir Bruce Small Park

Figure 34 – The existing streetscape neighbouring the Site to the east on the southern side of Carrara Street (source: GE 11/2022).

70 Obliquely to the northeast on the opposite side of Carrara Street the Site is neighboured by the grounds of the Pindara Private Hospital where its multi-storey carpark building is setback from the road frontage behind car parking and smaller single storey commercial medical buildings (refer to **Figures 35** below).

71 While the smaller buildings provide a transition of height and scale to the frontage, the Multi-storey car park and hospital buildings are prominent in the background and are visually dominant as a built form in relation to the streetscape. The limited landscaping along the frontage fails to effectively mitigate the appearance of the carparking and service areas of the buildings and diminish the more cohesive and landscape contribution of the streetscape opposite.

72 The hospital grounds are adjoined by the expansive area and vegetated frontage of Sir Bruce Small Park that occupies the remaining Carrara Street frontage as it diverts to the

southeast to intersect with Ashmore Road. The vegetated frontage makes a significant contribution to the landscape character and amenity of the streetscape.

Looking northwest of the Pindara Private Hospital neighbouring the Site to the northeast

Looking northeast of the Sir Bruce Small Park neighbouring the Site to the northeast

Figure 35 – The existing streetscape neighbouring the Site to the east on the opposite northern side of Carrara Street (source: GE 11/2022).

2.4 The Local Area

73 Besides the adjoining properties and the neighbouring streetscapes, the surrounding area most likely to be affected by changes to the Site will primarily relate to the extent of the proposed development's visibility.

74 As discussed at **s3.0** below, the proposed development will have a building height of up to 53m. A drone camera was used to assesses the sightlines from this height to the surrounding area. The drone photographs also allowed key representative visual receptor locations to be identified within the surrounding area for the purpose of preparing photomontage depictions of the proposed development from these key visual receptor locations (refer to **s4.0** below).

75 The proposed development was shown to be potentially visible to sensitive receptors up to 700m from the site. This approximate viewing distance, together with the existing topography assisted to identify the Local Area relevant to the impacts of visual changes to the Site as extending from approximately Allchurch Avenue to the north, the Gold Coast Regional Botanic Gardens to the west, the northern most canal of the residential area to the south, and Sir Bruce Small Park to the east (refer to **Figure 36** below).

Figure 36 – Aerial photograph showing the Local Area of primary relevance to the Site (source: adapted from QG)

76 The Local Area is notably characterised by the contrasting environments to the north and south of Ashmore Road. As discussed at **s4.0** below, the visibility of the proposed development to sensitive receptors within the Local Area will vary significantly.

2.4.1 North of Ashmore Road

77 The area to the north of Ashmore includes the Site, which is characterised by the bulk and appearance of the existing shopping centre development and the carparking and landscaping along the road frontages. The large landholdings of Benowa State High School and Benowa Primary School, with their large sports fields create the dominant open space character that neighbours the Site to the north and west respectively along Carrara Street and Benowa Road. The sports field of the Benowa State High School extends from the intersection with Benowa Road and along Ashmore Road to the west where it is a prominent feature of the streetscape's character within the Local Area. The sensitive visual receptors within the open space will have clear visibility of the proposed development.

78 This open space character would extend further along Carrara Street to the west and to Sir Bruce Small Park if not for the large and visually prominent built form intensification of the Pindara Private Hospital that separates the contiguity of the open space. The bulk and discordant appearance of the hospital buildings and the carpark structure, which are

setback from the Carrara Street frontage behind smaller buildings and an on-grade carpark, highly visible due to the neighbouring open space. This visibility accentuates the hospital's visual impact and contributes to its dominant built form impact on the Local Area.

79 The above mentioned Sir Bruce Small Park that adjoins the hospital to the east along Carrara Street occupies a large land area that extends to the north beyond the adjoining hospital, and to the east along Carrara Street to its intersection with Ashmore Road where it then extends further to the east along Ashmore Road and is a prominent feature of the streetscape's character within the Local Area.

2.4.2 South of Ashmore Road

80 The area to the south of Ashmore Road is significantly more intensive with respect to the one and two storey commercial buildings along the Ashmore Road frontage and the suburban low density residential area extending to the south that includes a network of canals.

81 The land generally falls away to the south from Ashmore Road, which contributes to the transition from the commercial and open space characters along Ashmore Road to the dominant suburban residential character to the south. Most sensitive visual receptors will not have any visibility of the proposed development from their homes.

82 The continuity of the commercial development along the Ashmore Road frontage and the residential area behind is interrupted to the west by the Gold Coast Regional Botanic Gardens that adjoins and extends along the Ashmore Road frontage and is adjoined to the west by the Royal Pines Resort Golf Course.

83 The vegetated character of the Botanic Gardens frontage complements the open space character of the Benowa State High School sports field frontage to the northeast on the opposite side Ashmore Road.

2.5 The Planning Context

84 Under City Plan v12 the land within the Local Area is subject to the following land use zone designations (refer to **Figure 37** below):

- The Site and the neighbouring properties to the east are subject to a Neighbourhood Centre Zone (NCZ) designation.

- The land occupied by Benowa State High School and Benowa Primary School are subject to a Community Facility Zone (CFZ) designation. The land adjoining the Benowa State High School to the west along Ashmore Road opposite the Gold Coast Regional Botanical Gardens is subject to a Medium Density Residential Zone (MDRZ) designation.

- The land occupied by the Pindara Private Hospital to an Innovation Zone (IZ) designation. Sir Bruce Small Park is subject to Open Space Zone (OSZ) and Sport and Recreation Zone (SRZ) designations.

- The area to the south of Ashmore Road within the Local Area is subject to a Low Density Residential Zone (LDRZ) designation other than for the land occupied by the Gold Coast Regional Botanical Gardens, which is subject to a OSZ designation.

Figure 37 – Land use zoning of the subject site and neighbouring properties (source: City Plan)

85 Except for the commercial uses along the southern side of the Ashmore Road frontage, the existing land uses are generally consistent with the land use zonings, which contribute to the Local Area's coherent but disjointed visual character.

2.6 Summary

2.6.1 Character

86 The concept of "character" is defined as "*the aggregate of qualities that distinguish one person or thing from others*".[3]

87 The Site's Local Area is bisected by Ashmore Road, which creates two differentiated character areas to its north and south. Ashmore Road provides a visual continuum passing through the Local Area and extending through the adjoining areas to the east and west. This continuum varies in its visual character. While the southern side of the road has a relatively continuous building edge, the northern side of the road has a discontinuous character comprised of dominant open space and a limited extent of building edge.

88 This fragmented character extends to the north from Ashmore Road to include Benowa State High School, Benowa State Primary School, the Pindara Private Hospital, and the Benowa Gardens Shopping Centre. The area extending to the south of Ashmore Road while accommodating commercial uses along the road frontage is characterised by a highly consistent and cohesive low density residential character.

89 While in a relatively prominent location on the northeast corner of Benowa Road and Ashmore Road, which is one of the city's most trafficked roads, the existing Benowa Garden's Shopping Centre is not highly dominant due to the Site's set down from the corner and the Ashmore frontage, and its 2-storey scale. This set down and the location of carparking along the Benowa Road and Carrara Street frontage minimises any direct engagement along the frontage interface with the pedestrian environment.

90 The Benowa Garden's Shopping Centre relationship to the frontages contributes to the fragmented and discordant character of the Site's adjoining streetscapes arising from the varied adjoining land uses and building typology. While the sports fields of the Benowa State High School and the Benowa State Primary School are highly visible along the road frontages and contribute to a coherent land use and open space character, they prevent the streetscape from having a cohesive spatial character.

91 The discordance is exacerbated by the on-grade car parking within the grounds of the Pindara Private Hospital along the northern side of Carrara Street. The two-storey built form of the commercial propertied adjoining the Site to the east along Carrara Street opposite the Pindara Private Hospital are the most cohesive elements of the existing streetscape. The properties are enhanced by established landscaping that assists to mitigate the impact of the carparking within most properties' frontages.

2.6.2 Sense of Place

[3] Macquarie Concise Dictionary, Fifth Edition. 2009. Macquarie Dictionary Publishers Pty Ltd.

92 The Dictionary of Urbanism[4] defines "sense of place" as "*a feeling of appreciation for the distinct character of a locality*", and notes that this will depend on characteristics of the observer and the place.

93 The area to the south of Ashmore Road as noted above has a consistent low density residential character primarily comprised of houses setback from the street frontages behind landscaped front yards. Some are screened by walls others back onto canal frontages. This consistent character contributes to a strong and consistent sense of place. The residents enjoy quiet landscaped streets, where they can walk pets, they can conveniently engage with neighbours, recreate in private open space and generally have a sense of well-being, with high residential amenity and comfort.

94 The area to the north lacks this consistency and consequently lacks a consistent sense of place. Instead, the sense of place varies between the properties. The schools may, for example, each enjoy a consolidate educational environment with landscaped grounds and human scale buildings that contribute to a sense of belonging to the school's history and culture.

95 While the existing Benowa Gardens Shopping Centre provides an activity focus and is likely to be an attractor to the local community it offers limited amenity as a pedestrian environment and contributes little to the amenity of the adjoining road frontage.

96 Sensitive receptors passing through the area to different land uses would feel a sense of detachment and disengagement with the streetscapes and the Local Area to the north Ashmore Road.

[4] Cowan, R. 2005. Streetwise Press.

3 The Proposed Development

97 The Variation Request application seeks to vary the effect of the following sections of the *City Plan*:

a) Table 5.5.5: MCU –Neighbourhood Centre Zone:
   - Categories of development assessment for Short-term accommodation, Shop and Building height and Residential density triggers.

b) Section 6.2.5 Neighbourhood centre zone code:
   - Acceptable Outcome/Performance Outcome 1 – Setbacks;
   - Acceptable Outcome/Performance Outcome 2 – Site cover;
   - Acceptable Outcome/ Performance Outcome 3 – Height;
   - Acceptable Outcome/Performance Outcome 4 – Density; and
   - Acceptable Outcome/Performance Outcome 11 – Land uses

c) Building height overlay map – Map 17

d) Residential density overlay map – Map 17

98 All remaining parts of City Plan remain applicable to future development within the Benowa Gardens Development Area, to the extent they are relevant to and not inconsistent with the Benowa Gardens Development Code (refer to below).

3.1 Development Code and Master Plan

99 Variation Request includes a Master Plan and Site specific '*Benowa Gardens Development Code'* (the **Development Code**), which incorporates the proposed variations to the *City Plan*.

100 Where relevant, the Development Code references the Master Plan Drawings prepared by Neylan Architecture. These drawings identify Performance and/or Acceptable Outcomes pertaining to the Development Code. Two drawings are referenced by the Development Code:

- The Building Height control map- Drawing No. SD1.8 (refer to **Figure 38** below)
- The Residential Density plan- Drawing No. SD.21(refer to **Figure 39** below)

101 Drawings not referenced by the Development Code are understood to be of a conceptual nature and indicative of the design outcomes achievable under the Development Code. As indicative outcomes, they may be varied by a future MCU Development Application that is consistent with the Development Code and applicable provisions of the City Plan.

Figure 38 – The Building Height control map- Drawing No. SD1.8 (Neylan Architecture)

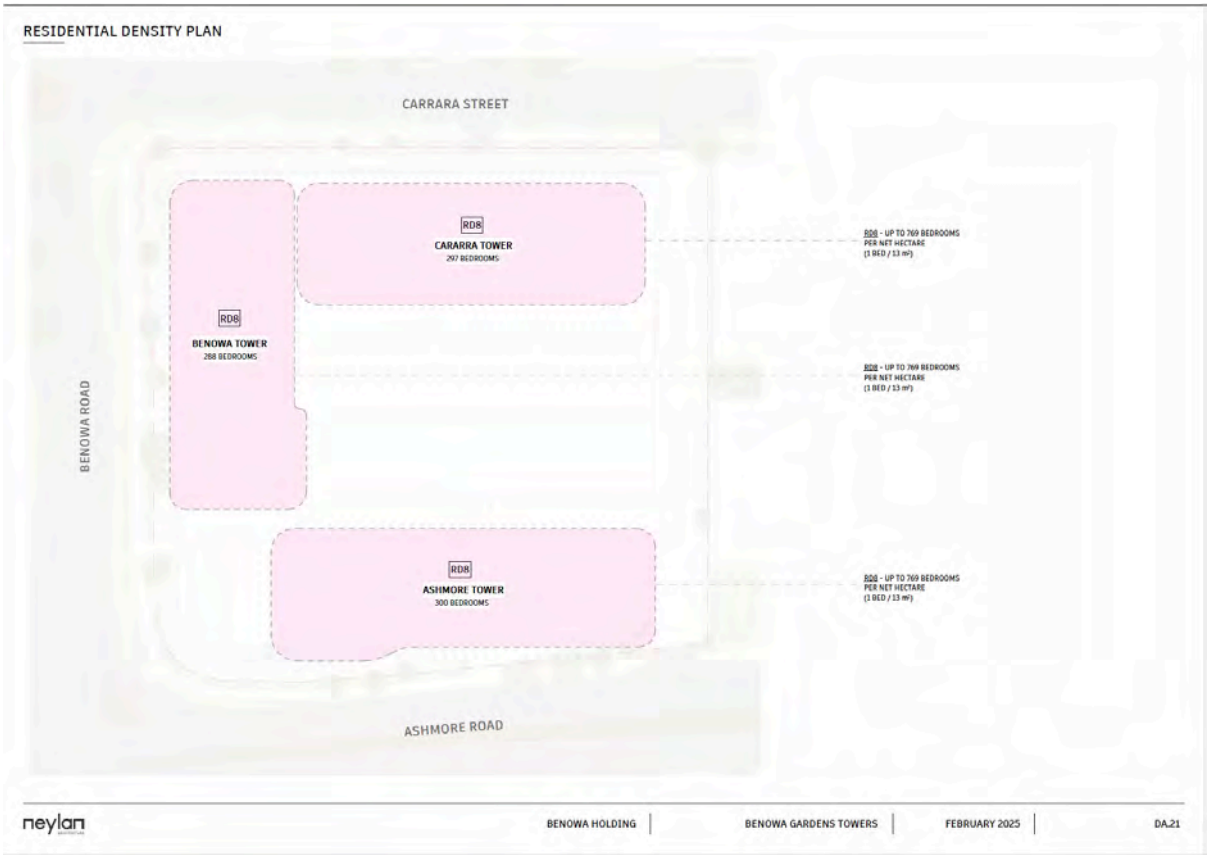


Figure 39 – The Residential Density Plan- Drawing No. SD21 (Neylan Architecture)

3.2 Conceptual Design

102 The Master Plan shows car parking provided at basement and podium levels, which will be accessed via an internal private road. Primary vehicle access points to the Site are provided from Ashmore Road and Carrara Street, with dedicated servicing and loading zones located on Carrara Street.

103 A four-storey podium will accommodate a mix of car parking, short-term accommodation units, medical suites, and retail tenancies. Communal open space will be provided on top of the podium at the base of three residential towers (Carrara Tower, Benowa Tower and Ashmore Tower), which will accommodate a mix of permanent and short-term accommodation. The residential apartments within the towers will overlook the street frontages and the internal communal open space. Key development metrics are summarised at **Table 1** below.

TABLE A – Development metrics summary (source: URBIS)

	PROPOSED
Building Height	• Podium – 22 metres • Carrara Tower – 53 metres (incl. podium) • Benowa Tower – 45 metres (incl. podium) • Ashmore Tower – 43 metres (incl. podium)
Site cover	• Podium – 80% • Residential towers – 50%
Car and Bicycle Parking	• 490 resident car parking spaces • 970 visitor car parking spaces • 100 resident bicycle spaces • 100 visitor bicycle spaces
Residential Units	• 306 x 2-bedroom apartments • 91 x 3-bedroom apartments

3.2.1 Building Bulk

104 In being incorporated into the Development Code, *The Building Height control map-Drawing No. SD1.8*, effectively 'locks in' in the overall heights and configuration of the building bulk on the Site, which allows for a review of the impacts of proposed development's visibility, overall form and relationship of its bulk to the streetscape and the Local Area (refer to **s4.0** below).

105 The conceptual drawings include an axonometric projection that assist to understand the overall massing and relationship of the development's primary components (refer to **Figure 40** below). The three towers are clearly differentiated from the podium levels by their lesser site cover, greater boundary setbacks and 'U' shaped configuration.

106 The towers are not 'slender tower forms', but the horizontal forms that are shown to be modulated along their lengths by varied recesses and projections. These variations, when vertically stacked as consistent floor plate shapes, create connected slender vertical forms that assist to balance the overall length of each tower.

Figure 40 – Axonometric Projection (Neylan Architecture)

107 The variations to the tower heights are relatively subtle, however they assist to further animate the distribution of the developments bulk and provide some complexity to the silhouette of the development's skyline profile. The complexity and interest are enhanced by the varied roof forms that cap each tower.

3.2.2 Site Planning

108 At ground level the podium is shown to generally provide retail tenancies along the road frontages, where they are setback from the boundaries to potentially accommodate landscaping, which would complement an active pedestrian interface between the tenancies and the frontages (refer to **Figures 41 and 42** below).

109 A loading dock is shown to be located at the northeast corner of the podium's frontage to Carrara Street. This is the location of the existing supermarket, which is setback from the frontage behind landscaping. The landscaping assists to mitigate the visual impact of the existing supermarket's bulk and appearance. A similar, approach would be required to mitigate the visual impact of the proposed loading dock.

110 Notably, an internal street with a footpath extends along the Site's eastern boundary adjacent to the adjoining existing commercial properties. The road will provide separation between the podium and the existing adjoining buildings, which will maintain and enhance the amenity of the adjoining buildings and provide pedestrian connectivity through the Site between Carrara Street and Ashmore Road. An allowance for a landscape strip between the footpath and the boundary will enhance amenity for pedestrians.

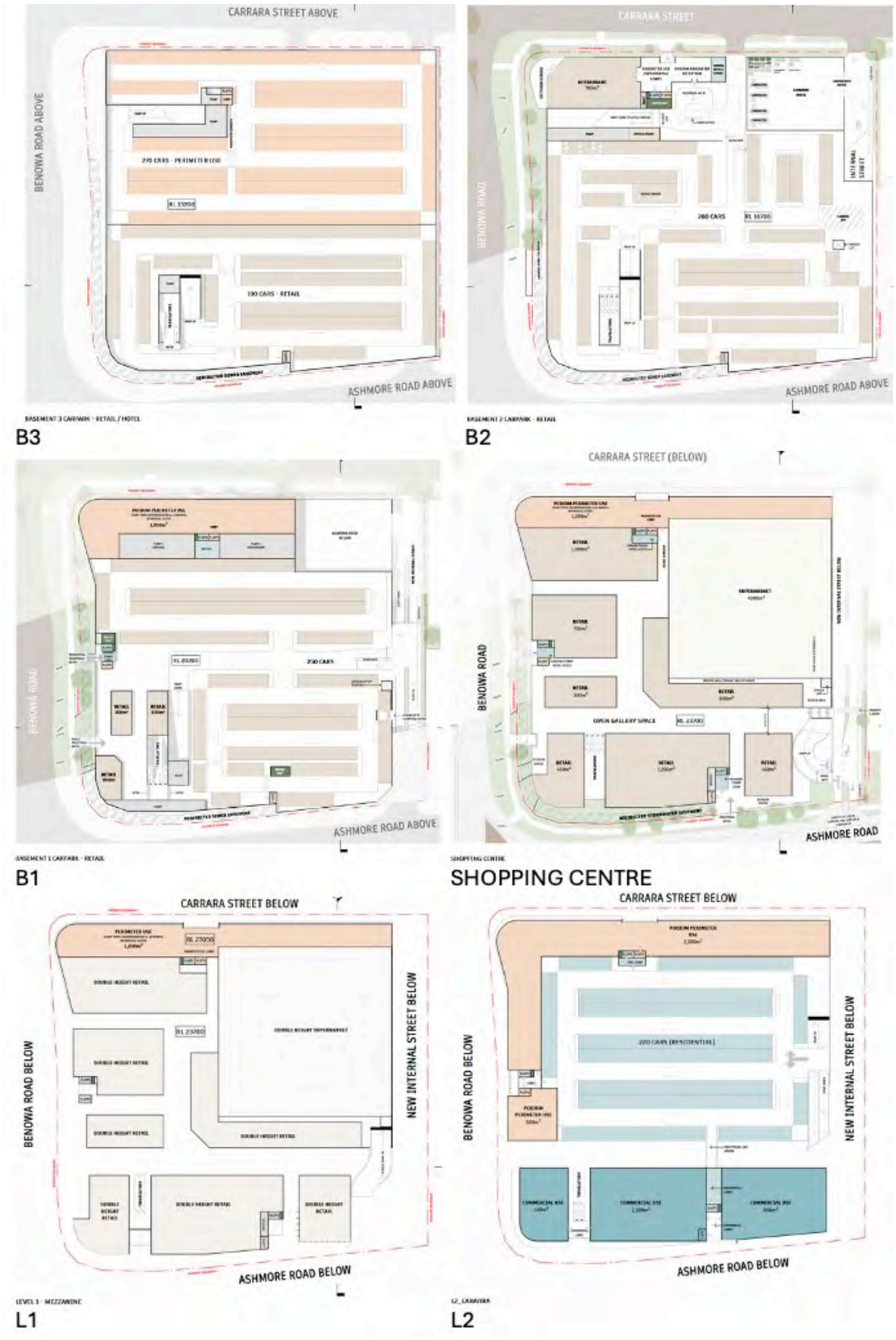


Figure 41 – Podium Floor Plans B1 to L2 (Neylan Architecture)

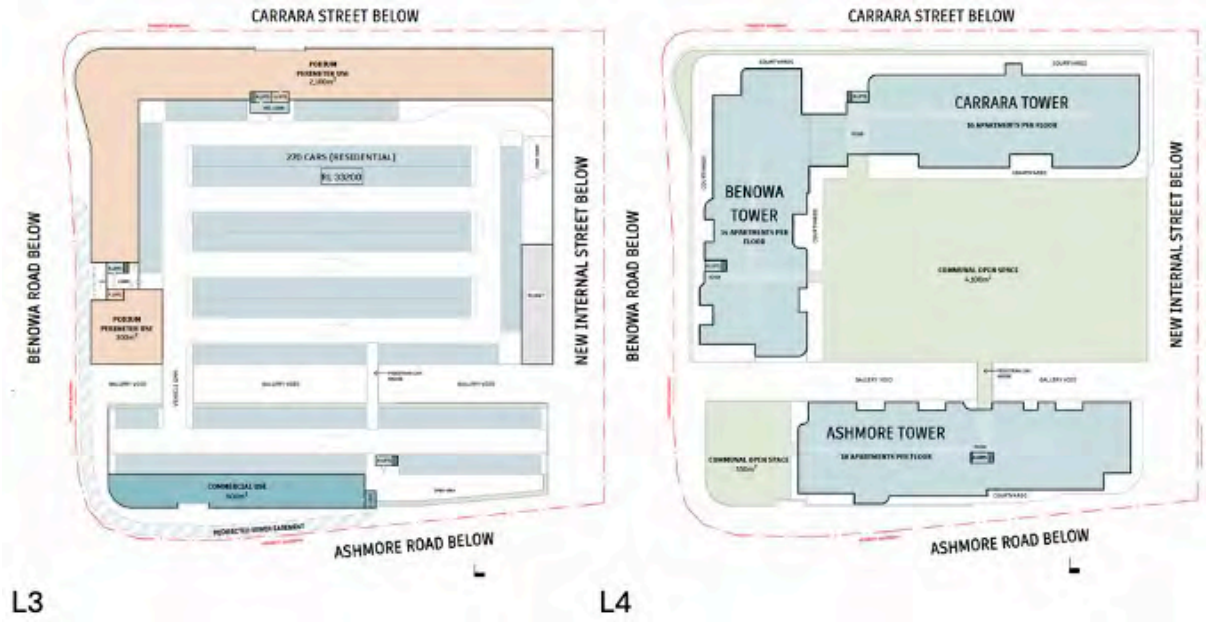


Figure 42 – Podium Floor Plans L3 to L4 (Neylan Architecture)

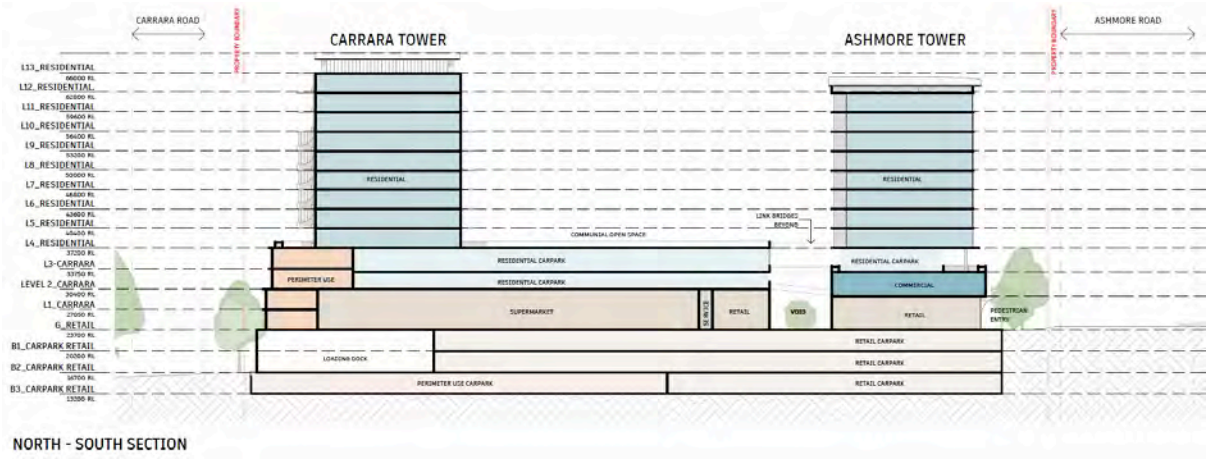


Figure 43 – Noth-south section looking east (Neylan Architecture)

111 The Carrara and Benowa Towers are connected along the Carrara Street frontage. Although this increases the length of the Carrara Tower's building bulk along the frontage the point of connection shown on both Drawing SD1.8 and L4 to be recessed, which will modulate the length and assist to mitigate the bulk.

112 The 'U' shaped configuration of the towers will provide good separation between the towers to facilitate access to daylight and breezes.

3.2.3 Indicative Appearances

113 Although conceptual and subject to potential change, the imagery produced by Neylan Architects show how the appearance of the building bulk might be effectively articulated to provide significant visual complexity and interest (refer to **Figures 44 and 45** below).

114 The images demonstrate how:

- the height and size of the development can be effectively mitigated to achieve a fragmentation of the visual bulk to provide a transition of height and scale to the road frontages,
- the ground storey interface can provide an attractive and activated interface with the road frontages, and
- the internal eastern road can provide separation the adjoining existing buildings and an amenable cross-block link between Ashmore Road and Carrara Street.

Figure 44 – Conceptual artist's impressions of the proposed development (Neylan Architecture)

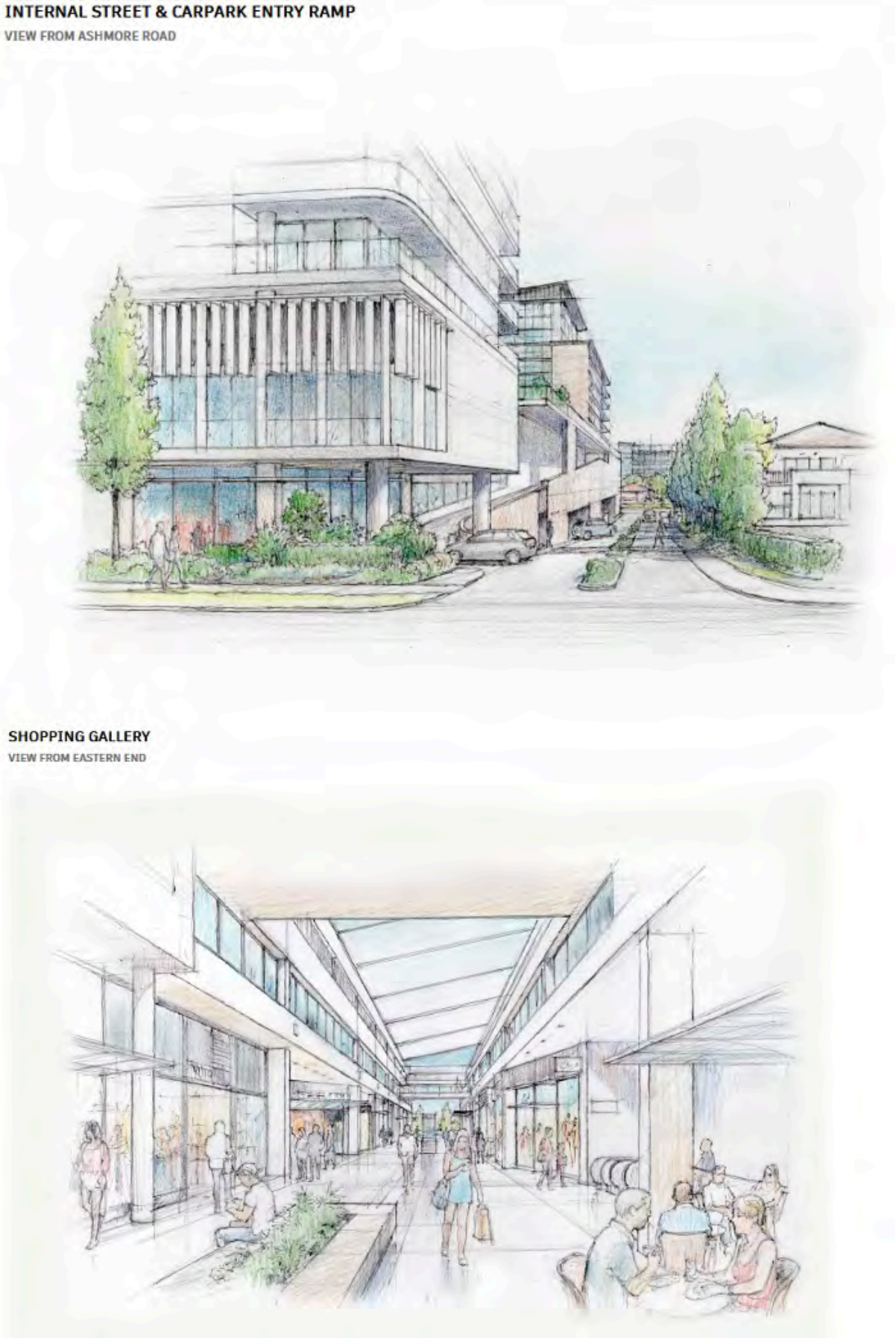


Figure 45 – Conceptual artist's impressions of the proposed development (Neylan Architecture)

3.3 Shadow Diagrams

115 The inclusion of Drawing SD1.8 in the Development Code provides an acceptable basis for the modelling of the proposed development's shadow impacts (refer to **Figure 46** below). Notably, the modelling does not include the shadows that will be cast by the existing vegetation. The impacts of the modelled shadows are discussed below.

3.3.1.1 Winter

116 The Shadow Diagrams prepared by Neylan Architects show the Proposed Development will cast some shadow on neighbouring properties to the south of Ashmore Road and over the corner of the sports fields at the northwest corner of the Ashmore Road and Benowa Road intersection.at 8.00am in winter. This will be when the shadows are at the longest for the year.

117 The corner of the sports field will already be shadowed by the tall established trees along the western side of Benowa Road at this time.

118 The affected residential properties along Dunkeith Street will already be shadowed by vegetation within the properties and on adjoining properties. The shadow on properties along Benowa Road at 8.00am in the morning will pass relatively quickly as the shadow shortens and passes from the southwest to the south. By mid-morning the properties are unlikely to be affected. These properties are also likely to be partially shadowed by structures and landscaping on the properties and within adjoining properties.

119 At 12.00pm and 3.00pm the shadows are shown to fall across Ashmore Road and on to the frontages and partially on the roofs of the commercial properties along the southern frontage of Ashmore Road.

3.3.1.2 Summer

At 8.00am in summer, the Proposed development will cast shadow across Benowa Road and on the edge of the sports field along the western frontage of Benowa Road. The sports field will already be shadowed by the tall established trees along the western side of Benowa Road at this time.

120 At 12.00pm the shadows cast by the Proposed Development are minimal and are fully contained within the Site.

121 At 3.00pm, the Proposed development will cast shadow across roof tops of the adjoining commercial properties to the east.

3.3.1.3 Summary

122 The Shadow Diagrams prepared by Neylan Architects show the Proposed Development will not have unacceptable shadow impacts on neighbouring properties.

Figure 46 – Shadow diagrams (Neylan Architecture)

4 VISUAL IMPACTS AND CONTEXTUAL CHANGE

4.1 Visibility of the Proposed Development

123 The visibility of the Site from potential visual receptors in the surrounding area was identified using a '**reverse sightline**' process. A drone camera was used to take photographs of the surrounding area from a location adjacent to the Site along Benowa Road at an approximate height of 53m.

124 The drone photographs were used to assesses the sightlines to the Local Area and identify key representative visual receptor locations for the purpose of preparing photomontage depictions of the proposed development bulk from these locations (refer to **Figures 47 and 48** below)

125 Six locations were identified:

- VP1 is a view approaching the Benowa Road roundabout from the northwest. This would provide an impression of height, scale and bulk when in proximity to the development.
- VP2 is from the intersection of Ashmore Road and Benowa Road. Ashmore Rd being an important major road with significant traffic and potential number sensitive receptors. It is also a surrogate location for properties along Ashmore Rd in proximity to the site.
- VP3 is from the school ground where the open space will increase the visibility and clearly change the outlook for users of the sports grounds.
- VP4 is from the Gold Coast Regional Botanical Gardens. It is more distant and a public destination with a valued and differentiated setting.
- VP5 is more distant. A public road but importantly a surrogate location for the potential impacts on the closest residential area to the south.
- VP6 is again more distant but from public open space where receptors can look around and experience the setting for relatively long durations. It is also a surrogate for more distant views along Ashmore Road looking to the west.

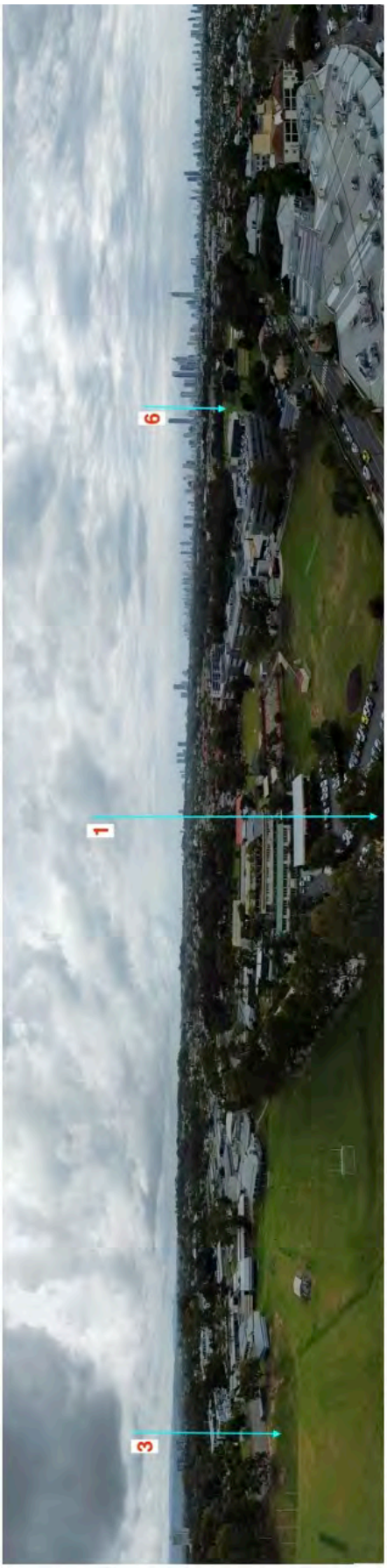


Figure 1- Drone Panorama A

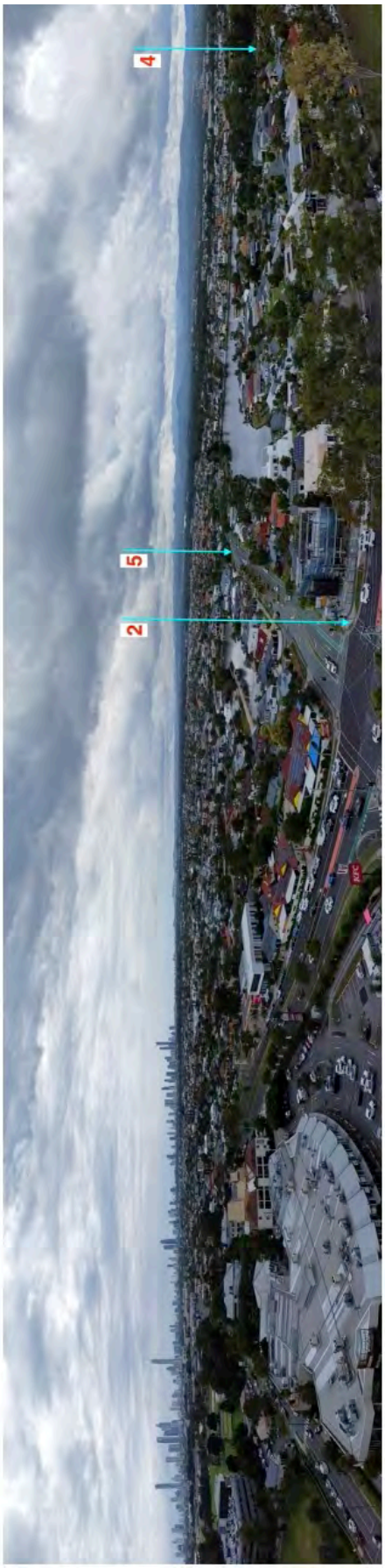


Figure 2- Drone Panorama B

Figure 47 – Drone photographs and identified representative visual receptor viewpoints

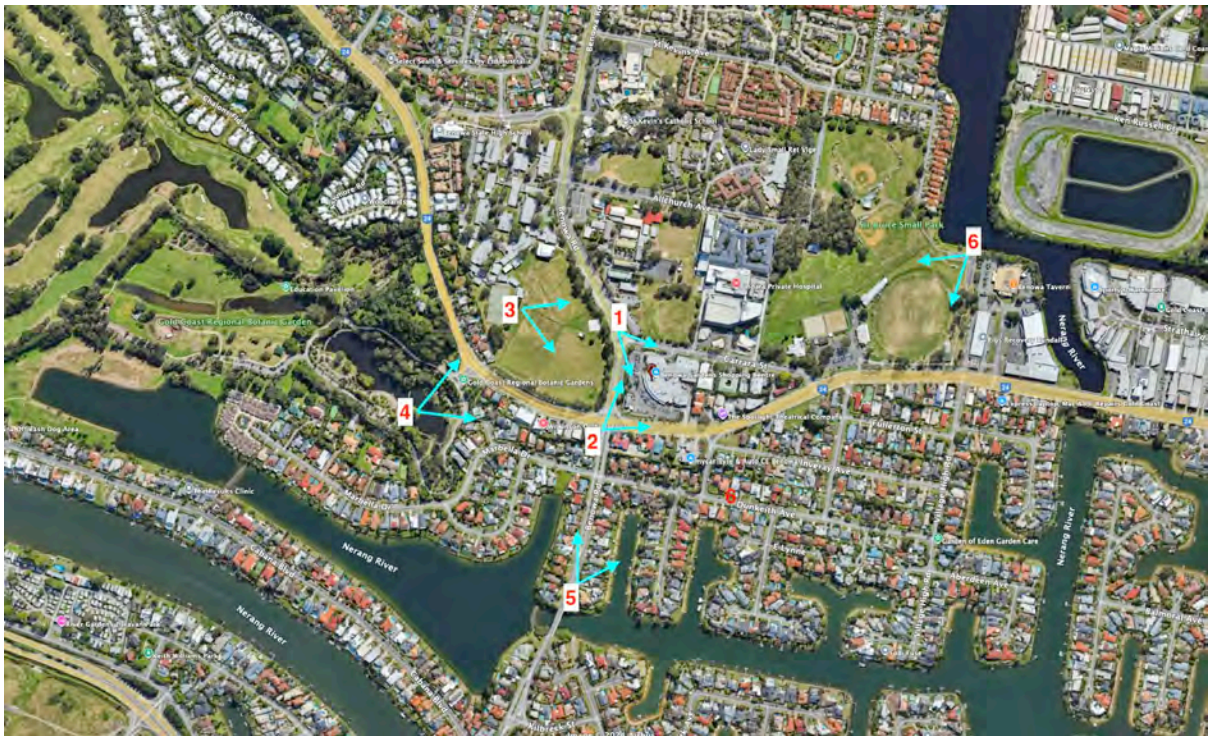


Figure 48 – Viewpoint locations (source: adapted from GE)

4.2 Appearance of the Proposed Development

126 Neylan Architects produced photomontage visualisations of the proposed development within the existing context from each viewpoint location except for VP6, which Neylan Architects advised was not produced due to the existing vegetation within Sir Bruce Small Park obstructing the sightline to the proposed development.

4.2.1 Viewpoint 1

4.2.1.1 Existing Conditions

127 The Benowa Road carriageway, median and intersection with Carrara Street are visually dominant. The road reserves and the adjoining open space along the frontages increase the visibility of the Site but also contribute to the open character of the setting. The shopping centre is a relatively prominent feature on the corner of the intersection (refer to **Figure 49** below).

128 The existing shopping centre building is set back from the intersection and road frontages behind landscaping and carparking, which provide a human scale interface along the frontage. The landscape contributes to the amenity of the frontage, partially screens the adverse impact of the carpark's appearance and assists to mitigate the dominance of the carriageways at the intersection.

129 The size and scale of the shopping centre's built form is compatible with the landscaping and while relatively prominent is not dominant in relation to the human scale and landscape character of the frontage. The glazed façade of the built form and the sheltered pedestrian walkway along the edge to the carpark animates the built form and contributes to the activation of the built form's interface with the carpark.

Figure 49 – VP1- Existing Conditions (Neylan Architecture)

4.2.1.2 The Proposed Development

130 The proposed development is visually dominant when viewed on the corner of Benowa Road and Carrara Street (refer to **Figure 50** below).

131 The height and scale of the podium is accentuated by the elevation of Benowa Road falling from the Ashmore Road intersection to the Carrara Street intersection, which progressively exposes more levels of the podium towards the corner and along the Carrara Street frontage. However, the proposed development's overall scale and bulk are balanced by the width of the road reserves and the open setting provided by the neighbouring sports fields.

132 The appearance of the development's overall bulk is modulated by the legibility of the tower and podium components and the differences in their setbacks and façade appearances. The visual break provided by the differentiation of the podium from towers provides a transition of height and scale to the road frontages, which mitigate the visual impact of the proposed development's overall bulk and contribute to the militating of its relationship to the existing context.

133 While it understood aspects of the proposed development's depiction are indicative, the curved form of the podium at the corner Benowa Road and Carrara Street allows the podium's form to 'turn the corner' and contribute to the cohesion of the podium's west

and south facing façades, while also addressing corner and reinforcing its visual significance.

134 The glazed ground storey façade will facilitate the podium's engagement with the frontage and activate the pedestrian level interface. The conceptual sketches provided at **s3.2.2** above provide further understanding and appreciation of the potential design outcome.

Figure 50 – VP1- The proposed Development (Neylan Architecture)

135 The height and scale of the podium is accentuated by the elevation of Benowa Road falling from the Ashmore Road intersection to the Carrara Street intersection, which progressively exposes more levels of the podium towards the corner and along the Carrara Street frontage. However, the proposed development's overall scale and bulk are balanced by the width of the road reserves and the open setting provided by the neighbouring sports fields.

136 The appearance of the development's overall bulk is modulated by the legibility of the tower and podium components and the differences in their setbacks and façade appearances. The visual break provided by the differentiation of the podium from towers provides a transition of height and scale to the road frontages, which mitigate the visual impact of the proposed development's overall bulk and contribute to the militating of its relationship to the existing context.

137 While it understood aspects of the proposed development's depiction are indicative, the curved form of the podium at the corner Benowa Road and Carrara Street allows the

podium's form to 'turn the corner' and contribute to the cohesion of the podium's west and north facing façades, while also addressing corner and reinforcing its visual significance.

138 The glazed ground storey façade will facilitate the podium's engagement with the frontage and activate the pedestrian level interface. The conceptual sketches provided at **s3.2.2** above provide further understanding and appreciation of the potential design outcome.

139 The articulation provided to the tower facades fragments their visual mass, layers their heights and provides expression to the individual human scale storeys. The corner balconies 'feather' the visual mass, and the stacked recessed and projecting balconies with the vertical grouping of architectural elements modulates the length of the towers and create connected slender vertical forms that assist to balance the overall length of each tower.

4.2.2 Viewpoint 2

4.2.2.1 Existing Conditions

140 The intersection of the Ashmore Road and Benowa Road carriageways is visually dominant as an expanse of road reserve. The contiguity of the road reserve frontages increases the visibility of the Site's ground level interface; however, the width of the road reserves also increases the area of open space adjoining the Site, which contributes to a greater open space character (refer to **Figure 51** below).

Figure 51 – VP2- Existing Conditions (Neylan Architecture)

141 The built form of the existing shopping centre is partially visible on the northeast corner of the intersection but is not particularly dominant. The upper part of the free standing Food and Beverage building (the KFC) is relatively prominent at the corner, where its legibility is reinforced by a pylon sign.

142 The established trees within the Benowa Road verge and within the site extending along the frontage from the Ashmore Road intersection are prominent and contribute to the landscape character of the streetscape and mostly screen the carpark and built form behind.

4.2.2.2 The Proposed Development

143 The proposed development is visually dominant on the corner of Ashmore Road and Benowa Road (refer to **Figure 52** below).

144 Unlike at the Benowa Road and Carrara Street, only the upper storeys of the podium project above ground level at the corner and along the Ashmore Road frontage. The appearance of the development's overall bulk is modulated by the legibility of the tower and podium components and the differences in their setbacks and façade appearances. The visual break provided by the differentiation of the podium from the towers provides a transition of height and scale to the road frontages, which mitigate the visual impact of the proposed development's overall bulk and contribute to the militating of its relationship to the existing context.

Figure 52 – VP2- The Proposed Development (Neylan Architecture)

145 While it is understood that aspects of the proposed development's depiction are indicative, the curved form of the podium at the corner of Ashmore Road and Benowa Road allows the podium's form to 'turn the corner' and contribute to the cohesion of the podium's west and south facing façades, while also addressing the corner and reinforcing its visual significance.

146 The articulation provided to the tower facades fragments their visual mass and layers their heights to provide expression to the individual human scale storeys. The stacked recessed balconies and vertical grouping of architectural elements modulates the length of the towers and create connected slender vertical forms that assist to balance the overall length of each tower.

147 The visual differentiation of the uppermost storey of the towers complemented by the projecting varied roof forms 'crown' the towers as resolved architectural forms.

4.2.3 Viewpoint 3

4.2.3.1 Existing Conditions

148 The size of the sports field's expansive open space area is visually dominant extending to the property's eastern frontage to Benowa Road (refer to **Figure 53** below). The established trees at the eastern edge of the sports field along Benowa Road screen the existing shopping centre development on the Site.

Figure 53 – VP1- Existing Conditions (Neylan Architecture)

4.2.3.2 The Proposed Development

149 The proposed development is visually prominent in the background on the eastern side of Benowa Road opposite the open space of the sports field. The established trees at the eastern edge of the sports field along Benowa Road mostly screen the Proposed Development's podium and partially screen the lower storeys of its towers (refer to **Figure 54** below).

150 The trees also provide an effective visual transition of height and scale from the development to the sports field's open space.

Figure 54 – VP3- The Proposed Development (Neylan Architecture)

151 The size of the sports field's expansive open space area comfortably balances the scale and bulk of the Proposed Development and mitigates the effects of its visual dominance in relation to the neighbouring area.

152 While it is understood that aspects of the proposed development's depiction are indicative, the articulation provided to the Benowa Road tower's facade fragments its visual mass and layers its height to provide expression to the individual human scale storeys. The stacked recessed balconies and vertical grouping of architectural elements modulates the length of the tower and creates connected slender vertical forms within the façade that assist to balance the overall length of the tower.

4.2.4 Viewpoint 4

4.2.4.1 Existing Conditions

153 The view from within the Gold Coast Regional Botanical Gardens looking to the northeast is across a water course and timber board walks (refer to **Figure 55** below). The low landscaping in the foreground adjacent to the boardwalk is complemented by the mix of taller established trees in the background behind the water course. The trees provide screening to the neighbouring built form and provide an attractive natural vertical edge that reinforces a sense of spatial containment to the attractive garden setting, which reinforces its localised amenity and sense of place.

Figure 55 – VP4- Existing Conditions (Neylan Architecture)

4.2.4.2 The Proposed Development

154 The view remains as described above with the minimal addition of the minimal visibility of the proposed development's towers projecting slightly above the existing edge of established tall trees (refer to **Figure 56** below). The minimal visibility has no material effect on the existing character and sense of place of the garden setting.

Figure 56 – VP4- The Proposed Development (Neylan Architecture)

4.2.5 Viewpoint 5

4.2.5.1 Existing Conditions

155 The view looking along Benowa Road to the north towards the intersection with Ashmore Road is characterised the low density residential development along the road frontages that is comprised of one and two storey houses setback from the road frontages behind either landscaped front yards that are visible to the road or high walls with landscaping partially visible behind (refer to **Figure 57** below).

156 Some taller trees are visible in the background, which contribute to the visual interest and amenity of the streetscape. The landscaping within the residential properties is complemented by the landscaped median that separates the north and south bound traffic lanes of the road carriageway. The median bisects the width of the carriageway to fragment the hardstand and provide the road with a more suburban character and scale.

157 Benowa Road increases in elevation to the north as it approaches the intersection with Ashmore Road. The change in elevation reinforces the transition in character along Benowa Road from the more active intensity of the commercial environment and traffic volumes along Ashmore Road to the less intense residential environment of the suburban environment extending to the south from Ashmore Road behind the residential uses.

Figure 57 – VP5- Existing Conditions (Neylan Architecture)

4.2.5.2 The Proposed Development

158 The proposed development is partially visible in the background on the northeast corner of Ashmore Road (refer to **Figure 58** below). The view of the proposed development's built form is mostly obstructed by the existing houses along the road frontage and the established landscaping.

159 The height of the power poles and the established trees are more prominent as taller features of the streetscape.

160 While a making a legible change to the skyline the proposed development's built form does not have a dominant impact on the setting, which remains characterised by the suburban environment described above. The visibility of the built form will however assist to visually structure the local context by reinforcing the legibility of the Ashmore Road intersection and the location of the Neighbourhood Centre.

Figure 58 – VP5- The proposed development (Neylan Architecture)

4.3 Sensitive Receptors

161 This VIA primarily relates to the sensitivity of receptors to the change to the visual environment resulting from the proposed development, the effect and magnitude of the change, and the relative significance the change. The GLVIA in its glossary[5] of terms identifies and describes two types of receptors:

a) **Landscape Receptors:** aspects of the landscape resource, which as the **Receiving Environment** of change will be affected by a proposed development.
b) **Visual Receptors:** Individuals and/or defined groups of people who have the potential to be affected by a proposal.

162 In this VIA the *Landscape Receptors* i.e. the ***Receiving Environments*** of the change and the ***Visual Receptors*** that will see the change are identified below in relation to the Streetscape, Neighbourhood and Citywide contexts.

4.4 Receptor Sensitivity, Impact Magnitude and Significance

163 Visual receptors experience the visual environmental across a spectrum of scale that is typically structured by the relationship of elements within the local streetscape context,

[5] GLVIA (digital version), page 157

the surrounding local neighbourhood context, and sometimes extending to the much larger citywide context.

164 Changes to the visual environment can have different effects in relation to each of these contexts due to:

a) The sensitivity of visual receptors to change.
b) The sensitivity of the context as a receiving environment to accommodate change.
c) The magnitude and significance of the change to the receiving environment and its effect on visual receptors.

165 The sensitivity of the **Receiving Environment** is primarily contingent upon its existing visual character. An environment that has a degree of scenic amenity such as an attractive landscape setting, or a cohesive urban setting with attractive architectural features will be more sensitive to change than a degraded or discordant visual environment that will be more resilient to change.

166 When assessing the sensitivity of a **Visual Receptor** consideration is given to the following factors:

a) Visual receptor sensitivity will vary between individuals for a multitude of reasons, including sensory acuteness, cultural and lifestyle preferences, the number and duration of their experiences of a place, the quality of the existing views and the militating attributes of their own inhabited space.
b) The reasonable expectations for change to the visual environment having regard to recent change and the potential for further change driven by planning scheme intents.

167 The landscape receptor and visual receptor sensitivity to change are rated as either High, Moderate, Low or Negligible based upon the criteria respectively set out in **Tables 1 and 2** at **Appendix B**.

168 The Magnitude of Impact of the change to the existing character depends on the nature, scale, intensity, extent, and duration of the impacts of the change that will result from the proposal. The magnitude of change is also rated as either High, Moderate, Low or Negligible based upon the criteria set out in **Table 3** at **Appendix B**.

169 The Significance of the Impact of the change is evaluated according to the sensitivity of receptors and the magnitude of change. These two criteria are typically assimilated and summarised in a matrix, which is set out in **Table 4** at **Appendix B**.

4.5 The Streetscape Context

4.5.1 Receiving Environment Sensitivity

170 The Streetscape Context typically relates to the potential change that a proposed development may have in relation to the Site's frontage, the adjoining properties, and the neighbouring streetscape, which are the Receiving Environment of the proposed change.

The Receiving Environment of the Street Context is described at **s2.1, s2.2** and **s2.3** above.

171 This Receiving Environment, while coherent with respect to the appearance and legibility of the different land uses is relatively discordant as a visual environment due to:

- The fragmentation created by the widths of the roads and their associated infrastructure that impede pedestrian movements.

- The different bulk, scale and/or intensity of the built form associated with the different land uses.

- The large areas of open space that while contributing to the open character of the setting fragments the continuity of the streetscape's spatial character as an urban activity focus for pedestrians.

172 This discordance diminishes the environment's visual cohesion and consistency. In the absence of cohesion and consistency the Receiving Environment's existing character would be less disrupted by new development outcomes and will be relatively resilient to change. The Receiving Environment of the Street Context will have a **LOW** sensitivity to change.

4.5.2 Visual Receptor Sensitivity

173 In relation to the streetscape context, the visual receptors will comprise of:

a) Residents in neighbouring properties in proximity to the site,
b) Students, workers and visitors to the Site and neighbouring non-residential properties.

174 As noted below, the site is not adjoined by any residential properties. The nearest neighbouring residential property being approximately 100m from the Site. The Site is neighboured by the sports fields of the high school and primary school to the west and north, the Pindara Private Hospital to the northeast, commercial properties adjoining to the east and the commercial properties to the south on the opposite side of Ashmore Road.

175 The residential properties will be occupied by residents for consistent durations and on a long-term basis, however they are a reasonable distance from the Site, at a lower elevation and are separated from the Site by existing commercial development and the width of Ashmore Road, which is a major traffic corridor. The non-residential properties will be occupied for smaller durations on a more term basis, where they will be focussed on the activities associated with the different land uses.

176 However, the Site's existing shopping centre land use would be an attractor for the occupants of the neighbouring properties. They may therefore be regular visitors to the Site, albeit for short durations, but would be familiar with its character, amenity and functionality.

177 Having regard to these mixed factors, sensitive visual receptors may be reasonably considered to have a **MODERATE** sensitivity to change to the Site within the Streetscape Context.

4.5.3 Visual Impacts on the Streetscape Context

178 Typical impacts that a new development may have on the Streetscape Context primarily relate to:

a) Impacts on the amenity of sensitive receptors in neighbouring properties, and
b) Compatibility, integration and contribution with the streetscape's existing character- having regard to its bulk and scale, and the activation and spatial definition it provides to adjoining pedestrian spaces.

4.5.3.1 Amenity

179 The Macquarie dictionary defines 'amenity' as: "*agreeable features, circumstances, ways etc.*". The concept of neighbouring amenity may be understood to refer to how agreeable the features of a property are to the occupants of the neighbouring property. What might be considered agreeable may vary between reasonable minds. However, most reasonably minds are likely to agree that the impacts of a development that unreasonably reduce the visual privacy, solar access or outlook of a neighbouring property would diminish the level of comfort for its occupants and may not preserve their reasonable level of amenity.

180 Amenity may also be impacted upon by neighbouring development that are of a significantly greater bulk and scale, where the overbearing of the neighbouring development may be overwhelming. The concept of a development being unacceptably overbearing is however militated by various factors including whether abrupt and significant contrasts in bulk and scale are an inevitable outcome of planning scheme intents, and if such contrasts are an established characteristic of the locality.

Residential Properties

181 Understandably, the potential for a development to unacceptably impact on the amenity of residential properties is of primary importance due to the reasonable expectations of residents to enjoy appropriate levels of their existing residential comfort and use, and the duration of time they typically spend occupying the property.

182 Importantly, the Site is not adjoined by any residential properties. The nearest residential properties are approximately 100m from the Site to the south of Ashmore Road within the low density residential area. This separating distance will prevent the proposed development from having any material impact on their existing visual privacy or result in any sense of overbearing.

183 Similarly, this separation distance and the potential for sightlines to the proposed development, being very limited due to the obstructions provided by existing buildings and vegetation and/or the orientation and design of the houses, will prevent the proposed

development from having any unacceptable impact on the outlook from the residential properties.

184 The Shadow Diagrams prepared by Neylan Architects show the proposed development will cast a shadow over some neighbouring properties to the south of Ashmore Road at 8.00am in winter. This will be when the shadows are at the longest for the year. The affected properties along Dunkeith Street will already be shadowed by vegetation within the properties and on adjoining properties. The shadow on properties along Benowa Road at 8.00am in the morning will pass relatively quickly as the shadow shortens and passes from the southwest to the south. By mid-morning the properties are unlikely to be affected. These properties are also likely to be partially shadowed by structures and landscaping on the properties and within the adjoining properties.

Non-Residential Properties

185 Occupants of the non-residential properties will not have the same expectations as residents with respect to amenity due to the nature of the activities that are involved with, the temporary and shorter occupancy of the properties, and the design of the built form they occupy. Based upon these militating considerations, the proposed development will not have an unacceptable impact on the visual privacy, solar access, sense of overbearing or outlook for occupants of the non-residential properties.

4.5.3.2 Streetscape Character

186 The information and observations set out at **s2.0, s3.0** and **s4.2** above show the existing streetscape will be significantly altered by the scale of the proposed development in relationship to the road frontages and the neighbouring properties.

187 The Master Plan's Conceptual Design information shows the detailed design of the proposed development may effectively mitigate the effects of the proposed development's scale to achieve an appropriate transition of scale to the streetscape environment where the podium's interface with the road frontages may enhance the cohesiveness and activation of the adjoining streetscapes.

4.5.4 Magnitude and Significance of Change

188 Based upon the above observations and the criteria set out at **Table 3** of **Appendix B**, the proposed development will result in a **HIGH** magnitude of change to the Site and the Streetscape Context.

189 Based upon the above observations and the criteria set out at **Table 4** of **Appendix B**, the proposed development's change to the neighbouring properties and streetscape will be of **MODERATE** significance.

4.6 Neighbourhood Context

4.6.1 Receiving Environment Sensitivity

190 The Streetscape Context described above will be 'nested' within the broader Neighbourhood Context, which is more broadly comprised of the Local Area discussed at above **s2.4**. This Local Area is the Receiving Environment of the proposed change in relation to the Neighbourhood Context.

191 This broader setting is comprised and characterised by a wider range of land use and built form outcomes. This diversity will not be legibly changed by smaller individual developments that are of limited size and scale. However, larger developments of a more significant scale may alter the visual relationship of elements within the Local Area. Highly visible developments on prominent Sites may reinforce the coherence of the land uses and the urban structure.

192 However, while the visible coherence of the land uses contributes to an understanding of the local urban structure and the lengths of some roads are characterised by similar building typologies, the fragmentation of the urban fabric and the overall discordance in the built from diminishes the Local Area's visual cohesion and consistency. This character will be relatively resilient to the change resulting from new development outcomes.

193 Having regard to the above observations and recognising the Streetscape Context as an integrated element of the Neighbourhood Context, the Receiving Environment will have a **LOW** sensitivity to change.

4.6.2 Visual Receptor Sensitivity

194 The Neighbourhood Context relates to the potential effects and change a new development may have upon the neighbourhood's broader existing character. At this scale a new development is unlikely to be viewed in direct relationship to all key existing elements within the neighbourhood at the one time. A visual receptor's experience of elements within the neighbourhood are therefore typically separated by time and space, and receptors have recourse to memory, whereupon the neighbourhood's character is a cognitive assemblage of remembered attributes and relationships.

195 Within the Neighbourhood Context, elements are also generally viewed from a greater distance where their appearance, size and scale are understood in relation to a greater number of elements and the larger topographical features that distinguish the local area from others. New development will be experienced as a change to this context, where the impacts of the change may alter the neighbourhood's character and identity.

196 Within the Neighbourhood Context, the people most likely to be sensitive visual receptors to change will comprise of:

a) The local community, when travelling through the Local Area enroute to their homes.

b) Short term visitors to the Local Area including persons accessing the local land uses.

197 With respect to (a); as residents, the local community will have greater familiarity and engagement with the existing local character, which will influence their understanding and appreciation of its sense place. The local community are therefore likely to have **MODERATE** level sensitivity to change to the Site within the Neighbourhood Context.

198 With respect to (b); while some short term visitors may have some familiarity with the Local Area, most will only have limited interest in its character and sense of place and are therefore likely to have a **LOW** level of sensitivity to change to the Site within the Neighbourhood Context.

4.6.3 Visual Impacts on the Neighbourhood Context

199 Typical effects that a new development may have upon the Neighbourhood Context primarily relate to:

a) The compatibility of the new development with the visual qualities that characterise and distinguish the Local Area's identity.
b) The new development's effect on important views of significant elements or landmarks from key locations that contribute to local identity.

4.6.3.1 Neighbourhood Character and Identity

200 As discussed at **s2.0**, the Local Area is comprised of a wide range of land uses with a diverse scale of building form and scale. As noted above, the coherence of the land uses contributes to an understanding of the local urban structure however the fragmentation of the urban fabric and the overall discordance in the built form diminishes the Local Area's visual cohesion and consistency.

201 While the Local Area extending along Ashmore Road will maintain its dominant fragmented character comprised of low rise commercial buildings and open space, the proposed development will provide an intensification of development on the northeast corner of the Ashmore Road and Benowa Road intersection that will increase the legibility of the Site as an urban node and further reinforce the coherence of the land uses and the local urban structure.

202 Notwithstanding this intensification, the expansiveness of the Site's open setting to the north and west provided by the neighbouring sports fields, will assist to balance the scale and bulk of the built form in relation to the scale and bulk of the surrounding existing built form. Visual receptors within the school buildings will be a significant distance from the Site and users of the sports fields will be within a vast open space and are unlikely to have a significant interest in the proposed development.

4.6.3.2 View Obstruction

203 Based upon the observations set out at **s2.0, s3.0** and **s4.2**, the proposed development will not obstruct existing views of any significant landscape or cultural features from any public spaces that are of relevance to the visual character and amenity of the Local Area.

4.6.4 Magnitude and Significance of Change

204 Based upon the above observations and the criteria set out at **Table 3** of **Appendix B**, the proposed development will result in a **HIGH** magnitude of change to the neighbourhood.

205 Based upon the above observations and the criteria set out at **Table 4** of **Appendix B**, the proposed development's change to the neighbourhood will be of **MODERATE** significance to the local community and of **LOW** significance to visitors to the Local Area.

4.7 Citywide Context

4.7.1 Receiving Environment Sensitivity

206 The Neighbourhood Context is 'nested' within the Citywide context, where the city as a whole is the Receiving Environment of the proposed change.

207 The Citywide Context is characterised by a very large range of land use and built form outcomes. Unless a development is of a highly significant scale or use to alter the dominant character of a place or neighbourhood that is integral to the city's image and identity, it will not materially alter the citywide context. The city will have a **LOW** level of sensitivity to change.

4.7.2 Visual Receptor Sensitivity

208 The Citywide Context relates to the potential effects and change a new development may have upon the city's image and identity. At this scale a new development cannot be viewed in direct relationship to all key existing elements within the city at the one time. A visual receptor's experiences of elements within city are therefore separated by time and space, and receptors have recourse to memory, whereupon the city's image and identity are a cognitive assemblage of remembered attributes and relationships.

209 Within the Citywide Context, elements are generally viewed from a greater distance where their appearance, size and scale are understood in relation to a greater number of elements and the larger topographical features that distinguish parts of the city from others. New development will be experienced primarily as a change to the local Neighbourhood Context, where if significantly altering its character and identity, may impact on the Neighbourhood's relationship to surrounding Local Areas, and potentially to the legibility city's established urban structure and form, which is integral to its image and identity.

210 The people most likely to be sensitive visual receptors to the change on the Site in relation to the Citywide context will be the people passing the Site while travelling in vehicles along Ashmore Road. These people may have varying familiarity and/or limited passing interest in Site and the Local Area. They are therefore likely to have a **LOW** level of sensitivity to change on the Site within the Citywide Context.

4.7.3 Visual Impacts on the Citywide Context

211 Typical effects that a new development may have upon the Citywide Context generally relate to:

a) The compatibility of the new development with the visual qualities that distinguish the local area's character as part of the city's broader image and identity
b) The new development's effect on any important views of significant elements or landmarks from key locations that contribute to the city's image and identity.

4.7.4 Image and Identity

212 The proposed development will provide an intensification of development on the northeast corner of the Ashmore Road and Benowa Road intersection, where its scale and bulk will increase the legibility of the Site as an urban node.

213 The change to the corner will be highly visible to the large number of visual receptors passing the Site each day. The proposed development will therefore become more legible as a distinctive feature of the urban environment along Ashmore Road, which is a major traffic route within the city's settlement pattern.

214 The legibility of the proposed development may serve as a local landmark that assist with wayfaring and therefore may be seen to contribute to the city's broader legibility, which is an important element of its image and identity.

4.7.5 View Obstruction

215 Based upon the observations set out at **s2.0, s3.0** and **s4.2**, the proposed development will not obstruct existing views of any significant landscape or cultural features from any public spaces that are of relevance to the image and identity of the city.

4.7.6 Magnitude and Significance of Change

216 Based upon the above observations and the criteria set out at **Table 3** of **Appendix B**, the proposed development will result in a **LOW** magnitude of change to the citywide.

217 Based upon the above observations and the criteria set out at **Table 4** of **Appendix B**, the proposed development's change to the neighbourhood will be of **LOW** significance.

4.8 Summary

218 The Proposed Development's change to the **Streetscape Context** will be of **HIGH magnitude** and of **MODERATE significance**. The significance of the change primarily relates to the dominant scale and bulk of the proposed development in relation to the adjoining streetscapes, and its potential positive engagement with the adjoining pedestrian environments along Ashmore Road, Benowa Road and Carrara Street.

219 The Proposed Development's change to the **Neighbourhood Context** will be of **HIGH magnitude** of **MODERATE significance** to the local community and of **LOW significance** to visitors to the Local Area. The significance of the change primarily relates to the dominant scale and bulk of the proposed development in relation to the existing neighbouring area but is balanced by the Site's open setting and will be experienced within a relatively discordant existing local character.

220 The Proposed Development's change to the **Citywide Context** will be of **LOW magnitude** and of **LOW significance**. The significance of the change primarily relates to the dominant scale and bulk of the proposed development on the corner of Ashmore Road and Benowa Road. where the proposed development is likely to become a local landmark that will contribute to the legibility of the city's urban form and structure.

5 MITIGATION OF VISUAL IMPACTS

5.1 Discussion

221 The change to the Citywide Context will be of **LOW** significance and primarily relates to its contribution to urban legibility, which is a desirable urban outcome requiring no mitigation.

222 The Proposed Development's change to the Streetscape Context and Neighbourhood Context will be of **MODERATE** significance. The significance of this impact primarily relates to the high magnitude of change with respect to the bulk of the proposed development's built form.

223 Based upon the observations set out at **s3.0 and s4.0**, the modulation provided to the overall building bulk by the differentiation of the podium and tower components will provide an effective break in the proposed development's height to achieve a transition in scale from the full height of the towers to the pedestrian scale of the streetscape environment.

224 This transition is most effective along the Site's Ashmore Road frontage, where the exposed height of the podium appears to be in the order of 10.05m (refer to **s3.3.2 Figure 43** above). The podium's height provides a visual reference and focus that will be compatible with and complement existing and potential future neighbouring development along the Ashmore Road frontage.

225 The podium's height projects further above ground level as Benowa Road extends to the north from the Ashmore Road intersection and falls in elevation towards the Carrara Street intersection, where the podium will have height of 20.50m at the corner of the intersection- approximately twice the height of its Ashmore Road frontage.

226 While the open character of the setting at the corner will assist to balance the scale of the podium's bulk, its form and appearance is likely to be overbearing in relation to the streetscape context unless appropriately mitigated by the podium's design with respect to its modulation and articulation. The conceptual drawings provide some indication of the potential mitigation that might be achieve.

227 The impacts of development are primarily regulated by applicable City Plan Codes. The development requirements of the applicable codes, inter alia, aim to facilitate desirable development outcomes and mitigate unacceptable impacts on the amenity and character of the existing or intended context.

5.2 The Benowa Gardens Place Code

228 The proposed 'Benowa Gardens Place Code' (the **Development Code**), will vary the development requirements of the City Plan and sets out the Categories of Assessment and Assessment Benchmarks for a Material Change of Use (MCU) on the Site.

229 The Development Code provides for an MCU Development Application to be Code assessable where:

a) A single Shop tenancy does not exceed 4000m^2, or

b) Short-term accommodation or Multiple Dwellings do not exceed the relevant residential densities prescribed on The Residential Density plan- Drawing No. SD.21 prepared by Neylan Architecture

230 The Development Code also provides for an MCU Development Application to be Impact assessable where:

a) Building height exceeds the height identified on the Building Height control map- Drawing No. SD1.8 prepared by Neylan Architecture, or

b) Building height, where not identified on the Building Height control map- Drawing No. SD1.8 prepared by Neylan Architecture exceeds 14 metres with no more than 2-storeys.

231 These variations to the existing City Plan requirements that are applicable to the Site are of primary relevance to the purpose of the Preliminary Application and the intended development outcome.

232 The Development Code is based upon Neighbourhood Centre Zone (NCZ) Code and variations are implemented as revisions to the NCZ Code. The balance of the NCZ Code's requirements remain unchanged and the proposed revisions, will not alter the application or efficacy of these requirements.

233 The NCZ Code regulates all development within all Neighbourhood Centres in the city and its requirements are therefore well established. In maintaining the majority of the NCZ Code's development requirements, the Preliminary Application will provide greater certainty to the MCU Development Application process with respect to the anticipated development outcomes and their impacts on the locality's existing character and amenity.

5.3 City Plan

234 The Development Code will complement the following applicable City Plan Codes in guiding the design of future MCU Development Applications for the Site:

- Commercial design code
- Driveways and vehicle crossings
- General development provisions code
- Healthy waters code
- High rise accommodation code
- Solid waste management code
- Transport code
- Vegetation management code

235 Like the NCZ Code, these codes are also well established, and in not being altered by the Preliminary Approval, will provide greater certainty to the MCU Development Application process with respect to the anticipated development outcomes and their impacts on the locality's existing character and amenity.

236 The proposed Development Code and the applicable City Plan Codes are expected to effectively mitigate any adverse development impacts.

6 CONCLUSION

238 The Proposed Development's change to the **Streetscape Context** will be of **HIGH magnitude** and of **MODERATE significance**.

239 The Proposed Development's change to the **Neighbourhood Context** will be of **HIGH magnitude,** of **MODERATE significance** to the local community and of **LOW significance** to visitors to the Local Area.

240 The Proposed Development's change to the **Citywide Context** will be of **LOW magnitude** and of **LOW significance**.

241 The Proposed Development will:

a) Not have unacceptable adverse impacts on neighbouring non-residential properties or residential properties in the Local Area.

b) Not be inconsistent with the existing discordant character of the Local Area

c) Provide a more cohesive, engaging and activated interface to the adjoining pedestrian environments along Ashmore Road, Benowa Road and Carrara Street.

d) Provide a 'cross-block' vehicle and pedestrian link between Ashmore Road and Carrara Street that will improve connectivity through the Local Area and separate the proposed development's built form from existing adjoining non-residential properties to the east.

e) Contribute to the legibility of the city's urban form and structure.

242 The effects of the Proposed Development's change to the visual environment can be effectively managed and mitigated by a MCU Development Application that provides resolved detailed design responses that satisfy the requirements of the proposed Development Code and the City Plan.

APPENDIX A: CURRICULUM VITAE

Leslie Grahame Curtis
architect | urban designer | visual assessment consultant

interplan architects pty ltd | PO Box 290, Sanctuary Cove, QLD 4212 | Email: leslie.curtis@icloud.com | Mob: 0434 213 771

QUALIFICATIONS AND PROFESSIONAL AFFILIATIONS

Bachelor of Architecture (SAIT 1982)
Registered Architect (Reg. No. 2784), Queensland, Australia
Member, Australian Institute of Architects (RAIA)

SKILLS AND EXPERTISE

As a professional architect Leslie has expertise in architecture and urban design, visual assessment and the master planning of urban developments.

He has over 40 years national and international experience in resolving complex design issues on a broad range of project types. Leslie has led project teams on major developments, managed a multi-disciplinary design office, and has been a senior specialist adviser to the Queensland State Government and Local Government Authorities.

Leslie has prepared numerous visual impact assessments for development applications and has assisted the Planning and Environment Court of Queensland as an expert witness in relation to visual amenity, architecture and urban design appeal matters.

PROFESSIONAL EXPERIENCE

- August 1997- Current: Director,
  interplan architects pty ltd / interplan va, Gold Coast, QLD
- December 2014- November 2018: Senior Design Architect (consultant)
  DBI Design, Gold Coast, QLD
- May 2011- December 2014: Associate and Manager Urban Design and Visual Assessment,
  LVO, Brisbane, QLD
- May 2009- June 2012: Senior Urban Design Advisor,
  Office of the Queensland Government Architect, Brisbane, QLD
- October 2008- May 2009: Gold Coast Manager / Architect / Urban Designer,
  O1A Gold Coast, QLD and Melbourne, VIC
- June 2003 to October 2008: Principal Architect and Urban Designer
  Planning, Environment and Transport Directorate, Gold Coast City Council,
  Gold Coast QLD
- November 1999 to June 2003: Senior Advisor- Architecture and Urban Design
  Redland Shire Council Cleveland, QLD
- August 1997- Current: Director, interplan architects, Gold Coast, QLD
- April 1990 to August 1997: Managing Director and Principal Architect (Brisbane) Executive Director (Tokyo), Interplan Y. Hasegawa and Associates, Brisbane and Tokyo
- February 1989 to March 1990: Senior Design Architect
  Stephenson and Turner Victoria, Melbourne, VIC and Adelaide, SA
- September 1984 to September 1988: Design Architect,
  Woods Bagot, Adelaide, SA
- March 1982 to September 1984: Graduate Architect
  SAIT (University of South Australia), Executive Architect / Property Management Office, Adelaide, SA

Leslie Grahame Curtis
architect | urban designer | visual assessment consultant

PROFESSIONAL EXPERIENCE

Court Appeals

Experience as an expert witness in the Queensland Planning and Environment Court with respect to visual amenity, architecture and/or urban design matters:

- Ooh Media Assets Pty Ltd v BCC_PEC3782 of 2023
- Stuart & anor v BCC & Unison Projects No.5_PEC1150_24
- Aesthete No.15 Pty Ltd and Anor v CoCoGC and Cielo Property Group PEC64/2024
- Staldone Turramurra v BCC PEC335_24
- Booth and ors v CoCoGc and Seagull Haus PEC487/24
- Beckdev Coolangatta Pty Ltd v CoCoGC PECBD899/24
- Hanlon and Ors v BCC and anor PEC252/24
- AG Frazer and EJ frazer v BCC PEC516/24
- Andreatta Properties and Green rd Properties v Logan City Council PEC653/24
- Capital 22 Pty Ltd v SCRC and Anor PEC2562/23
- Marc and Natasha Kenney v BCC PEC3873/23
- EVJ Holdings v Noosa Shire Council PEC D133/23
- Forty7 High Street v CoCoGC PEC3465/23
- Middle Pond Pty Ltd v Whitsunday Regional Council and Ors PEC884/23
- MBRC v Capricorn Hotel UT Pty Ltd and Ors PEC84/23
- SVMJ v MBRC PEC2669/23
- Noosa Privatised Hospital Pty Ltd v Noosa Shire Council PEC3156/23
- Eco Cottages Pty Ltd v Noosa Shire Council PEC153/23
- Ramsay Health Care Aust Pty Ltd v BCC and Anor PEC3130/23
- Landarch Properties v LCC PEC1740/23
- Dunn and Anor v CoCoGC & Ridge Properties PEC222/23
- Charters Towers Operations v Charters Towers RC 2544/23
- BC for 62 Pacific v CoCoGC and LGDC Mcinnesville Pty Ltd_PEC1333/23
- 3329 Surfers Paradise Blvd Stevens & DGS v CoCoGC 2791/22
- 11 Aubrey St Stevens & DGS v CoCoGC 2790/22
- Lyndon Garbutt & Ors v BCC & Ors PEC1361/23
- AR Developments v Redland City Council & Ors PEC124/23
- Flynn Nune developments v Logan City Council PEC1057/23
- Banner S&C (Logan Village) Pty Ltd v Logan city council PEC1994/22
- 1335 Waterford Tamborine Rd v Logan City Council PEC 340/21
- Robin Easton-Berry v Council of the City of Gold Coast PEC3016/22
- Green v Council of the City of Gold Coast & Ors PEC256/22
- Loudou v Sunshine Coast Reginal Council PEC203_21
- Ainsworth & Others v Brisbane City Council & Mosaic Property Group - PEA No. 1566 of 2022
- S&S No. 4 Pty Ltd v Council of the City of Gold Coast - 1128-1132 Gold Coast Highway, Palm Beach
- Save our Foreshore v WRC and Meridien_PEC 60 and 459 of 22
- Thorogood v Council of the City of Gold Coast & Anor - PEC160 of 2022
- Douglas Shire Sustainability Group Inc & Ors v Douglas Shire Council & Graben Pty Ltd - PEC 1276 of 2022
- 74 The Esplanade Pty Ltd -V- Council of The City Of Gold Coast – Pec 1024_22
- SDA Fiduciaries 8 Pty Ltd v CoCoGC
- TAL GP Projects No7 Pty Ltd v BCC 145/22
- Wilshire Village Unit Trust v BCC PEC726/22
- Woodstock Nominees (Qld) & Hodson Superannuation v Redland City Council - 3291/2021
- Noffke_ Fabcot &Stephen Family Pastorl v Logan City and Logan Rd North PEC2369/21 and 2401/2021
- Bronco Dino v Cassowary Coast RC PEC199/19
- Northern Sands v Cairns Regional Council
- Parkview Holdings v BCC_PEC805/20
- Dux Drive Bongaree Gem Life and MBRC
- David William Neate v Noosa SC and Ors
- West End Community Assoc v BCC and 82 Merivale Street Pty Ltd
- Andema v Noosa Shire Council
- Cox v BCC PEC3333/20
- Northbrook Village v SCRC
- GTH Projects No 4 v Noosa shire council
- DVB projects v CocoGC PEA1646/20
- Smit v BCC PEA
- Darrah and ors v CoGCC and RSL PEC556/21
- Procon Developments v Bundaberg Regional Council_PEA3023/20
- Hudson and Ors v BCC PEA 1316/21

- Trustee for the Kilda Av property trust v CoCoGC
- Trinity Park investments v Cairns regional Council PEA2386/20
- Ashanti Logistics v SCRC
- Newkrop v SCRC PE117/21
- Jezreel and Sorbello v BCC and PEA2067/21
- Pearl Inv (Aust) v SCRC 1542/21
- Anthony Pinzone & Ors v SCRC
- McFarr Properties Pty Ltd v BCC and Ors
- Nicolle Patricia archer and Ors v CoCoGC and JWZ PE1892/21
- Chiodo Dev Corp v Douglas Shire Council
- Parmac Property Pty Ltd v Townsville City Council and Ors
- Daniel Clarry v BCC and 4005 Properties PEC2616/21_28 Maxwell St New Farm
- 427 Beckett Rd v BCC PEA 1760/20
- Wanless recycling Park v Ipswich City Council PEA2715/21
- QM Properties v Logan City Council_PEA1536/21
- McLucas v CocOGC and Marquee Flora PEA2428_21
- SDA Property Nominees v Scenic Rim Regional Council PEA 2001/21
- Kirra Developments v CoCoGC
- Allure Property group No4 v CoCoGC PEC 3120/20
- Wyandra JV Pty Ltd v BCC PEC1913/21
- Coles Group Property developments v SCRC and Ors PEC2243/21
- Covey v BCC PEC14/21
- 3580 Main Beach Pde v CoCoGC
- Caydon North Burleigh v CoCoGC 266 The Esplanade Miami
- BJLG v CoCoGC PEC14/22
- Hingston and Ors v Noosa Council
- Opal Health Care Minor Change Clayfield
- Little Projects v CoCoGC
- Wellington Boatshed v BCC PEC388/21
- Aquence Towers v Redland CC and York St Dev PEC5/22
- J-Corp Retail Pty Ltd v CoCoGC and Kirra One Pty Ltd
- Bell Co Pty Ltd and Ors v CoCoGC and Scott Reginald Headland PEC6/22
- Bayview St Qld RB Pty Ltd v CoCoGC PEC 815/22
- Michael Keniger and Jane Grealy v BCC and Property Projects Australia PEC558/22
- Dajen Investments & Ors; Ruffin & Ors v GCCC & Perspective Point Break Pty Ltd - PEC911/22 and 918/22
- Sparksman & Ors v CoCoGC & Anor PE2674/20
- Paradise Palms Residents Association Inc v Cairns Regional Council & Anor PEC 217 of 2020
- Odna Group v Logan City Council PE3218/20
- Grassy Knoll V CoCoGC PEC3526/20
- Fisigi v BCC PE 2533/20
- GG Propco v SCRC PEC2909/20
- JP and CA Walsh v SCRC PECD96/20
- Clive Palmer v CoCoGC PEC2800/20
- HPD Group v SCRC PE2765/20
- Noosa Spotlight v Noosa Council PEC476/20
- David William Neate v Noosa Council and Ors PEC1219/20
- Creelman v CoCoGC PE1982/20
- Scumley Pty Ltd v BCC PE978/20
- Upan Company v CoCoGC PE2009/20
- Fort Real Estate Capital v Redland City Council PE1724/20
- Melinda Jane Patterson v CoCoGC &Ors PE1410/20
- Robina Transit_Palmer Leisure v CoGCC PE865/20
- Fetterun Pty Ltd v Sunshine Coast CouncilP&E Appeal 97/19
- North Harbour Holdings v MBRC and Or PE771/20
- Anthony Charles Burchill v CoGCC and Nifsan Dev Pty Ltd PEC D67/20
- Parkview Holdings v BCC_PEC805/20
- JSFNQ1 V Townsville City Council PEC139/19
- Patterson v CoGCC PEC1784/20
- Danny Powe v CoCoGC PE1502/20
- Self Storage Helensvale v GCCC PE 157/20
- Body Corp for Lofts on Jackson CTS 35501 v BCC
- Peter Michael Jensen v BCC and Azure 1750/20
- Reno Anthony Panozzo v BCC and Azure 1749/20
- Peter Anthony McKay v BCC and Azure 1747/20
- Northern Sands v Cairns Regional Council 72/17
- Henderson v BCC PE BD4139/18
- Zumbo v BCC and Ors 1934/19
- Aus Outdoor Sign Co v BCC 3725/19

- Austin BMI v ICC PE912/20
- Carla Turner and Ors V BCC PE187/20
- GC Motorsport Train Ctr v GCCC (3387/16)
- Wade Trass and Ors v BCC and Katwal 4655/19
- Matzin Capital Pty Ltd v Redland City Council -PE3797/19
- Paul Keogh V CoGC PE281/2019
- Dean Sandstrom & Ors v SCC and Windansea Boardriders 3760/19
- Dreamline Dev Corp v BCC [2807/19]
- Roubaix Properties Pty Ltd v Somerset Regional Council & Anor (2327/19)
- Cleanaway v ICC (4101/19)
- Rayjon Properties v Council of City of GC (3562/19)
- Kindred v MBRC (3331/2019)
- Lantrak Property Holdings (Qld) Pty Ltd v Ipswich City Council & Ors (3473/2019)
- Edith Pastoral V SRC (2773/2019)
- Dwyer v SCRC (166/2019)
- Stephens Family Pastoral V Logan City Council
- YQ Property Pty Ltd V BCC (1409/19)
- DFC (Project Management) v BCC 77 Walkers Way Nundah (1810/19)
- Riverstone (Townsville) vTCC (1275/19
- Taylor v Moreton Bay Reg Council (108/19)
- TriCare (PT Vernon) Pty Ltd v Brisbane City Council (4646/17)
- JRD No.2 v BCC_5 The Esplanade, Forest Lake
- Maddison Ridge v Lockyer Valley RC (4340/18)
- Adpen v Moreton Bay Reg Council and Others (232/19)
- Andrew Micalleff v Moreton Bay Regional Council (4350/18)
- Deleje v BCC (2777/15)
- HPC Urban Design and Planning v Ipswich City Council and Ors.
- Parry KB v BCC (1326/2017)
- Gamblin v BCC - P&E Appeal no. 2782 of 2017
- Thomas Kevin Dooley & Ors v Brisbane City Council & Anor (1695/18 and 1696/18)
- The Planning Place Pty Ltd v BCC (1675/18)
- Northern Properties v BCC (3500/18)
- Birchie Pty Ltd v BCC (3844/18)
- ALH Group Ltd v Sunshine Coast Regional Council (1343 of 2015)
- QCAT Tree Dispute, Michael Ortlipp 8 Jaora Street, Graceville
- Leger &Ors v BCC (3974/16).
- Reid & Ors v BCC & Ors (130/17)
- United Petroleum Pty Ltd v Gold Coast City Council & Anor - P&E Appeal no. 3902 of 2016
- Residential Development Alliance Inc v GCCC & CSI (Gold Coast) Pty Ltd (271/15 and 187/17)
- Harman v BCC & Snape (2841/17)
- Community Facilities (Mosque and associated uses) at 161 & 16IA Underwood Road, Eight Mile Plains, QLD. Planning & Environment Court Appeal No. 2249 of 2014
- ALH Group Ltd v Ipswich City Council - P&E Appeal No 451 of 2015
- ALH Group Ltd v Moreton Bay Regional Council - P&E Appeal No 1662 of 2015
- ALH Group Ltd v Brisbane City Council - P&E Appeal No 3963 of 2015
- Quintenon Pty Ltd v Brisbane City Council - P&E Appeal No 1996/15
- Emzay and Jones v GCCC and Paynter Dixon, PE_ 295 and 4301of 2015
- Kirra Blue pty ltd v GCCC & Ors PE_ 287 of 2015
- Laws v Gold Coast City Council & Ors - P&E Appeal No 114 of 2016
- Body Corp. for Bowden Place & Ors v BCC and Carillon Newfarm Pty. Ltd.
- Malchada Pty Ltd v Gold Coast City Council PE_ 2940 of 2013
- 46 The Strand Pty Ltd v TCC – P&E Appeal no: 233 of 2015.
- Ordex Pty Ltd v Brisbane City Council, PE_ 2555/15)
- Lambert St Kangaroo Point, P&E Appeal no. 2841 of 201

Visual Assessment

Experience in providing specialist advice and/or preparing specialist reports in relation to the visual assessment and impacts of development applications including:

- High-rise, Multiple Dwelling, Dixon St Coolangatta
- Multiple Dwelling, 798-800 Pacific Parade Currumbin
- Medium-rise, Multiple Dwelling, Breakfast Crk Rd Newstead
- Kirra Beach Hotel Change Application
- High-rise, Multiple Dwelling, 332 The Esplanade Palm Beach
- High-rise, Multiple Dwelling, Miles Street Kirra

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- Medium-rise, Multiple Dwelling, Coyne St Kirra
- High-rise, Multiple Dwelling, 264 The Esplanade Miami
- High-rise, Multiple Dwelling,10 St Kilda Ave Broadbeach
- Digital Billboard, Springwood
- Medium-rise, Multiple Dwelling, 10 Goodwin Tce Burleigh Heads
- Medium-rise, Multiple Dwelling, Maxwell St, New Farm
- High-rise, Multiple Dwelling, 2 Musgrave Street, Coolangatta
- Medium-rise, Multiple Dwelling, Hayle St_Burleigh Heads
- High-rise, Multiple Dwelling, 64 Goodwin Tce Burleigh Heads
- High-rise, Multiple Dwelling, 3547 Main Beach Parade
- Tricare Aged Care facility, Runaway Bay
- Medium-rise, Multiple Dwelling, 28 Pacific Pde Bilinga
- High-rise, Multiple Dwelling, 10 Goodwin Tce Burleigh Heads
- Two x High-rise Apartment/Resort Hotel tower development 48, 50-56 & 58 The Esplanade & 5 First Avenue, Burleigh Heads
- Aged Care facility, Runaway Bay, QLD
- Four x High-rise apartment /mixed use development, Capital Court, Varsity Lakes
- High-rise apartment building, 2 Musgrave Street, Coolangatta
- High-rise apartment building 64 Goodwin Terrace, Burleigh Heads, QLD
- High-rise apartment building First Ave, Burleigh Heads, QLD
- Two x Highrise towers/mixed use development, 1 Redcliffe Parade, Redcliffe
- Retirement Village, Pine Mountain Rd, Carindale
- High-rise apartment building, 1827 Gold Coast Highway Burleigh Heads, QLD
- High Rise Apartment Building and High Rise Hotel, The Esplanade, Burleigh Heads, QLD
- Sculpt Tower, High rise apartment building, Oak and Birt Avenues, Budds Beach, QLD
- Kirra Beach Hotel, Marine Parade, Kirra, QLD
- Iconic Vistas- BCC Civic Spaces Policy, Brisbane, QLD
- Apartment Buildings, 31 – 35 Grant Avenue, Hope Island, QLD
- Multi-Unit Building, 37 Arthur Street, Mermaid Beach, Gold Coast
- Multiple Dwelling and Short Term Accommodation Development 1908-1910 Gold Coast Highway, Miami, QLD
- Australian Legend World, Theme Park, 4 Lakeview Drive, Nerang, QLD
- Multi-unit building 488-490 Esplanade, Palm Beach
- High-rise 20-storey apartment building 20-22 Executive Drive, Burleigh Heads
- High-rise apartment building 46 Goodwin Terrace, Burleigh Heads, QLD
- High Rise Apartment Building, Mawarra St, Chevron Island, Surfers Paradise
- High Rise Accommodation / Mixed use Building, 100-102 Marine Parade, Southport, QLD
- High Rise Apartment Building, 2945-2947 Surfers Paradise Blvd, Surfers Pardise, QLD
- Magnoli, multi-unit building, Palm Beach Gold Coast
- High-rise Multi residential Development, 1969 Gold Coast Highway, Burleigh Heads, QLD
- Apartment Building Golden Four Drive & Lang Street, Billinga
- Multi-Residential Development, 372-374 Marine Parade, Labrador, QLD
- Greenmount Redevelopment, Coolangatta Gold Coast QLD
- Apartment Building, Marine Parade, Labrador, QLD
- Multi-unit Buildings, 11 Querrin St. Yeronga, QLD
- Komune Apartments and Hotel, Coolangatta, QLD
- Luxe Private Residences, Surfers Paradise, Gold Coast
- High Rise Towers, Mariner's Cove, The Spit, Gold Coast
- Tourist Development, Firetail St, Tweed South
- Apartment Building, Frank St. Labrador
- Transfer Station, Barletts Road, Environ (Tweed)
- High Rise Apartment Building 127-129 Nerang St. Southport, Qld.
- Apartment Buildings, 130 Christine Avenue, Varsity Lakes
- El Dorado Redevelopment, major high-rise mixed use residential, cinema and retail development, Indooroopilly, Brisbane.
- "Coles Ashmore", Shopping Centre, Ashmore, Gold Coast
- "Vantage", Residential development, Ashmore, Gold Coast
- High-rise apartment building, Burleigh Heads, Gold Coast
- Runaway Bay Marina Redevelopment, Runaway Bay, Gold Coast
- Boutique Hotel, Spring Hill, Brisbane.
- "Jewel", High-rise/mixed use, Surfers Paradise, Gold Coast
- High-rise apartments building, Kangaroo Point, Brisbane
- High –rise commercial building, South Brisbane
- High-rise/mixed use, Southport, Gold Coast
- "Paradise Resort", High-rise/mixed use, Surfers Paradise
- "Pure", High-rise/residential, Kirra
- "Kirra Beach Hotel", High-rise/mixed use, Kirra
- "Main Place", High-rise/mixed use, Broadbeach
- Detached Dwelling House, Hawthorne, Brisbane
- Residential Units, Camp Hill, Brisbane

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Statutory Planning Assessment

Experience as the City of Gold Coast's Principal Architect and Urban Designer in advising and liaising with development applicants and undertaking specialist architecture and urban design assessments of major development proposals including:

- "The Oracle", High-rise/mixed use, Broadbeach
- "The Wave", High-rise/mixed use, Surfers Paradise
- "Jade", High-rise residential, Surfers Paradise
- "The Hilton", High-rise/mixed use, Surfers Paradise
- "Soul", High-rise/mixed use, Surfers Paradise
- "Southport Central", High-rise/mixed use, Southport
- "Brighton on Broadwater", High-rise/mixed use, Southport
- "Ultra", High-rise/residential, Broadbeach
- "Emerald Lakes", staged Residential/mixed use master planned community, Carrara
- "Reflections 1&2", High-rise/mixed use development, Coolangatta
- "Nirvana", High-rise/mixed use development, Kirra
- "Solaire", High-rise/mixed use development, Surfers Paradise
- "Artique", High-rise/residential development, Surfers Paradise
- "Cova", Master Planned Community, Hope Island
- "Victoria Towers", High-rise/mixed use, Southport
- "Seachange", Aged Care Community, Arundel
- "Marina Mirage", Shopping Centre extensions, Main Beach
- "Hope Island Master Plan", Master Planned Community, Hope Island

Architecture and Urban Design

Experience as the project/design architect and/or urban designer in preparing design proposals and/or leading design teams for a range of projects including:

Master Planning and Urban Design

- **Hope Island Residences, Gold Coast Qld,** *Master plan for nine residential apartment building ranging in height from 3 to 14-storeys and comprising of 943 apartments and commercial tenancies*
- **Toowoomba Regional Sports Centre Master Plan,** *Preparation of a master plan, urban design strategy and conceptual architecture for a major sports complex at Toowoomba.*
- **The Town of Carmichael,** *Preparation of a conceptual master plan for the staged development of a new township for 10,000 people to service the proposed Adani mine in central Queensland.*
- **Kadamba Master Plan, Goa, India.** *Preparation of a master plan and urban design strategy for an integrated mixed use development encompassing over 800 residential apartments, a hotel, 11,000 sqm of retail space and 70,000 sqm of commercial office space.*
- **Redland Bay Centre and Foreshore Master Plan.** *Preparation of a centre master plan strategy to address long term land use, open space, recreation and transport issues.*
- **Capalaba Town Centre and Streetscape.** *Design management of a new public square and town centre streetscape works.*
- **Point Lookout, North Stradbroke Island Streetscape works.** *Design management of Point Lookout town centre streetscape enhancements.*
- **Putatan Mixed use Development, Sabah, Malaysia.** *Master plan and Urban Design for a mixed-use land reclamation project, including a residential estate, specialised university, shopping centre, marina and two tourist hotels.*
- **Asia Pacific Space Centre, QLD., Australia.** *Preliminary Master plan and prototype housing study for a remote residential community.*
- **Nosoko Resort, Ishigaki Island, Japan.** *Master plan for an integrated golf course resort on a coastal site.*
- **Miyazaki Residential Estate, Japan.** *Master plan for 32 Ha, 600 unit residential project including detached houses and condominiums.*
- **Residential Resort, Isu Shirahama, Japan.** *Master plan and Urban Design for an integrated residential resort that included a 100room hotel, 650 residential units, sports centre and 2 golf courses.*
- **Miho Resort, Ibaraki, Japan.** *Master plan and Urban Design for an integrated resort including a 300 room hotel, 50 room boutique hotel, 200 residential units, conference centre, commercial retail and cultural centre, recreational gardens and golf course.*
- **Seihi Resort, Nagasaki, Japan.** *Master plan and Urban design of 360 ha coastal site including 850 room hotel, conference centre, water park, entertainment centre, commercial and retail centre, marina, 240 residential units and 2 golf courses*
- **Chikura Residential Resort, Japan.** *Master plan and Urban design for 100 ha development including 440 high rise apartments, 380 medium rise condominiums, 250 room hotel, 400 residential allotments and village shopping centre.*
- **Tokyo Bay Marina, Tokyo, Japan.** *Master plan for 21 Ha land fill project in Tokyo Bay including a 250 room hotel, 120 residential allotments and over 100 apartment units.*
- **Tomigusuku Community, Okinawa, Japan.** *Master plan, Urban design and Building Design Guidelines for a 200 Ha land reclamation project including a 60 Ha Industrial Park, 54 Ha Recreational Park, commercial and cultural centre and residential accommodation for 8,000 people.*
- **Urban Resort, Osaka, Japan.** *Master plan and Concept proposal for a 135 Ha island reclamation project including marina, hotel, golf course and sporting facilities.*
- **Recreational Park, Fukushima, Japan.** *Master plan and Urban design for a 150 room hotel, museum, water park and electronic amusement complex.*

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- **Lakefront Redevelopment, Suwa, Japan.** *Master plan concept proposal for the redevelopment of a lakefront industrial site including 250 room hotel, 250 condominiums, cultural, commercial and retail facilities.*
- **Hotel Project, Kagoshima, Japan.** *Master plan and concept design for a 200 room hotel and shopping centre.*
- **Sky Garden Resort, Vung Tau, Vietnam.** *Master plan and concept proposal including 3 hotels, casino country club, tourist retail, cultural village and golf course.*
- **Golf Resort, Noumea, New Caledonia.** *Master plan and Urban design for a 300 room beach front hotel, tourist retail centre and golf course.*
- **Parque Espana, Ise-Shima, Japan.** *Master plan concept for a 70 Ha themed residential estate including 500 condominiums, retail centre and parklands.*
- **Yaeyama Resort, Ishigaki Island, Japan.** *Master plan for a 150 room hotel, 100 condominiums, sports club and executive 6 hole golf course.*
- **Shan Shui Resort, Sabah, Malaysia.** *Conceptual Master plan for an integrated resort including a 250 room hotel, sports centre and golf club.*
- **Orange County National Golf Centre, Florida, U.S.A.** *Master plan for a major golf academy including a club-house, specialised instruction facilities, student accommodation, staff amenities and course maintenance facilities.*
- **Thanh Nhan Park, Hanoi, Vietnam.** *Conceptual Master plan for the redevelopment of a recreational parkland including a 250 room hotel, 150 residential apartments, 9000 sq. m. shopping centre, water park and amusement centre.*
- **City Centre Redevelopment, Konohana, Japan.** *Conceptual Master plan for the integrated urban redevelopment of areas surrounding the proposed Universal Studios Theme Park in Osaka, Japan.*
- **Urawa Town Centre, Urawa, Japan**. *Conceptual Town Planning proposal for the redevelopment of a lakeside city centre.*
- **Irabu Coral Island Resort, Okinawa, Japan.** *Conceptual Master plan and Design for a 27 hole Golf Course, 300 room hotel, 100 room hotel, sports centre, function centre, golf academy and retail facilities.*
- **Submarine Assembly Facility, Port Adelaide, South Aust.** *Team leader for the master plan, design and documentation of the Manufacturing and assembly complex for the Royal Australian Navy Submarine Fleet.*
- **Jubilee Point, Glenelg, South Aust.** *Master plan team for an urban redevelopment and land reclamation project including 200 room hotel, amusement park, marina, canal front housing, condominiums and commercial retail centre.*
- **Victor Harbour Foreshore, Victor Harbour, South Aust.** *Premiated master plan and schematic design competition entry for the redevelopment of a coastal park and public facilities.*

Residential

- **Jewel:** *Design Development (constructed) of the podium for the high profile mixed use hotel, apartment and commercial development comprising three high-rise towers opposite the beach at Surfers Paradise*
- **Waltons Redevelopment:** *Conceptual design for two 31-storey high rise residential towers, a 15-storey hotel with commercial podium/arcade adjoining the Fortitude Valley railway station in Brisbane's night time entertainment precinct.*
- **Iconic:** *Concept Design and Design Development (constructed) for a 15-storey mixed-use residential apartment building opposite the beach at Kirra on the Gold Coast.*
- **Ruby Stage 3:** *Concept Design and Development Application (approved) for a 52-storey residential apartment building with commercial mixed use podium including a supermarket, entertainment centre, ice rink and retail tenancies in Surfers Paradise.*
- **Ruby Stage 4:** *Concept Design and Development Application (approved) for a 30-storey residential apartment building and retail tenancies in Surfers Paradise.*
- **Imperial City:** *Concept Design for a 3 tower (100-storey, 70-storey and 50-storey) and 60,000m2 commercial / education / shopping centre at Southport, City of Gold Coast.*
- **Kurrawa Lodge:** *Concept Design and Development Application (approved) for a 16-storey boutique apartment building in central Broadbeach on the Gold Coast.*
- **Midwater:** *Concept Design and Development Application (approved) for a 47-storey residential apartment building at Main Beach.*
- **Hope Island Residences:** *Concept Design and Development Application (submitted) for nine residential apartment building ranging in height from 3 to 14-storeys and comprising of 943 apartments and commercial tenancies. Hope island, Gold Coast, QLD*
- **72 Musgrave Street:** *Concept Design and Development Application (approved) for 14-storey mixed-use residential apartment building opposite the beach at Kirra on the Gold Coast.*
- **Residential High Rise Apartment Buildings (50 storeys and 10 storeys), Gold Coast, Australia.** *Conceptual design for a high profile residential development on a prominent site in Surfers Paradise. The project includes significant urban improvement works aimed at creating an identifiable pedestrian precinct.*
- **Public Housing, Brisbane and Gold Coast, Australia.** *Schematic Design consultant for 64 residential units at 5 site locations.*
- **Corporate Guest House, Gold Coast, Australia.** *Concept Design consultant for a 2500 sqm residence and corporate guest house.*
- **Private Residence, Russell Island, QLD, Australia.** *Schematic Design and Design Development consultant for a 300 sqm luxury residence.*
- **Unit Development, South Brisbane, QLD, Australia.** *Concept design and Development Application for 16 inner city units.*
- **Unit Development, Taringa, QLD, Australia.** *Concept design, design development and Development Application for 12 luxury units.*
- **Unit Development, Kangaroo Point, QLD, Australia.** *Concept Design for a 12 storey luxury condominium development.*
- **Likos Residence, Tallai, Gold Coast, QLD, Australia.** *Design and Documentation of a 600 sqm private residence overlooking the Gold Coast.*
- **Curtis Residence, Red Hill, QLD., Australia.** *Design, Documentation and Project management for alterations and additions to an inner city residence.*
- **Townhouse Prototypes, Gold Coast, QLD. Australia.** *Concept design for three duplex townhouse prototypes.*

- **Unit Development, Kirra, Gold Coast, QLD. Australia.** *Concept design and design development for the alterations and additions to six beachside units.*
- **Private Residence, Paddington, QLD., Australia.** *Design and Documentation for alterations and additions to an inner city residence.*
- **Marina Condominiums, Misaki, Japan.** *Schematic design for 9 luxury condominiums.*
- **Pearl Garden Residential and Commercial Centre, Guangzhou, China.** *Schematic Design and Design Development for 780 residential apartments.*
- **Private Residences, Adelaide, South Aust.** *Schematic design for two inner city residences.*
- **Curtis Residence, Bridgewater, South Australia.** *Design, documentation and construction management of a house in the Adelaide Hills.*
- **Judd Residence, Blenheim, New Zealand.** *Design and documentation of a house located within a vineyard for a leading NZ winemaker.*
- **Thomas Residence, Seddon, New Zealand.** *Design and documentation of a house on a rural site.*
- **Brown Residence, Berowra, New South Wales.** *Design of a house on a suburban site.*
- **Gumley Residence, Sunshine Beach, Qld.** *Design, documentation and contract administration of a two staged holiday/beach house overlooking sunshine beach.*
- **Binney Residence, Noosa Heads, Qld.** *Design and documentation of a multi level house on Noosa hill.*
- **House renovation, Sunshine Beach, Qld.** *Concept design for alterations and additions to a suburban house.*
- **Cameron Residence, Noosa Heads, Qld.** *Concept design for a multi level house on Noosa Hill*

Tourism and Hospitality

- **Lianyungang Centre, China.** *Concept design for a large scale integrated mixed-use facility including three hotels, commercial and retail space and an intercity bus interchange.*
- **Seaside Hotel, Montenegro.** *Conceptual design consultant for a 32 room luxury boutique hotel.*
- **Shan Shui Golf and Country Club, Sabah, Malaysia.** *Concept design and design development for a two stage 300 room, 4 star resort hotel.*
- **Irabu Coral Island Resort Hotel, Okinawa, Japan.** *Concept Design for a 300 room hotel and function centre.*
- **Rhiga Royal Hotel, Okinawa, Japan.** *Schematic and design development management for a 350 room hotel at an integrated coastal resort.*
- **Sun Moon Lake Hotel, Taiwan.** *Schematic design of 300 room resort hotel on a lake side site.*
- **Forest Hotel, Hachinohe, Japan.** *Schematic design for 200 room hotel and conference centre on 55 Ha forest site.*
- **Hotel Project, Cairns, Australia.** *site evaluation, concept proposals and feasibility study for a 250 room hotel.*
- **Miho Resort Tourist Hotel, Ibaraki, Japan.** *Concept design for a 300 room 3 star hotel, conference, cultural and retail centre.*
- **Miho Resort All Suite Hotel, Ibaraki, Japan.** *Concept design for a 5 star 50 room all suite boutique hotel.*
- **Seihi Resort Hotel, Nagasaki, Japan.** *Concept design for an 850 room hotel and conference centre.*
- **Hotel Project, Chatan, Okinawa.** *Site evaluation and preliminary concept proposals for a 200 room hotel.*
- **Sky Garden Resort, Vung Tau, Vietnam.** *Concept design for a 300 room hotel and casino.*
- **Golf Resort, Noumea, New Caledonia.** *Concept design for a 300 room beach front hotel and tourist retail centre.*
- **Chatan Hotel and Shopping Centre, Okinawa, Japan.** *Conceptual design for a 300 room hotel and 24,000 sq. m. shopping centre*
- **International Hotel, Hanoi, Vietnam.** *Conceptual Design for a 250 room luxury, low rise hotel in Thanh Nhan Park.*
- **Konohana Hotel and Conference Centre, Osaka Japan.** *Conceptual design for a 500 room high rise hotel and conference centre.*
- **Konohana Ferry Terminal & Hotel, Osaka, Japan.** *Concept Design for an urban river Ferry Terminal and 200 room Hotel.*
- **Ishigaki Port Terminal & Hotel, Okinawa, Japan.** *Concept Design for a Port Passenger Terminal, Exhibition Hall and 160 room Hotel.*
- **Restaurant Tenancy, Victor Harbour, South Aust.** *Fitout of new retail tenancy as a restaurant.*
- **Student Cafeteria, SAIT, Adelaide, South Aust.** *Refurbishment of student cafeteria.*

Commercial

- **Australian Submarine Corporation Headquarters, Port Adelaide, South Australia.** *Design and documentation of a 2000sqm office building as part of the ASC complex.*
- **Government offices, Sandakan, Sabah, Malaysia.** *Schematic Design and space planning for a two storey, 400 sqm. office building.*
- **Commercial Offices, Bundall, Gold Coast, QLD. Australia.** *Concept design for a 1200sqm. high profile speculative office development.*
- **Damin Commercial Centre, Guangzhou, China.** *Concept Design for a 31 level, mixed use development.*
- **State Bank Branch, Ingle Farm, South Aust.** *Schematic design and design development for a new suburban bank building.*
- **Mutual Community, Adelaide, South Aust.** *Alterations and additions to ground and top floor levels of high rise building.*
- **Hindmarsh Tower, Adelaide, South Aust.** *Schematic design team for a high-rise office tower.*
- **Mutual Community Branch, Adelaide, South Aust.** *Schematic design for alternations to fitout and building facade in street shopping mall.*
- **Telecom Tenancy, Darwin, Nth. Territory.** *Fitout and space planning of retail tenancy for Telecom.*
- **Ward and Partners, Adelaide, South Aust.** *Highrise tenancy fitout and space planning for a Law firm.*
- **Telecom Tenancy, Adelaide, South Aust.** *Fitout of retail tenancy for Telecom.*
- **Health Insurance Commission, Canberra, ACT.** *Design team for the headquarters for Government Health Commission including specialised Computer Centre.*

Leslie Grahame Curtis
architect | urban designer | visual assessment consultant

- **101 Pirie Street, Adelaide, South Aust.** *Design development for a high-rise office building.*
- **Japan - Australian Business Centre, SAIT, Adelaide, South Aust.** *Design, documentation and contract administration of office and lecture room fit outs to existing building.*
- **Student Union Office, SAIT, Adelaide, South Aust**. *Design, documentation and contract administration of office fit outs to an existing building*

Leisure and Recreation

- **Sandakan Golf and Country Club redevelopment, Sabah, Malaysia.** *Schematic design for a Golf Clubhouse alterations and additions and a new Multipurpose Sports Centre.*
- **Shan Shui Golf Club, Sabah, Malaysia.** *Schematic design and design development for the Shan Shui Resort Golf Clubhouse.*
- **K Project, Tokyo, Japan.** *Concept design proposal for a US$3 Billion domed theme park.*
- **Orange County National Golf Centre, Florida, U.S.A.** *Schematic design and design development for a golf club ,teaching institute, student accommodation , staff ammenities and course maintenance facilities.*
- **Golf Club House, Tomobe, Japan.** *Concept design for golf club house.*
- **Hockey Centre, Glenelg, South Aust.** *Schematic design of a hockey field, grandstand, bar, gym and change room facilities.*
- **Entertainment Centre, Findon, South Aust.** *Schematic design team for a competition entry.*
- **Regent Cinema, Adelaide, South Aust.** *Design, documentation and contract administration of the refurbishment and alterations to a heritage listed cinema auditorium and public spaces.*
- **Poolhouse and Swimming Pool, Unley, South Australia.** *Design, documentation and contract administration of a recreational pool house and swimming pool.*

Industry and Technology

- **Asia Pacific Space Centre , Christmas Island.** *Concept Design proposal for a space vehicle assembly and support facilities.*
- **Submarine Assembly Facility, Port Adelaide, South Aust.** *Team leader for the design and documentation of the Manufacturing and assembly complex for the Royal Australian Navy Submarine Fleet*
- **Advertiser Reel Store, Hindmarsh, South Aust.** *Project architect for the design and documentation of a paper reel storage and handling facility for News Limited.*
- **Advertiser Production Centre, Hindmarsh, South Aust.** *Conceptual design proposal for new printing and administration facilities for News Limited.*
- **Faulding Laboratory Facility, Salisbury, South Aust.** *Project architect for the design and documentation of a research and development building including laboratory, research library and trial manufacturing facilities.*
- **Winery, Marlborough, New Zealand.** *Schematic design for a boutique winery and wine information centre.*
- **Computer Centre, SAIT, Adelaide, South Aust**. *Design, documentation and contract administration of a fitout to an existing building to provide Computer room and Office facilities for Central Administration department.*
- **Maintenance Workshop, SAIT, Pooraka, South Aust.** *Design, documentation and contract administration of alterations and additions to workshop and office area for Property Manager.*
- **Electronics Laboratory, SAIT, Whyalla, South Aust.** *Design, documentation and contract administration of alterations and additions to existing laboratory facilities.*
- **Acoustics Laboratory, SAIT, Adelaide, South Aust.** *Design, documentation and contract administration of a fitout to an existing building to provide facilities for the School of Architecture.*

Retail

- **Pearl Garden Residential and Commercial Centre, Guangzhou, China.** *Schematic Design and Design Development for a medical centre and 20,000 sq. m. shopping centre.*
- **Shopping Centre, Burnside, South Aust.** *Design development of a suburban shopping mall and office complex.*
- **Harbour Mall Shopping Centre, Victor Harbour, South Aust.** *Design, documentation and contract administration for a new shopping village and covered pedestrian mall.*
- **Chatan Shopping Centre, Okinawa, Japan.** *Concept design for a 24,000sqm beach front shopping centre.*

Transport

- **Lianyungang Centre, China.** *Concept design for a large scale integrated mixed-use facility including an intercity bus interchange.*
- **Bus Station, Capalaba, Queensland, Australia.** *Design management of a bus interchange and landscaped public square in Capalaba.*
- **Heliport, Osaka, Japan.** *Concept proposal for prototype multiple heliport design.*
- **Ansett Air Terminal, Adelaide, South Aust.** *Design and Design Development for alterations and additions to the Adelaide Airport terminal for Ansett Airlines. It included new check-in facilities, arrival lounge, baggage collection, covered walkways, office areas and flight club lounge.*
- **Konohana Ferry Terminal, Osaka, Japan.** *Concept Design for an urban river Ferry Terminal.*
- **Ishigaki Port Terminal, Okinawa, Japan.** *Concept Design for a Port Passenger Terminal, Exhibition Hall*

Medical

Leslie Grahame Curtis
architect | urban designer | visual assessment consultant

- **Public Hospital, Port Pirie, South Aust.** *Schematic design team for a design and construct proposal for alterations and additions to a regional hospital.*
- **Medical Centre, Adelaide, South Aust.** *Conceptual planning and design team for alterations and additions to an inner city private hospital.*

Education

- **School of Business, SAIT, Adelaide, South Aust.** *Design, documentation and contract administration of the conversion of an existing nurses home building to classrooms and offices for the SAIT School of Business.*
- **School of Nursing, SAIT, Adelaide, South Aust.** *Schematic design for new School of Nursing building.*
- **School of Petroleum Engineering, SAIT, Pooraka, South Aust.** *Schematic design proposal for new School of Petroleum Engineering.*
- **Studio and Classrooms, SAIT, Adelaide, South Aust**. *Design, documentation and contract administration of the refurbishment of facilities for the School of Architecture.*
- **Entrance and Stairs, SAIT, Adelaide, South Aust.** *Design, documentation and contract administration of the addition of fire escape stairs and new entrance to a heritage listed building*

APPENDIX B: VIA METHODOLOGY

1 Overview

1 The methodology utilised for the preparation of this VIA includes recommendations set out in the Guidelines for Landscape and Visual Impact assessment (GLVIA). The GLVIA6 identifies the components required for a visual impact assessment process. Those of relevance to this VIA are summarised as follows:

a) **Scoping**: Makes an initial judgement about the scope of the assessment and of the issues that need to be covered under the individual topics or themes. Includes establishment of the relevant study area.
b) **Project description/specification**: Provides a description of the proposed development for the purpose of the assessment, identifying the main features of the proposals and establishing parameters such as maximum extents of the development or sizes of the elements. Normally includes description of any alternatives considered.
c) **Baseline studies**: Establishes the existing nature of the landscape and visual environment in the study area, including any relevant changes likely to occur independently of the development proposal. Includes information on the value attached to the different environmental resources.
d) **Identification and description of effects**: Systematically identifies and describes the effects that are likely to occur, including whether they are adverse or beneficial.

2 The scoping requirements are addressed by the observations and comments set out at **s1.0** and **s2.0**. The project description is provided at **s3.0**, and the baseline studies, identification and description of effects are addressed by the observations and comments set out at **s4.0** and **s5.0**.

2 Sensitive Receptors

3 The VIA primarily relates to the sensitivity of *receptors* to change, the effect and magnitude of the change, and the relative significance of the change.

2.1 Receptors

4 The GLVIA[7] in its glossary of terms identifies and describes two types of *receptors*:

a) **Landscape receptors:** aspects of the landscape resource that have the potential to be affected by a proposal.
b) **Visual receptors:** Individuals and/or defined groups of people who have the potential to be affected by a proposal.

2.1.1 The Landscape Receptor

5 An assessment of landscape effects deals with the effects of the change the proposed development has on the landscape as a resource referred to in the VIA the **Receiving**

[6] GLVIA (digital version), page 23.
[7] GLVIA (digital version), page 157.

Environment. This VIA relates to how the proposed development will affect the aesthetic and perceptual aspects of the landscape and its distinctive character.

2.1.1.1 Study Area

6 The GLVIA identifies the area of landscape that needs to be covered when assessing landscape effects (referred to as the *study area*), as comprising of:

> *"..the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner. This will usually be based on the extent of Landscape Character Areas likely to be significantly affected either directly or indirectly. However, it may also be based on the extent of the area from which the development is potentially visible, defined as the Zone of Theoretical Visibility, or a combination of the two."*[8]

7 The extent of the *site and the wider landscape area around it* are as described and identified at **s2.0**, and the approximate extent of the areas from where it may be potentially visible are discussed at **s2.4**.

8 The visibility of the Site is more specifically identified by visibility mapping. The GLVIA recognises two main approaches to visibility mapping:

1. *"Manual approaches use map interpretation, cross sections through the site in relation to its surroundings and visual envelope mapping on site. This means standing at the location of the development and looking out to identify and map the land that is visible from that and other points within the site. This can establish the outer limit or visual envelope of the land that may be visually connected with the proposal.*

2. *Digital approaches use elevation data to create a digital terrain model of the study area and calculate inter-visibility between points or along lines radiating out from the development location, to construct a map showing the area from which the proposal may theoretically be visible."*[9]

9 The GLVIA also notes:

"..the use of digitally mapped areas of visibility has become increasingly the norm, although it is less commonly used in urban areas because of the difficulty of mapping and modelling accurately the buildings and structures that would influence potential visibility."[10]

10 This VIA has adopted a reverse sight line manual approach to the mapping of the Site's visibility. The sensitivity of the landscape resource to change was assessed by applying the rating criteria set out in **Table 1** below.

[8] GLVIA (digital version), page 68.
[9] GLVIA (digital version), page 99.
[10] GLVIA (digital version), page 99.

2.1.2 Visual Receptors

11 The location of visual receptors that are representative of the potential viewing opportunities of the Site from within the Study Area were identified by the visibility mapping referred to above and as set out at **s4.1**

2.1.2.1 Visual Receptor Types

12 The GLVIA identifies different visual receptors as having differing susceptibility to changes in views and visual amenity subject to the occupation or activity of people experiencing the view at particular locations; and the extent to which their attention or interest may be focused on the views and the visual amenity they experience at particular locations[11].

13 The visual receptors most likely to be more sensitive to change generally include:

a) residents at home;
b) people, whether residents or visitors, who are engaged in outdoor recreation, including use of public rights of way, whose attention or interest is likely to be focused on the landscape and on particular views;
c) visitors to heritage assets, or to other attractions, where views of the surroundings are an important contributor to the experience;
d) communities where views contribute to the landscape setting enjoyed by residents in the area.
e) Travellers on road, rail or other transport routes tend to fall into an intermediate category of moderate susceptibility to change. Where travel involves recognised scenic routes awareness of views is likely to be particularly high.

14 Visual receptors less likely to be sensitive to change include:

a) people engaged in outdoor sport or recreation which does not involve or depend upon appreciation of views of the landscape;
b) people at their place of work whose attention may be focused on their work or activity, not on their surroundings, and where the setting is not important to the quality of working life (although there may on occasion be cases where views are an important contributor to the setting and to the quality of working life).

15 The relative sensitivity of visual receptors to change was assessed by applying the criteria set out in **Table 2** below**.**

2.2 Magnitude of the Impact's effects

16 The GLVIA identifies a range factors that assist to evaluate the magnitude of the impact that a change may have, which are summarised as follows:

a) The size and scale of the effect;
b) The geographical extent of the area that will be affected;
c) The duration of the effect and its reversibility;

[11] GLVIA (digital version), page 99.

d) How the Impacts on the landscape as a resource may present having regard to how the landscape feature is valued and how its character or qualities are changed; and
e) How visual impacts may present in terms of changes to the quality or value of the available views, and other changes to amenity such as visual privacy or access to daylight.

17 The assessment of the magnitude impact of the proposed development's change to the Site and Local Area was informed by the project descriptions and the photomontage visualisation analyses set out at **s3.0** and **s4.0.**

18 A rating proposed development's Magnitude of Change impact was made by applying the criteria set out at **Table 3.**

2.3 Significance of the Impact

19 The GLVIA recommends that to draw final conclusions about significance, the separate judgements about the sensitivity of the visual receptors and the magnitude of the visual effects need to be combined, to allow a final judgement about whether each effect is significant or not.

20 The judgements can be sequentially combined into assessments of sensitivity for each receptor and magnitude for each effect. Sensitivity and magnitude can then be combined to assess overall significance- often presented as a matrix.

2.3.1 Visual Assessment Rating Criteria

21 This VIA adopts with some additions the rating criteria as adopted for the RCKRA, which is set out at **Tables 1, 2, 3** and **4** below.

TABLE 1 – RECEIVING ENVIRONMENT- SENSTIVITY RATING CRITERIA

SENSITIVITY	DESCRIPTION	EXAMPLES
HIGH	*Visual Environments that:* • *are of particularly high value to a large population or,* • *comprise of regionally important topographical features that are relatively expansive and/or accessible or,* • *are particularly vulnerable to change.*	*Visual Environments that:* • *are of national or regional importance, such as National Parks or,* • *are characterised by notable complexity, high scenic amenity, or include highly valued features or,* • *that are identified as particularly vulnerable due to cultural or ecological reasons or,* • *serve a regionally important role in supporting, defining, or structuring topographical areas, such as inter-urban breaks*
MODERATE	*Visual Environments that:* • *are of recognised scenic value that are generally accessible to the wider local community or,* • *have an attractive cohesive character or distinctive features that contribute to the local identity*	*Visual Environments that:* • *are of local importance such as attractive public places and open space* • *that are characterised by their notable scenic amenity and features that contribute to local views and vistas* • *that are visually cohesive such as architectural streetscapes that contribute to the identity of the local area or,* • *play a recognised role in assisting to define and structure local topographical areas,*
LOW	*Visual Environments that:* • *are of moderate or low value to the community or,* • *are relatively commonplace and do not comprise of any significant character or feature values or,* • *are relatively resilient to change*	*Visual Environments that:* • *are of limited local importance* • *that are not characterised by their scenic amenity values* • *that are not cohesive have some resilience to change* • *that are common in a local area and have no significant cultural or ecological value*
NEGLIGIBLE	*Visual Environments that:* • *are without any valued character or features or* • *are resilient to change or,* • *are of limited size and are not known to the wider population or,* • *inaccessible to the wider population*	*Visual Environments that:* • *have little scenic value or,* • *are of no or little interest and are not valued by the local or, wider communities* • *have a highly disjointed or discordant visual character or,* • *possess adverse visual qualities that generally considered unattractive*

TABLE 2 – VISUAL RECEPTORS- SENSTIVITY RATING CRITERIA

SENSITIVITY	DESCRIPTION	EXAMPLES
HIGH	*Situations where:* • *viewpoints are easily accessible or,* • *viewing opportunities are prolonged or,* • *the value of the view is high quality or,* • *where the scale or extent of views are substantial.*	*People who:* • *are travellers along scenic routes or,* • *have access to high quality views from public spaces to landscapes that are rare, unique or of regional importance or,* • *are residents within properties adjoining the Subject Land that benefit from high quality residential amenity including- visual privacy, access to daylight and access to high quality views*
MODERATE	*Situations where:* • *viewpoints are reasonably accessible or,* • *viewing opportunities are more than fleeting or,* • *the value of the view is of moderate or moderate-high quality or,* • *where the scale or extent of views are substantial.*	*People who:* • *are pedestrians walking along high-quality streetscapes or,* • *are travellers along road and rail routes in proximity to the Subject Land that offer clear and quality views of local features or,* • *are visitors to viewing locations where views to landscapes are representative of local character or sense of place, but are not rare or unique or,* • *are residents or workers neighbouring the Subject Land in the local area, with an interest in local topographical views or,* • *are involved in outdoor recreation within open spaces neighbouring the subject land in the local area and have a high interest in local topographical views*
LOW	*Situations where:* • *viewpoints are not easily accessible or,* • *viewing opportunities are of limited duration or,* • *the value of the view is of moderate-low or low quality or,* • *the scale or extent of views are limited.*	*People who:* • *Are travellers along road and rail routes not in proximity to the Subject Land that offer clear and quality views of the local topography* • *Are residents or workers within the local area but not in proximity to the Subject Land that have access to clear and quality views to the Subject Land or,*
NEGLIGIBLE	*Situations where:* • *the viewers have little or no concern about changes or,* • *access to a viewpoint is very limited.*	*People who:* • *with little interest in views or,* • *here the Subject Land is barely noticeable*

TABLE 3 – IMPACT MAGNITUDE RATING CRITERIA

	Explanation	Examples
High	The size, scale, and duration of the effect are substantial and/or the geographic extent of the effect is large (i.e. regionally significant	-extreme consequences that are significant at a regional level -a large number of people are affected -substantial / obvious changes due to the total loss of or change to elements, features or characteristics of the landscape that are regionally significant -substantial / obvious changes due to the addition of or enhancement to elements, features or characteristics of the landscape that positively contribute to its visual amenity and are regionally significant -overwhelming loss or addition of features in the view, such that the nature of the visual environment is fundamentally changed -significant contrast of any new features or changes compared to existing and remaining landscape -views to key landscape elements (such as the ocean, skyline, headlands, etc) are substantially or entirely obstructed
Moderate	The size, scale, or duration may be limited, or the geographic extent is limited (i.e. locally significant).	- moderate consequences, significant at a local level - discernible changes due to partial loss, addition, or change to elements, features or characteristics of the landscape which are locally significant - significant loss or addition of features in the view, such that the nature of the view or character of the landscape is materially altered - noticeable contrast of any new features or changes compared to existing and remaining visual environment - built form partially integrated such that the dominance of landscape elements remain - views to key landscape elements are partially obstructed but views remain intact - views to key landscape elements are partially expanded and enhanced
Low	Either the size, scale, or duration of change is constrained or limited, and geographic extent is limited.	- low consequences, significant at a local level - minor change in the visual environment due to the loss, addition or change to one or two elements, features, or characteristics of the visual environment which are locally significant - minor memorable change to the visual environment - impact likely to be temporary or reversible - built form well integrated such that landscape is clearly dominant -little permanent change to local character
Negligible	The change is not material in terms of size, scale, duration or extent	-No consequence or significance at a local level -almost imperceptible or no change to the landscape as there is little or no loss of/or change to the elements. Features or characteristics of the visual environment -no memorable change to the visual environment

TABLE 4 – SIGNIFICANCE OF IMPACT

Receptor Sensitivity	Impact Magnitude			
	High	**Moderate**	**Low**	**Negligible**
High	High	High-Moderate	Moderate	Negligible or Low
Moderate	High-Moderate	Moderate	Moderate-Low	Negligible
Low	Moderate	Moderate-Low	Low	Negligible
Negligible	Negligible or Low	Negligible	Negligible	Negligible

3 Principles

22 The Visual Impact Assessment (VIA) includes the following overarching principles:

a) As a visual context, the environment is primarily comprised of topographical features (natural and cultural elements) with attributes that inform cognitive mapping.

b) The general public's common impressions of the visual environment including its character are primarily based upon the elements that can be seen from and within the public realm. Priority is therefore given to the views available from public and semi-public spaces. Although some individuals may have privileged views of the surrounding environment from private properties, the public primarily have a commonly shared experience of the environment from within the public realm.

c) Viewpoints may have primary views in one direction to an attractive or distinctive feature and secondary views in other directions. The distinction between primary and secondary may relate to the relative attractiveness of the alternate views or the nature of the viewpoint (i.e., whether it is from a principal living space or from a bedroom).

d) When travelling along a path a person generally looks in the direction of their travel whereupon their lines of sight to the elements along the path will generally be at an oblique angle with one element viewed behind another. Elements will therefore be partially obstructed by neighbouring elements and the separation between elements might become less apparent whereupon individual building and landscape forms can partially merge into a contiguous visual mass.

e) Most people prefer:

- Views of natural elements such as the ocean or mountains as opposed to urban elements,

- Views that are structured with focal elements, a mid-ground and a background,
- Diversity over uniformity,
- Heritage over modernity

f) The legibility and cohesiveness of these elements and their attributes are understood across a spectrum of experiential scale that is structured by the street, neighborhood and city contexts.

g) Discordant elements that contrast markedly with their otherwise attractive settings can have a detrimental impact upon amenity. Urban environments with clear legibility of elements and a cohesive visual character that facilitate cognitive mapping are more easily understood and are therefore more likely to be amenable to the public's positive engagement.

4 Urban Elements

23 What might be visible to a person from a particular location (i.e., from a viewpoint) is referred to as a viewshed. What might be visible from a combination of viewpoints and viewsheds in relation to a defined setting is referred to as a visual catchment. Viewsheds are therefore more relevant to a person when stationary, whereas a visual catchment is more relevant to a person when they are moving and the sequence of viewsheds is continually changing, which is more often the case as a person travels through an area between locations. The community's impressions of a visual context are formed from what is visible to them from the view catchments provided within the paths of the public realm.

24 The eminent urban theorist Kevin Lynch [12] identified a typology of elements that contribute to legibility and a sense of place. Of these elements, it is generally the paths that pass through an area that provide the primary viewing opportunities for most people, as Lynch explains below:

Paths

25 *"Paths are the channels along which the observer customarily, occasionally, or potentially moves. They may be streets, walkways, transit lines, canals, and railroads. For*

[12] The Image of the city (1960)

many people, these are the predominant elements in their image. People observe the city while moving through it, and along these paths the other environmental elements are arranged and related."

Edges

26 *"Edges are the linear elements not used or considered as paths by the observer. They are the boundaries between two phases, linear breaks in continuity: shores, railroad cuts, and edges of development, walls. They are lateral references rather than coordinate axes. Such edges may be barriers, more or less penetrable, which close one region off from another; or they may be seams, lines along which two regions are related and joined together. These edge elements, although probably not as dominant as paths, are for many people important organising features, particularly in the role of holding together generalized areas, as in the outline of a city by water or wall"*

Districts

27 *"Districts are the medium-to-large sections of the city sections of the city, conceived of as having two- dimensional extent, which the observer mentally enters "inside of," and which are recognizable as having- some common, identifying character. Always identifiable from the inside, they are also used for exterior reference if visible from the outside. Most people structure their city to some extent in this way, with individual differences as to whether paths or districts are the dominant elements. It seems to depend not only upon the individual but also upon the given city."*

Nodes

28 *"Nodes are points, the strategic spots in a city into which an observer can enter, and which are the intensive foci to and from which he is traveling. They may be primarily junctions, places of a break in transportation, a crossing or convergence of paths, moments of shift from one structure to another. Or the nodes may be simply concentrations, which gain their importance from being the condensation of some use or physical character, as a street-corner hangout or an enclosed square. Some of these concentration nodes are the focus and epitome of a district, over which their influence radiates and of which they stand as a symbol. They may be called cores. Many nodes, of course, partake of the nature of both junctions and concentrations. The concept of node is related to the concept of path, since junctions are typically the convergence of paths, events on the journey. It is similarly related to the concept of district, since cores are typically the intensive foci of districts, their polarizing center. In any event, some*

nodal points are to be found in almost every image, and in certain cases they may be the dominant feature."

Landmarks

29 *"Landmarks are another type of point-reference, but in this case the observer does not enter within them, they are external. They are usually a rather simply defined physical object: building, sign, store, or mountain. Their use involves the singling out of one element from a host of possibilities. Some landmarks are distant ones, typically seen from many angles and distances, over the tops of smaller elements, and used as radial references. They may be within the city or at such a distance that for all practical purposes they symbolize a constant direction. Such are isolated towers, golden domes, and great hills. Even a mobile point, like the sun, whose motion is sufficiently slow and regular, may be employed. Other landmarks are primarily local, being visible only in restricted localities and from certain approaches. These are the innumerable signs, storefronts, trees, doorknobs, and other urban detail, which fill in the image of most observers. They are frequently used clues of identity and even of structure, and seem to be increasingly relied upon as a journey becomes more and more familiar."*

30 Where relevant, Lynch's typology of elements informs the analysis undertaken in this report. The relative coherence or legibility of these elements and their relationships influences a person's impression and cognitive mapping of the urban environment.

31 The visual impact a new development has in relation to the existing visual coherence and legibility of these elements may affect the existing visual character and legibility of the local area.

32 Poor legibility of the urban environment can lead to confusion or create poor impressions of buildings, urban space, and city form. This can have an adverse effect on a person's actions and potentially compromise their ability or willingness to engage with buildings and spaces. A lack of engagement can lead to a loss of social and economic opportunities for the local community. Good legibility, on the other hand can facilitate engagement, enhance social and economic opportunities, and contribute to the long-term sustainability of the city.

5 Perceptual Qualities

33 The above environmental elements are generally comprised of components with identifiable perceptual qualities. Those perceptual qualities most relevant to the visual character of a place are discussed below.

Character

34 The Macquarie Dictionary defines character as: *"the aggregate of qualities that distinguishes one person or thing from others"*. The visual character of a locality or neighbourhood may therefore be the aggregation of perceptual qualities arising from the visual relationships between the landform, vegetation, buildings, structures, infrastructure, land uses and activities. This character may include common qualities or features shared by various elements or the distinctiveness of a particular element that distinguishes the locality through its visual prominence.

Legibility

35 Legibility refers to how well an environment is understood and how easily important elements are recognised. Environments that have a greater degree of visual coherence and cohesiveness are likely to be more easily understood, which facilitates the engagement of observers and encourages positive interaction. It is therefore reasonable to conclude a visually cohesive environment will enhance its visual coherence making it more legible and attractive to engagement.

Identity

36 Identity describes the quality of a physical object or place, which leaves the observer with a strong, vivid, and memorable image. A place with a strong and desirable image would be well formed, distinct, and remarkable. To achieve this, it would need to have good legibility and a strong identity- being the extent to which a person can recognise or recall a place as being distinct from other places, which are influenced by the distinctiveness of form, visibility, use and symbolic significance. As with legibility, the identity of the locality is largely defined by the visual character of the locality's urban elements and their relationship to each other.

5.1 Attributes

37 The above qualities are contingent upon the various visual attributes of a building or place and their relationships. Key attributes that are relevant to a locality's character, legibility, identity and sense of place are identified below.

Order and Complexity

38 Appropriate levels of complexity in urban environments are necessary to provide visual interest, and the level of complexity is often one of the defining qualities of the environment's image and identity. Too much complexity may appear as chaotic, whereas too little may appear as mundane. Complexity typically arises from variations in built form- including its shapes, textures, colours, materials, as well as landscape, signage, and the visible activity of an environment.

Spatial Definition and Activation

39 The buildings that adjoin and surround an outdoor space define the space and provide a sense of enclosure, which assists to create a sense of position and territoriality for the persons within the space. Comfortable spatial definition depends upon appropriate relationships of building scale to the space and the animation, activation and interest of spatial boundaries, edges and interfaces. Poorly animated or activated edges and interfaces reduce complexity and visual interest, which diminish the character and amenity of the space.

Coherence, Cohesiveness and Amenity

40 Where the urban form and appearance of a neighbourhood has a greater degree of visual coherence and cohesiveness it's character will be more apparent and more easily understood, which may facilitate the engagement of observers and encourage positive interactions.

41 With respect to amenity, the Macquarie Dictionary's definition includes: "*..agreeable features, circumstances, ways, etc.*" A visually cohesive environment that has a coherent visual character will be more "agreeable" to an observer's positive engagement and may therefore be considered to exhibit greater amenity.

6 Environmental Scale

42 The above perceptual qualities and attributes are experienced across a spectrum of environmental scale, which for the purpose of this report is structured by the street, neighbourhood, and city contexts. Development outcomes that are compatible with the perceptual qualities that characterise these contexts and/or provide an effective transition of scale between these contexts will contribute to the visual cohesion of the built environment.

6.1 Street Context

43 The Streetscape Context typically relates to a receptor's perception of the proposed development's interface and relationship to the street frontage, adjoining properties and the neighbouring streetscape. At this scale the proposed development will have a direct relationship to the human scale and the active engagement of a pedestrian's interest.

44 Typical streetscape effects include the proposed developments:

a) impact upon the amenity of adjoining properties.
b) compatibility with the human scale at ground level including the mediation of impacts arising from its height and bulk.
c) activation and animation of adjoining pedestrian spaces.
d) contribution to the spatial character and appearance of the streetscape as a public place; and
e) obstruction to any significant views available from adjoining public spaces.

6.2 Neighbourhood Context

45 Visual impacts upon the broader Neighbourhood Context typically relate to a development's integration with the neighbourhood's general character where its appearance, size and scale will be viewed in relation to a greater number of elements and the larger topographical features that assist to distinguish the local area from others.

46 At this scale a development is experienced from a distance where its visual impact and compatibility with the visual context may influence the local area's evolving character, legibility and "sense of place".

47 Typical neighbourhood effects include the proposed developments:

a) compatibility with the bulk and scale of nearby development when viewed within the broader view catchments of the local area.
b) compatibility with the visual qualities that characterise and distinguish the local area's identity, character and legibility; and
c) A development's effect on important views of significant elements or landmarks from key locations that contribute to local identity.

6.3 City Context

48 The effect of change brought about by a proposed development in relation to the Citywide Context are less common but typically relate to a development's affect upon the city's image and identity. Larger landmark developments of significant height and/or intensity may become highly memorable iconic symbols that are forever associated with the city. Others might reinforce existing key features such as the city's concentrations of high-rise buildings or have adverse impacts such as obstructing key vistas to important natural landmarks.

49 Typical citywide effects include the proposed developments:
a) Impact on the existing and/or intended character of the local area and its legibility as part of the city's image.
b) The protection of local view access to key natural and cultural features that are part of the city's image.

7 PROCESS

50 The visual assessment typically comprises of the following actions:
a) Preliminary Project Review and Site Inspection
- Project initiation, review of the project information and undertake preliminary desk-top/web-based analyses of relevant planning scheme provisions, the site and its surrounding area
- Undertake a personal inspection and photography of the site, adjoining properties and the local area.

b) Context Analysis
- Undertake a review of the local topography and identify the principal view corridors relevant to the site.

- Undertake an analysis of the existing development pattern and built form that structures and characterises the site's urban context.

c) Visual Impact Analysis

- Review the proposed development's principal visual characteristics and undertake a visual impact analysis including:
- A review and assessment of the likely sensitivity of receptors to change from principal vantage points and;
- An assessment of the existing context's (i.e., the receiving environment's) sensitivity to change;
- An assessment of the proposed development's potential visual impact, mitigation of impact and resulting magnitude of change to the receiving environment in relation to the streetscape, neighbourhood and city-wide context.

d) Legislative Provisions

- Review the proposal's responses to Planning Scheme requirements that are relevant to visual impact, character and amenity including: Specific Outcomes, Overall Outcomes and Performance Criteria.

URBIS

BENOWA GARDENS SHOPPING CENTRE

Supermarket Impact Assessment

Prepared for Horizontal Investment
November 2024

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Urbis staff responsible for this report were:

Director	David Wilcox
Associate Director	Meredith Knox
Project code	P0052526
Report number	Final

Urbis acknowledges the important contribution that Aboriginal and Torres Strait Islander people make in creating a strong and vibrant Australian society.

We acknowledge, in each of our offices, the Traditional Owners on whose land we stand.

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ACKNOWLEDGEMENT OF COUNTRY

Urbis acknowledges the Traditional Custodians of the lands we operate on.

We recognise that First Nations sovereignty was never ceded and respect First Nations peoples continuing connection to these lands, waterways and ecosystems for over 60,000 years.

We pay our respects to First Nations Elders, past and present.

The river is the symbol of the Dreaming and the journey of life. The circles and lines represent people meeting and connections across time and space. When we are working in different places, we can still be connected and work towards the same goal.

Title: Sacred River Dreaming
Artist: Hayley Pigram
Darug Nation
Sydney, NSW

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EXECUTIVE SUMMARY

Urbis has been engaged by Horizontal Investment to prepare a Supermarket Impact Assessment to consider the **expansion of a supermarket** at Benowa Gardens from **from 1,860 sq.m to 4,000 sq.m**. The expansion is part of a broader mixed use redevelopment proposal for the site.

The analysis confirms that the proposed supermarket expansion is a **proportionate response to market need and will deliver a net community benefit.**

Drivers of need for the proposed supermarket expansion include:

- **Population and spending growth** in the main trade area and environs as the Gold Coast responds to population demand through infill development
- An **under provision** of major supermarket floorspace in the main trade area relative to benchmarks

Key insights from the impact assessment are:

- **Modest trading impacts** across the centres heirachy, ranging from -$0.5m at Sorento Village to -$3.5 million at Benowa Village. No centre experiences trading impacts of greater than -4.3%, which are minor and likely capable of being absorbed within a short timescale.
- **The highest impacts are assumed at centres with similar scale supermarkets** – reflecting normal competitive trading between supermarket operators, as well as intra-operator network impacts.
- **All centres are better off in 2030 with the expansion of Coles Benowa Gardens** This is due to the ongoing population growth and assumed per capita spending growth contributing to market growth overall.
- **Trading levels are expected to remain strong** – Due to high resident spend per capita, trading levels of existing centres are estimated to be strong, achieving sustainable productivity rates. The strength of existing centres is reflected by low vacancies in each location.

The proposed **expansion of the supermarket** is supportable from an economic perspective as it delivers multiple positive outcomes:

- **Providing a right-sized supermarket to meet local needs**, allowing residents to fulfill their retail requirements close to home.
- **Major investment in an established retail centre with no material impact** on the viability of the existing centres heirachy
- **Responding to trade area population growth and current supermarket floorspace undersupply** by expanding the scale of supermarket retail offer.
- **Creating additional job opportunities**, particularly for local residents, including the younger demographic, which is a key employment segment for retail shops.
- Contributing towards **urban renewal** and mixed use revitalization of a centre to deliver a range of social, environmental and economic benefits, including increased housing supply.
- Increased competition in the area can act as an **exemplar and catalyst** to encourage other property owners to consider redevelopment of their centres.

The remainder of this report has been structured as follows:

- **Section 1 Development Context** – Provides an overview of the subject site, its surrounding land uses and proposed development.
- **Section 2 Trade Area Analysis** – Provides an overview of the current and forecast population within the defined trade area, including a summary of the current demographic and retail spending characteristics.
- **Section 3 Local Retail Analysis** – An assessment of the scale, composition and quality of relevant existing retail centres in the locality, including any proposed developments within the future supply pipeline.
- **Section 4 Retail Impact Assessment** – An assessment of the performance of existing centres, the potential turnover uplift from the expansion of the supermarket, and the distribution of trading impacts on the centres heirachy from this uplift.

01

DEVELOPMENT CONTEXT

LOCATION CONTEXT

Benowa Gardens Shopping Centre is situated at 203 Ashmore Rd, Benowa, approximately 6km from the Southport CBD.

The existing centre has approximately 5,730 sq.m of retail and non-retail floorspace and is **currently anchored by an 1,857 sq.m Coles supermarket**.

Centrally positioned in the established residential suburb of Benowa, the centre benefits from Ashmore Road's connectivity to nearby residential areas such as Benowa Waters, Bundall, Sorrento, and Ashmore.

With its location at the corner of Ashmore Road and Benowa Road, Benowa Gardens enjoys high visibility and currently provides over 440 car parking spaces. The centre is conveniently located near three large schools and directly opposite the Pindara Private Hospital complex, providing essential retail amenities for visitors, families and workers in the area.

Ongoing development in the immediate vicinity of the centre, includes the approved Sunlight Precinct development at the Gold Coast Turf Club which will add 557 apartments.

Location Context

PROPOSED DEVELOPMENT

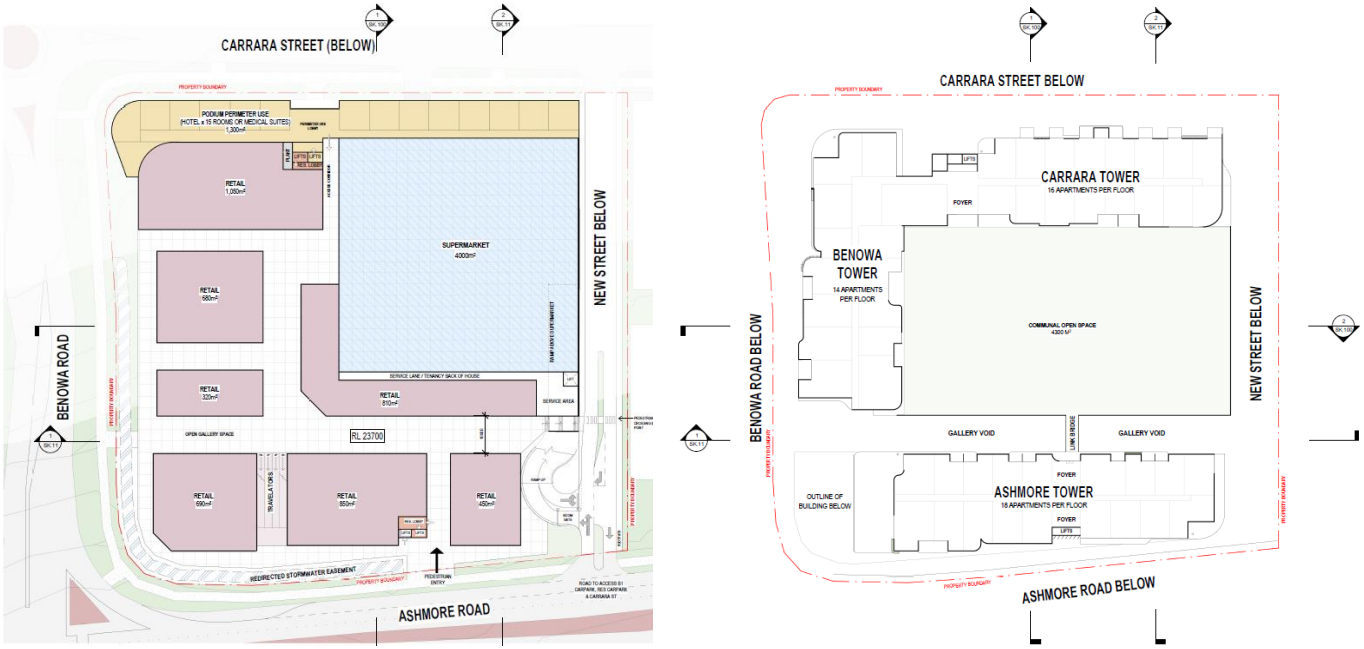
The proposed mixed use redevelopment of Benowa Gardens is positioned to provide a full-line supermarket, with a range of retail amenity to satisfy future a future on-site market and surrounding local residents.

The proposed development includes:

- **394 apartments**
- 10,000 sq.m of retail floorspace, including:
  - A 4,000 sq.m supermarket
  - 6,000 sq.m of retail speciality space
- 690 retail car parks
- 3,000 sq.m of commercial floorspace
- 8,400 sq.m of podium perimeter space to be a combination of any of the following uses:
  - Medical suites
  - Short term accommodation (41 hotel rooms)
  - Apartments (44 x 1-bed apartments)

This assessment considers the need for, and impact of the supermarket expansion which will add ~2,150 sq.m floorspace.

Benowa Gardens Proposed Development



Source: Horizontal Investment

02

TRADE AREA ANALYSIS

BENOWA GARDENS TRADE AREA

The Benowa Gardens trade area is shown on the map opposite.

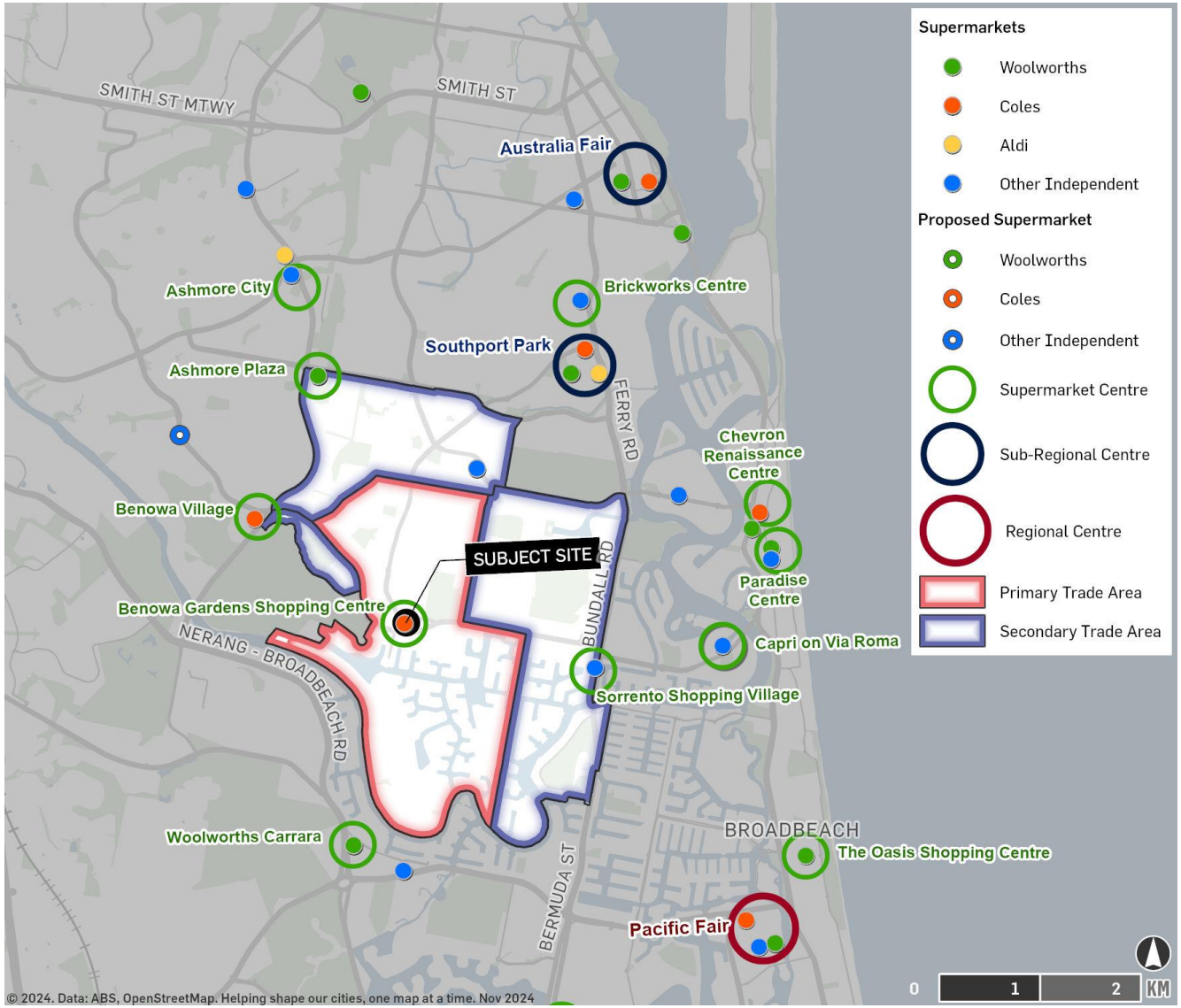
The trade area has been defined and validated based on Human Movement Data (HMD) analysis of visitation to the current Benowa Gardens and competing centres, plus physical barriers (e.g. main roads, geographical barriers).

HMD mapping shown in Appendix A shows the current visitor draw of existing retail centres in the area.

The **Main Trade Area** is segmented into the following areas:

- **Primary Trade Area** which incorporates the suburb of Benowa, extending from Nerang River in the south to Heeb Street in the north.
- **Secondary North Trade Area** which incorporates part of Ashmore and Southport, extending from Heeb Street in south to Cotlew Street in the north. It extends east towards Southport Golf Club and as far west as Currumburra Road.
- **Secondary East Trade Area** which extends from Nerang River to Southport Golf Club in the north. Bundall Road is a physical barrier to the east and Nerang River canals to the west.
- **Secondary West Trade Area** which covers a small residential population in Bundall located between the Gold Coast Regional Botanic Garden and Ashmore Road.

Benowa Gardens Trade Area



RESIDENT POPULATION

The population forecasts for Benowa Gardens Trade Area is derived from the following data sources:

- ABS Estimated Resident Population to 2023.
- Population forecasts and residential development forecasts provided by .id (informed decisions).
- A review of Cordell Connect for relevant residential development applications and approvals.
- The proponent's aspirations for a future on-site apartment development.
- ABS Census data on average household sizes and household occupancy.

The current and forecast resident population for the Benowa Gardens Trade Area is as follows:

- An estimated **17,880 residents** currently live in the main trade area. Of which, **9,040** residents are within the primary trade area.
- The Main Trade Area population is forecast to increase by **2,410 residents** or **1.2% per annum** between 2024 and 2034.
- This growth is primarily driven by infill developments, including:
  - The Sunlight Precinct development at the Gold Coast Turf Club is forecast to add 557 apartments or around 1,225 residents by 2030 to the Secondary East.
  - The Benowa Gardens proposed residential apartments (394 apartments) is forecast to add around 870 residents on site by 2029.

Population growth will drive further retail spending from main trade area residents and drive demand for additional supermarket floorspace.

Resident Population, Benowa Gardens Trade Area 2024-2034

	Population (no.)				Annual Population Growth (%)		Total Population Growth (no.)	
	2019	2024	2029	2034	19-24	24-34	19-24	24-34
Primary Trade Area	**9,040**	**9,270**	**10,170**	**10,180**	**0.5%**	**0.9%**	**230**	**910**
Secondary:								
Secondary North	4,750	4,790	4,800	4,830	0.2%	0.1%	40	40
Secondary East	3,640	3,770	4,390	5,140	0.7%	3.1%	130	1,370
Secondary West	450	500	580	590	2.1%	1.7%	50	90
Secondary Trade Area	**8,840**	**9,060**	**9,770**	**10,560**	**0.5%**	**1.5%**	**220**	**1,500**
Main Trade Area	**17,880**	**18,330**	**19,940**	**20,740**	**0.5%**	**1.2%**	**450**	**2,410**

1. Data provided as at June.

Source: Australian Bureau of Statistics (ABS); Urbis

RESIDENT DEMOGRAPHIC PROFILE

The demographic profile of existing trade area residents, compared to the Gold Coast LGA, is shown in the table to the right.

Key insights as follows:

- The existing resident profile reflects an **affluent area**, with main trade area per capita incomes **+9%** above the Gold Coast average. Primary trade area resident per capita incomes are 1**2% higher** than the Gold Coast average.
- The larger household sizes in the Primary Trade Area influence the **higher average household income** (+26% vs Gold Coast LGA).
- Existing residents have a similar age profile to the Gold Coast LGA, with a slightly lower proportion of residents aged 25-39 years (16% vs 21%). This is due to the established family profile within the area.
- **78%** of the existing resident population are employed in **white collar jobs**, which is 8% above the Gold Coast average.

Demographic Profile, Benowa Gardens Trade Area (2021)

	Primary Trade Area	Secondary Trade Area	**Main Trade Area**	*Gold Coast LGA*
Income Metrics:				
Per Capita Income	49,100	47,200	**47,900**	*43,800*
Var. From Gold Coast Average	*+12%*	*+8%*	***+9%***	
Average Household Income	142,700	121,100	**131,000**	*113,600*
Var. From Gold Coast Average	*+26%*	*+7%*	***+15%***	
Age Profile:				
% 0-14 years	20%	16%	**18%**	*18%*
% 15-24 years	12%	11%	**12%**	*12%*
% 25-39 Years	14%	18%	**16%**	*21%*
% 40-54 Years	23%	21%	**22%**	*20%*
% 55-64 Years	12%	13%	**13%**	*12%*
% 65+ Years	19%	20%	**19%**	*18%*
Average Age	41	42	**41**	*40*
Household Metrics:				
% Separate House	75%	52%	**63%**	*51%*
% Families With Children	52%	43%	**47%**	*43%*
% Owned Outright	40%	36%	**38%**	*29%*
% Owned With a Mortgage	43%	34%	**38%**	*36%*
% Rented	17%	30%	**24%**	*35%*
Average Household Size	2.8	2.5	**2.7**	*2.5*
Other Metrics:				
% White Collar Workers	*80%*	*76%*	***78%***	*70%*
% Overseas Born	35%	34%	**35%**	*31%*

1. Data provided as at June 2021.
Source: Australian Census of Population & Housing (ABS); Urbis

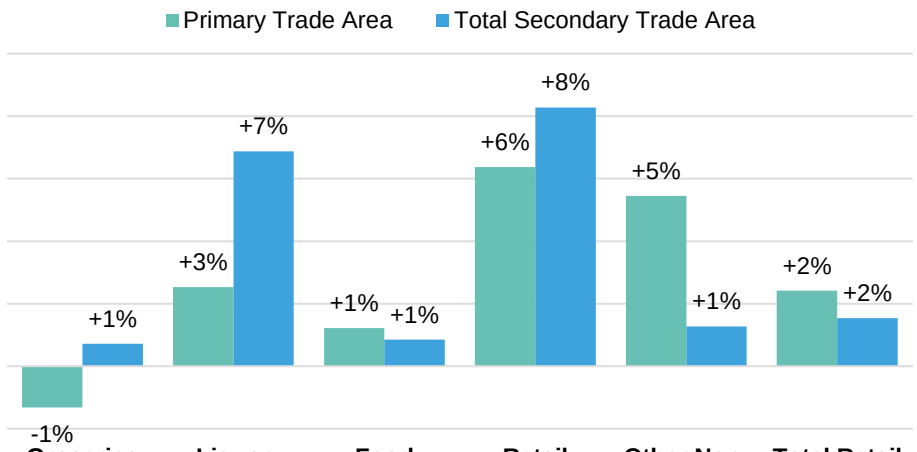
CURRENT RESIDENT RETAIL SPENDING – YEAR ENDED JUNE 2024

In our analysis of the main trade area retail spending market we have utilised CommBank iQ Retail Spending Insights to inform an average resident retail spend per capita. Of note:

- **Spending on groceries is similar to the Gold Coast LGA average.**
- Liquor (take-home liquor) expenditure is significantly higher. Conversely, dining out and liquor consumed on premises is on average with the Gold Coast.
- Spending on retail services is higher, this includes spending on hair and beauty services.

Overall, main trade area total retail spending will be slightly above the Gold Coast LGA average +2%).

Retail Spend Per Capita Variation to Gold Coast LGA



	Groceries	Liquor	Food Catering	Retail Services	Other Non-Food	Total Retail
Primary Trade Area	$5,579	$881	$3,955	$742	$7,993	$19,150
Total Secondary Trade Area	$5,695	$918	$3,941	$755	$7,677	$18,986
Main Trade Area	**$5,636**	**$899**	**$3,948**	**$749**	**$7,837**	**$19,069**
Gold Coast LGA	*$5,654*	*$859*	*$3,907*	*$698*	*$7,580*	*$18,698*
MTA var'n to Gold Coast LGA average	-0%	+5%	+1%	+7%	+3%	+2%

1. Data provided for the year ending June including GST and excluding inflation.
Source: CommBank iQ Retail Spending Insights June 2024; Australian Bureau of Statistics (ABS); Urbis

FORECAST RESIDENT RETAIL SPENDING

This section outlines the current and forecast retail expenditure between 2024 and 2034 (including GST and excluding retail price inflation). Of note:

- The spending market is forecast to reach **$456.8 million** by 2034. This reflects growth of $**107.6 million** over the 10-year period.
- Around **42%** of this growth is forecast to occur in the **primary trade area**, which will increase from **$177.5 million** in 2024, to **$223 million** in 2034.
- **Groceries** spending (directed to supermarkets and other food retailers) is forecast to increase from **$51.7 million** in 2024 to **$59.2 million in 2034** in the primary trade area.
- Main trade area, groceries spending is forecast to increase by **$19.4 million** over the 10-year period.
- Spending growth in the main trade area is mostly driven by retail per capita spending growth (1.5% per annum), reflecting the established residential character of the trade area.

Forecast Resident Retail Spending ($M, incl. GST, excl. inflation)

	Forecast Expenditure ($M)									
	Groceries	Liquor	F&B	Retail Services	Other Non-Food	**Total Retail**	Annual Growth	= Pop Growth	+ Real Per Capita Growth
Primary Trade Area:									
2024	51.7	8.2	36.7	6.9	53.8	177.5			
2029	55.2	8.6	40.9	7.8	61.5	197.5	2.2%	1.0%	1.2%
2034	59.2	9.1	46.7	8.9	71.5	223.0	2.5%	0.9%	1.5%
Growth (24-34)	**7.4**	**0.9**	**10.1**	**2.0**	**17.8**	**45.5**	**2.3%**	**0.9%**	**1.4%**
Secondary Trade Area:									
2024	51.5	8.3	35.6	6.8	50.5	171.7			
2029	54.9	8.8	39.8	7.7	57.8	190.9	2.1%	0.9%	1.3%
2034	63.4	10.0	49.5	9.7	72.9	233.8	4.1%	2.2%	1.9%
Growth (24-34)	**11.9**	**1.7**	**13.9**	**2.9**	**22.5**	**62.1**	**3.1%**	**1.6%**	**1.6%**
Main Trade Area:									
2024	103.2	16.5	72.3	13.7	104.2	349.2			
2029	110.1	17.4	80.6	15.5	119.3	388.4	2.2%	0.9%	1.2%
2034	122.6	19.1	96.3	18.6	144.4	456.8	3.3%	1.6%	1.7%
Growth (24-34)	**19.4**	**2.6**	**24.0**	**4.9**	**40.2**	**107.6**	**2.7%**	**1.2%**	**1.5%**

1. Data provided for the year ending June including GST and excluding inflation.
Source: CommBank iQ Retail Spending Insights June 2024; Australian Bureau of Statistics (ABS); Urbis

03

LOCAL RETAIL ANALYSIS

COMPETITIVE RETAIL ENVIRONMENT

The existing centre hierarchy across the Gold Coast is positioned to cater to a mix of residents and tourists.

Centres in and around the main trade area generally serve the local resident market.

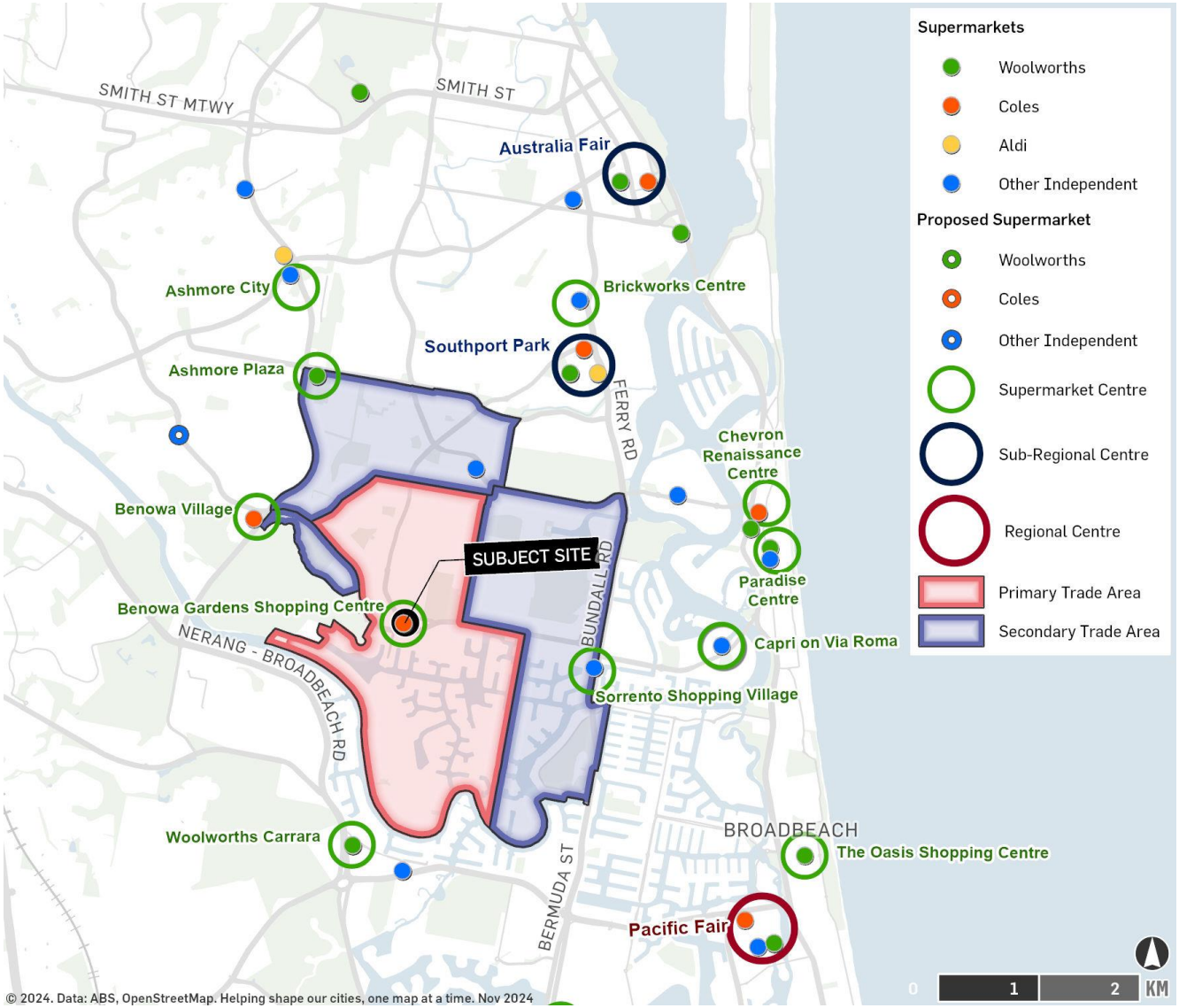
Centres within the Main Trade Area include:

- The existing Benowa Gardens Shopping Centre
- Sorrento Village
- Bronberg Plaza
- Ashmore Plaza and adjoining ancillary retail

Other centres in the vicinity of the main trade area include:

- Benowa Village
- Ashmore City and adjoining retail precincts (e.g. Spotlight Centre, Pitt Stop, ALDI)
- Southport Park
- Carrara Shopping Centre
- Capri on Via Roma

Competitive Retail Environment



COMPETITIVE RETAIL ENVIRONMENT

Competitive centres included in the retail impact modelling are summarised below. Retail floorspace numbers have been estimated through site inspections and checked against relevant data sources including Property Council Australia Shopping Centres Online, development applications and lease information, aerial satellite measurements and Urbis Shopping Centre Benchmark averages.

For the purposes of this assessment, it is assumed that the proposed retail developments at Ashmore Markets and Bundall (1-8 Corporate Court) do not proceed before 2034.

Centres within the Main Trade Area:

- **Sorrento Village** is the closest centre within the main trade area, approximately 2.3km from the subject site. The recently redeveloped centre includes a mix of convenience-focused retail and dining catering primarily to locals. Sorrento Village is anchored by an IGA supermarket of around 540 sq.m, with 1,600 sq.m of total retail floorspace.
- **Bronberg Plaza** is located 2.8km north of the subject site and is a small convenience-focused retail plaza. The anchor food retail tenant is Flannerys (520 sq.m) a specialty food retailer, focusing on health foods. The centre has a total retail floorspace of 1,700 sq.m and serves local residents.
- **Ashmore Plaza and adjoining ancillary retail** includes a Woolworths anchored supermarket centre approximately 3.6km from the subject site. The centre offers convenience-focused retail and services. A mix of takeaway food retailers and a liquor store are located on the opposite side of Cotlew Street . In total, there is approximately 6,500 sq.m of retail floorspace within this precinct.

Centres beyond the Main Trade Area:

- **Benowa Village** *is the closest full-line supermarket anchored centre*, which includes a 4,250 sq.m Coles supermarket. The centre has a largely convenience-focused offer, with takeaway pad sites providing 6,000 sq.m of retail floorspace in total. This is the closest full-line supermarket to the trade area, 2.5km west of the subject site.
- **Ashmore City and surrounding retail precincts** is the largest retail precinct in proximity to the subject site (5km north). It combines the Ashmore City Shopping Centre, which includes a Drakes supermarket and convenience-focused retail. The centre is co-located with Pitt Stop (a takeaway focused retail strip), Spotlight Centre Ashmore large format retail precinct and a standalone ALDI supermarket (1,550 sq.m). Combined this precinct has an estimated 19,800 sq.m of retail floorspace.
- **Southport Park** is the second largest offering on the periphery of the trade area (4.1km from the subject site). It includes Coles, Woolworths and ALDI and a fresh food grocer. The centre offers a larger non-food discretionary offer compared to other competing centres.
- **Carrara Shopping Centre** is a Woolworths-anchored supermarket centre located 7.1km south of the subject site. The centre offers convenience retail offer with 3,600 sq.m of retail floorspace.
- **Capri on Via Roma** is a destinational retail centre, approximately 3.8km east of the subject site. The destinational draw of the centre is supported by Gold Coast's only Harris Farm store and several destinational food and beverage retail tenants. The centre is positioned on the Nerang River offering a view of the canal waterfront.

		Centres within the Main Trade Area			Centres beyond the Main Trade Area				
	Benowa Gardens (Subject Site)	**Sorrento Village-**	**Bronberg Plaza**	**Ashmore Plaza and ancillary retail**	**Benowa Village**	**Ashmore City Precinct**	**Southport Park**	**Carrara Shopping Centre**	**Capri on Via Roma**
Distance from Benowa Gardens Shopping Centre (km)*	-	2.3	2.8	3.6	2.5	5.0	4.1	7.1	3.8
Anchor Food Retail Tenant	Coles	IGA	Flannerys	Woolworths	Coles	Drakes, ALDI	Coles, Woolworths, ALDI	Woolworths	Harris Farm
Retail Floorspace:									
Food Anchor	1,857	540	520	2,350	4,250	4,050	10,440	3,220	1,320
Food Specialties	1,940	800	900	2,500	1,100	2,200	1,000	300	1,600
Non-Food Specialties	989	260	280	1,650	650	13,550	1,960	80	980
Total Retail	**2,929**	**1,600**	**1,700**	**6,500**	**6,000**	**19,800**	**13,400**	**3,600**	**3,900**
Vacant Specialties	333	100	-	250	-	900	-	75	265

**Drive distance*

Source: Urbis Audit November 2024; Urbis Shopping Centre Benchmark Averages 2024; PCA Shopping Centres Online; Other online sources

04

RETAIL IMPACT ASSESSMENT

TRADE IMPACT ANALYSIS SCOPE & CONTEXT

An impact assessment can reasonably be expected to provide an indication of the trading environment and average trading conditions which retailers are likely to operate within, and implications for likely turnover declines or turnover gains, on average, for the retailers involved. Because an impact assessment seeks to forecast how groups of people are likely to alter their shopping behaviour in response to a given change in the competitive environment, it is not possible to be so precise as to estimate exactly what will happen to each individual retailer, or each group of retailers in each location.

It is therefore not possible in any impact assessment of this type to estimate precisely what will be the trading impacts on any specific individual retailer. The impact on any one individual retailer, or any small group of retailers in a given location, would depend on many factors, some of which are within their control. **The actions which each of these retailers take will determine the eventual impact on each of them, and furthermore the actions which they each take will also determine the eventual impact on the other retailers involved.**

All of these factors need to be kept in mind when considering the likely impact of any relocation and expansion of a retailer within the existing retail network. **Existing retailers are not passive participants**, but rather will play a major role in the eventual impact which they will experience.

It should also be noted that the effects of new competition on individual businesses or centres are not a relevant planning consideration in most situations. The relevant consideration in planning terms relates to the ongoing ability for a centre to continue to provide for the needs of the community which they serve, and to ensure that new development does not fundamentally undermine the viability (or resulting trading levels) and role of existing and planned centres, particularly their role as community focal points for a range of needs.

The sustainability of the activity centre hierarchy is of paramount importance, not simply the one-off percentage trading impact. Of note, a centre can have a significant percentage impact but still be viable given the resulting trading levels are still within viable and sustainable levels.

METHODOLOGY & ASSUMPTIONS

Key Assumptions

Key assumptions applied to the assessment of the trading impact are summarised below:

- Base year: FY2024
- Year of centre launch: 2029
- First full year of trade/Impact year: FY2030
- Dollar value: constant 2024 dollar (i.e. excluding retail price inflation) including GST

Impact Assessment Methodology

We have assumed the development will be fully operational by 2029. Therefore, **FY2030 will be the first year of operation** as well as the year against which any impacts are assessed. This timing assumption is based on discussions with Horizonal Investment and our independent assessment of a realistic timeframe to construct the Benowa Gardens redevelopment.

Based on the assumed **additional supermarket floorspace** for the proposed Benowa Gardens expansion, an indicative turnover performance assessment is carried out to determine the **indicative market shares for each trade area** and from beyond the trade area are then estimated (see pages 23 and 24). The turnover generated by the **proposed retail development** and its relative market share will provide the basis on which the impact on trading performance of surrounding centres is assessed.

An assessment of the indicative **turnover** and **market share changes** that could occur to each individual centre most likely to be impacted is then carried out. This is based on the principle that if residents choose to direct some of their retail expenditure to the subject site development, they will reduce their expenditure at other centres in a similar proportion to their usage of each centre, reflected by each centre's market share from the trade area.

The impact analysis therefore details the **turnover change**, or net impact, which is expected for each centre, expressed as a **reduction in turnover** and as a **percentage of the turnover level for the impact year**. This is a **one-off impact**, with centres expected to capture a share of market growth in subsequent years, noting they will **all benefit from market growth** prior to the new development being delivered.

In forecasting the impact on these individual centres, Urbis has estimated the potential turnover increase or decrease of each centre under two cases:

- **Case 1 – Business As Usual – No Expansion**. In this case, we consider turnover growth of Coles Benowa Gardens 'as is', and each centre based on its current market share and any potential change of this share due to changes in the local competitive landscape.
- **Case 2 – Subject Site Supermarket Expansion**. In this case, the market share of each centre is likely to change as a result of direct competition from the expanded supermarket. The impact on each key individual centre is therefore measured by the **turnover change** in both dollar value and percentage terms **against Case 1** and relative to the **current turnover level**.

MARKET NEED AND DEMAND ASSESSMENT – INDICATIVE SUPERMARKET FLOORSPACE PROVISIONING

The table to the right considers supermarket demand within the main trade area on a per capita basis, by comparing provision with the Gold Coast LGA average.

Using this benchmark metrics, it shows:

- In 2024, there is an existing shortfall of full-line supermarkets. **The Main Trade Area is under supplied by 2,062 sq.m.**
- By 2030, there is market capacity from the trade area population to support the conversion of the Coles supermarket at Benowa Gardens to a full-line supermarket offer of around 4,000 sq.m.
- The expansion of the supermarket would provide **the only full-line supermarket offer within the trade area**.
- This indicative demand should be considered in the context of supermarkets on the edge of the trade area including Woolworths Ashmore (included in calculation) and Coles Benowa Village (excluded). Each of these centres have trade areas that overlap and extend beyond the Benowa Gardens main trade area.

Indicative Supermarket Floorspace Per Capita Provisioning, 2024-2034

	Benowa Gardens Trade Area		
	2024	**2030**	**2034**
Population:			
Primary Trade Area	9,270	10,180	10,180
Secondary Trade Area	9,060	10,390	10,560
Main Trade Area	**18,330**	**20,570**	**20,740**
Gold Coast @ 40 sq.m per 100 Residents			
Supermarket Floorspace Demand:			
Primary Trade Area	3,708	4,072	4,072
Secondary Trade Area	3,624	4,156	4,224
Main Trade Area	**7,332**	**8,228**	**8,296**
Existing Supermarket Floorspace (sq.m):			
Primary Trade Area	1,860	4,000	4,000
Secondary Trade Area	3,410	3,410	3,410
Main Trade Area	**5,270**	**7,410**	**7,410**
Demand Supply Gap (+Oversupply | - Undersupply):			
Primary Trade Area	**-1,848**	**-72**	**-72**
Secondary Trade Area	**-214**	**-746**	**-814**
Main Trade Area	**-2,062**	**-818**	**-886**

1. Data provided as at June.

Source: Australian Bureau of Statistics (ABS); .id (informed decisions); Urbis

MARKET NEED AND DEMAND ASSESSMENT – INDICATIVE SUPERMARKET TURNOVER

To determine the forecast supermarket turnover for a full-line Coles supermarket at Benowa Gardens, we have assumed:

- Coles Benowa Gardens is the only future supermarket development within the trade area by 2030.
- The first full-year of trade will be in FY2030.
- Estimated turnover of existing MTA supermarkets (based on benchmarking) and an estimate of the proportion of their turnover that is derived from the trade area. This is reflected in the current MTA supermarket spending retention rate (37% in 2024).
- An allowance for trade area supermarket spend retention rates to increase due to the expansion of Coles Benowa Gardens.
- Achievable market shares for a new full line supermarket at the subject site, plus an allowance for general merchandise sales (6%) and spend from beyond the trade area (15%).

As detailed in the table to the right, Coles Benowa Gardens is currently achieving a turnover **of $23.5 million from an 1,857 sq.m store** ($12,685 per sq.m).

With a new full-line supermarket offer in the trade area, the proportion of supermarket spending that is retained in the MTA is forecast to increase from **37%** in 2024 to **46%** in FY2030.

An **expanded 4,000 sq.m** supermarket is forecast to achieve a greater share of the spending retained, resulting in an indicative turnover of **$37.5 million** in FY2030 from a 4,000 sq.m store ($9,369 per sq.m).

Indicative Supermarket Turnover, 2024 – 2034 ($2024M, excl. retail price inflation)

	2024	Year 1 2030
Main Trade Area (MTA) Expenditure on Groceries ($2024M):		
Primary	51.7	58.0
Secondary North	25.1	25.7
Secondary East	23.7	30.3
Secondary West	2.7	3.2
MTA Groceries Spending Market	**103.2**	**117.2**
Groceries Spending directed to Supermarkets:		
Primary	40.1	45.0
Secondary North	19.4	19.9
Secondary East	18.4	23.5
Secondary West	2.1	2.5
MTA Groceries Spending available to Supermarkets	**80.0**	**90.8**
Supermarket Spending Retained Within MTA:		
Primary	20.0	27.0
Secondary North	3.9	5.0
Secondary East	5.5	9.4
Secondary West	0.2	0.4
MTA Supermarket Spend Retained by MTA Supermarkets	**29.7**	**41.7**
Share of Supermarket Spending Retained in MTA	37%	46%
Benowa Gardens Coles Supermarket Share of Retained Spend:		
Primary	70%	80%
Secondary North	45%	50%
Secondary East	50%	60%
Secondary West	70%	65%
Benowa Gardens Coles Supermarket Turnover ($M):		
Primary	14.0	21.6
Secondary North	1.7	2.5
Secondary East	2.8	5.6
Secondary West	0.1	0.2
Total Supermarket Groceries Turnover from Trade Area	**18.7**	**29.9**
+ Turnover from Beyond (@15%)	3.3	5.3
Total Supermarket Groceries Turnover	**22.0**	**35.2**
+ General Merc. Turnover (@6%)	1.5	2.2
Total Supermarket Turnover	**23.5**	**37.5**
Supermarket GLA	*1,857*	*4,000*
Turnover per sq.m	*12,658*	*9,369*

Note: Inclusive of GST, exclusive of retail price inflation
Source: CommBank iQ Retail Spending Insights; Horizontal Investment; Urbis

SUPERMARKET TURNOVER UPLIFT

The table to the right shows the change in supermarket turnover under a 'Business as Usual – No Expansion' and a 'Supermarket Expansion' scenario.

If Coles Benowa was to continue to trade as normal, the store is forecast to achieve sales of **$23.7 million in 2030** (including GST and excluding retail price inflation). This allows for population growth and real spending growth, as well as considering impacts from online and market share erosion.

Under a 'Supermarket Expansion' scenario, a full-line supermarket at Benowa Gardens has a forecast turnover of **$37.5 million in 2030**. This is an **uplift of $13.8 million** from the 'Business as Usual' scenario.

Forecast supermarket turnover results in main trade area grocery market shares increasing from **18%** in 2024 to **26%** in 2030, including **37%** from the primary trade area. These market shares are considered reasonable given the location of supermarkets on the periphery of the trade area and the lack of full-line supermarket within the Main Trade Area.

Indicative Market Shares, 2024 & 2030 (Year 1)

Turnover ($2024M, excl. retail price inflation):	**2024**	**2030**
Business As Usual – No Expansion	23.5	**23.7**
Supermarket Expansion	23.5	**37.5**
Supermarket Turnover Increase (With Expansion)		**13.8**

Trade Area Expenditure on Groceries ($2024M):	**2024**	**2030**
Primary	51.7	58.0
Secondary North	25.1	25.7
Secondary East	23.7	30.3
Secondary West	2.7	3.2
Total Groceries Spending Market	**103.2**	**117.2**

			Groceries Market Share	
Turnover from Trade Area ($2024M):	**2024**	**2030**	**2024**	**2030**
Primary	14.0	21.6	27%	37%
Secondary North	1.7	2.5	7%	10%
Secondary East	2.8	5.6	12%	19%
Secondary West	0.1	0.2	5%	8%
Total Turnover from Trade Area	**18.7**	**29.9**	**18%**	**26%**
+ Turnover from Beyond (@15%)	3.3	5.3		
Total Supermarket Groceries Turnover	**22.0**	**35.2**		
+ General Merc. Turnover (@6%)	1.5	2.2		
Total Supermarket Turnover	**23.5**	**37.5**		
Average Trading Level ($ per sq.m)	*12,658*	*9,369*		

Note: Inclusive of GST, exclusive of retail price inflation
Source: CommBank iQ Retail Spending Insights; Horizontal Investment; Urbis

IMPACT ON EXISTING CENTRES

Our analysis indicates that the modelled impacts to existing centres within and adjacent to the trade are **modest and will not fundamentally alter the vitality and viability of existing, designated or proposed centres** nor their role and function within the centres hierarchy. All existing centres within trade area are expected to continue to be able to viably offer the range of services currently provided and in line with their designated role within the centres hierarchy.

As indicated previously supermarket turnover is estimated to be $37.5 million because of the proposed expansion, **an increase of $13.8 million** from 'Business As Usual' scenario. It is the impact of the diversion of this additional $13.8 million from other centres, within and beyond the trade area that is assessed in the table below. Steps taken to arrive at the dollar impact as well as in percentage terms are summarised below.

- (1) GLA – Gross Lettable Area has been sourced from site visits to the centres and supplemented by Property Council Australia Shopping Centres Online, development applications and lease information, aerial satellite measurements and Urbis Shopping Centre Benchmark averages.
- (2) Current Retail Turnover – current turnover for centres is estimated with reference to Urbis' internal database, our market knowledge of trading performance for comparable centres in the region, and our observations of the relative strength of each centre.
- (3) & (4) Forecast Turnover – turnover "Business As Usual" represents a scenario in the supermarket expansion does not proceed. The growth in this period is driven by infill population growth and real spend per capita growth. Additionally, all centres experience market share erosion over time.
- The "**Supermarket Expansion**" scenario reflects the modelled turnover at existing centres in 2030, after the impacts of the supermarket expansion at Benowa Gardens has been absorbed.
- (5) & (6) Impact calculations show the turnover diversion in dollar and percentage values relative to 'Business As Usual – No Expansion' scenario in 2030.
- (7) & (8) Show the change in turnover in percentage values relative to current trading.

The implications and key takeaways from this analysis are discussed overleaf. Critically, as shown in the Change in Turnover columns below, all existing centres / precincts would trade at a higher level post expansion than they do currently.

This confirms that the one-off trading impacts are minor in scale and have no material impact on viability.

Indicative Retail Trading Impact on Existing Centres 2030 ($2024)

		Retail Turnover ($2024M)			Diversion		Change in Turnover		Average Trading Level ($2024)		
	Retail GLA (sq.m)	Current (2024)	'Business As Usual – No Expansion' (2030)	'Supermarket Expansion' (2030)	($M)	(%)	($M)	(%)	Current (2024)	'Business As Usual – No Expansion' (2030)	'Supermarket Expansion' (2030)
Existing Centres:	(1)	(2)	(3)	(4)	(5) = (4) - (3)	(6) = (5) - (3)	(7) = (4) - (2)	(8) = (7) / (2)	(9) = (2) / (1)	(10)= (3) / (1)	(11) = (4) / (1)
Benowa Village	6,000	74.3	80.2	76.8	-3.5	-4.3%	+2.5	+3.4%	12,381	13,374	12,798
Southport Park	13,400	151.8	162.8	160.2	-2.6	-1.6%	+8.4	+5.5%	11,331	12,149	11,958
Ashmore Plaza Precinct	6,500	50.5	53.1	51.7	-1.4	-2.7%	+1.1	+2.2%	7,776	8,166	7,950
Ashmore City Precinct	19,800	122.8	133.8	132.6	-1.2	-0.9%	+9.8	+8.0%	6,202	6,758	6,698
Carrara Shopping Centre	3,600	41.4	44.7	43.8	-0.9	-1.9%	+2.4	+5.8%	11,499	12,407	12,169
Bronberg Plaza	1,700	19.0	19.8	19.1	-0.7	-3.4%	+0.2	+0.9%	11,167	11,659	11,262
Capri on Via Roma	3,900	60.0	66.4	65.9	-0.6	-0.8%	+5.9	+9.8%	15,384	17,032	16,890
Sorrento Village	1,600	15.4	17.3	16.8	-0.5	-2.8%	+1.4	+9.3%	9,620	10,821	10,516
Other Centres					*-2.6*						
Total Impact					**-13.8**						

IMPACT ON EXISTING CENTRES

Key insights from the impact assessment are summarised below.

- **Impacts in the assessment year are modest,** ranging from -$0.5m at Sorento Village to -$3.5 million at Benowa Village. No centre experiences trading impacts of greater than -4.3%, which are minor and likely capable of being absorbed within a short timescale.
- **The highest impacts are assumed at centres with similar scale supermarkets** – reflecting normal competitive trading between supermarket operators, as well as intra-operator network impacts.
- **All centres are better off in 2030 with the expansion of Coles Benowa Gardens** This is due to the ongoing population growth and assumed per capita spending growth contributing to market growth overall.
- **Trading levels are expected to remain strong** – Due to high resident spend per capita, trading levels of existing centres are estimated to be strong, achieving sustainable productivity rates. The strength of existing centres is reflected by low vacancies in each location.

In addition to the above, **broader community benefits** resulting from the proposed supermarket expansion will include:

- **Providing a right-sized supermarket to meet local needs**, allowing residents to fulfill their retail requirements close to home.
- **Responding to trade area population growth and current supermarket floorspace undersupply** by expanding the scale of supermarket retail offer within an established retail centre
- **Creating additional job opportunities**, particularly for local residents, including the younger demographic, which is a key employment segment for retail shops.
- Contributing towards **urban renewal** and mixed use revitalization of a centre to deliver a range of social, environmental and economic benefits, including increased housing supply.
- Increased competition in the area can act as an **exemplar and catalyst** to encourage other property owners to consider redevelopment of their centres.

Having regard to all of these factors the proposed supermarket expansion is supportable from an economic perspective.

05

APPENDICES

APPENDIX A: EXISTING CUSTOMER DRAW BY CENTRE

COVID-19 AND THE POTENTIAL IMPACT ON DATA INFORMATION

The data and information that informs and supports our opinions, estimates, surveys, forecasts, projections, conclusion, judgments, assumptions and recommendations contained in this report (Report Content) are predominantly generated over long periods, and is reflective of the circumstances applying in the past. Significant economic, health and other local and world events can, however, take a period of time for the market to absorb and to be reflected in such data and information. In many instances a change in market thinking and actual market conditions as at the date of this report may not be reflected in the data and information used to support the Report Content.

The recent international outbreak of the Novel Coronavirus (COVID-19), which the World Health Organisation declared a global health emergency in January 2020 and pandemic on 11 March 2020, has and continues to cause considerable business uncertainty which in turn materially impacts market conditions and the Australian and world economies more broadly.

The uncertainty has and is continuing to impact the Australian real estate market and business operations. The full extent of the impact on the real estate market and more broadly on the Australian economy and how long that impact will last is not known and it is not possible to accurately and definitively predict. Some business sectors, such as the retail, hotel and tourism sectors, have reported material impacts on trading performance. For example, Shopping Centre operators are reporting material reductions in foot traffic numbers, particularly in centres that ordinarily experience a high proportion of international visitors.

The data and information that informs and supports the Report Content is current as at the date of this report and (unless otherwise specifically stated in the Report) does not necessarily reflect the full impact of the COVID-19 Outbreak on the Australian economy, the asset(s) and any associated business operations to which the report relates. It is not possible to ascertain with certainty at this time how the market and the Australian economy more broadly will respond to this unprecedented event and the various programs and initiatives governments have adopted in attempting to address its impact. It is possible that the market conditions applying to the asset(s) and any associated business operations to which the report relates and the business sector to which they belong has been, and may be further, materially impacted by the COVID-19 Outbreak within a short space of time and that it will have a longer lasting impact than we have assumed. Clearly, the COVID-19 Outbreak is an important risk factor you must carefully consider when relying on the report and the Report Content.

Where we have sought to address the impact of the COVID-19 Outbreak in the Report, we have had to make estimates, assumptions, conclusions and judgements that (unless otherwise specifically stated in the Report) are not directly supported by available and reliable data and information. Any Report Content addressing the impact of the COVID-19 Outbreak on the asset(s) and any associated business operations to which the report relates or the Australian economy more broadly is (unless otherwise specifically stated in the Report) unsupported by specific and reliable data and information and must not be relied on.

To the maximum extent permitted by law, Urbis (its officers, employees and agents) expressly disclaim all liability and responsibility, whether direct or indirect, to any person (including the Instructing Party) in respect of any loss suffered or incurred as a result of the COVID-19 Outbreak materially impacting the Report Content, but only to the extent that such impact is not reflected in the data and information used to support the Report Content.

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MORGAN
CONSULTING ENGINEERS
♦STRUCTURAL♦CIVIL♦HOUSING♦FORENSIC♦

MORGAN CONSULTING ENGINEERS PTY LTD
ABN 82 009 859 081
1 GREAT GEORGE STREET
PADDINGTON QLD 4064
PHONE: (07) 3369 8411
FACSIMILE: (07) 3369 1893
EMAIL: mail@morgance.com.au

ENGINEERING SERVICES REPORT

PROPOSED COMMERCIAL DEVELOPMENT AT 203 ASHMORE ROAD BENOWA

Prepared for

Benowa Gardens Pty Ltd ATF

Attention: Wei-Cheng Lu

Document Reference

24191 - ESR/1

Record of Issue:

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This investigation and report has been authorised by Mr Henry Morgan, a Director of Morgan Consulting Engineers Pty Ltd.

Henry J Morgan RPEQ 11950 Thursday, 6 February 2025

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1 INTRODUCTION

Morgan Consulting Engineers (MCE) has been engaged to provide an engineering services report to address the servicing of the proposed Commercial Development at 203 Ashmore Road, Benowa.

This report will aim to assess how the site can be serviced by road, sewer, water and stormwater infrastructure in accordance with the Gold Coast City Council (GCCC) Planning and Development standards and best practice.

It is noted that this report has been compiled based on information current at the time of report printing and the recommendations supplied within this report are based solely on the above and will be subject to full engineering review and detailed design once a Council development approval has been obtained for this project.

2 EXISTING SITE

2.1 The Site

The subject site, comprised of Lot 822 RP839746, is approximately 17,660m^2 (1.766ha) in area. The site is occupied by the Benowa Gardens Shopping Centre which contains carparking hardstand and landscaping scattered throughout.

The site generally slopes from the southeast (with an approximate height of 10.00m AHD) to the northwest (with an approximate height of 4.00m AHD). Access to the subject site is currently provided from Carrara Street and Ashmore Road, along the northern and southern site boundary, respectively.

Refer to Figure 2.1 for a Locality Plan.

Figure 2.1 – Locality Plan of Site and Surrounding Area

2.2 Surrounding Area

The site is located within the limits of the CoGC region and is classified as neighbourhood centre under Division 6. The site is predominantly surrounded by primary and secondary schools to the north and west, respectively, and residential properties in all other directions.

3 PROPOSED DEVELOPMENT

The proposed Commercial Development primarily consists of:

1. A new mixed-use development consisting of a supermarket and retail tenancies on ground level and commercial tenancies on level two;
2. Three residential towers from level four to level thirteen containing 394 apartments, consisting of two to three bedroom units;
3. Three-level basement carparking for retail staff and customers;
4. Residential carparking on level two and three for residents and visitors;
5. Vehicular access to basement level two and ground level from Carrara Street and Ashmore Road, north and south of the site, respectively; and
6. Dedicated landscaping and deep planting areas throughout the site.

Refer to **Appendix A** for the Proposed Development Plans.

4 CODE ASSESSMENT

The proposed Commercial Development has been assessed against the following GCCC Planning Scheme Codes (Refer to **Appendix B**):

1. CoGC Works for Infrastructure Code.

5 ENGINEERING ASSESSMENT

5.1 Earthworks

Initially the subject site will be cleared of the existing building structures and vegetation. Preliminary earthworks will be undertaken to provide a level building pad for the proposed development.

Basement retaining walls will be constructed as part of the initial bulk earthworks stage. This will form part of the building structure. Therefore, there will be minimal impact to the visual amenity for surrounding properties as a result of the proposed development. The earthworks and basement retaining wall construction will ensure no impact to the stability of the adjacent existing structures.

Temporary boundary retention will be required given the extent of the proposed basement level car park and its proximity to the property boundaries. A bored pile retention system with cantilever piers will be incorporated along the boundaries of the subject site. Bored retention piles can be installed within close proximity to the property boundaries without protruding into or impacting the neighbouring properties. Accordingly, incorporation of bored retention piles or similar has been envisaged as an appropriate temporary retention method for the proposed development.

All temporary batters will be constructed with a maximum temporary batter of 1 in 1 unless otherwise noted in the Geotechnical Investigation.

The proposed earthworks over the subject site will be carried out under Level 1 geotechnical supervision and as per AS3798 – 2007 "Guidelines on earthworks for commercial and residential developments". All uncontrolled fill will be removed/replaced as per the CoGC Works for Infrastructure Code.

Refer to **Appendix B** for the CoGC Works for Infrastructure Code.

5.2 Erosion and Sedimentation Control

The site is considered 'Medium Risk' with respect to contaminants generated during the construction phase. Sediment generated during the construction phase shall be dealt with in accordance with an Erosion and Sediment Control Plan to be kept on site during the construction phase.

Refer to the separate Site Based Stormwater Management Plan (SBSMP) prepared by Morgan Consulting Engineers for further erosion and sedimentation control details.

5.3 Roadworks

The site will be accessed via a new driveway crossover located on Carrara Street and the existing driveway crossover located on Ashmore Road. The proposed new driveway crossover will be design in accordance with GCCC's standards and requirements.

5.4 Sewerage Reticulation

According to the City of Gold Coast (CoGC) ArcGIS database, there is a 150mm diameter sewer main along the western property boundary of 18 Carrara Street traversing Carrara Street, northeast of the site. There is also a 150mm sewer main traversing Benowa Road, northwest of the site. There is an existing sewer property connection currently servicing the site from the aforementioned main, northeast of the site.

It is proposed to maintain or upgrade the existing sewer property connection as needed to service the proposed development.

It is anticipated that the existing sewer infrastructure has sufficient capacity to service the proposed development. However, this will be confirmed by CoGC during detailed design.

Refer to **Appendix C** for the Concept Services Plan.

5.5 Water Reticulation

According to the City of Gold Coast (CoGC) ArcGIS database, there is a 150mm water main within the verges of Ashmore Road, south of the site, with a 225mm sewer main traversing the intersection of Ashmore Road and Benowa Road, southwest of the site. There is also a 200mm water main along the southern and eastern verge of Carrara Street and Benowa Road, north and west of the site, respectively. A water service and meter assembly currently services the site from the aforementioned main within Carrara Street.

It is proposed to upgrade the existing water service and meter assembly and relocate as needed to service the proposed development.

There are multiple fire hydrants along Carrara Street, Ashmore Road, and Benowa Road, providing fire hydrant coverage to the site. Internal fire protection measures will be specified by a hydraulic consultant during detailed design.

It is anticipated that the existing water infrastructure has sufficient capacity to service the proposed development. However, this will be confirmed by CoGC during detailed design.

Refer to **Appendix C** for the Concept Services Plan.

5.6 Stormwater

Refer to the separate Site Based Stormwater Management Plan (SBSMP) prepared by Morgan Consulting Engineers for considerations to stormwater and the GCCC Health Waters Code.

5.7 Electricity and Telecommunications

The site can be serviced by electricity at the following locations:

1. Aboveground powerlines are situated along the northern verge of Ashmore Road and the southern verge of Carrara Street, south and north of the site.

Refer to **Appendix D** for the BYDA plans.

The site can be service by telecommunications at the following locations:

1. Underground Telstra and NBN cables are located along the Carrara Street and Ashmore Road verges.

2. Underground Optus cables are located along the southern verge of Ashmore Street, western verge of Benowa Road and northern verge of Carrara Street, south, west and north of the site.

3. Underground TPG cables are located along the northern verge of Ashmore Road, south of the site.

Refer to **Appendix D** for the BYDA plans.

5.8 Gas

An underground 63mm Polyethylene high pressure medium density gas main is situated along the southern verge of Carrara Street, north of the site. Therefore, the site is serviceable by gas.

Refer to **Appendix D** for the BYDA plans.

6 CONCLUSION

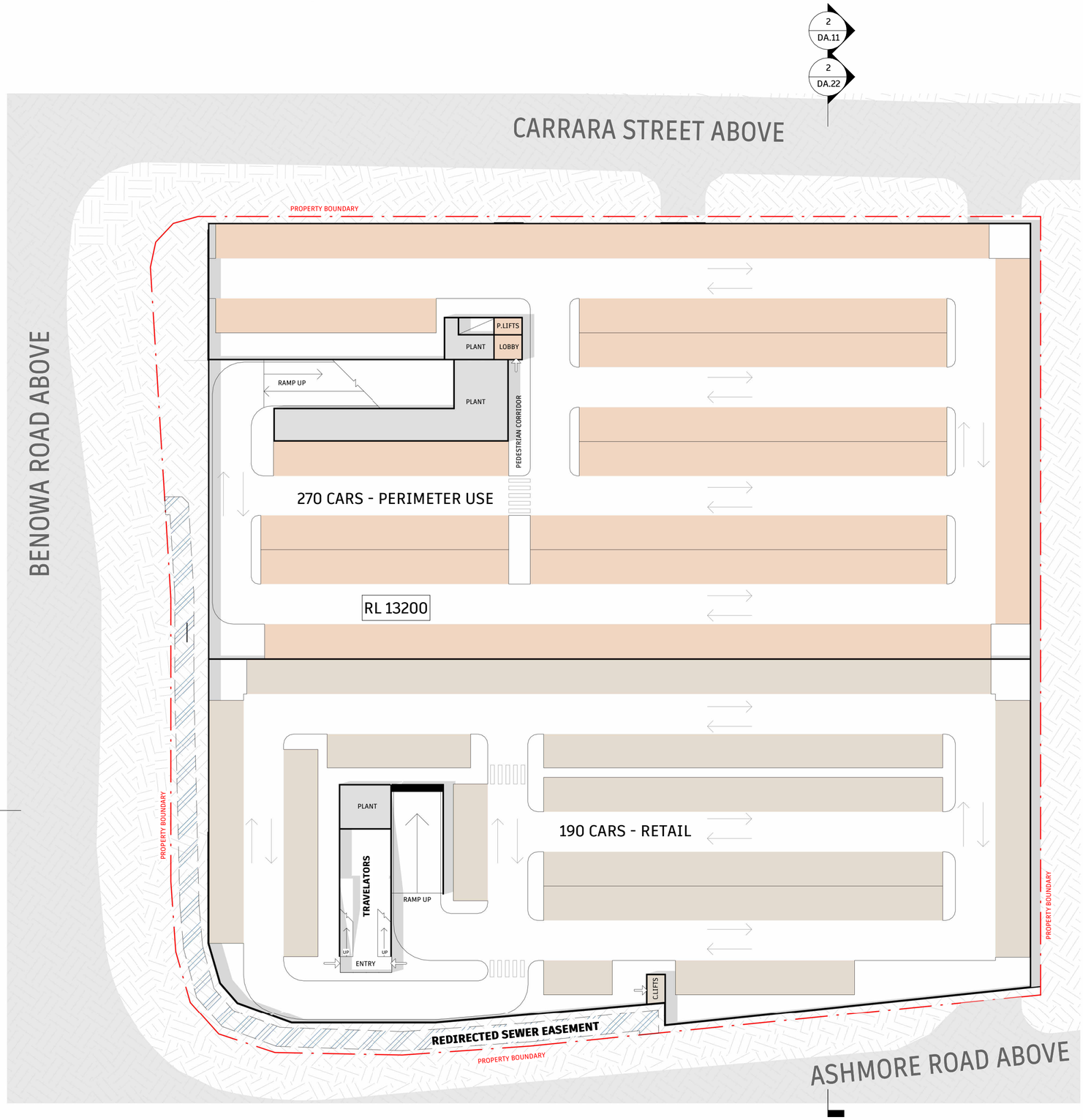
The proposed Commercial Development at 203 Ashmore Road, Benowa has been assessed to determine if the proposed development can be serviced by roadworks, sewer, water, drainage, electrical/telecommunications and gas in accordance with the GCCC standards and best practice.

Based on all the findings outlined in this report, MCE believes that there are no engineering issues in relation to this development that would preclude the above development from being approved by Council.

Appendix A

PROPOSED DEVELOPMENT PLANS

FLOOR PLAN-BASEMENT 3 (RETAIL)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

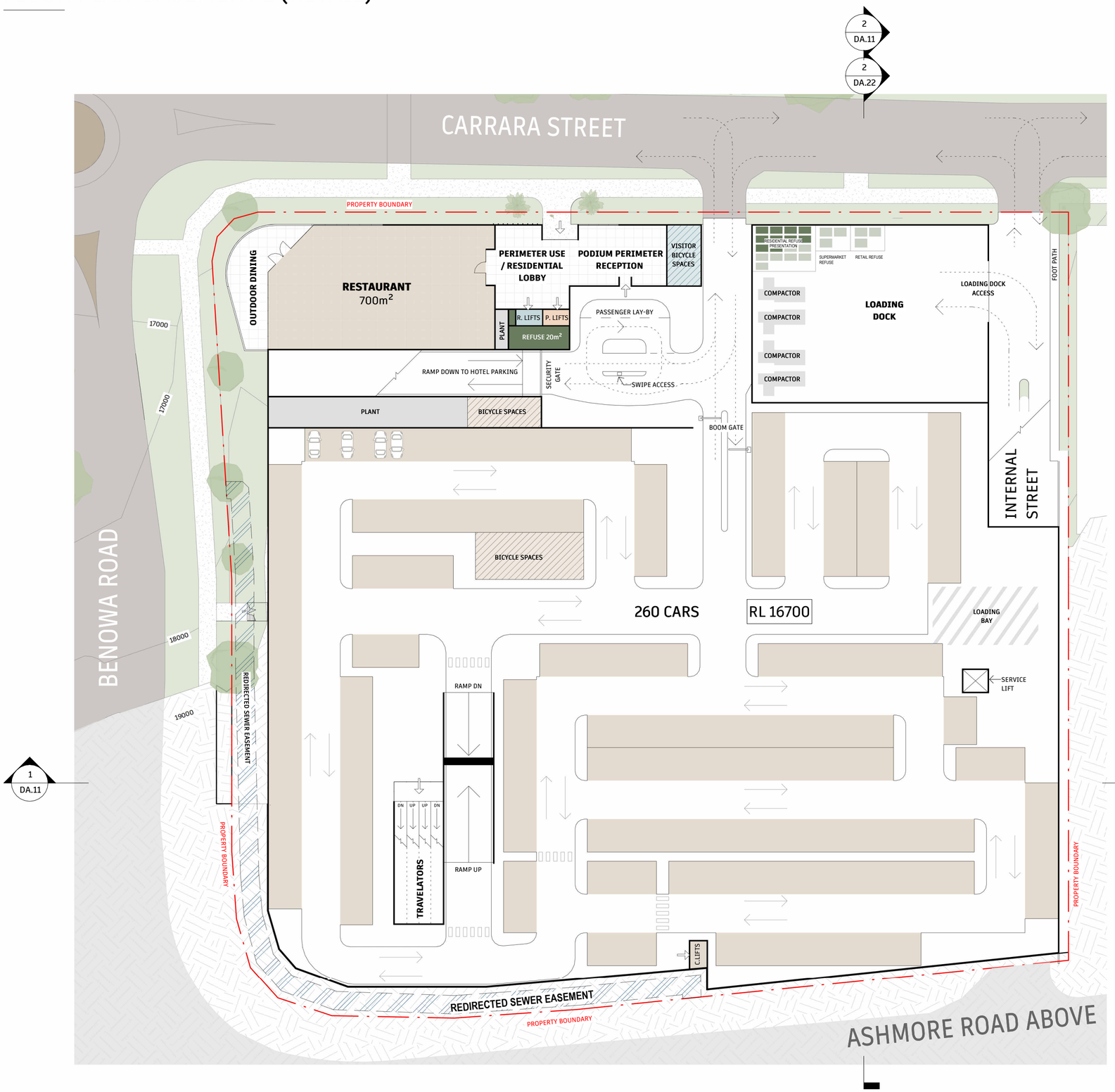
TOTAL CARPARKS	1,460

BASEMENT 3 CARPARK - RETAIL / HOTEL

1 : 500

0 5 10 25 45m

FLOOR PLAN-BASEMENT 2 (RETAIL)



BASEMENT 2 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
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TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
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TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

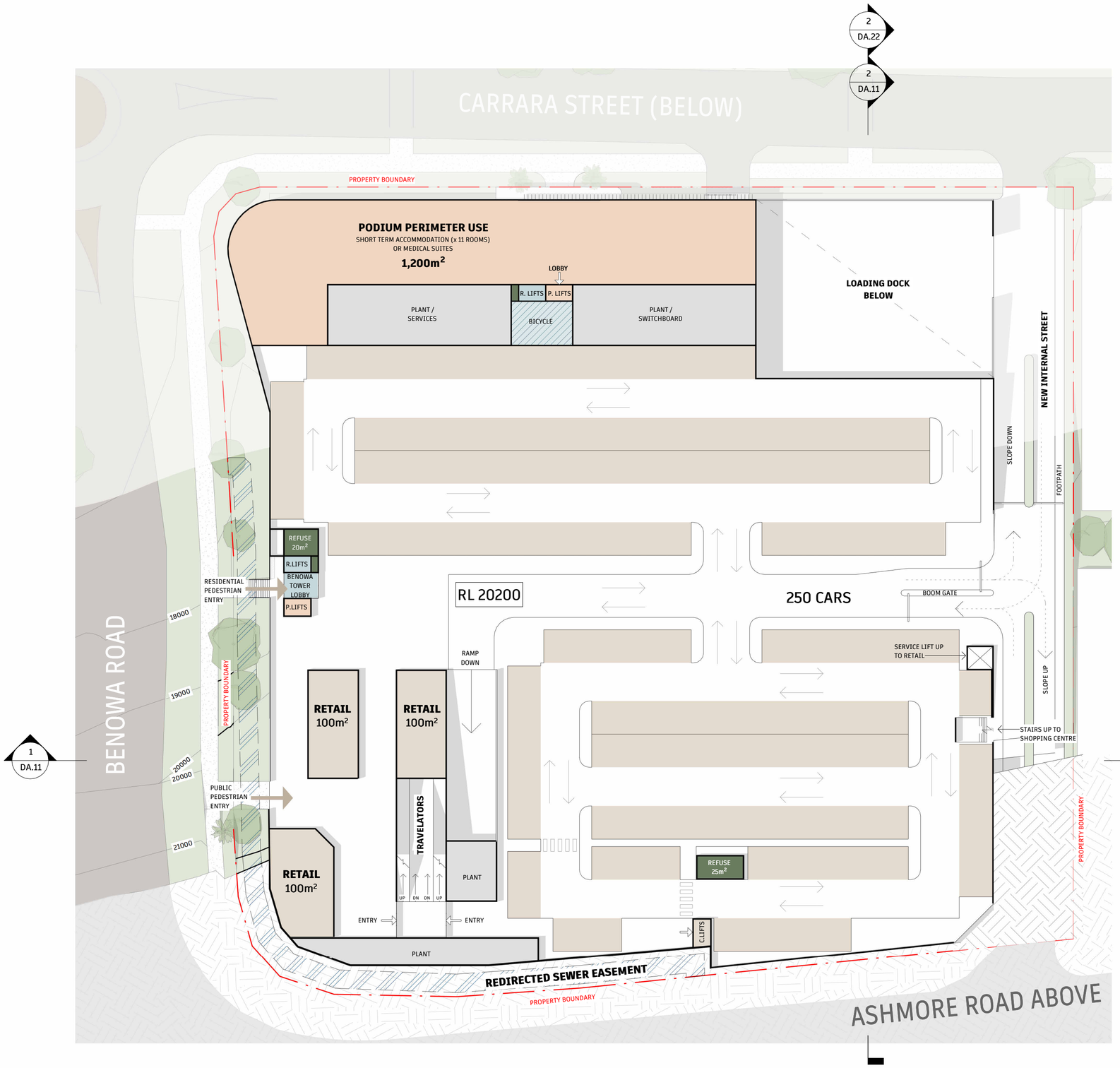
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-BASEMENT 1 (RETAIL)



BASEMENT 1 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
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PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

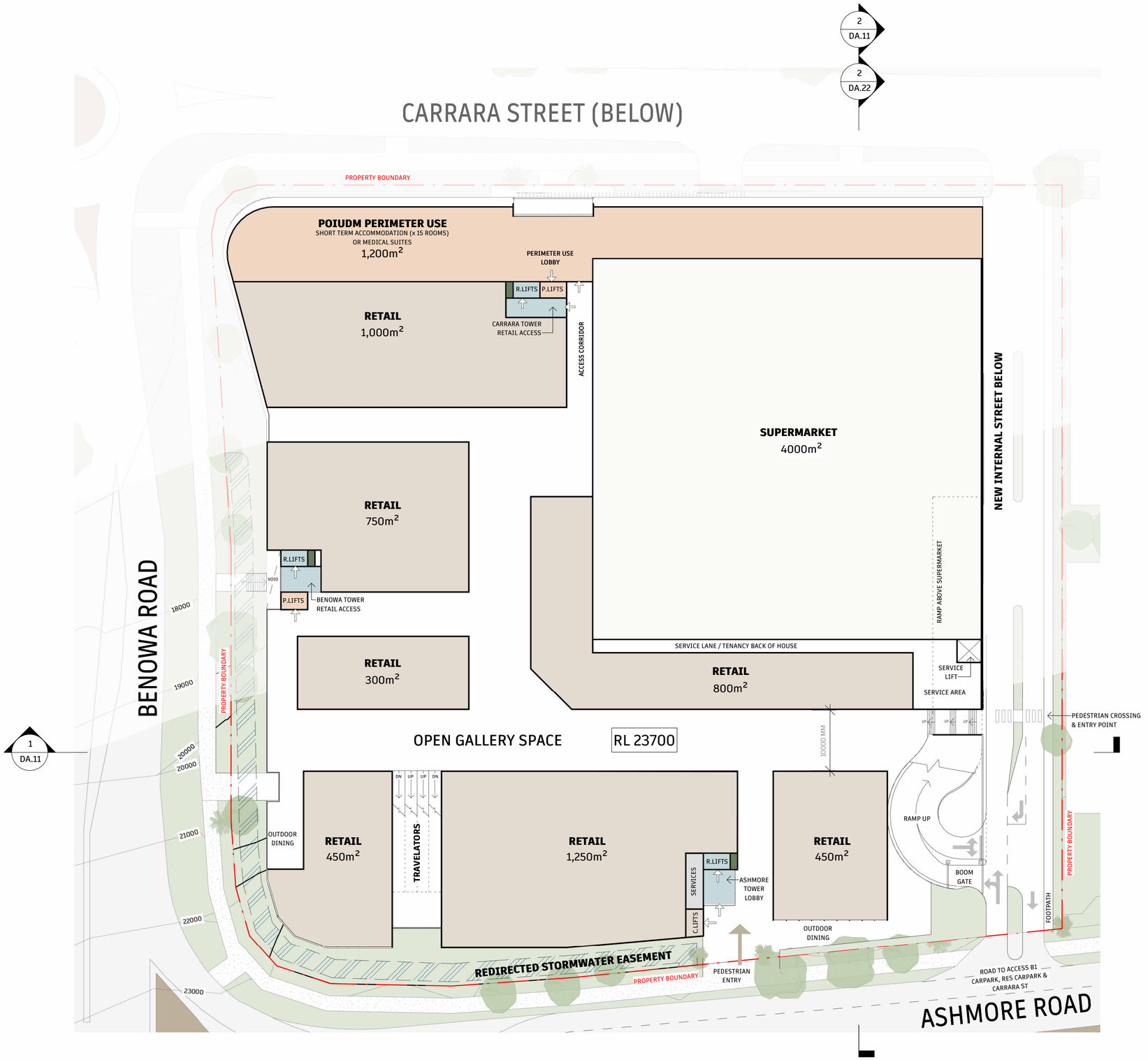
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-SHOPPING CENTRE



LEGEND

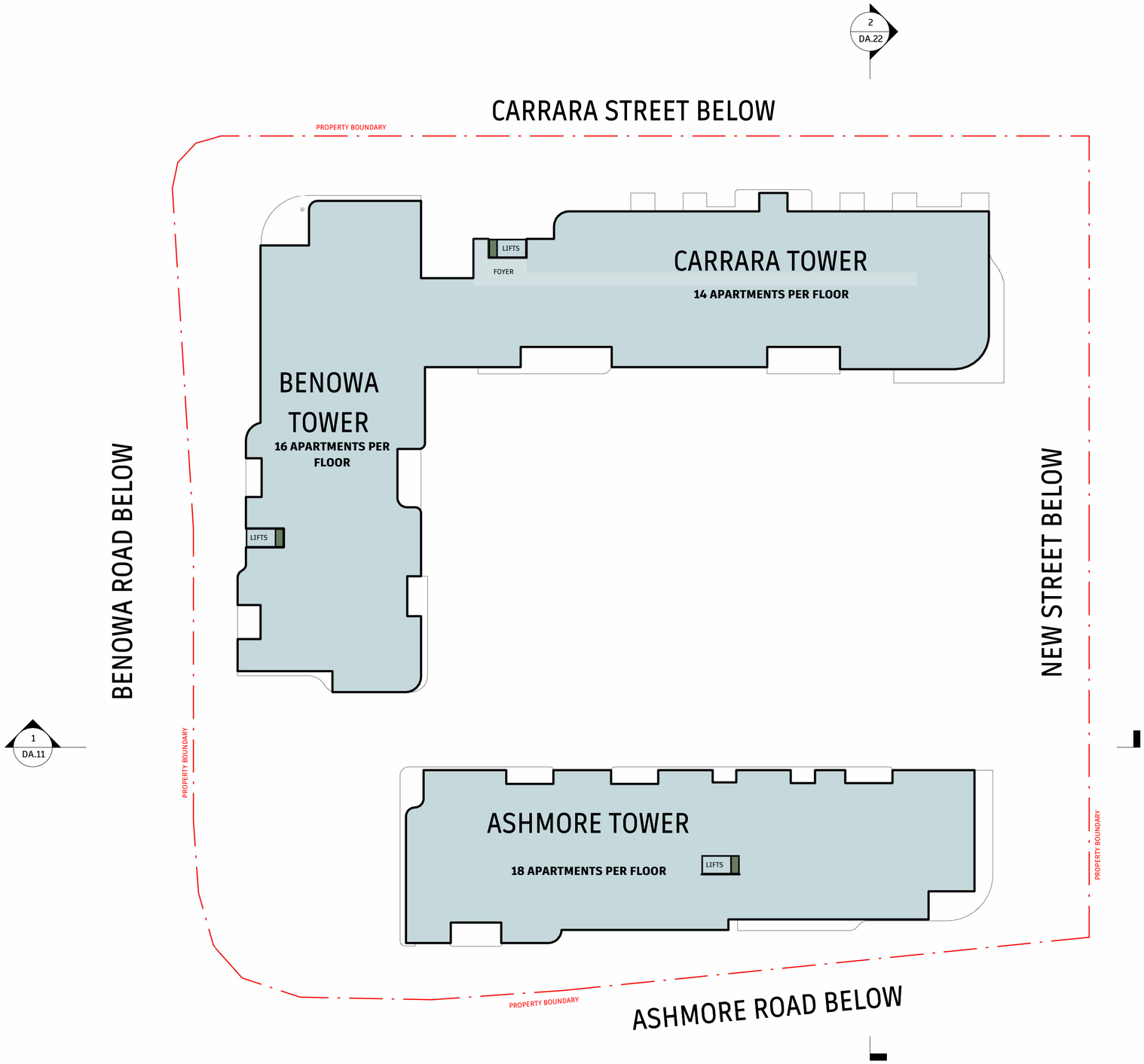
- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

SHOPPING CENTRE

1 : 500

0 5 10 25 45m

FLOOR PLAN-TYPICAL TOWER PLAN



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

TYPICAL RESIDENTIAL FLOOR

1 : 500

0 5 10 25 45m

Appendix B

GCCC CODE ASSESSMENTS

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
General				
PO1 Development for filling or excavation minimises visual impacts from retaining walls and earthworks.	**AO1** Development ensures that the total height of any cut and fill, whether or not retained, does not exceed: (a) 2.5m in a zone in the Industry zones category; (b) 1m in all other zones, or if adjoining a sensitive zone.	✓	**RO1** The proposal complies. Initially, the development area of the subject site will be cleared of any existing structures and vegetation and a level pad will be provided for the proposed development. Basement retaining walls will be constructed as part of the initial bulk earthworks stage. This will form part of the building structure. Temporary boundary retention will be required given the extent of the proposed basement level car park and its proximity to the property boundaries of the subject site. All proposed retaining walls will be incorporated as part of the building structure. Therefore, there will be minimal impact to the visual amenity for surrounding properties as a result of the proposed development.	
PO2 Development of a retaining wall proposed as a result of filling or excavation: (a) is designed and constructed to be fit for purpose; (b) does not impact adversely on significant vegetation; (c) is capable of easy maintenance.	**AO2.1** Development of a retaining structure, including footings, surface drainage and subsoil drainage: (a) is wholly contained within the site; (b) if the total height to be retained is greater than 1m, then: (i) the retaining wall at the property boundary is no greater than 1m above the ground level; (ii) all further terracing from the 1m high	✓	**RO2.1** All retaining structures proposed for the development will be contained wholly within the site.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Editor's note—A retaining wall also needs to comply with the Building Regulation and embankment gradients will need to comply with theBuilding Regulation. Note—Guidance on the protection of native vegetation is included in the Biodiversity areas planning scheme policy.	boundary retaining wall is 1 vertical unit:1 horizontal unit; (iii) the distance between each successive retaining wall (back of lower wall to face of higher wall) is no less than 1m horizontally to incorporate planting areas.			
	AO2.2 Development of a retaining wall over 1m in height protects significant vegetation on the site and on adjoining land and is designed and constructed in accordance with the structures standards in the Infrastructure design planning scheme policy and certified by a Registered Professional Engineer Queensland.	✓	**RO2.2** All proposed retaining walls will be design and constructed in accordance with the stuctures standas in the CoGC Planning Scheme Policies by a Registered Professional Engineer of Queensland.	
	AO2.3 Development provides a retaining wall finish that presents to adjoining land that is maintenance free if the setback is less than 750mm from the boundary.	✓	**RO2.3** All proposed retaining walls to adjoining land will have a finish that is maintenance free and will not be visually intrusive to the neighbouring development.	
	AO2.4 Development for filling only uses clean fill that does not include any construction rubble, debris, weed seed or viable parts of plant species listed as an undesirable plant species in the Planting species planning scheme policy.	✓	**RO2.4** All fill imported to site will be free of contaminants.	
PO3 Development ensures that a rock anchor is designed and constructed to be fit for purpose.	**AO3** Development ensures that a rock anchor: ▪ is constructed in accordance with the standards in the Infrastructure design planning scheme policy; (b) where it extends beyond the property boundary, is supported by a letter of consent from the adjoining land and building owners.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
PO4 Development protects all services and public utilities.	**AO4** Development protects services and public utilities and ensures that any alteration or relocation of services or public utilities meets the standard design specifications of the responsible service authorities.	✓	**RO4** Prior to construction the contractor will confirm the correct locations of all existing services whether indicated or not on the plans. The construction of the proposed development will ensure the protection of all existing services or public utilities.	
PO5 Development provides surface and sub-surface drainage to prevent water seepage, concentration of run-off or ponding of stormwater on adjacent land.	**AO5** Development ensures all flows and subsoil drainage are directed to a lawful point of discharge of a surface water diversion drain, including to the top or toe of a retaining wall in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	✓	**RO5** All proposed excavation will be undertaken in accordance with the CoGC Health Waters Code of the Planning Scheme Policies. Earthworks will be designed to prevent ponding of stormwater on the site and on neighbouring land. All stormwater surface runoff and subsoil flows will be directed to the lawful point of discharge. Refer to the SBSMP prepared by MCE.	
PO6 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural	**AO6** Filling or excavation does not involve the construction of open drainage.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
channel design guidelines.				
PO7 Development for filling or excavation: (a) does not degrade water quality or adversely affect environmental values in receiving waters; (b) ensures site sediment and erosion control standards are best practice.	**AO7.1** Development for filling or excavation provides water quality treatment that complies with the stormwater drainage section of the Infrastructure design planning scheme policy.	✓	**RO7.1** An Erosion and Sediment Control Plan shall be prepared (prior to commencement of construction) and maintained for the management of the sediment laden stormwater runoff during the construction phase in accordance with the CoGC Healthy Waters Code of the Planning Scheme Policies.	
	AO7.2 Development provides erosion and sediment control standards that are in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	✓	**RO7.2** Refer to RO7.1 above.	
PO8 Development for filling or excavation is conducted such that adverse impacts at a sensitive use due to noise and dust are prevented or minimised. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO8.1** Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site.	✓	**RO8.1** Water trucks shall be used to minimise dust emissions. An ESC plan is to be prepared for the construction phase.	
	AO8.2 Development for filling or excavation activity only occurs between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays.	✓	**RO8.2** Bulk earthworks for the proposed development shall be performed within the hours nominated in AO8.2.	
PO9 Development ensures that vibration generated by the filling or excavation operation does not exceed the vibration criteria in Table 9.4.3.3.B, Table 9.4.3.3.C, Table 9.4.3.3.D and Table 9.4.3.3.E. Note—A noise management report	**AO9** Development involving filling or excavation does not cause a ground-borne vibration beyond the boundary of the site.	✓	**RO9** Minimal vibration will result beyond the boundary of the site during the construction phase of the proposed development.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
prepared in accordance with theNoise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.				
PO10 Development ensures that heavy trucks hauling material to and from the site do not affect the amenity of established areas and limits environmental nuisance impact on adjacent land.	**AO10** Development ensures that heavy trucks hauling material to and from the site: (a) occur for a maximum of 3 weeks; (b) use a major road to access the site; (c) only use a minor road for the shortest-most-direct route that has the least amount of environmental nuisance if there is no major road alternative.	✓	**RO11** Haul routes from trucks used to transport fill/spoil and material to and from the site will only use major roads as required. Alternatively, if there is no major road route to the site, haul trucks will use minor roads with the shortest, most direct route that will have the least amount of environmental impact. This will be clearly documented in the Construction Management Plan. For the limits of environment nuisance impacts on adjacent land, refer to RO7.1. The bulk excavation for the new pad will be completed within 3 weeks of commencement of excavation works.	
PO11 Development for filling or excavation protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	**AO11** Development does not involve: (a) excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; (b) filling with material containing a contaminant.	✓	**RO11** A search will be undertaken to verify whether the development falls on land listed on the Environmental Management Register and/or the Contaminated Land Register.	
PO12 Development provides for: (a) landscaping for water conservation	**AO12.1** Development provides landscaping which is designed using the standards in	✓	**RO12.1** Refer Concept landscaping advice	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

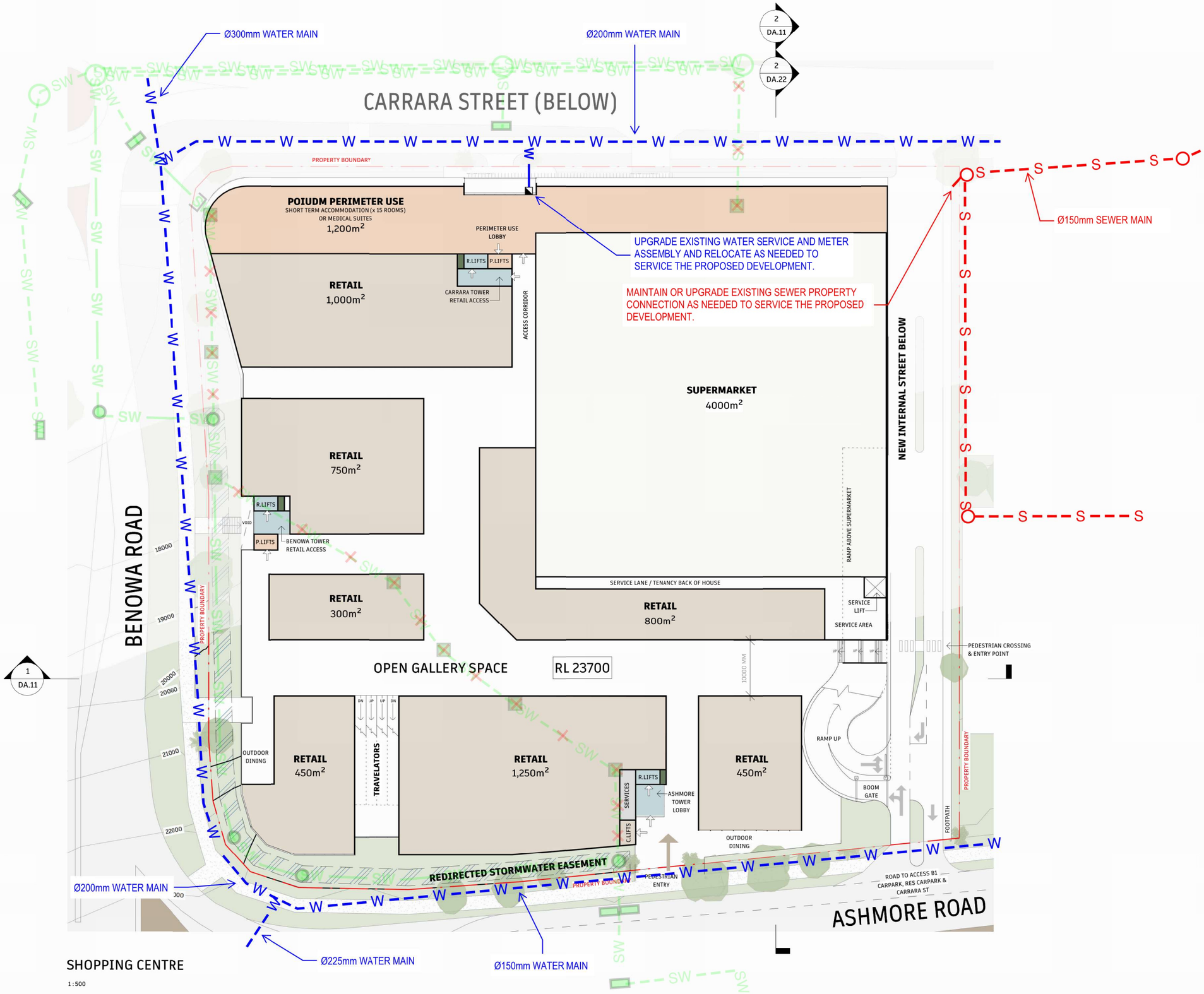
Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
purposes; (b) water sensitive urban design measures which are employed within the landscape design to maximise stormwater use and to reduce any adverse impacts on the landscape; (c) stormwater harvesting to be maximised and any adverse impacts of stormwater minimised.	the Landscape design guidelines for water conservation planning scheme policy.			
	AO12.2 Development ensures that the design and requirements for irrigation are in compliance with the standards in the Landscape design guidelines for water conservation planning scheme policy.	✓	**RO12.2** Refer Concept landscaping advice	
	AO12.3 Development provides areas of pavement, turf and mulched garden beds which are drained. Note—This may be achieved through the provision and/or treatment of swales, spoon drains, field gullies, sub-surface drainage and stormwater connections.	✓	**RO12.3** Refer Concept landscaping advice	
PO13 Development ensures cutting and filling for the development of canals or artificial waterways avoids adverse impacts on coastal resources and processes.	**AO13** Development does not involve the creation of canals or artificial waterways.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Appendix C

CONCEPT SERVICES PLAN

FLOOR PLAN-SHOPPING CENTRE



SHOPPING CENTRE

1:500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CONCEPT SERVICES PLAN
MCE 24191
LG_REV-2 06-02-25

0 5 10 25 45m

Appendix D

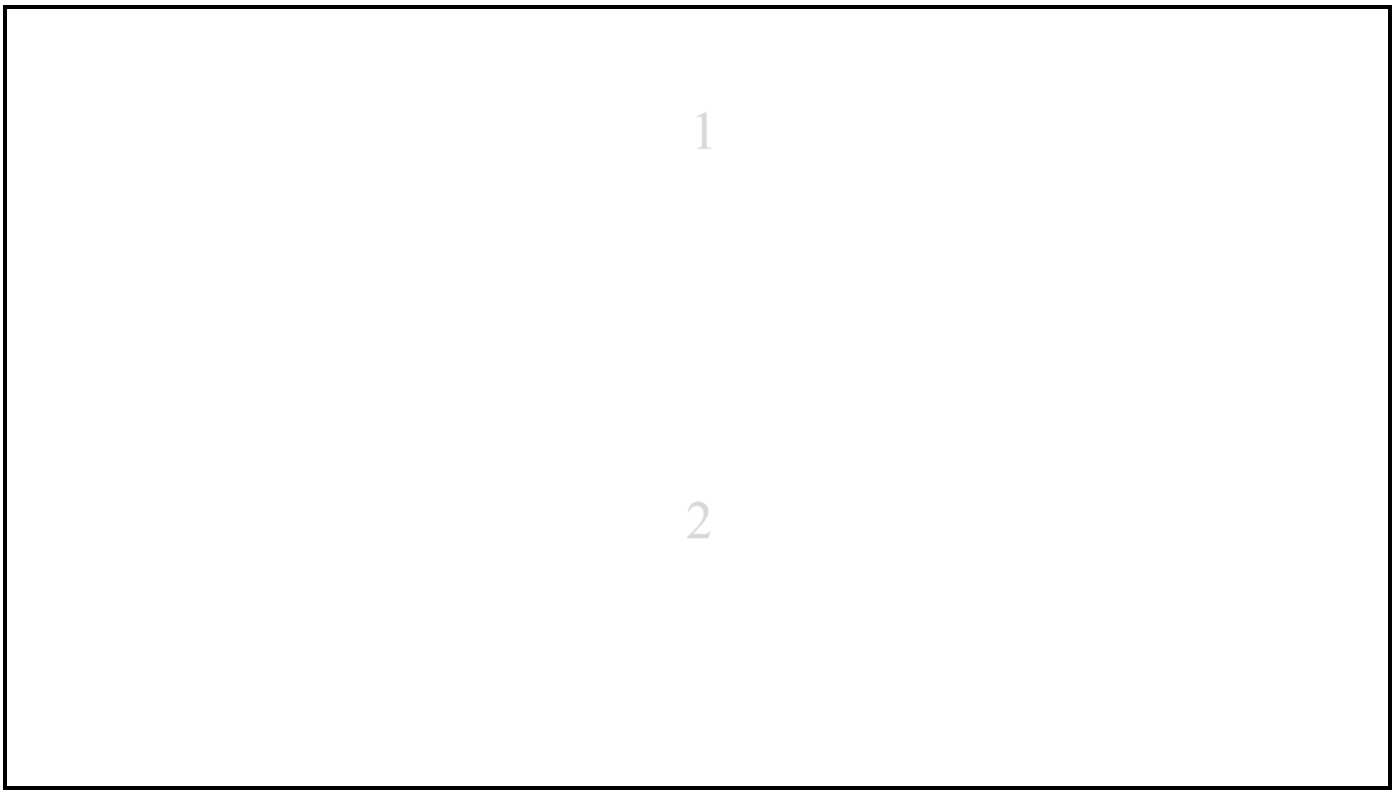
BYDA PLANS

To:	Henry Morgan
Phone:	Not Supplied
Fax:	Not Supplied
Email:	civildept@morgance.com.au

Dial before you dig Job #:	37597888
Sequence #	244700595
Issue Date:	16/09/2024
Location:	360-370 Benowa Road , Benowa , QLD , 4217

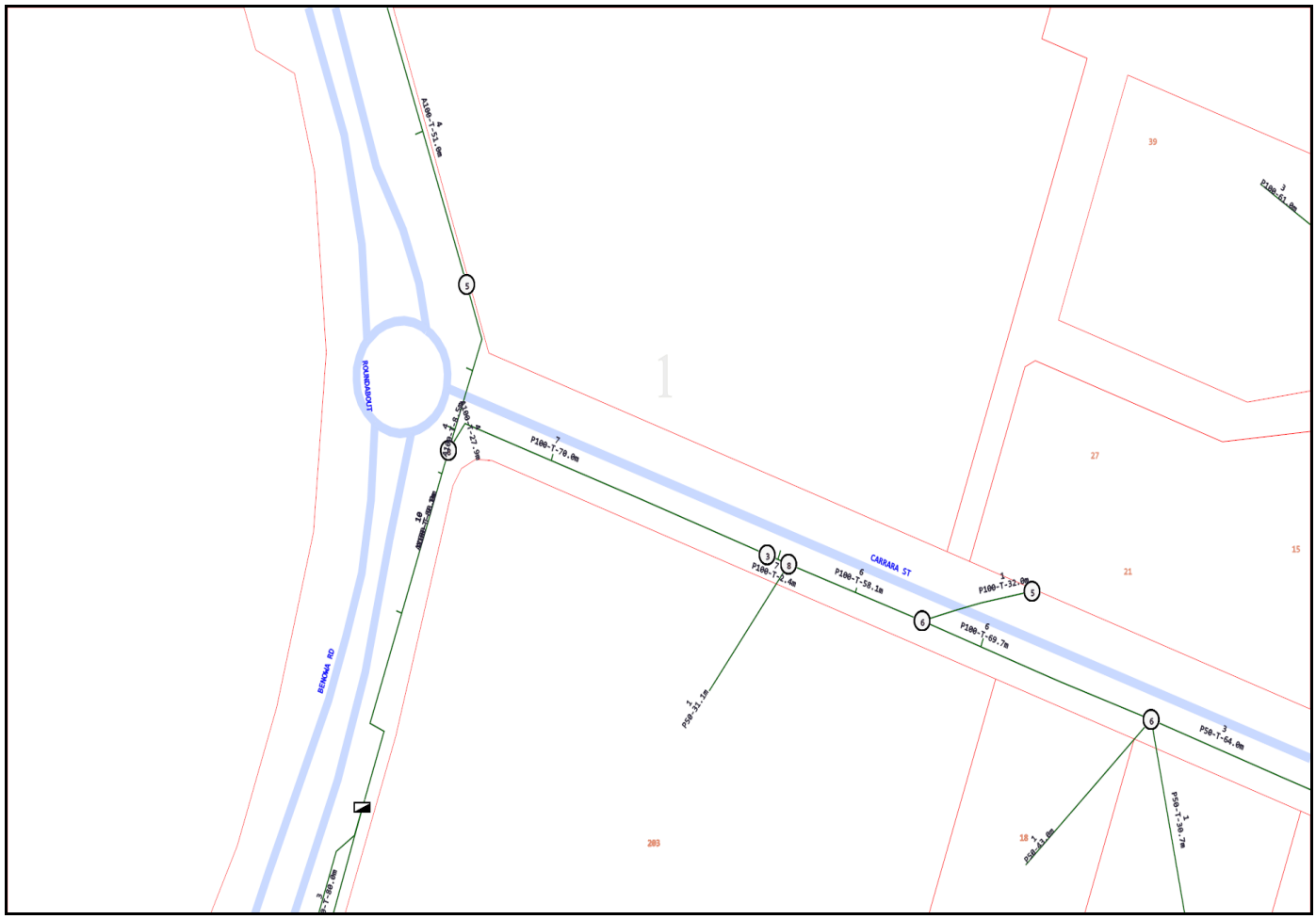
BEFORE YOU DIG www.byda.com.au Zero Damage - Zero Harm

Indicative Plans



LEGEND

34	Parcel and the location
5	Pit with size "5"
2E	Power Pit with size "2E". Valid PIT Size: e.g. 2E, 5E, 6E, 8E, 9E, E, null.
	Manhole
	Pillar
2 PO – T- 25.0m P40 – 20.0m 5 9	Cable count of trench is 2. One "Other size" PVC conduit (PO) owned by Telstra (-T-), between pits of sizes, "5" and "9" are 25.0m apart. One 40mm PVC conduit (P40) owned by NBN, between pits of sizes, "5" and "9" are 20.0m apart.
2 10.0m 5 9	2 Direct buried cables between pits of sizes ,"5" and "9" are 10.0m apart.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Copper/RF/Fibre) cables.
5 9	Trench containing only DESIGNED/PLANNED (Copper/RF/Fibre/Power) cables.
5 9	Trench containing any INSERVICE/CONSTRUCTED (Power) cables.
BROADWAY ST	Road and the street name "Broadway ST"
Scale	0 20 40 60 Meters 1:2000 1 cm equals 20 m


ROUNDABOUT
BENOWA RD
CARRARA ST
A100-T-51.9m
P100-T-70.8m
P100-T-58.1m
P100-T-69.7m
P100-T-32.0m
P50-T-64.0m
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P50-T-43.8m
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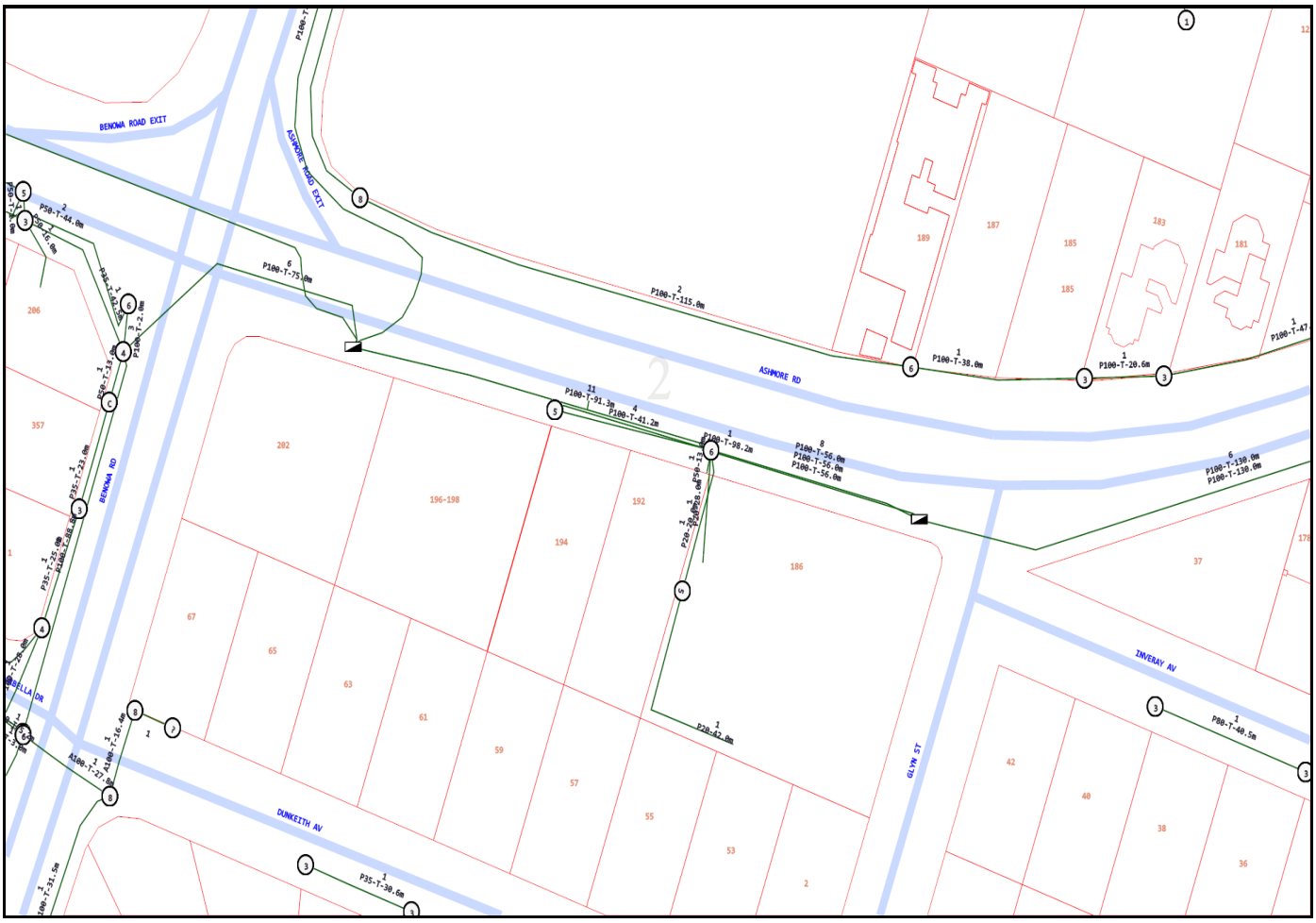
39
27
21
15
203
18



Emergency Contacts

You must immediately report any damage to the **nbn™** network that you are/become aware of. Notification may be by telephone - 1800 626 329.

Tile No: 1

Uecomm Underground Cable

Scale: 1:2500

Printed on: 16 Sep 2024

Sequence Number: 244700596

Location: 360-370 Benowa Road, Benowa, QLD 4217

Job Location
- Line
- Point
- Area

Undergound Asset
- Uecomm

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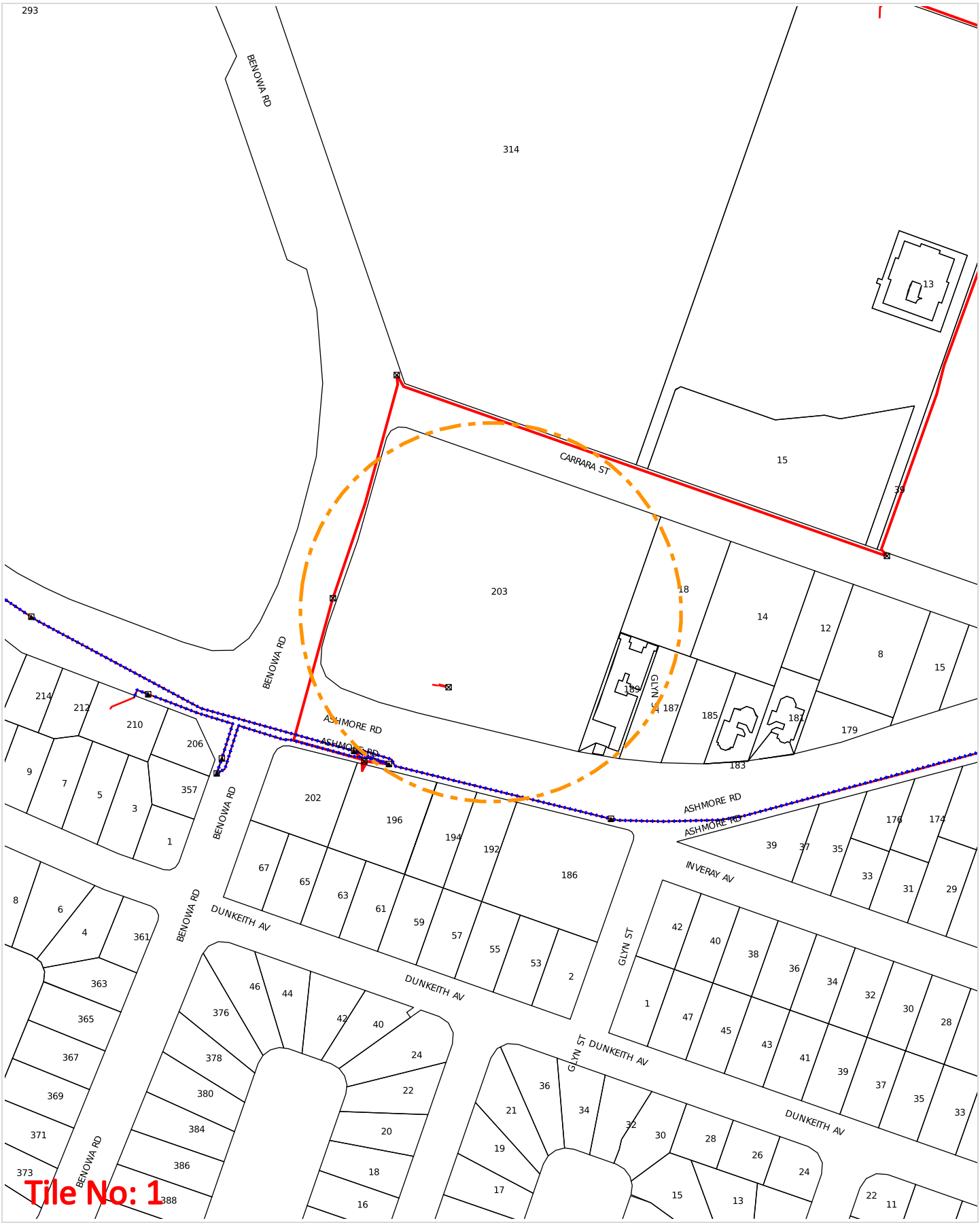


Tile No: 1

WARNING: This document is confidential and may also be privileged. Confidentiality nor privilege is not waived or destroyed by virtue of it being transmitted to an incorrect addressee. Unauthorised use of the contents is therefore strictly prohibited. Any information contained in this document that has been extracted from our records is believed to be accurate, but no responsibility is assumed for any error or omission. Optus Plans and information supplied are valid for 30 days from the date of issue. If this timeline has elapsed, please raise a new enquiry.

Sequence Number: 244700596

Date Generated: 16 Sep 2024

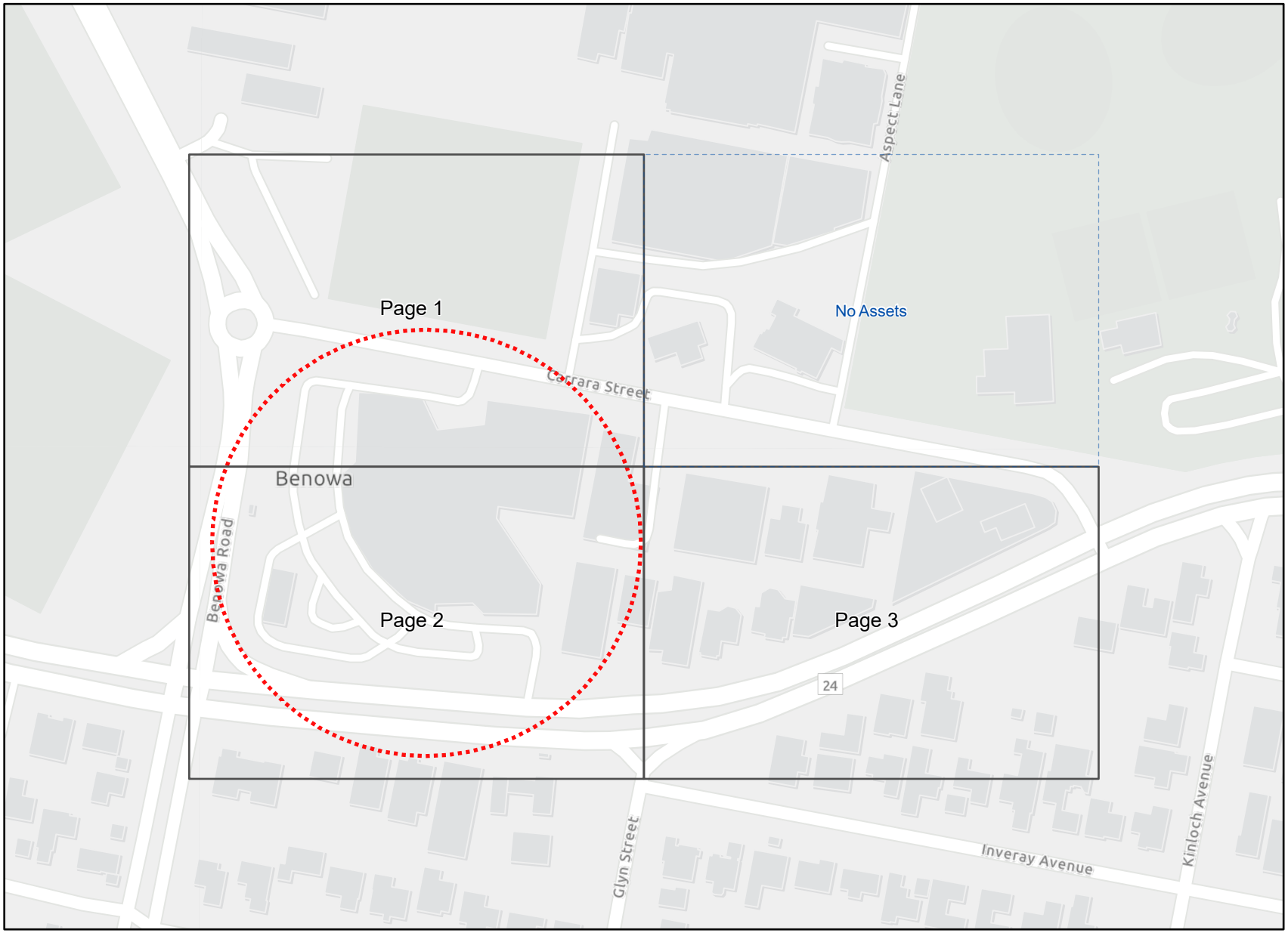
For all Optus DBYD plan enquiries –
Email: Fibre.Locations@optus.net.au
For urgent onsite assistance contact 1800 505 777
Optus Limited ACN 052 833 208

CITY OF GOLDCOAST.

Job # 37597888
Seq # 244700597

Provided by City of Gold Coast

BEFORE YOU DIG www.byda.com.au



Legend

- BYDA Enquiry
- Detailed map page
- No dig site assets

Esri Community Maps Contributors, Department of Resources, DESI, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS

Disclaimer: The Plan is provided in response to a Before You Dig request. While all reasonable care has been taken to ensure the accuracy of the information on this plan, its purpose is to provide a general indication of the location of Gold Coast City Council infrastructure. The information provided may contain errors or omissions and the accuracy may not suit all users. A site inspection and investigation is recommended before commencement of any project based on this data.

In an emergency contact City of Gold Coast on 1300 465 326

Index Sheet

Plans generated by SmarterWX™ Automate

0 25 50 100 m

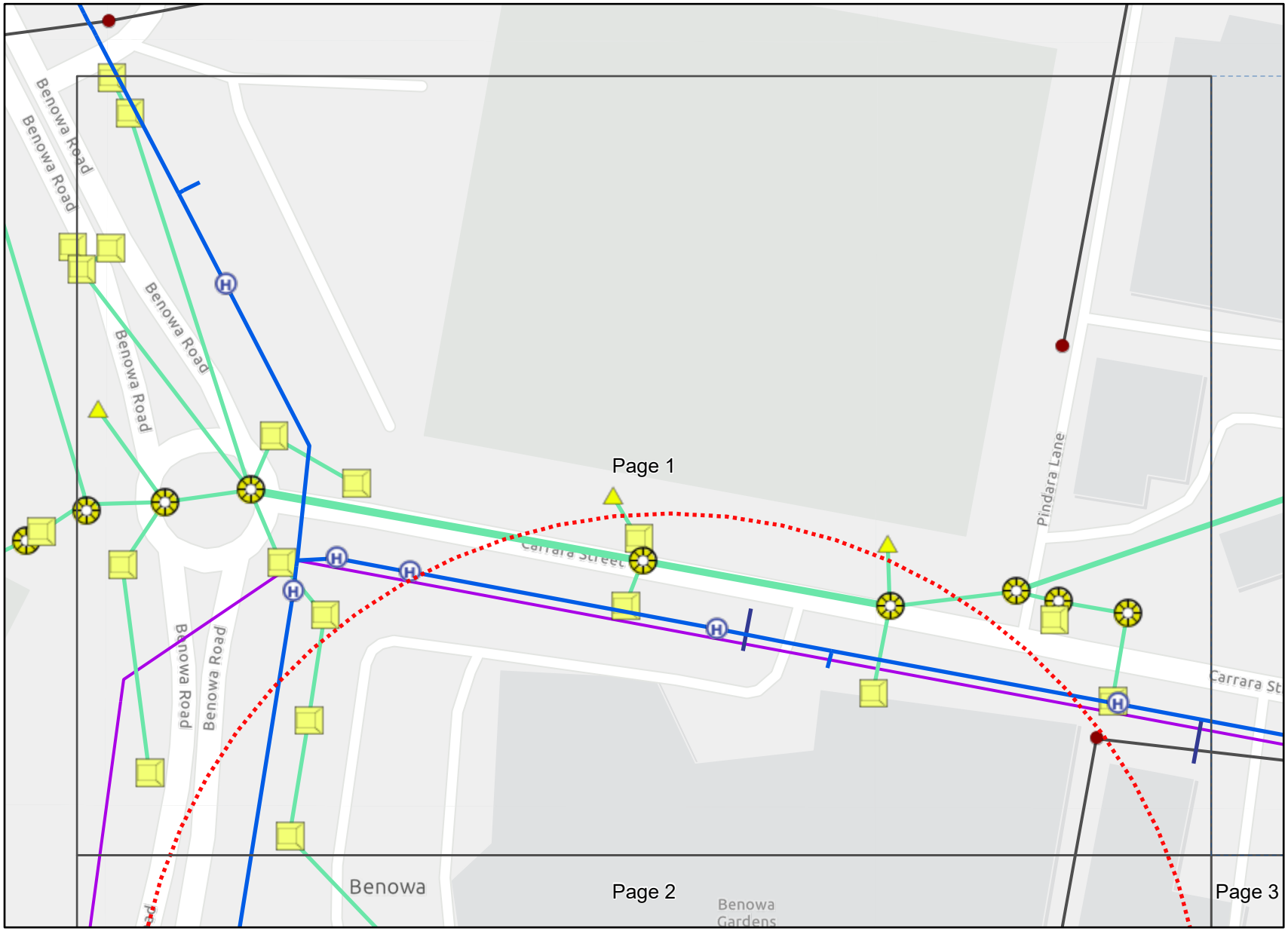
N

Scale 1:2,500

CITY OF GOLDCOAST.

Job # 37597888
Seq # 244700597
Provided by City of Gold Coast

BEFORE YOU DIG www.byda.com.au



Legend

- BYDA Enquiry
- Water Hydrant
- Water Pipe
- Potable Water Connection
- Stormwater Drainage Pipe
- Stormwater Inlet Gully
- Stormwater Manhole
- Stormwater End Structure
- Sewer Pipe Non Pressure
- Sewer Manhole
- Recycled Water Pipe
- Fibre Optic Pit
- Fibre Optic Cable
- GCCC Boundary

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In an emergency contact City of Gold Coast on 1300 465 326

16/09/24 (valid for 30 days)

Plans generated by SmarterWX™ Automate

0 10 20 40 m

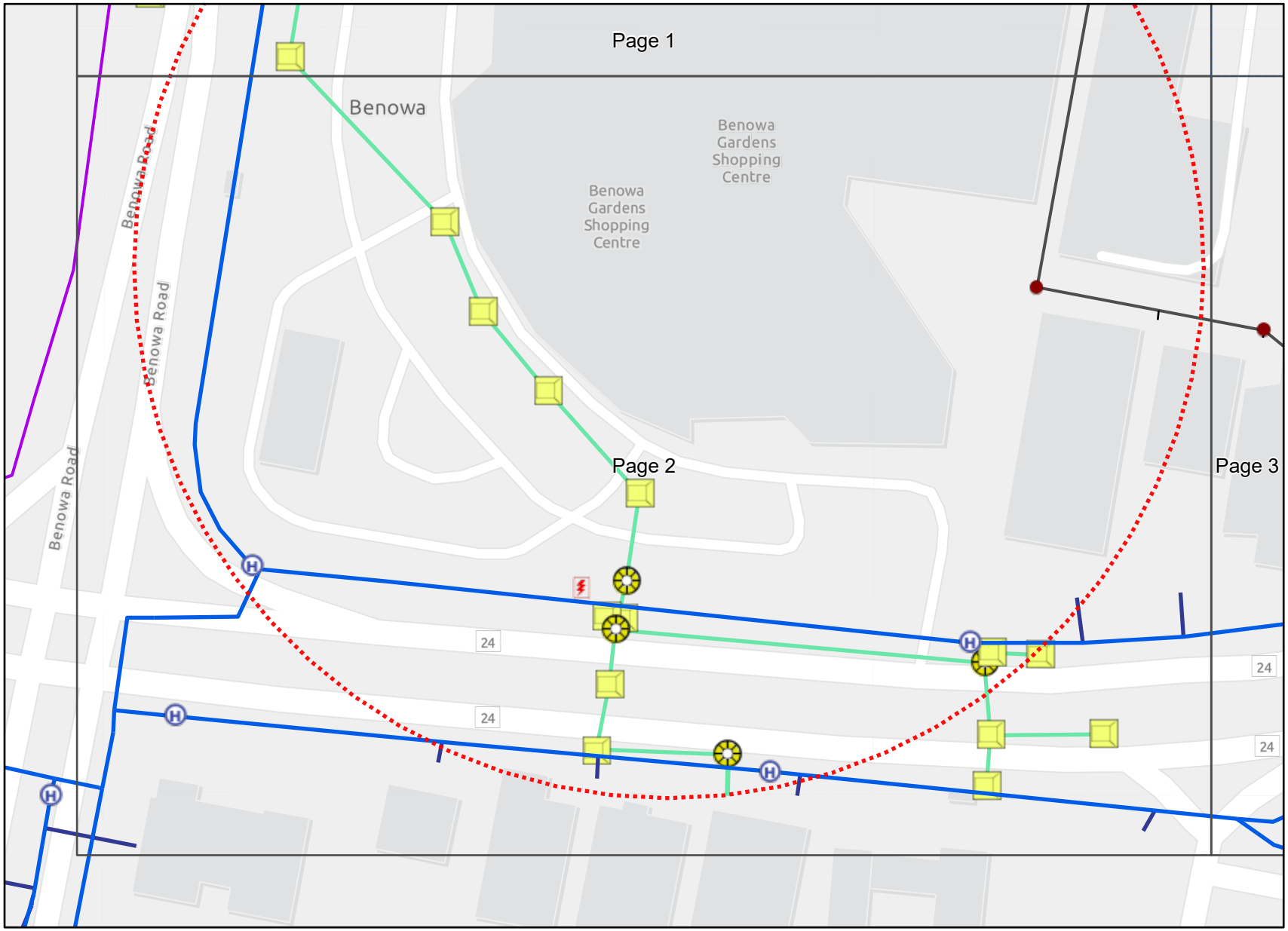
N

Scale 1:1,000

CITY OF GOLDCOAST.

Job # 37597888
Seq # 244700597
Provided by City of Gold Coast

BEFORE YOU DIG www.byda.com.au



Legend

- BYDA Enquiry
- Water Hydrant
- Water Pipe
- Potable Water Connection
- Stormwater Drainage Pipe
- Stormwater Inlet Gully
- Stormwater Manhole
- Sewer Connection
- Sewer Pipe Non Pressure
- Sewer Manhole
- Recycled Water Pipe
- Cabling Pit
- Fibre Optic Pit
- Fibre Optic Cable
- GCCC Boundary

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0 10 20 40 m

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CITY OF GOLDCOAST.

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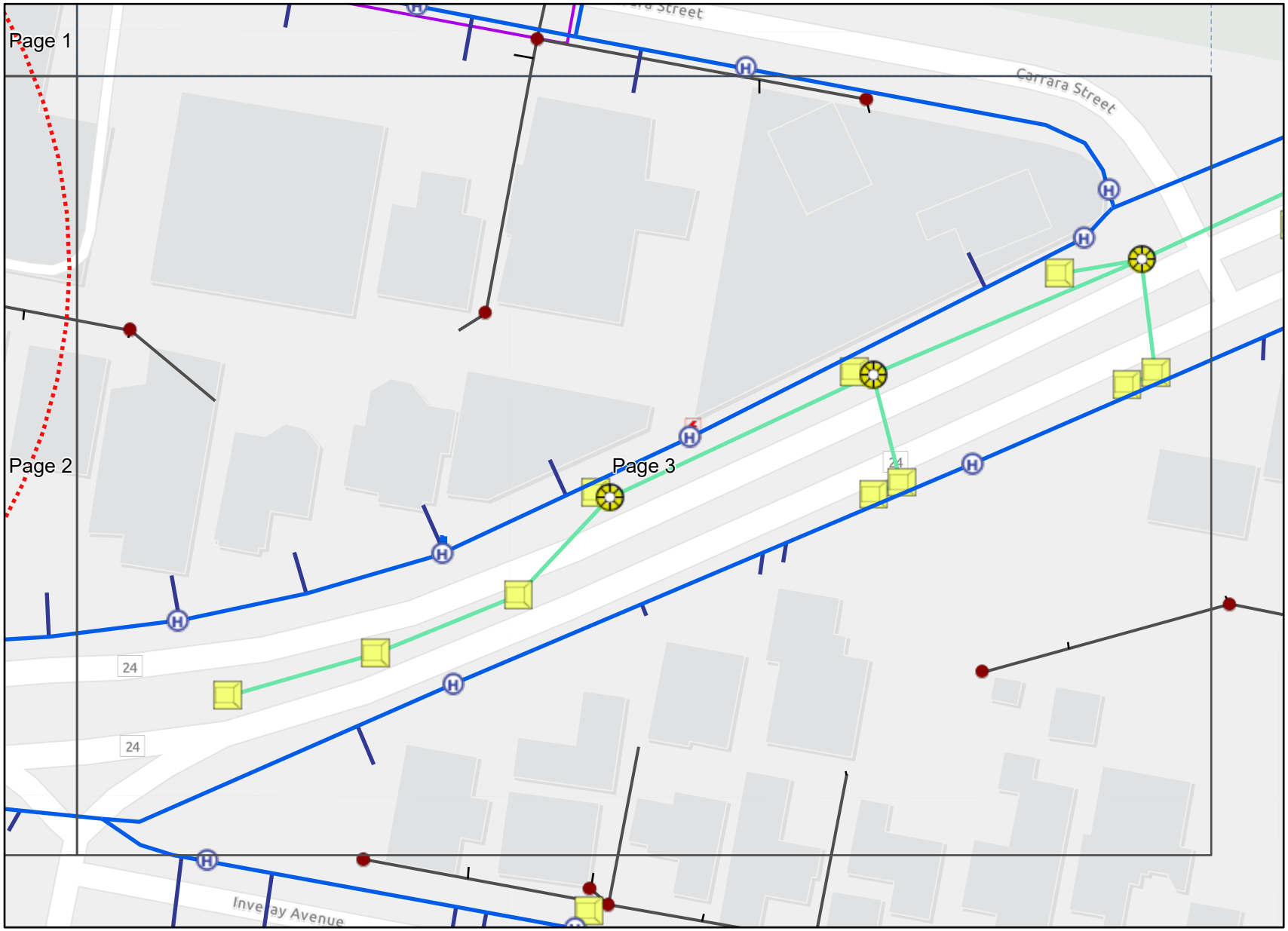

Legend

- BYDA Enquiry
- Water Hydrant
- Water Pipe
- Potable Water Connection
- Stormwater Drainage Pipe
- Stormwater Inlet Gully
- Stormwater Manhole
- Sewer Connection
- Sewer Pipe Non Pressure
- Sewer Manhole
- Recycled Water Pipe
- Cabling Pit
- Fibre Optic Pit
- Fibre Optic Cable
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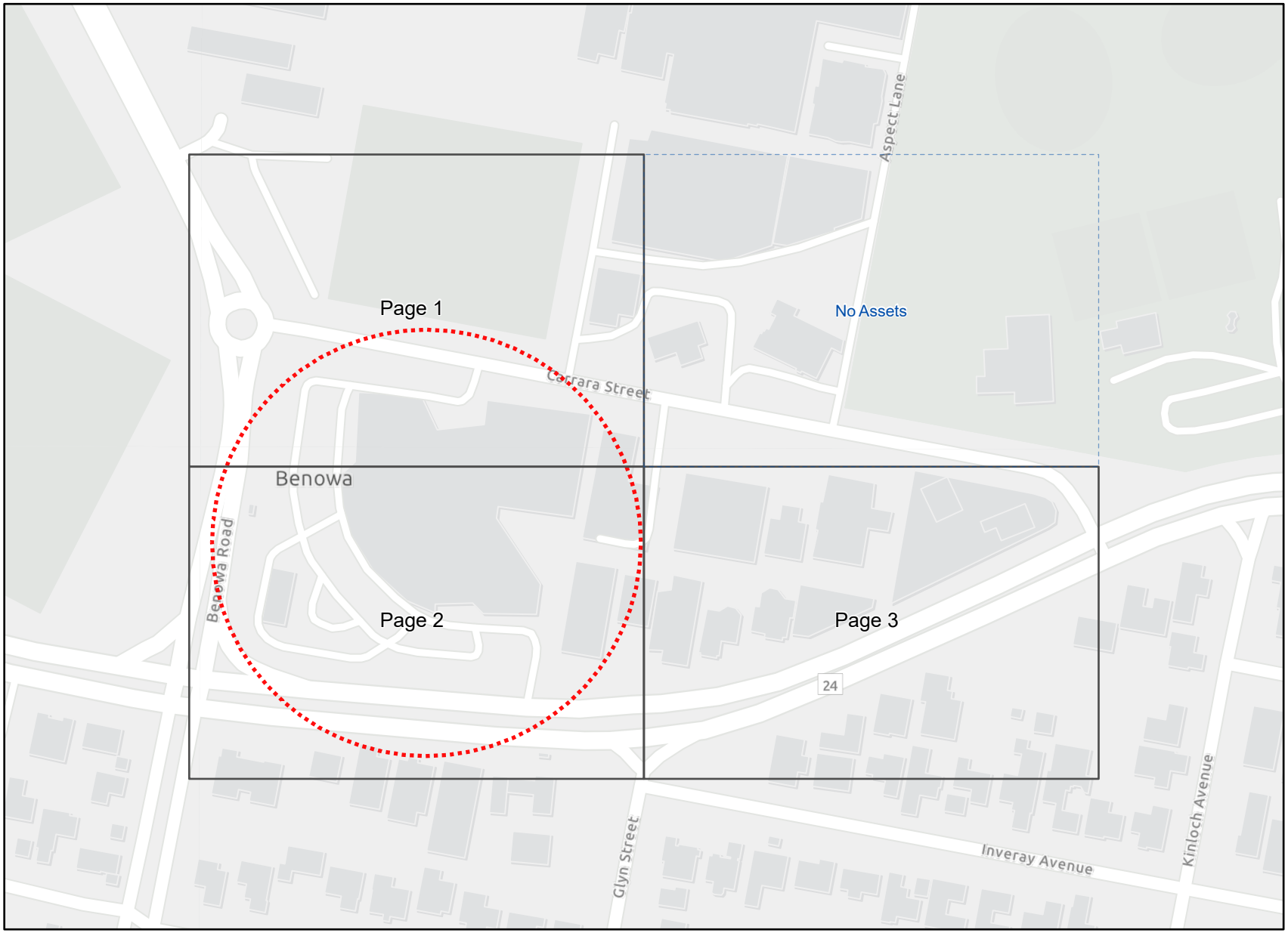

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- BYDA Enquiry
- Detailed map page
- No dig site assets

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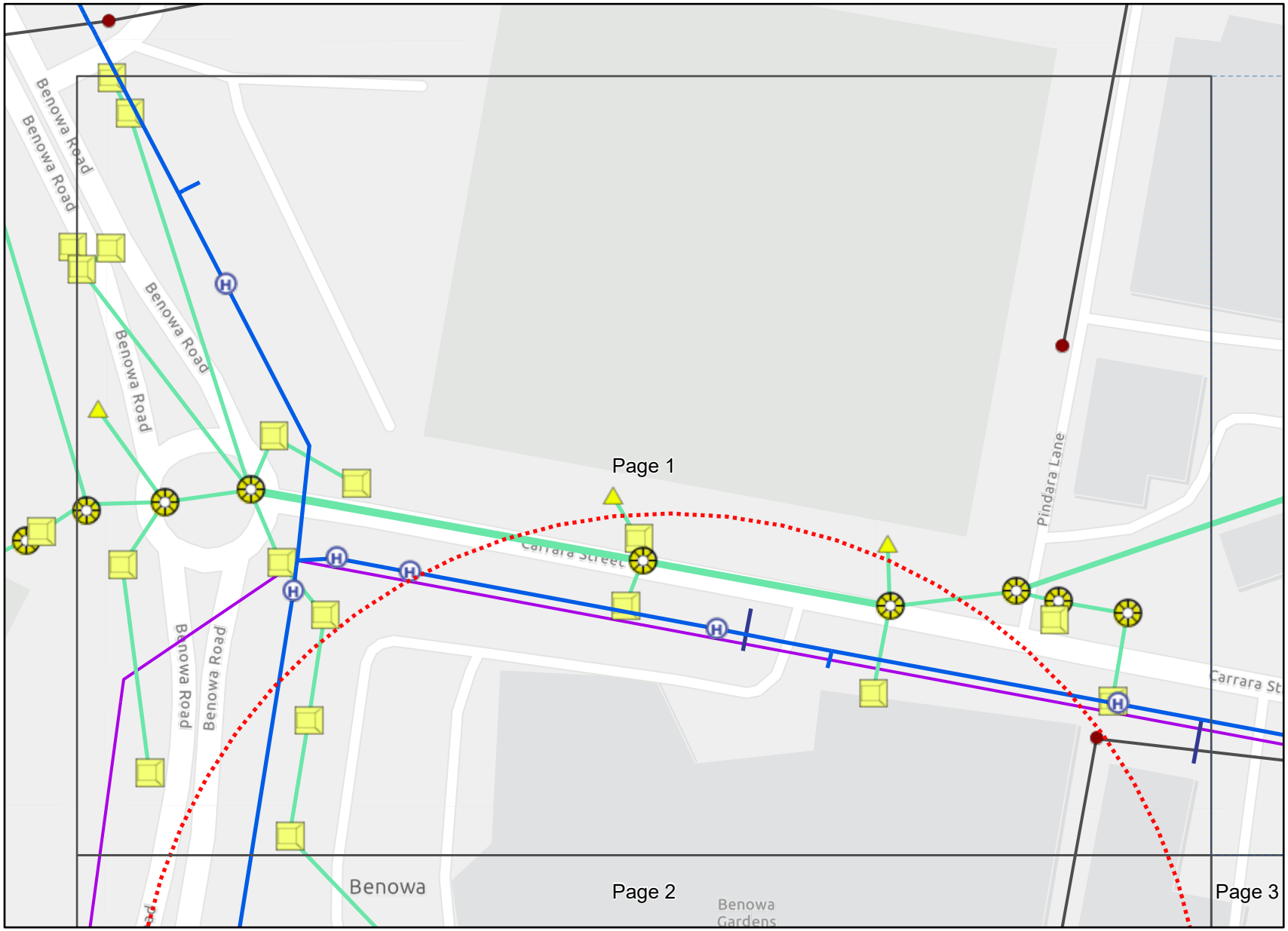

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- Stormwater End Structure
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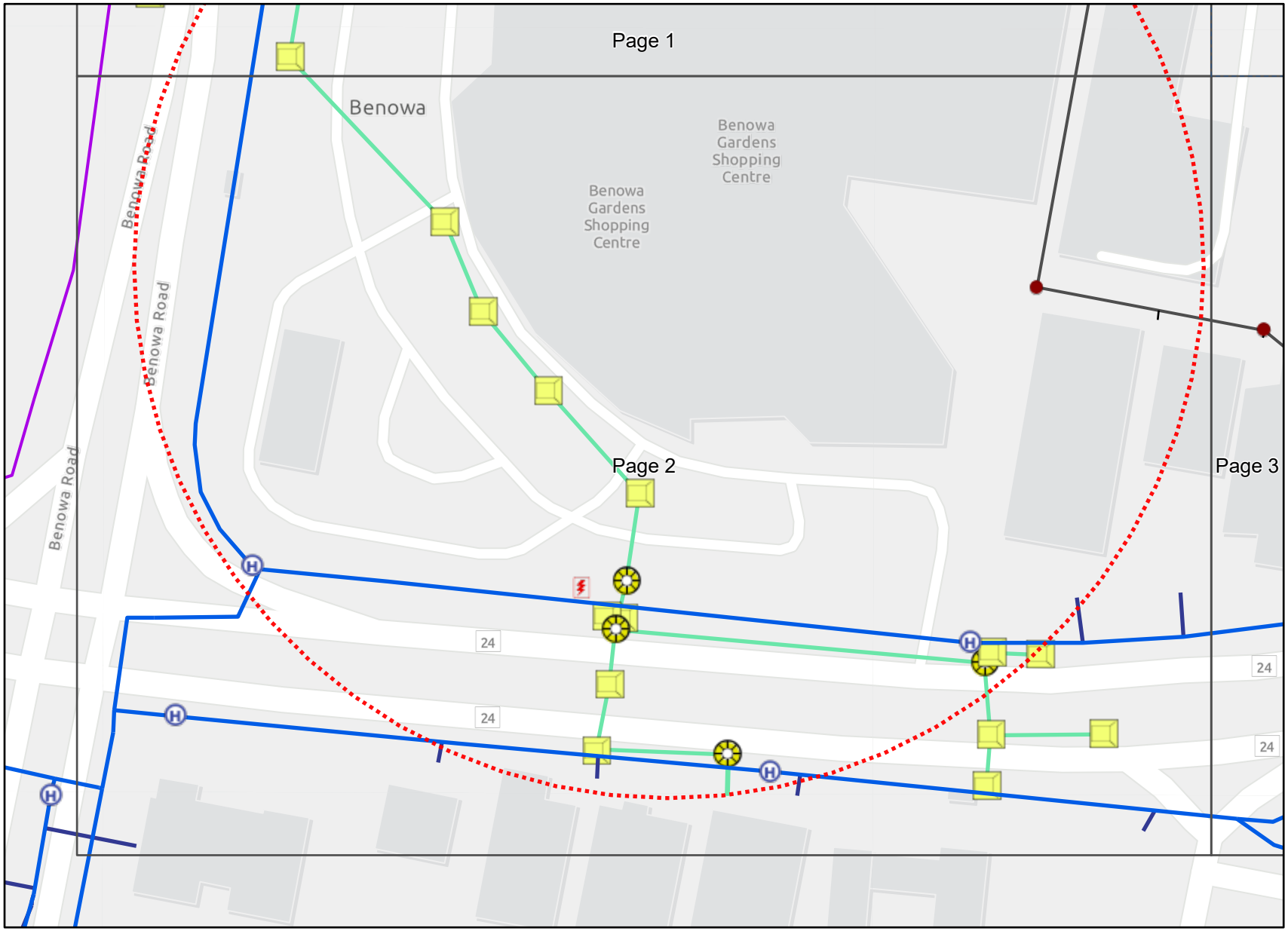

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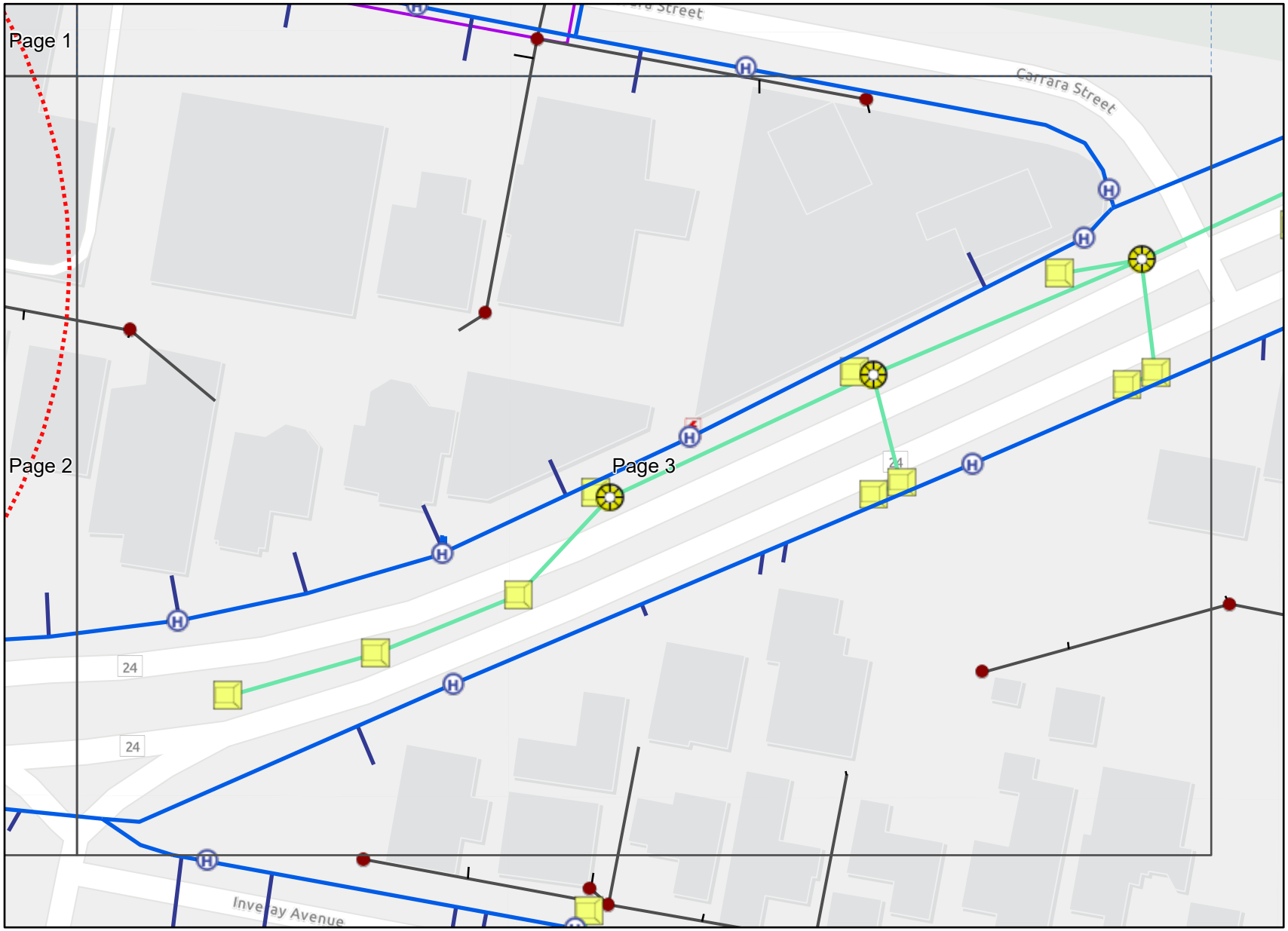

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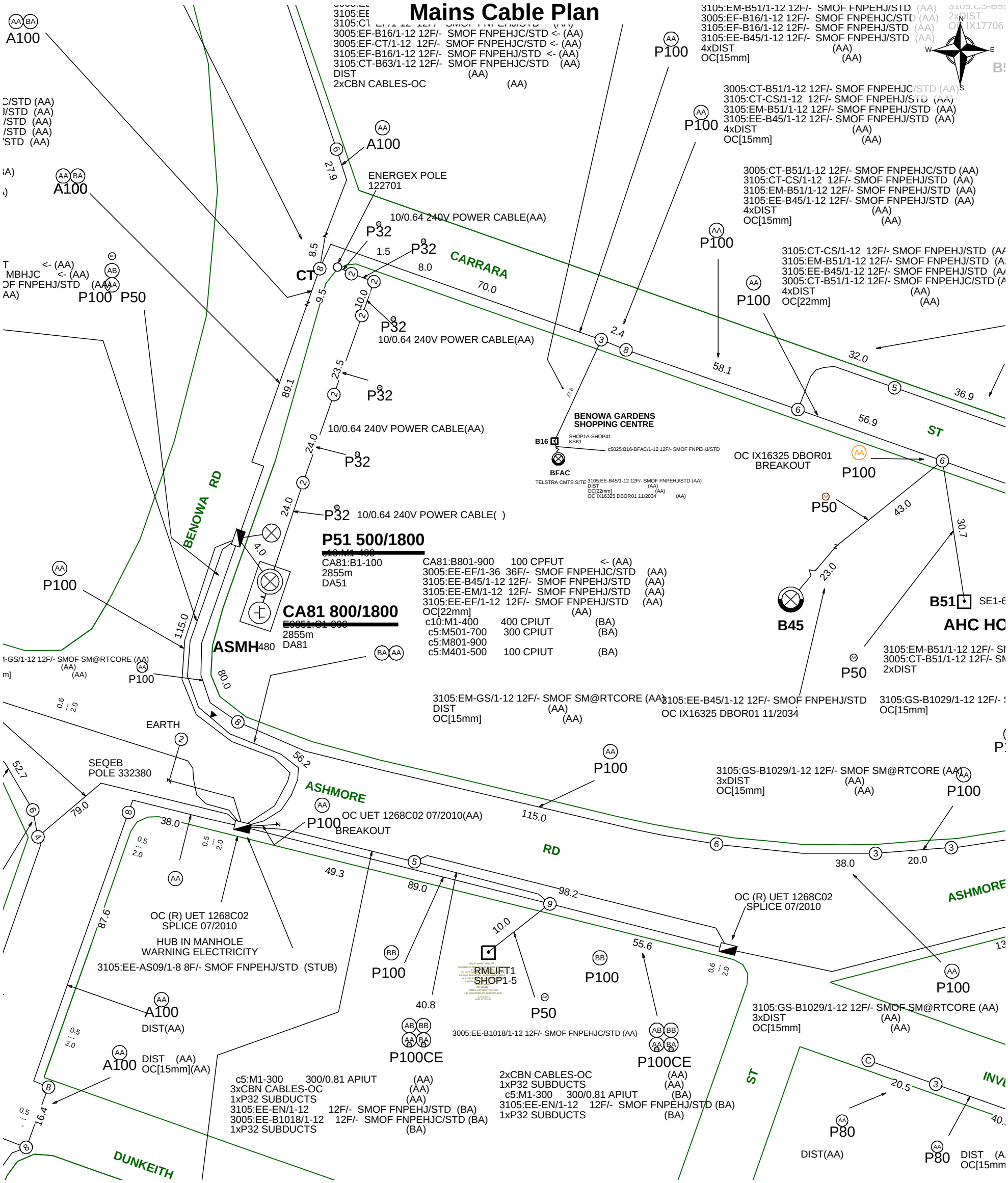
Mains Cable Plan



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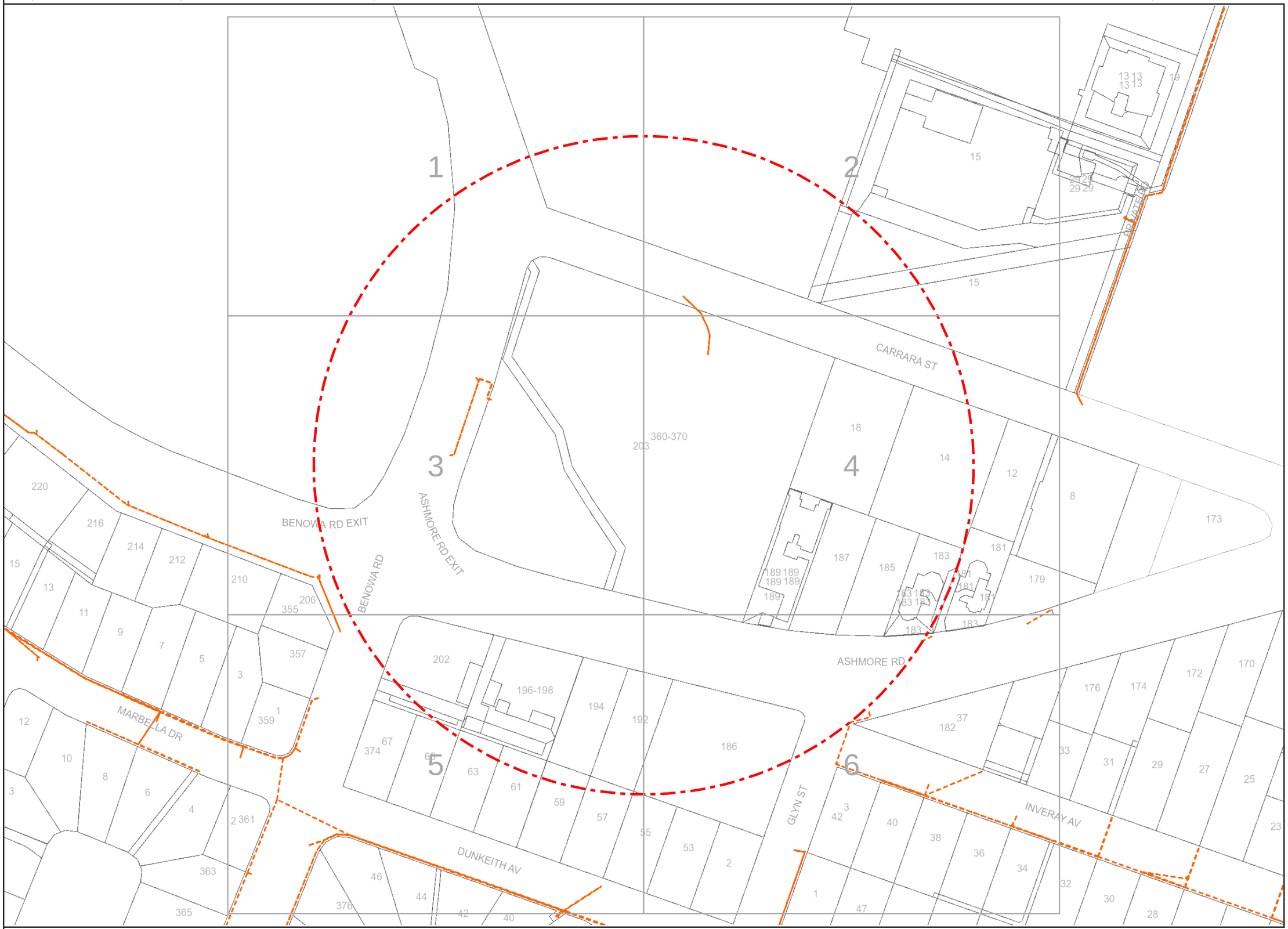

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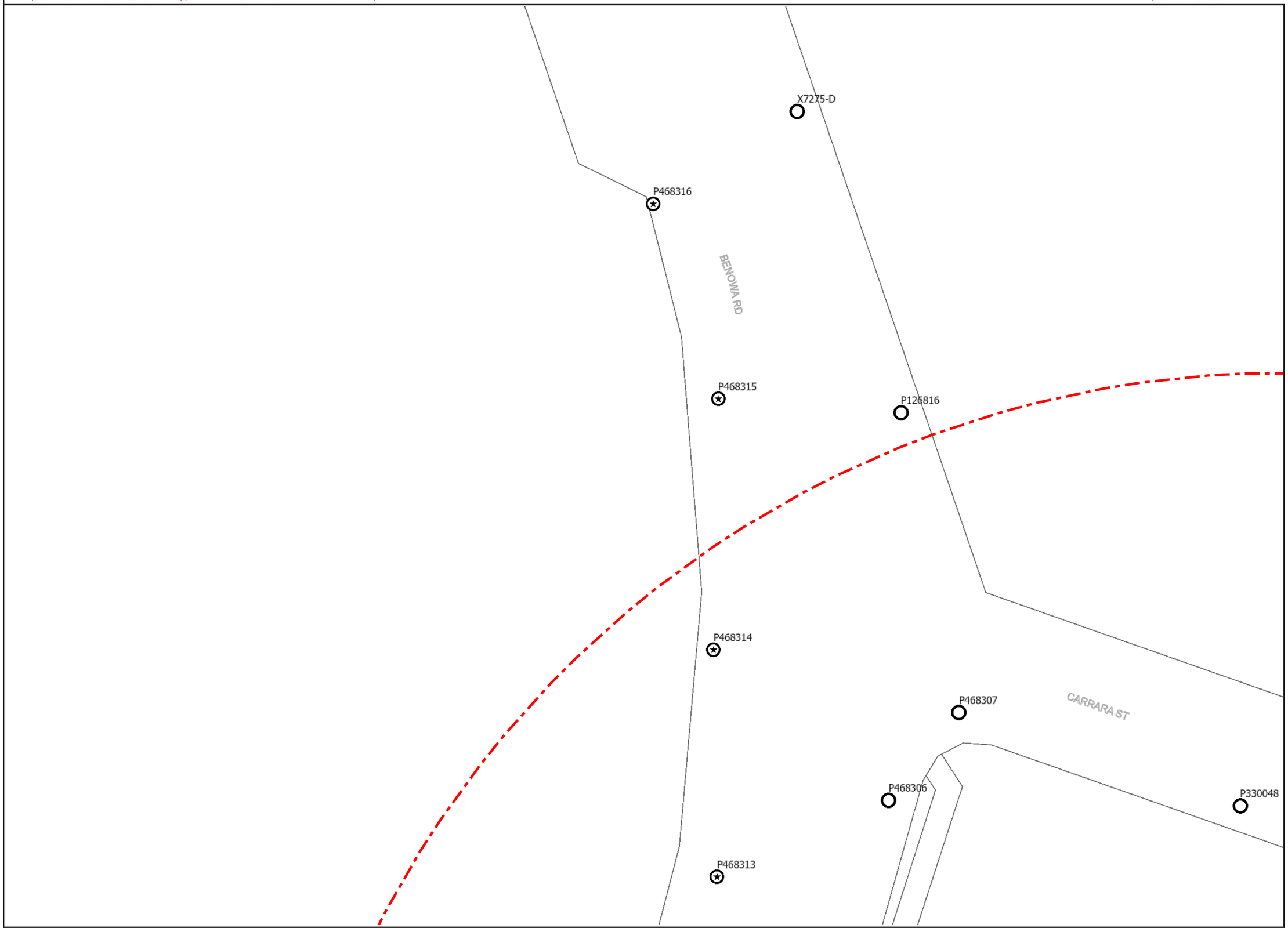

BYDA

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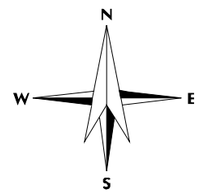

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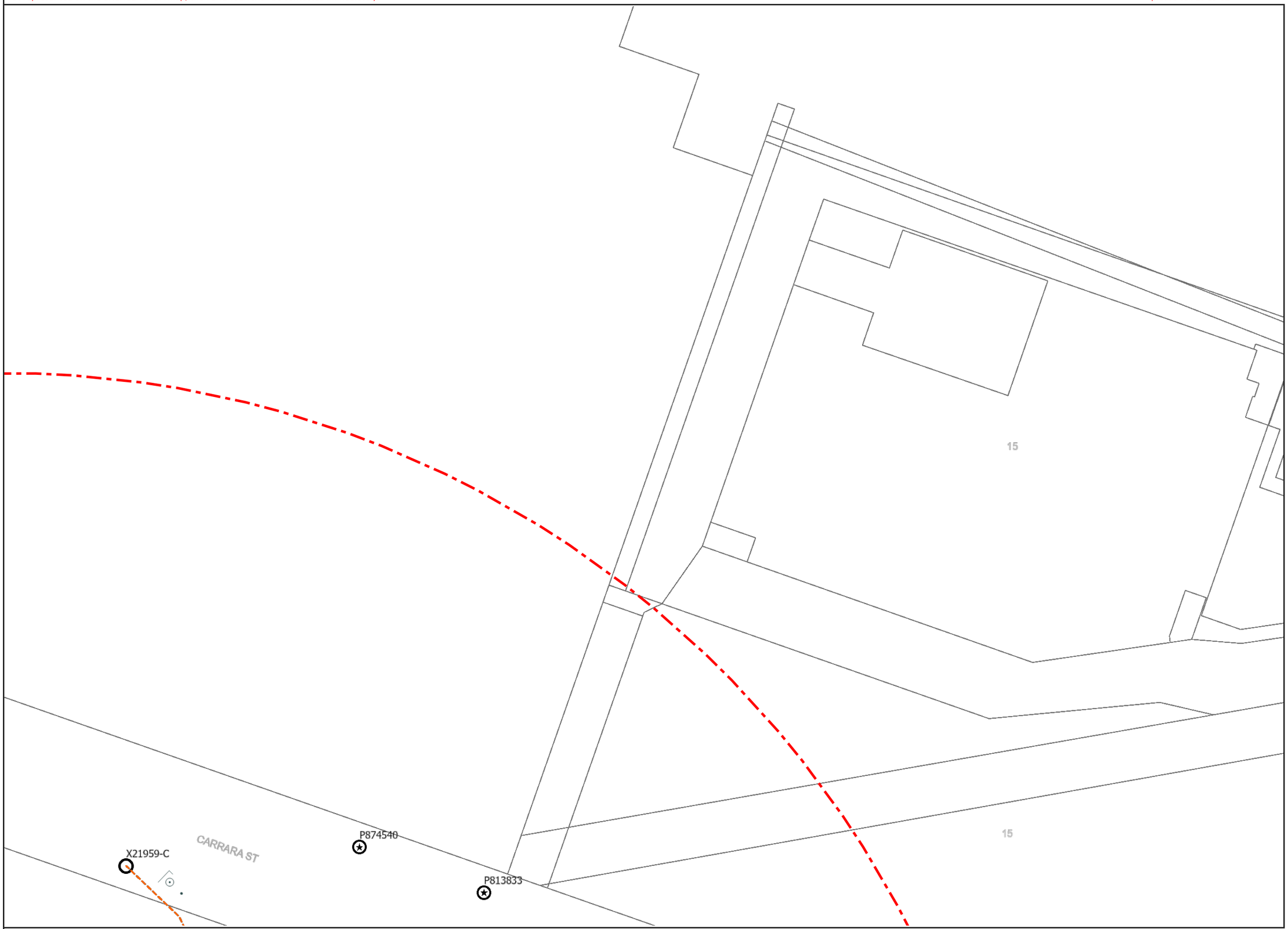

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AS5488 Category “D” Plan

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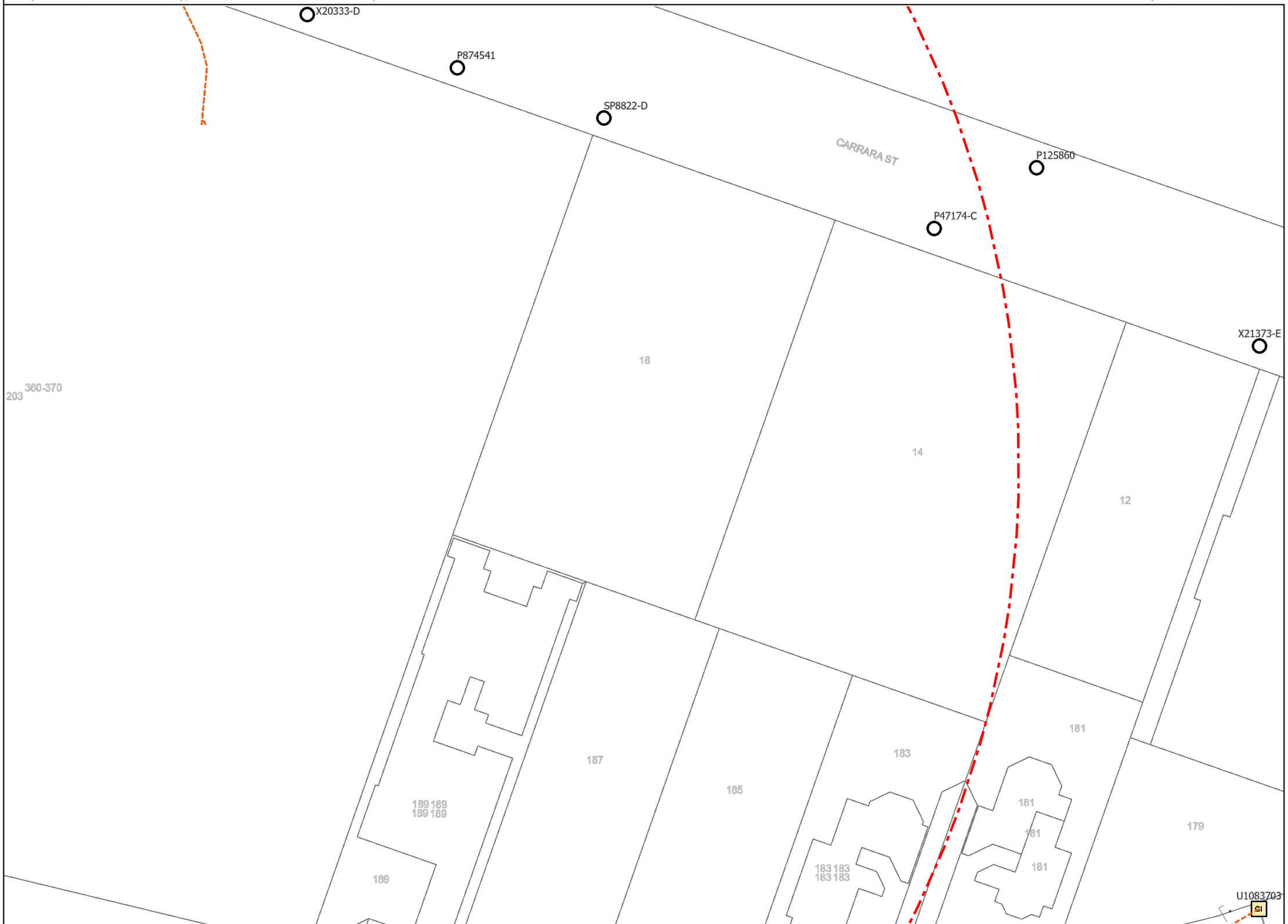

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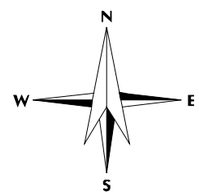

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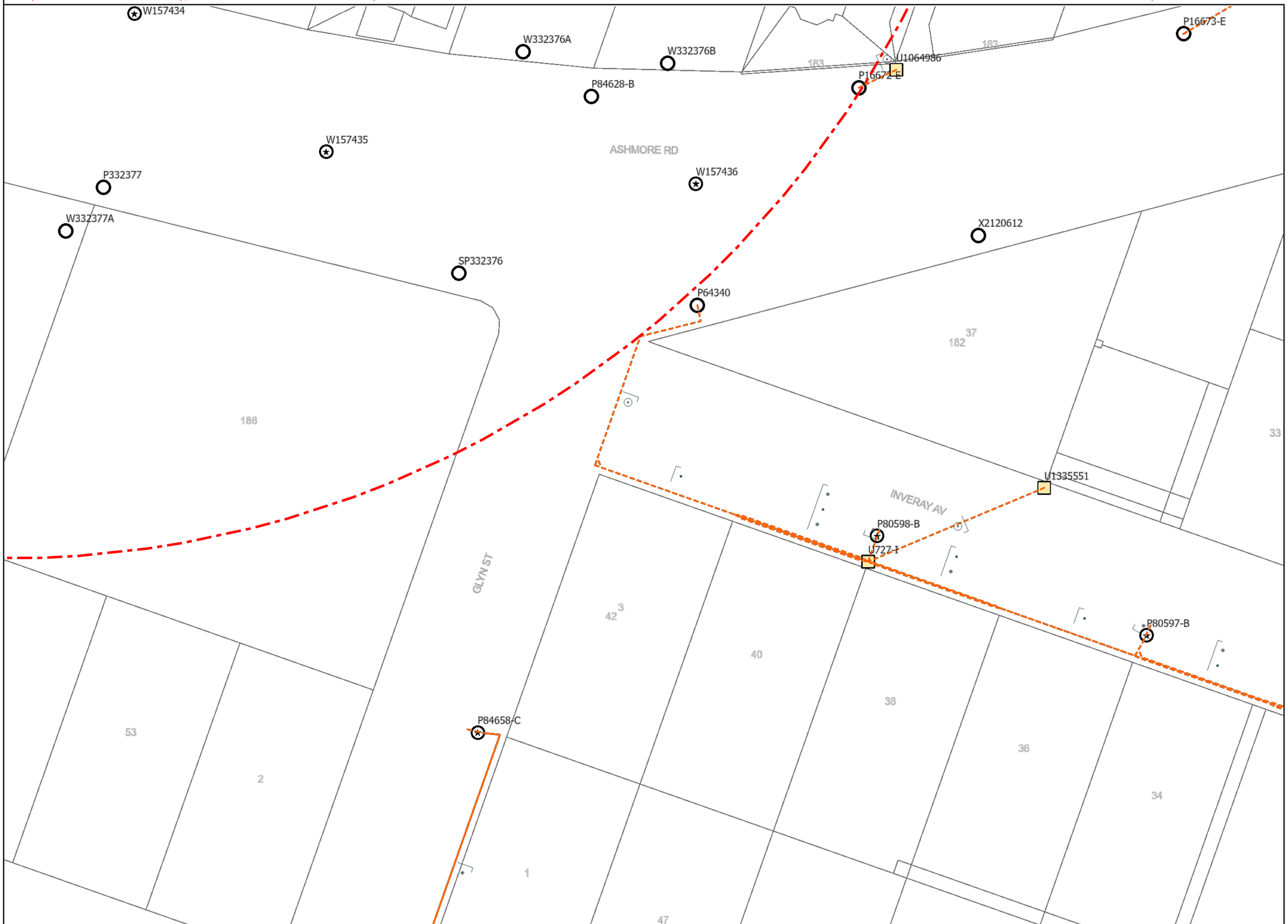

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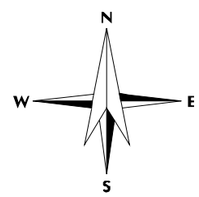

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EMAIL: mail@morgance.com.au

SITE BASED STORMWATER MANAGEMENT PLAN

PROPOSED MIXED-USE DEVELOPMENT AT 203 ASHMORE ROAD BENOWA

Prepared for

Benowa Gardens Pty Ltd ATF

Attention: Wei-Cheng Lu

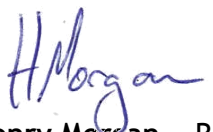
Document Reference

24191 - SBSMP/3

Record of Issue:

Issue	Status	Author	Date	Checked	Date	Authorised	Date
0	For Approval	Winston Boon	25 Oct 2024	Henry Morgan RPEQ 11950	30 Oct 2024	Henry Morgan RPEQ 11950	31 Oct 2024
1	For Approval	Winston Boon	16 Dec 2024	Henry Morgan RPEQ 11950	18 Dec 2024	Henry Morgan RPEQ 11950	18 Dec 2024
2	For Approval	Liam Goodwin	03 Feb 2025	Matthew Klease	05 Feb 2025	Henry Morgan RPEQ 11950	06 Feb 2025
3	For Approval	Liam Goodwin	06 Feb 2025	Matthew Klease	06 Feb 2025	Henry Morgan RPEQ 11950	06 Feb 2025

This investigation and report has been authorised by Mr Henry Morgan, a Director of Morgan Consulting Engineers Pty Ltd.



Henry Morgan RPEQ 11950 Thursday, 6 February 2025

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1 INTRODUCTION

This Site Based Stormwater Management Plan (SBSMP) has been prepared for the proposed Mixed-Use Development at 203 Ashmore Road, Benowa.

This SBSMP has been prepared to investigate the effects the development will have on stormwater quantity and quality.

The objective of this SBSMP is to ensure that there is no adverse impact by the development on the environmental value of the receiving waters during the construction and operational phases of the development. This SBSMP will also provide recommendations to ensure that the post-development peak outflow conditions are not greater than the pre-development peak outflow conditions.

In order to achieve this objective, this SBSMP:

1. Describes the environmental setting of the development site and precinct;
2. Describes the nature of the subject site as it relates to stormwater quality;
3. Calculates the peak flows from external catchments contributing flows to the stormwater infrastructure onsite; and
4. Identifies potential sources of contaminants and describes the management techniques designed to be employed on the site to achieve the water quality objectives.

The subject site has been assessed against the following guidelines and planning documents:

1. State Planning Policy 2017 (SPP 2017);
2. Urban Stormwater Quality Planning Guidelines 2010;
3. The Queensland Urban Drainage Manual (QUDM);
4. City of Gold Coast's (CoGC) City Plan 2016; and
5. City of Gold Coast's (CoGC) City Plan Policy – Land Development Guidelines.

2 EXISTING SITE

2.1 The Site

The subject site, comprised of Lot 822 RP839746, is approximately 17,660m^2 (1.766ha) in area. The site is occupied by the Benowa Gardens Shopping Centre which contains carparking hardstand and landscaping scattered throughout.

The site generally slopes from the southeast (with an approximate height of 10.00m AHD) to the northwest (with an approximate height of 4.00m AHD). Access to the subject site is currently provided from Carrara Street and Ashmore Road, along the northern and southern site boundary, respectively.

Refer to Figure 2.1 for a Locality Plan.

Figure 2.1 – Locality Plan of Site and Surrounding Area

2.2 Surrounding Area

The site is located within the limits of the CoGC region and is classified as neighbourhood centre under Division 6. The site is predominantly surrounded by primary and secondary schools to the north and west, respectively, and residential properties in all other directions.

3 PROPOSED DEVELOPMENT

The proposed Mixed-Use Development primarily involves:

1. A new mixed-use development consisting of a supermarket and retail tenancies on ground level and commercial tenancies on level two;
2. Three residential towers from level four to level thirteen containing 394 apartments, consisting of two to three bedroom units;
3. Three-level basement carparking for retail staff and customers;
4. Residential carparking on level two and three for residents and visitors;
5. Vehicular access to basement level two and ground level from Carrara Street and Ashmore Road, north and south of the site, respectively; and
6. Dedicated landscaping and deep planting areas throughout the site.

Refer to **Appendix A** for the Proposed Development Plans.

4 EXISTING DRAINAGE PATTERNS

4.1 Existing Infrastructure

Data obtained from the City of Gold Coast (CoGC) ArcGIS database and Before You Dig Australia (BYDA) plans indicate the following existing drainage infrastructure:

1. Multiple stormwater gully pits and manhole structures connected to a 375mm diameter stormwater line within Ashmore Road;
2. Multiple stormwater structures connected to a 450mm to 825mm diameter stormwater line within a drainage easement traversing through the site;
3. Multiple stormwater gully pits and manhole structures connected to a 525mm to 1200mm diameter stormwater line within the intersection of Benowa Road and Carrara Street, north of the site.

Refer to Figure 4.1 for the existing stormwater infrastructure and drainage patterns and **Appendix G** for the CoGC Infrastructure Assets Map.

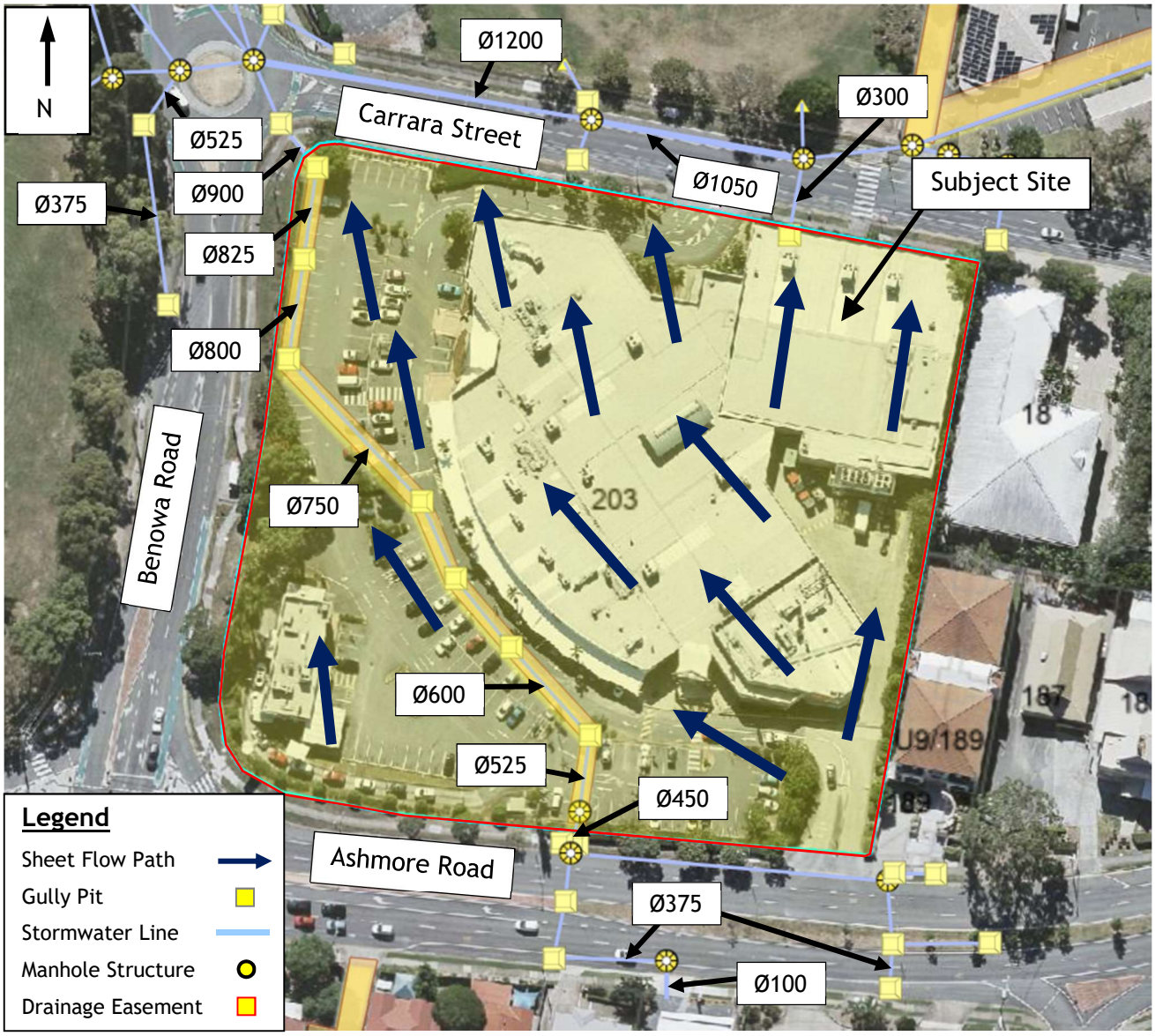


Figure 4.1 – Existing Drainage Paths & Infrastructure

4.2 Existing Drainage Patterns

Following an assessment of the existing site conditions and drainage infrastructure we can confirm that the site has the following drainage patterns:

Roof Catchment:

- Roofwater runoff from the existing shopping centre on site is collected via downpipes to an internal drainage network, where it is then directed to the existing stormwater infrastructure within the intersection of Carrera Street and Benowa Road, northwest of the site.

Surface Runoff

- Surface runoff from the existing shopping centre on site is collected by various stormwater pits connected to the internal drainage network, where it is then directed to the existing stormwater infrastructure within the intersection of Carrera Street and Benowa Road, northwest of the site.

External Catchment

- There is an external catchment from the properties and ground catchments to the south contributing stormwater runoff to the existing stormwater infrastructure within Ashmore Road, south of the site. Stormwater runoff from this external catchment is captured by the 450mm to 850mm diameter stormwater line traversing the site where it is then directed to the existing stormwater infrastructure within the intersection of Carrera Street and Benowa Road, northwest of the site.

Refer to Figure 4.1 for a drainage schematic and **Appendix G** for the CoGC Infrastructure Assets Map.

4.3 Lawful Point of Discharge

The lawful point of discharge (LPD) for the proposed development is the existing stormwater infrastructure within the intersection of Carrer Street and Benowa Road, northwest of the site.

In consideration of the site characteristics, surrounding topology and stormwater drainage infrastructure, the aforementioned proposed lawful point of discharge is considered to be compliant with the criteria for lawful point of discharge outlined in Section 3.9.1. of QUDM 2017 as per below:

i) The location of the proposed discharge point is under the lawful control of the local government or other statutory authority from whom permission to discharge has been received.

ii) The post development discharge will not cause an actionable nuisance, nor environmental or property damage, as the existing flow characteristics and drainage patterns will be maintained for the subject site.

iii) Authority to discharge over affected properties will not be required as the proposed drainage patterns does not impact surrounding properties adjacent to and downstream of the subject site.

Refer to **Section 5** outlining the Stormwater Quantity aspects of this site and **Appendix B** for the CoGC Healthy Waters Code.

5 STORMWATER QUANTITY

A roof and allotment drainage system is to be designed to comply with:

1. AS/NZS 3500.3:2015 - Plumbing and Drainage Part 3: Stormwater Drainage;
2. The Queensland Urban Drainage Manual (QUDM), and;
3. The City of Gold Coast (CoGC) City Plan policies.

As the majority of the site is impervious, there will be no increase in peak discharge stormwater runoff as a result of the proposed development and there will be no worsening of drainage conditions on properties upstream, adjacent to or downstream of the proposed commercial development. Therefore, on-site detention is not warranted for this development in order to achieve pre-development flow conditions.

Refer to **Appendix E** for the Concept Drainage Plan and **Section 6** for the Stormwater Quality Assessment.

5.1 External Catchment Analysis

An analysis of the external catchment was completed to determine the extent of stormwater runoff entering the existing stormwater infrastructure within Ashmore Road, south of the site, and ultimately into the stormwater drainage system traversing the site.

Refer to Table 5-1 for a summary of the minor and major discharge rates for the pre-development flow conditions and **Appendix C** for the Rational Method Calculations for the external catchment.

Table 5-1 – Pre-Development Peak Flows

Property State	50% AEP Q_2 (m^3/s)	20% AEP Q_5 (m^3/s)	10% AEP Q_{10} (m^3/s)	5% AEP Q_{20} (m^3/s)	2% AEP Q_{50} (m^3/s)	1% AEP Q_{100} (m^3/s)
Pre-development	0.180	0.272	0.337	0.405	0.509	0.561

It is proposed to install a 600mm diameter stormwater line at minimum 1.0% grade along the southern and western property boundary to convey stormwater flows from the contributing external catchment to the stormwater infrastructure within the intersection of Benowa Road and Carrara Street, northwest of the site. This stormwater line has the capacity to convey approximately 700L/s and will be contained within a 3.0m wide drainage easement containing a vegetated swale providing an additional conveyance volume of approximately 400L/s for emergency overflow.

Refer to **Appendix D** for the Channel Capacity Analysis of the vegetated swale and **Appendix F** for the Concept External Catchment Plan.

5.2 Proposed Drainage Patterns

The proposed drainage patterns for the propose development are as follows:

<u>Roof Catchment:</u>

- Runoff from the proposed roof catchment will flow via downpipes to an internal drainage network, where it will be directed to the Lawful Point of Discharge, northwest of the site.

Ground Catchment:

- Surface runoff from the proposed ground catchment will be collected by various stormwater pits connected to the internal drainage network, where it will be directed to the Lawful Point of Discharge, northwest of the site.

External Catchment:

- Stormwater runoff from the external catchment will be conveyed to the existing stormwater infrastructure within Ashmore Road and diverted through the new stormwater line along the southwest property boundary, which will ultimately be conveyed to the Lawful Point of Discharge, northwest of the site.

Refer to **Appendix E** for the Concept Drainage Plan and **Section 6** for the Stormwater Quality Management Plan.

6 STORMWATER QUALITY

The following section of the report will outline the potential contaminants and proposed solutions to be incorporated during the construction and operational phases of the proposed development.

6.1 State Planning Policy Assessment

The purpose of this sub section is to determine if State Planning Policy (*SPP 2017*) stormwater quality requirements, as set out by the Department of Environment and Resource Management, will be triggered for this development. Refer to Table 6-1 for the State Planning Policy Checklist for stormwater quality.

Table 6-1 – State Planning Policy Checklist

Material Change of Use (MCU)	Y/N?
MCU for an urban purpose that involves premises ≥ 2500m^2	Y
AND Will result in 6 or more dwellings	Y
OR Will result in impervious area greater than 25% of the net developable area.	Y

The development has been assessed against the latest State Planning Policy 2017 (*SPP 2017*). The subject site will entail the material change of use for urban purposes, which will involve a land area greater than 2,500m^2. Consequently, the State Planning Policy 2017 (*SPP 2017*) is triggered.

6.2 Construction Phase

Sediment generated during the construction phase shall be dealt with in accordance with best practice and sediment control. Sediment generated during the construction phase shall be dealt with in accordance with an Erosion and Sediment Control Plan and kept on site during the construction phase.

Erosion and Sediment Control (ESC) Measures such as silt fences, diversion drains, drainage structure protection and dust control (clearing) will be implemented. Silt fences are to be erected along the boundary of the site and around the construction area. These fences are to be cleaned by the contractor when the capacity is reduced by 25%. Where possible, disturbance to the existing surface is to be limited to the immediate work area. The existing ground cover is not to be stripped until the contractor is ready for earthworks to begin.

Stockpiles and construction materials are not permitted to be stored within the road reserve and should be contained using silt fences. Diversion drains are to be provided at upstream catchments to reduce flows to earthworks areas. In any areas where flows could enter adjacent properties temporary stabilisation is to be provided.

All ESC measures are to be provided as soon as earthworks have commenced and staged to suit construction. The contractor is responsible for this action. A temporary construction exit is to be located at each entry point to the site and will be determined based on the stage of works being completed. The contractor is to ensure all dust tracked onto surrounding roads is immediately swept to remove silt/dust.

All new stormwater pits are to be protected from sediment infiltration by wrapping new pits and grates in geofabric or covering appropriately with timber board. Silt fences are to remain in place during the maintenance period until the site is established (80% ground cover) and accepted “Off Maintenance” by City of Gold Coast.

Potential sources of contaminants identified for the construction phase of the development are outlined in Table 6-3 together with proposed stormwater quality improvement devices, management and maintenance procedures.

Table 6-3 - Potential Contaminants and Proposed Treatments for Construction Phase

Pollutant	Potential Source	Management / Maintenance Procedures	Proposed Treatment Device and Maintenance Procedure
Sediment & Eroded material	Excavated material, fill material, exposed ground, stockpiles of material.	Provision of sediment and silt barriers to the site drainage entry and exit points.	Sand filled filter socks. Removal of excess sand/silt build-up at regular intervals and after every storm.
Dust	Stockpiles of material, exposed ground.	Covering the material or wetting it down at regular intervals.	Coverage of material with plastic, geotextile, surface binding agents or regular watering.
Litter	Refuse generated by staff.	Construction waste is to be cleaned off the site area and disposed of into an industrial bin then removed by a refuse collection contractor.	Industrial bin is to be provided within the construction area - to be emptied on at least a weekly basis.
Concrete	Washing of concrete trucks/tools to remove wet/unused concrete.	Provision of a closed area onsite for washing off of concrete slurries.	Liquids to be removed by a waste collection contractor. Solids to be placed into a refuse bin.
Surfactants (detergents)	Washing down operations on hardstand area using detergents.	No cleaning of vehicles will be permitted on site.	Monitoring & prevention
Chemical (Paints, thinners etc.)	Typically this may occur due to spillage of product.	Where spills occur, the containment area is to stop escape. The material is to be treated (as required) and removed and cleaned by a licensed contractor. Minor spillage outside this area shall be cleaned up with cloths and disposed of to waste via the industrial bin.	A temporary containment area. This is to be impermeable and of a size to permit mixing/transfer, and with a storage volume of twice the largest container used. Treatment of spills is to occur on site. No discharge of treated water to the stormwater system is to occur without council approval. Incidents are to be reported to the EPA.
Wastewater	Spillage from the relocation of the existing sewerage reticulation.	A licensed contractor shall remove any residue sewage from unused pipes and contaminated soils are to be disposed of via the industrial bin.	No leakage is to be permitted to enter the groundwater or discharge to the stormwater system.

6.3 Operational Phase

As *State Planning Policy 2017 (SPP 2017)* is triggered, the proposed development must provide stormwater quality treatment sufficient to meet the SPP 2017 water quality objectives for South East Queensland.

Water quality objectives (WQO's) for South East Queensland as set out in State Planning Policy 2017 (SPP 2017) should be achieved by identifying and adopting best practise techniques in accordance with the abovementioned guidelines. Refer to Table 6-3 for the target WQO's.

Table 6-3 – Minimum Mean Annual Load Reductions

Contaminant	Minimum Mean Annual Load Reductions
Total Suspended Solids (TSS)	≥ 80%
Total Phosphorus (TP)	≥ 60%
Total Nitrogen (TN)	≥ 45%
Gross Pollutants (GP)	≥ 90%

6.3.1 Sources of Contaminants

Potential sources of contaminants and stormwater quality improvement devices identified for the operational phase of the development are outlined in Table 6-4

Table 6-4- Sources of Contaminants

Target Pollutant Type		Pollutant Size	Acceptable Treatment Examples
Primary Pollutants	Screening of gross pollutants	>5000um	Litter baskets, swales, buffer strips, GPT's, Bio-retention basins
Secondary Pollutants	Sedimentation of coarse to medium sediment	125um - 5000um	Swales, sedimentation basins, ponds
Tertiary Pollutants	Enhanced sedimentation of fine particulates	10um – 125um	Bio-retention basins, constructed wetland macrophyte zones, other bio technologies, proprietary tertiary stormwater treatment devices
	Adhesion and filtration of very fine / colloidal sediment	0.45um – 10um	Constructed wetland macrophyte zones, other bio technologies, proprietary tertiary stormwater treatment devices
	Biological uptake of dissolved particles	<0.45um	Constructed wetland macrophyte zones, other bio technologies

6.3.2 Proposed Treatment Train

The proposed treatment train has been modelled using the following methodology:

1. Stormwater Runoff Capture: Roofwater and surface runoff is captured/directed within the internal stormwater network;

2. Primary Treatment: All surface runoff captured from the site shall be treated by Litter Baskets (Atlan Stormsacks or approval equivalent) before discharging from the site;

3. Secondary/Tertiary Treatment: All stormwater runoff captured from the site shall be trated by end of line Atlan Filters housed in 2 Atlan Vaults.

All runoff described above will then discharge to the legal point of discharge. Refer to Table 6-5 for details of the proposed treatment train assets.

Table 6-5- Proposed Treatment Assets

Treatment Level	Treatment Asset	Description
Primary	Litter Baskets	12 x Atlan Stormsack (or approved equivalent) Litter Baskets to be installed within the stormwater pits of the site.
Primary/ Secondary/ Tertiary	Secondary/Tertiary Treatment Device	15 x Atlan Filters (or approved equivalent) housed in 2 Atlan Vaults to be installed.

6.3.3 Pollutant Export Modelling

Following the definition of water quality objectives for the site and an assessment of the treatment options suitable for the development, the most appropriate treatment scheme for the site was identified. The impact of the stormwater management strategy on the quality of stormwater runoff discharged from the site has been assessed using the pollutant export model, *Model for Urban Stormwater Improvement Conceptualisation* (MUSIC).

6.3.4 MUSIC Modelling Parameters

The MUSIC model was set up in accordance with the Water-By-Design *MUSIC Modelling Guidelines for South East Queensland* to the parameters listed in Table 6-6 and Table 6-7. Refer to Figure 6.1 for source node areas.

Table 6-6 – MUSIC Parameters

Parameter	Data Used
Rainfall Data	40584 HINZE DAM
Modelling Timestep	6 minutes
Routing	No routing drain links were adopted

Table 6-7 – Catchment Runoff Generation Parameters

Parameter	Commercial Catchment
Rainfall Threshold	1
Soil Storage Capacity (mm)	18
Initial Storage Capacity (% capacity)	10
Field Capacity (mm)	80
Infiltration Capacity Coefficient a	243
Infiltration Capacity Coefficient b	0.6
Initial Depth (mm)	50
Daily Recharge Rate (%)	0
Daily Baseflow Rate (%)	31
Daily Deep Seepage Rate (%)	0

6.3.5 MUSIC Modelling Results

Refer to Figure 6.1 for a print screen schematic of the MUSIC model for the proposed development and Figure 6.2 for the annual pollutant loads that will be discharged from the site for the proposed development.

Figure 6.1 - MUSIC Model Print Screen Schematic

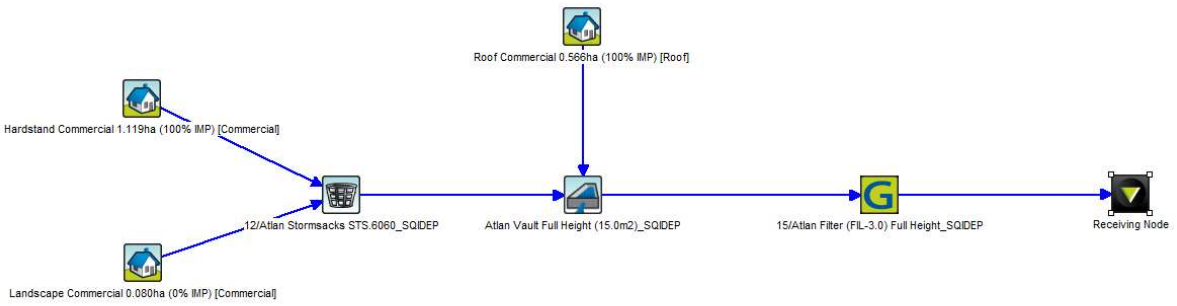
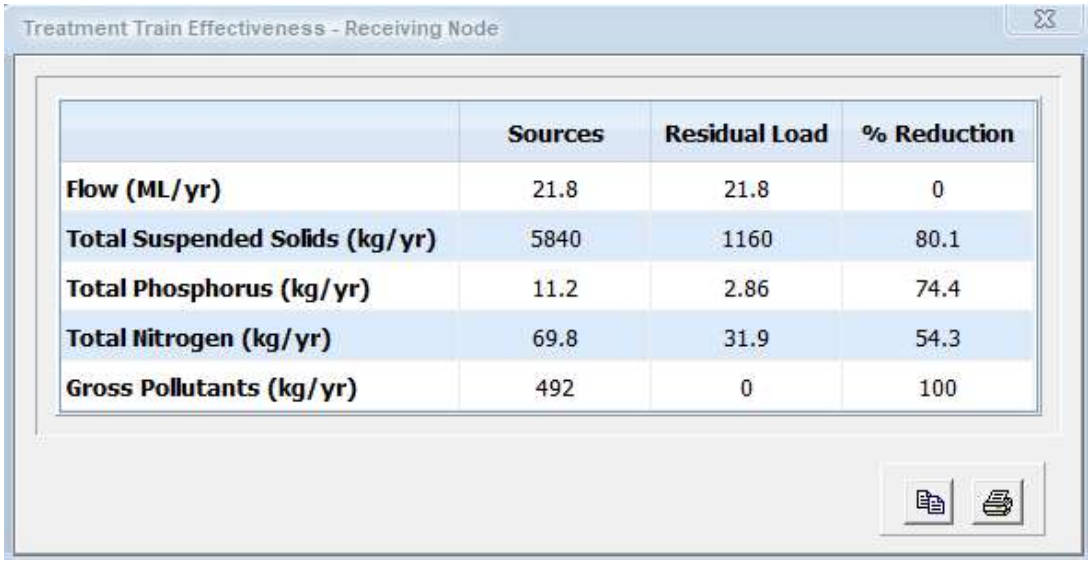


Figure 6.2 - MUSIC Modelling Results



	Sources	Residual Load	% Reduction
Flow (ML/yr)	21.8	21.8	0
Total Suspended Solids (kg/yr)	5840	1160	80.1
Total Phosphorus (kg/yr)	11.2	2.86	74.4
Total Nitrogen (kg/yr)	69.8	31.9	54.3
Gross Pollutants (kg/yr)	492	0	100

The modelling results show that the pollutant reduction objectives are met for all contaminants given in Section 6.

Should operational requirements change, this plan is required to be amended to suit. Substantial changes may require resubmission to the local authority. Following completion of construction, this plan is to be incorporated into the total-site management practices.

7 FLOODING

A Flood Planning Map was obtained from City of Gold Coast (CoGC). The map indicates that a small portion of the northern property boundary is within the maximum regional flood extent, with an existing ground level at the centre of the property at approximately 6.920m AHD. As the maximum defined flood level is approximately 3.857m AHD, it is expected that the subject site will achieve flood immunity.

Refer to **Appendix H** for the CoGC Flood Planning Map.

8 CONCLUSION

The proposed Mixed-Use Development at 203 Ashmore Road, Benowa has been assessed for its impact on the quantity and quality of stormwater drainage.

The lawful point of discharge is the existing stormwater infrastructure within the intersection of Benowa Road and Carrara Street, northwest of the site.

On-site detention is not warranted for this development.

Sediment generated during the construction phase shall be dealt with in accordance with an Erosion and Sediment Control Plan to be kept on site during the construction phase.

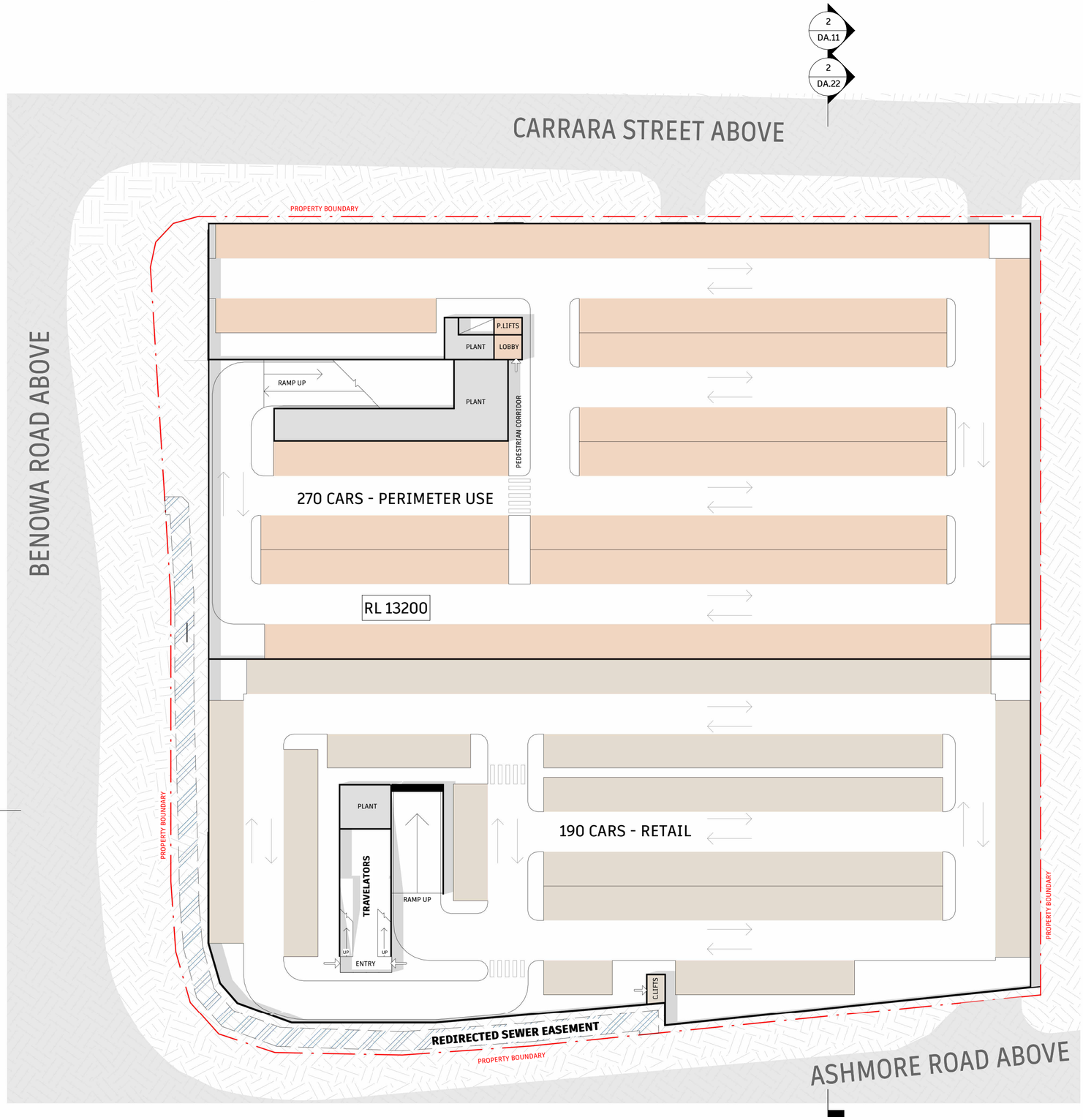
As the development involves the material change of use for urban purposes which involve a land area greater than 2,500m^2, the State Planning Policy 2017 (SPP 2017) is triggered. The water quality objectives (WQO's) have therefore been achieved by treating the proposed roof and surface stormwater runoff via litter baskets and filter cartridges prior to discharging to the Lawful Point of Discharge.

The subject site is able to achieve flood immunity.

APPENDIX A

PROPOSED DEVELOPMENT PLANS

FLOOR PLAN-BASEMENT 3 (RETAIL)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

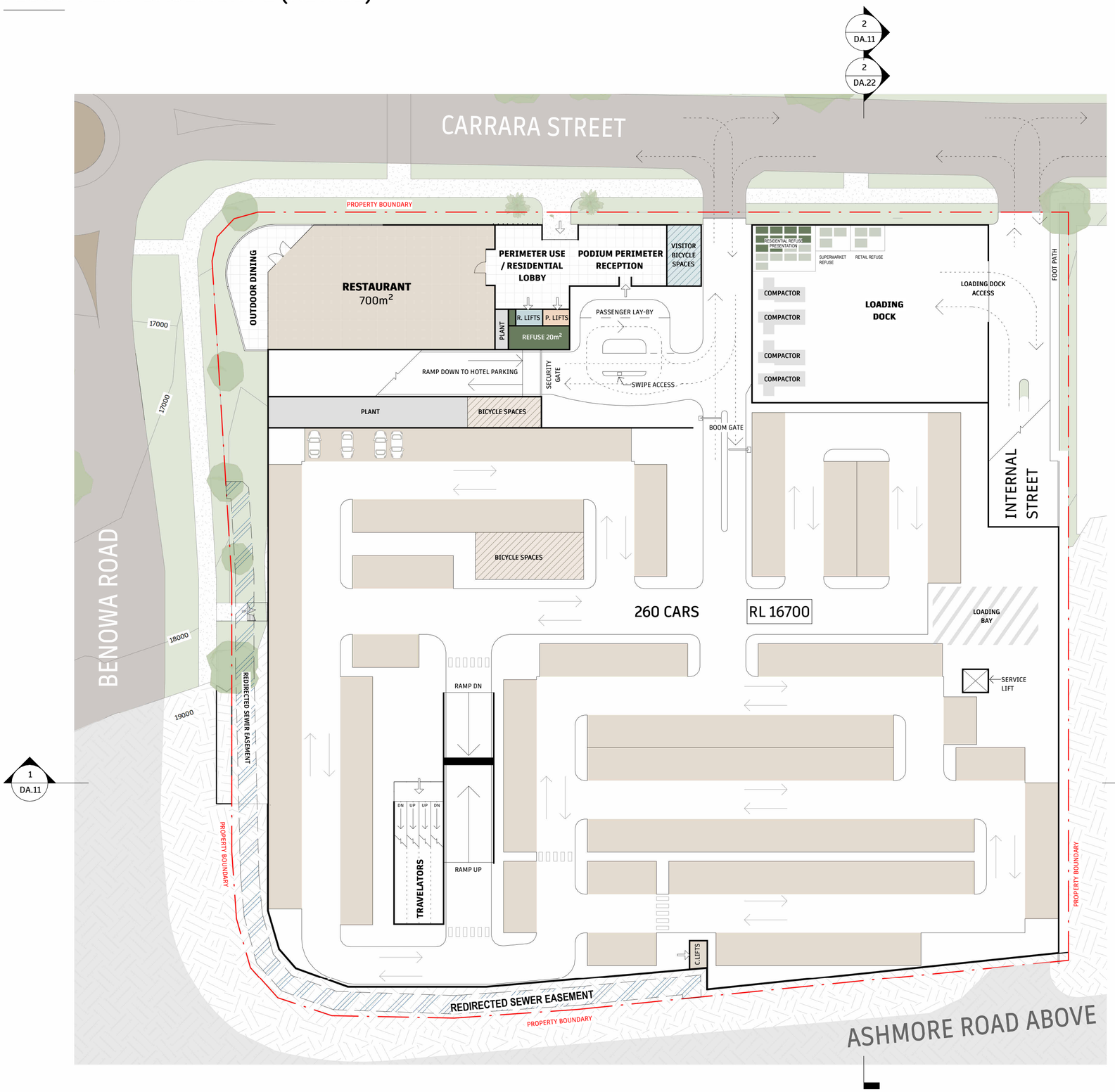
TOTAL CARPARKS	1,460

BASEMENT 3 CARPARK - RETAIL / HOTEL

1 : 500

0 5 10 25 45m

FLOOR PLAN-BASEMENT 2 (RETAIL)



BASEMENT 2 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

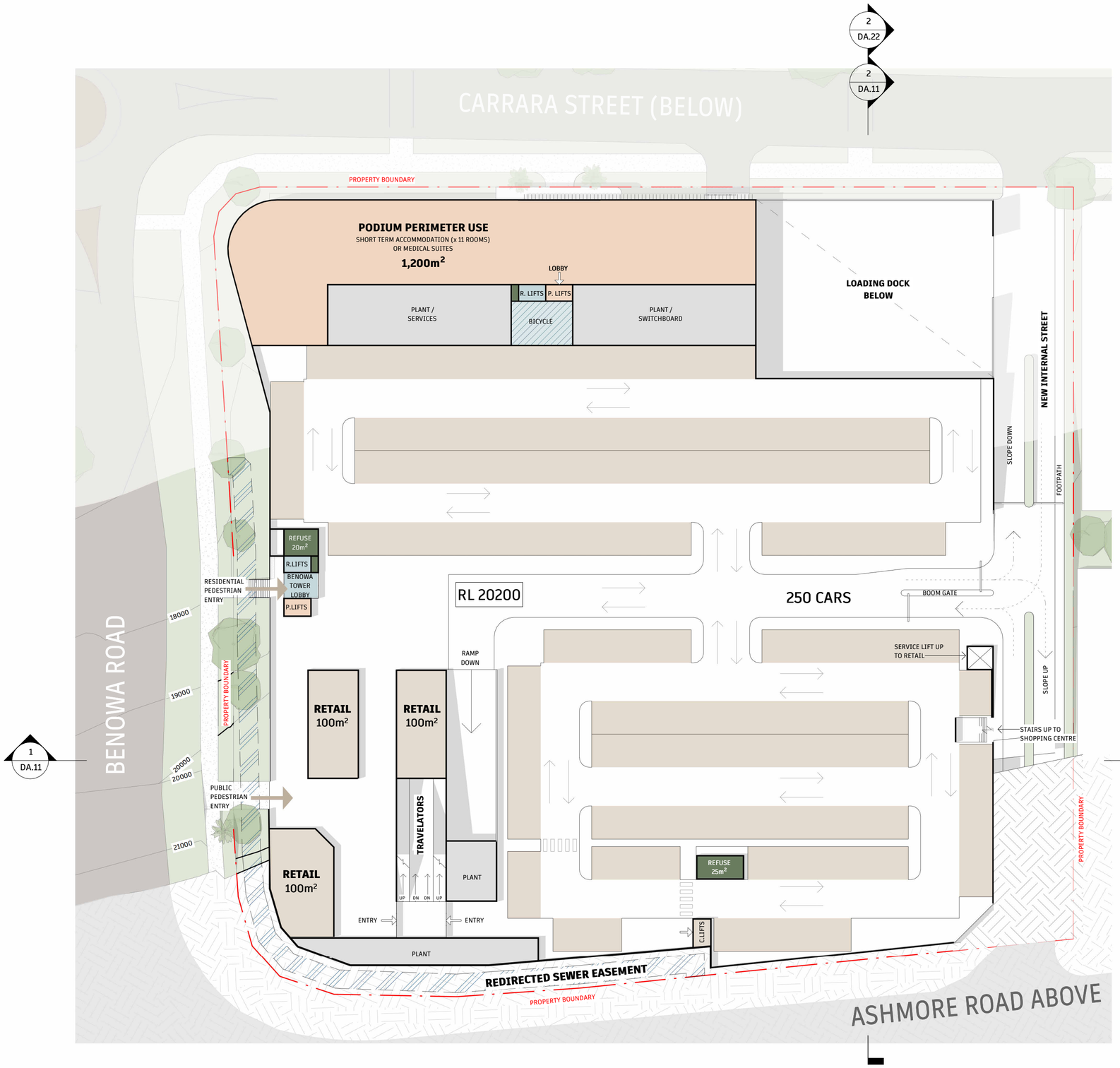
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-BASEMENT 1 (RETAIL)



BASEMENT 1 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

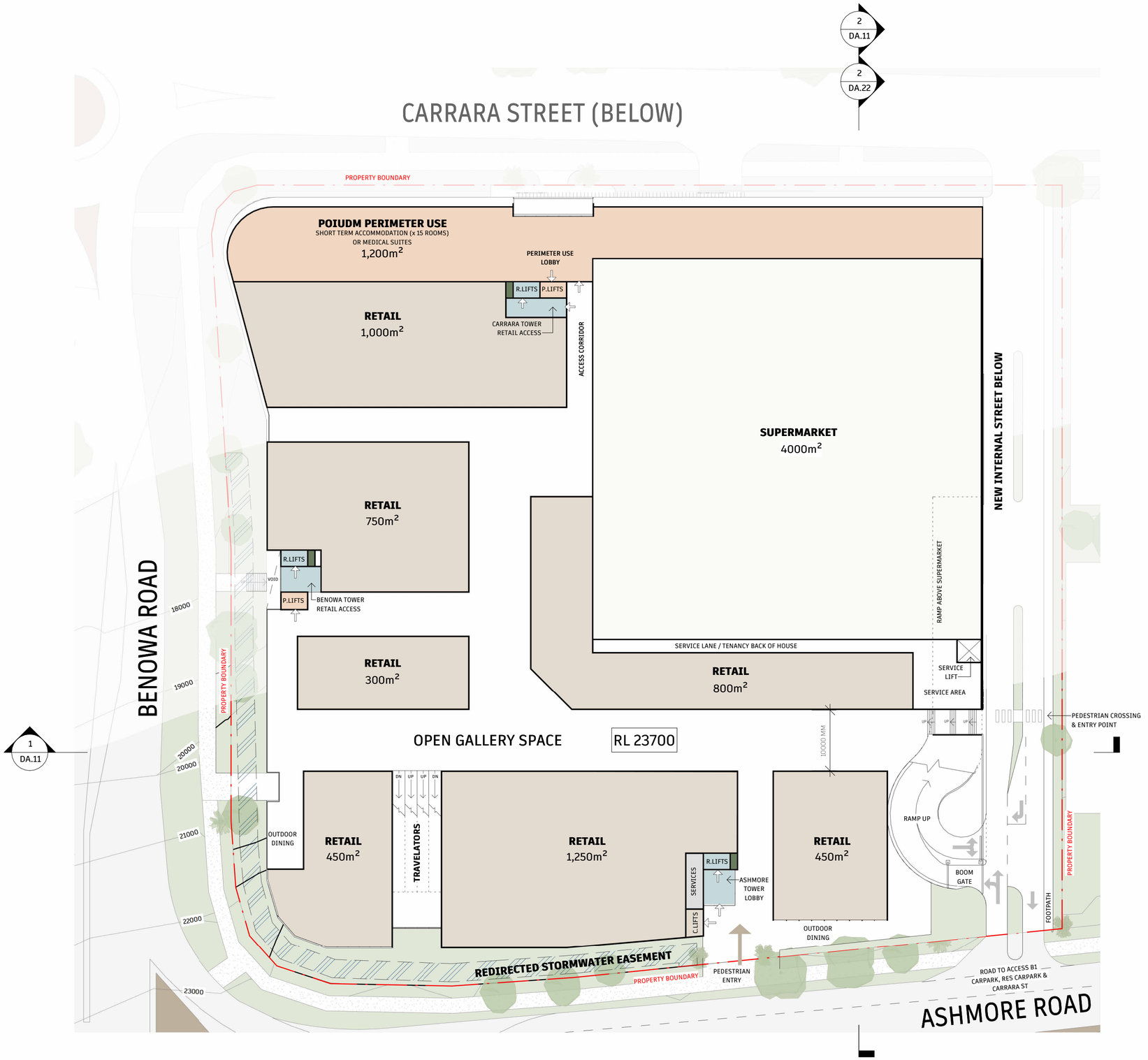
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-SHOPPING CENTRE



LEGEND

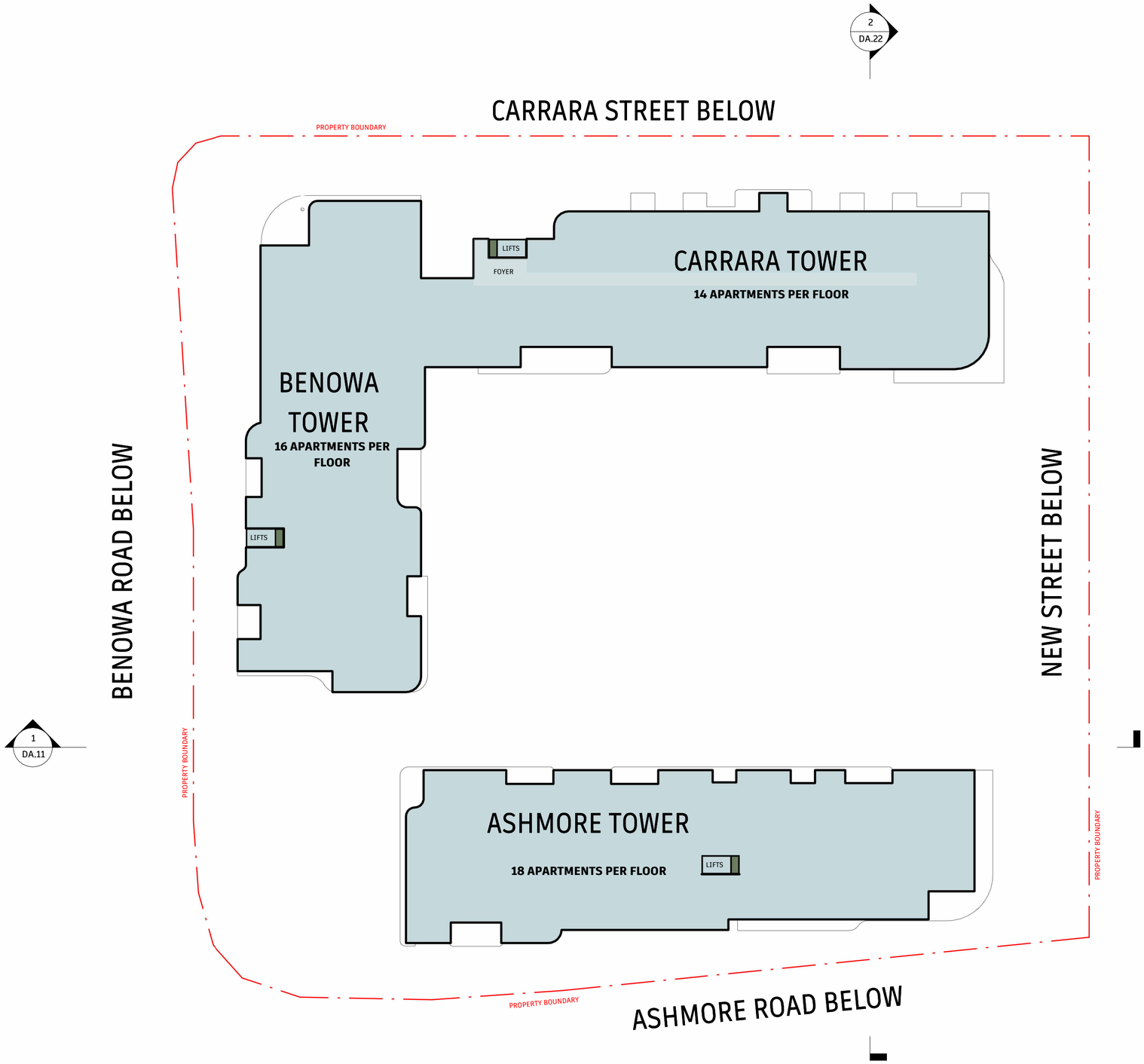
- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

SHOPPING CENTRE

1 : 500

0 5 10 25 45m

FLOOR PLAN-TYPICAL TOWER PLAN



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

TYPICAL RESIDENTIAL FLOOR

1 : 500

0 5 10 25 45m

APPENDIX B

COGC HEALTHY WATERS CODE

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Erosion and Sediment Control				
PO1 Stormwater discharge from a development site achieves the construction phase water quality objectives of **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.**	**AO1** No acceptable outcome provided.	✓	**RO1** The proposal complies. Refer to the SBSMP prepared by MCE.	
PO2 Erosion, sediment and dust is appropriately managed during the construction phase.	**AO2** The level of risk for soil erosion and sediment pollution to the environment is determined by an erosion hazard assessment, completed by a suitably-qualified person in accordance with the criteria in **Table 9.4.5-4: Erosion hazard assessment**. Where the erosion hazard assessment has a risk score of: (a) less than or equal to 10: A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the *Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.* (b) greater than 10 or developments involving multiple stages of disturbance or more than 1.25 ha of land: (i) For material change of use or reconfiguring a lot, a conceptual erosion and sediment control plan (ESCP) is prepared by a	✓	**RO2** An Erosion and Sediment Control Plan shall be prepared (prior to commencement of construction) and maintained for the management of the sediment laden stormwater runoff during the construction phase in accordance with the criteria in **Table 9.4.5-4: Erosion hazard assessment**.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	suitably-qualified person for Council approval in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**, and the *Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008*. (ii) For operational work, a detailed ESCP is prepared by a suitably-qualified person in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**, and *Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008*. The ESCP is to detail appropriate treatment measures for the construction phase of development, demonstrating how the minimum design objectives in **Table 9.4.5-5: Stormwater design objectives** are achieved, including: (a) measures to ensure the release of sediment-laden stormwater for the nominated design storm are minimised when the design storm is exceeded; (b) detailed design, installation, construction, monitoring and maintenance requirements of all approved proprietary products in accordance with local conditions and			

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	manufacturer's recommendations; and (c) details of how the ESCP aligns with the approved development staging plan.			
Stormwater Quality				
PO3 Development appropriately manages stormwater quality to: (d) protect natural ecosystems; (e) protect water quality; (f) reduce runoff and peak flows; and (g) meet the water quality objectives and environmental values for Queensland waters. **Note: Water quality objectives and environmental values for Queensland waters are contained within** *Schedule 1* **of the** *Environmental Protection (Water) Policy 2009***. Water quality objectives are locally specific and vary between and within river catchments.** Note: A stormwater quality management plan prepared by a suitably qualified person in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards, is Council's preferred method for addressing this performance outcome.	**AO3.1** For post developed sites, the following minimum pollutant reduction targets are achieved: (h) Gross pollutants (>5mm) – 90%; (i) Total Suspended Solids (TSS) – 80%, (j) Total Phosphorus (TP) – 60%; and Total Nitrogen (TN) – 45%.	✓	**RO3.1** The proposal complies. Refer to the SBSMP prepared by MCE.	
	AO3.2 For development on land less than 1.25ha, a deemed to comply solution for stormwater quality is achieved in accordance with **Table 9.4.5-6: Stormwater quality deemed to comply solutions**.	**N/A**		
	AO3.3 For development on land greater than 1.25ha, a stormwater quality management plan is to be prepared by a suitably qualified person in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**, is required.	**N/A**	**RO3.3** The proposal complies and is in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**. Refer to the SBSMP prepared by MCE.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Waterway Stability				
PO4 In-stream erosion, downstream of urban development is prevented by controlling the rate (or magnitude) and duration of sediment transporting flows.	**AO4** Post-development peak 0.632 Annual Exceedance Probability (AEP) event discharge within receiving waterway is limited to pre-development peak 0.632 AEP event discharge and is in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.**	✓	**RO4** The proposal complies and is in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.**	
Stormwater Quantity Control				
PO5 Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.	**AO5** The following is achieved external to the development site: (a) no increase in peak flood flow rate from the development site for all events up to and including the 1% AEP; (b) no increase in peak flood velocities from the development site for all events up to and including the 1% AEP; (c) no increase in peak flood level from the development site for all events up to and including the 1% AEP; and (d) stormwater outfalls or discharge is located to avoid conflict with existing usage of downstream land or impacts on existing watercourse or drainage.	✓	**RO5** The proposal complies. Refer to the SBSMP prepared by MCE.	
Lawful point of discharge				
PO6 Development ensures the stormwater systems are designed to not cause actionable nuisance that would adversely affect adjoining (upstream or downstream) properties.	**AO6** A lawful point of discharge must be identified and demonstrated that all discharge point/s from the development are in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive**	✓	**RO6** The proposal complies and is in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water**	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	urban design standards.		**sensitive urban design standards**.	
Overland flow paths				
PO7 Development must not obstruct free open surface flow of stormwater through a site.	**AO7** Overland flowing stormwater is allowed free open surface flow between the street and any waterway at the rear or sides of a property, in accordance with the provisions of the *Building Code of Australia.*	✓	**RO7** The proposal complies.	
Whole of life costs				
PO8 Stormwater infrastructure is designed and constructed to: (k) remain fit for purpose for the life of the development and maintains full functionality in the design flood event; (l) be cost effective to maintain; and (m) ensure no structural damage to existing stormwater infrastructure.	**AO8** No acceptable outcome provided.	✓	**RO8** The proposal complies.	
Landscape integration				
PO9 Stormwater treatment devices and stormwater infrastructure are designed to: (n) integrate with the urban design and landscape outcomes of the development; (o) complement natural environments, wetlands and watercourses; (p) protect environmental values; (q) enhance visual amenity; and	**AO9.1** Where stormwater treatment devices and stormwater infrastructure are integrated into public open space, a Statement of Landscape Intent is to be prepared by a suitably qualified person, for approval by Council. The plan is to demonstrate that the operation of stormwater infrastructure does not compromise the function of any co-located uses and reflect the design principles within **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.**	✓	**RO9.1** The proposal complies and reflects the design principles within **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
(r) incorporate CPTED principles in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.	**Note: A Statement of landscape intent is to be prepared in accordance with SC6.13 City Plan policy – Landscape work.**			
	AO9.2 Stormwater treatment devices are located offline to any upstream catchment. **Note: This provision relates to the integration of stormwater treatment devices and stormwater infrastructure into the landscape. Development identified on the Environmental significance – wetlands and watercourse overlay map will still require assessment against the Environmental significance overlay code.**	✓	**RO9.2** Refer to RO9.1.	
	AO9.3 All stormwater outlets that are located adjacent to watercourses, creeks and drainage paths are aligned at a maximum of 45 degrees to the downstream direction of flow, and energy dissipation measures installed to minimise scour.	✓	**RO9.2** Refer to RO9.1.	
Public safety				
PO10 Stormwater treatment devices and stormwater infrastructure minimise impacts on public health and safety.	**AO10** All stormwater quantity control measures are designed in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Maintenance access				
PO11 Maintenance access is provided for all stormwater management systems and considers: (s) the type of vehicle or machinery needed to service particular assets; and (t) the need to ensure a safe working environment for maintenance personnel and the public.	**AO11.1** All weather vehicle access is to be provided to inlet zones of the stormwater treatment systems in accordance with **Table 9.4.5-7: Maintenance access requirements (slope).**	**N/A**		
	AO11.2 Maintenance access is to be provided around the perimeter of all stormwater treatment systems in accordance with **Table 9.4.5-8: Maintenance access requirements (size).**	**N/A**		
	AO11.3 A maintenance buffer is provided around the perimeter of all stormwater treatment devices and adjoining private property equal to: (a) 1m in width; or (b) the width of a perimeter maintenance access, as delivered in AO11.2, plus 0.5m. The maintenance buffer is measured from the adjacent allotment boundary to the top of batter around the treatment measure. The maximum slope on the maintenance buffer is 1 in 10.	**N/A**		
Fauna movement				
PO12 Stormwater conveyance structures and channels are designed to ensure the safe movement of native fauna and provide for terrestrial and aquatic passage.	**AO12.1** Stormwater drainage structures and channels minimise impacts on aquatic fauna and associated habitats and provide opportunities for beneficial habitat uses of structures in accordance with the *Department of Primary Industries and Fisheries – Fisheries guidelines for Fish-friendly structures (2006).*	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	AO12.2 Stormwater drainage structures allow for the safe movement of terrestrial fauna in accordance with: (a) the Queensland Government Fauna Sensitive Road Design Manual Volume 2: Preferred Practices; and (b) the Queensland Government Koala-Sensitive Design Guidelines.	**N/A**		
Wastewater management				
PO13 Development does not discharge wastewater to receiving waters or areas external to the site unless demonstrated to be the best-practice environmental management for that site and takes into consideration: (a) the applicable water quality objectives for the receiving waters; and (b) the potential adverse impact on ecosystem health of receiving waters.	**AO13** Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP) is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following: (a) wastewater type; (b) climatic conditions; (c) water quality objectives; (d) best-practice environmental management; (e) waste management hierarchy; and (f) the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that: (i) avoids wastewater discharge to watercourses; or (ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to watercourses is minimised through re-use, recycling, recovery and treatment	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	for disposal to sewer, surface water and groundwater.			
Dewatering management				
PO14 Dewatering occurs in accordance with an approved Dewatering management plan.	**AO14** No acceptable outcome provided.	**N/A**		
Woongoolba flood mitigation catchment area				
PO15 In the Woongoolba flood mitigation catchment area, shown on the **Water catchments and dual supply system area overlay map**, peak outflow and its timing for Q2, Q5 and Q10 for rainfall events up to 72 hours does not change as a result of development.	**AO15** No acceptable outcome provided.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

APPENDIX C

RATIONAL METHOD CALCULATIONS

Rational Method Peak Flow Calculations

Job No: 24191
Job Type: Proposed Commercial Development
Address: 203 Ashmore Road, Benowa
Council: CoGC

MORGAN CONSULTING
ENGINEERS PTY LTD
1 GREAT GEORGE STREET
PADDINGTON QLD 4064

IFD Data: 27.4625 (S),152.9875 (E)
$^{1}I_{10}$ 69mm/hr
Minor Storm: Q10
Major Storm: Q100
Designed: WB
Checked: HM

External Catchment Pre-Development

Time of Concentration

Standard Inlet Time

Standard Inlet Time	15	*mins*	QUDM (Urban residential areas where average slope at top of catchment is up to 3%)

Sheet Flow (Friends Equation)

Sheet flow length (L)		*m*	
roughness (n)			short grass
Fall of NSL		*m*	
Slope of Surface (S)		*%*	
total	**0.0**	*mins*	

Kerb Flow (QUDM)

Length of KOC (m)	
Slope (%)	
total	

t = 0.025L/S^0.5

Total t_c **15.0** *mins*

Runoff Volume Calculations

Name	Area (ha)	tc	f_i	C_{10}
	0.9489		0.90	0.88
Total	0.949	15.0		0.88

ARI (years)	Frequency Factor (F_y)	Cy (F_y*C_{10})	Iy (mm/h)	A (Ha)	Q_y (m_3/s)
3 mth					0.075
1	0.800	0.701	81	0.949	0.150
2	0.850	0.745	92	0.949	0.180
5	0.950	0.832	124	0.949	0.272
10	1.000	0.876	146	0.949	0.337
20	1.050	0.920	167	0.949	0.405
50	1.150	1.000	193	0.949	0.509
100	1.200	1.000	213	0.949	0.561

Pipe size required at outlet to maintain existing minor flow:

Item	
dia (mm)	600
A (m2)	0.28
(n)	0.011
P	1.88
Slope (%)	1
Slope (1 in X)	100.0
Pipe Capacity, Q (m3/s)	0.726
Total Minor Storm Peak Flow (m3/s)	0.180

$$Q = \frac{1.0}{n} A R^{2/3} S^{1/2}$$

30/10/2024

APPENDIX D

CHANNEL CAPACITY ANALYSIS

Job No:	24191	
Job Type:	Proposed Mixed-Use Development	
Address:	203 Ashmore Road, Benowa	
Council:	CoGC	

MORGAN CONSULTING
ENGINEERS PTY LTD
1 GREAT GEORGE STREET
PADDINGTON QLD 4064

Description : Channel assessment of proposed vegetated swale within drainage easement

Designer : WB
Checked : HM

Comments : Capturing emergency overflows

RL of swale channel	0.75	depth (m)							
water lev	0.85	0.100							
slope	1.000		A	B	P	R		AR2/3	PR5/3
mann n (const)	0.070		0.18	2.10	2.98	0.06		0.02772015	0.0277461
V	2.20								
V*d	0.22	m2/s							
Q uniform	0.396	m3/s	SIMPLE , UNIFORM FLOW (n constant)						
Q compound	0.052	m3/s	COMPOUND CROSS SECTION (ARR 1987 , 4.38) (n varies)						
Freeboard (m)	0.15								

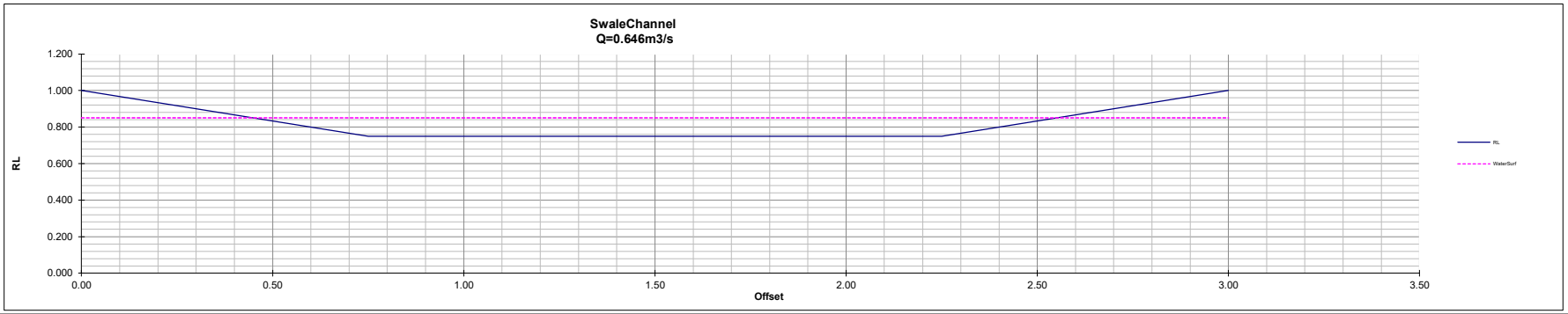
Summation			K		
1.19	0.04	0.05	0.05		0.40

Pt	location	Offset	RL	n	Z	area	perimeter	Pn^1.5	B	R	A^5/3 / p^2/3	A^5/3 / (n*P^2/3)	K= A.R^2/3/n	PR^5/3/n	Q-sect (uniform)	Q-sect (compound)	v	Water RL
1	Property boundary	0.00	1.000	0.700	-33.3%	0.02	0.32	0.185	0.30	0.05	0.00	0.00	0.003	0.003	0.021	0.00	0.19	0.85
2	Base of swale (LHS)	0.75	0.750	0.700	0.0%	0.15	1.50	0.878	1.50	0.10	0.03	0.05	0.045	0.045	0.343	0.05	0.31	0.85
3	Base of swale (RHS)	2.25	0.750	0.700	33.3%	0.02	0.32	0.185	0.30	0.05	0.00	0.00	0.003	0.003	0.021	0.00	0.19	0.85
4	Top of swale (RHS)	3.00	1.000	0.700		0.00	0.00	0.001	0.00	1.00	0.00	0.00	0.001	0.001	0.011	0.00	1.43	0.85
5	Building extent		1.000	0.700		0.00	0.85	0.498	0.00	0.00	0.00	0.00	0.000	0.000	0.000	0.00	0.01	0.85
6																		
7																		
8																		
10																		
11																		

(insert new lines above this termination line)

Qdes 0.022 *External Catchment Flow

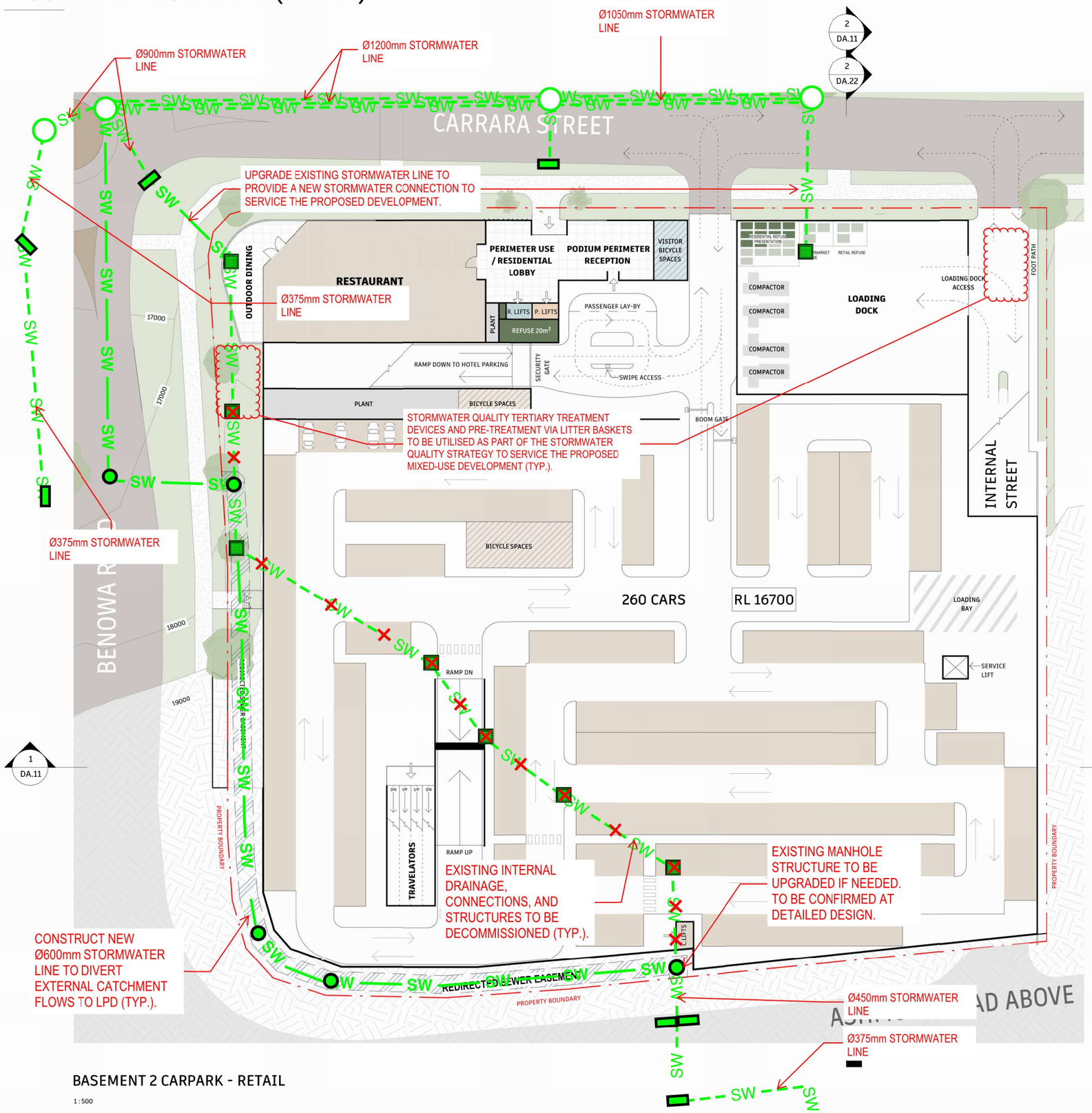
Composite n values	0.700	Horton n= (ARR87 4.30)	0.700	Carroll n= (QUDM 8.03)	0.529	Lotter n= (ARR87 4.31)



APPENDIX E

CONCEPT DRAINAGE PLAN

FLOOR PLAN-BASEMENT 2 (RETAIL)

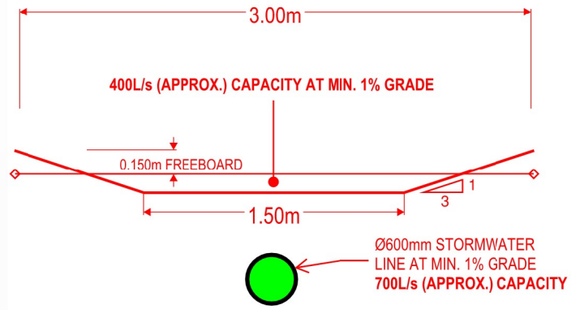


BASEMENT 2 CARPARK - RETAIL

1:500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE



TYPICAL SWALE DETAIL

N.T.S.

CONCEPT DRAINAGE PLAN

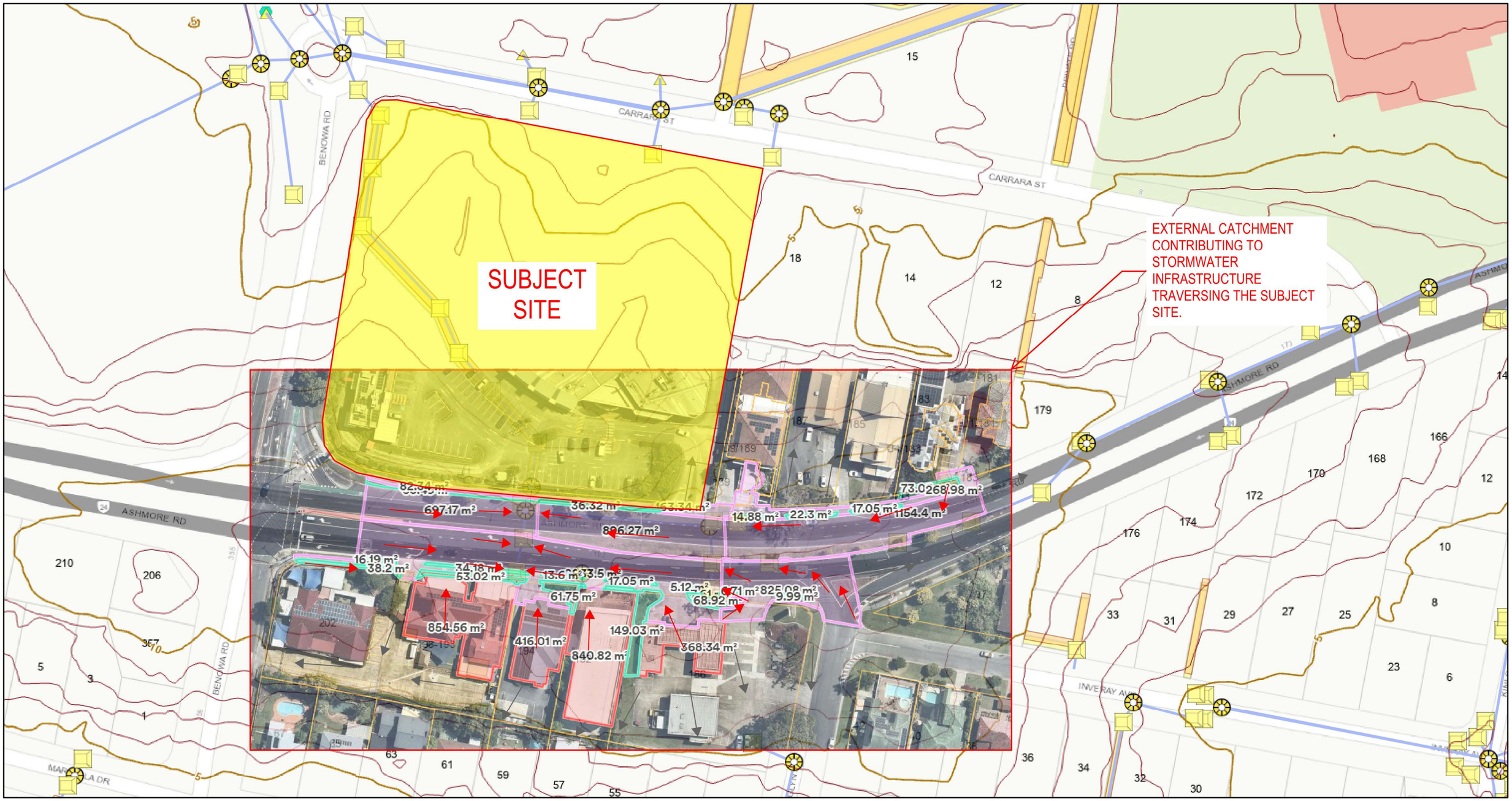
MCE 24191

LG_REV-3 06-02-25

0 5 10 25 45m

APPENDIX F

CONCEPT EXTERNAL CATCHMENT PLAN



EXTERNAL CATCHMENT FLOWS

FLOWS NOT CONTRIBUTING TO EXTERNAL CATCHMENT

CONCEPT EXTERNAL CATCHMENT PLAN
MCE 24191
WB_REV-1 06-02-25

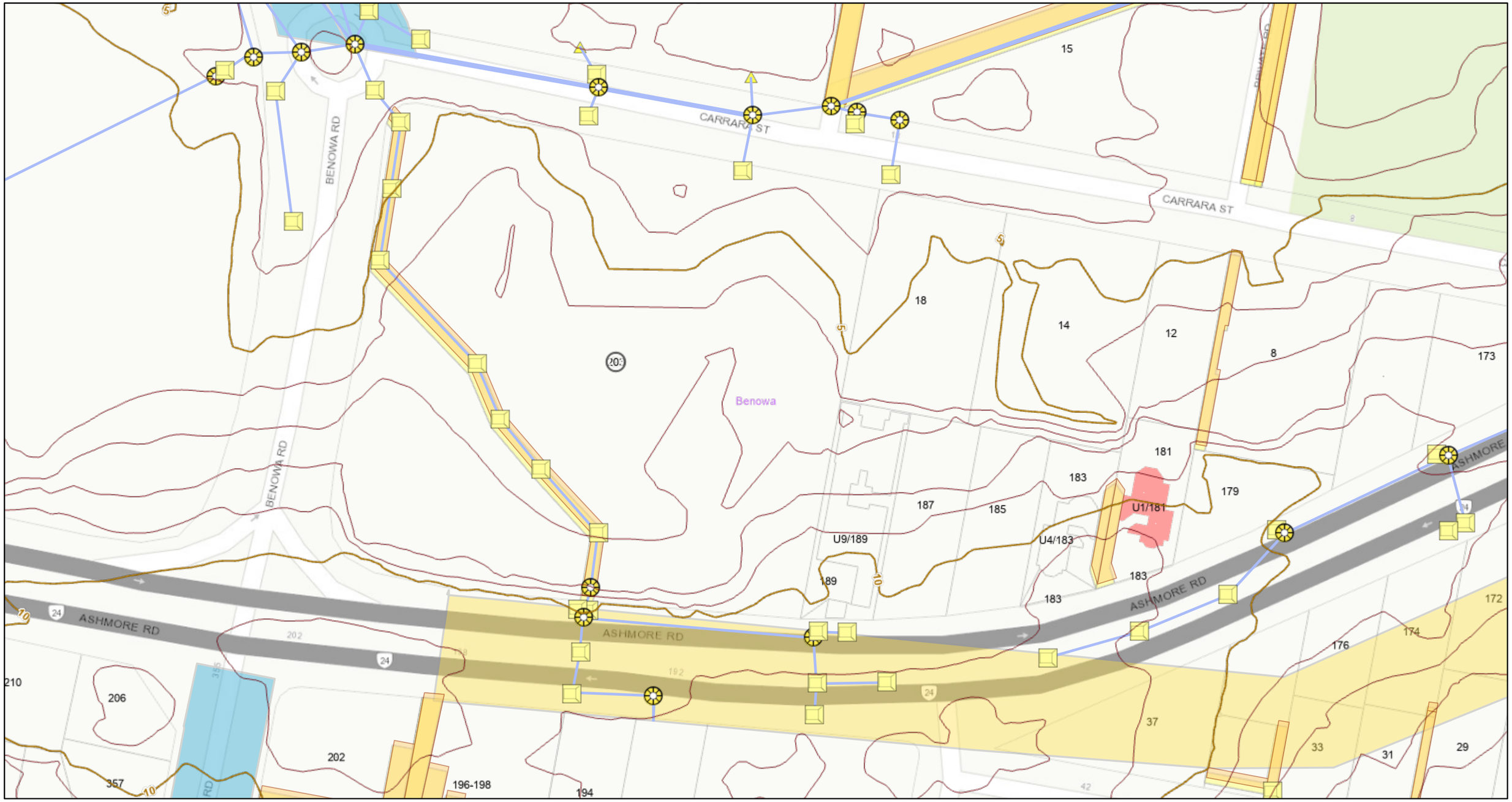
1:1,500

0 0.01 0.03 0.06 mi
0 0.03 0.05 0.1 km

APPENDIX G

COGC INFRASTRUCTURE ASSETS MAP

CoGC Infrastructure Assets Map



22/10/2024

1:1,200

5m Contour Interval
- Minor Contour
- 1 m Contour Interval
- LGA_Boundary

Drainage Pit
- Inlet Gully
- Manhole
- Drainage Pipe
- Stormwater End Structure

Easement

Capital_Works
- 2017-18
- 2020-21

Addresses

Cadastral parcels
- Base
- Easement
- Strata (Lot)
- Locality Boundaries

0 0.01 0.03 0.05 mi
0 0.02 0.04 0.08 km

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APPENDIX H

COGC FLOOD MAP

CITY OF GOLDCOAST.

Flood planning map

Esri Community Maps Contributors, Department of Resources, DESI, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, Foursquare, METI/NASA, USGS

Powered by Esri

Transport Engineering Report

Proposed Mixed-Use Development – Preliminary Approval

203 Ashmore Road Benowa

About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

T: (07) 3327 9500
F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au

Revision Record

No.	Author	Reviewed/Approved	Description	Date
1.	B. Vanetti/ M. Grierson	M. Grierson	Preliminary Approval Report	05/02/2025
2.	B. Vanetti/ M. Grierson	M. Grierson	Preliminary Report - Update	07/02/2025
3.				
4.				

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Level 8, 369 Ann Street, Brisbane. PO Box 12015 George Street Brisbane 4003

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1. Introduction

1.1. Purpose

Colliers International Engineering and Design (TTMC) Pty Ltd has been engaged by Neylan Architecture to prepare a Transport Engineering Report investigating a proposed Mixed-Use Development located at 203 Ashmore Road Benowa. It is understood this report will accompany a Development Application for a Preliminary Approval for a Mixed Use development to be lodged with the Gold Coast City Council (GCC).

1.2. Scope

The scope of the preliminary transport aspects investigated includes:

- Reviewing the prevailing traffic and transport conditions surrounding the site.
- Identifying at a high level the likely parking supply required to cater for development demands.
- Assessing the access configuration to provide efficient and safe manoeuvring between the site and the public road network for cars, service vehicles, cyclists and pedestrians.
- Identifying the preliminary service vehicle needs for the site.
- Reviewing access to a suitable level of public and active transport provisions.
- Identification of likely traffic volumes and traffic distribution from the development.
- Identification of likely traffic impacts of development on the surrounding road network.

The development plans have been assessed against the following guidelines and planning documents:

- Gold Coast City Council Planning Scheme (City Plan 2014), specifically:
  - *9.4.13 Transport Code (Transport Code)*
- Australian Standards for Parking Facilities, specifically:
  - *Part 1: Off-street car parking (AS2890.1:2004)*
  - *Part 2: Off-street commercial vehicle facilities (AS2890.2:2019)*
  - *Part 3: Bicycle parking (AS2890.3:2015)*
  - *Part 6: Off-street parking for people with disabilities (AS2890.6:2009).*
- Austroads "Guide to Traffic Management" (GTM)

2. Site Context and Travel Environment

2.1. Site Location

The site is located between the intersections of Benowa Road/Carrara Street and Ashmore Road/Benowa Road, Benowa. The property description is Lot 822 on RP 839746 and has a total site area of 17,660m^2. The site is currently occupied by a Shopping Centre, with approximately 17 different business and with vehicle access to Carrara Street and Ashmore Road.

The subject site is currently zoned as Neighbourhood Centre under the City Plan. The surrounding area of the site is zoned as Innovation and Community Facilities.

Figure 2.1 shows the subject site and the surroundings. Figure 2.2 is shown an immediate context of the site location.

Figure 2.1: Site location (Surrounding Context) Map Source: Google Maps

Figure 2.2: Site Location (Immediate Context) Map Source: Nearmap

2.2. The Road Network

The hierarchy and characteristics of roads in the immediate vicinity of the site are shown in Table 2.1.

Table 2.1: Local Road Hierarchy

Road	Speed Limit	Road Configuration			Classification under the City Plan
		Reserve Width	Carriageway Width	Lane Configuration	
Carrara St	40km/h	20m	12m	• 2 Traffic lanes. • Undivided. • Parking permitted on both sides. • Shared cycle lane.	Local Access Road
Ashmore Rd	60km/h	33m	24m	• 4 Traffic lanes. • Median divided. • Parking permitted on both sides. • Cycle lane on both sides.	Arterial Road
Benowa Rd	60km/h	20m	10m – 27m	• 2 Traffic lanes. • Median divided/undivided • Parking permitted on both sides/ no parking. • Cycle lane on both sides.	Distributor Road

Ashmore Road / Benowa Road and Ashmore Road / Carrara Street intersections are both signal-controlled.

2.3. Existing Traffic Volumes

TTM conducted traffic surveys at the Benowa Road / Carrara Street, Ashmore Road / Benowa Road, Ashmore Road / Carrara Street, Shopping Centre Northern Access / Carrara Street and Shopping Centre Southern Access / Ashmore Road intersections. The surveys were conducted on Thursday, June 20th and Saturday, June 15th. From the surveys, peak hour movements were derived. In general, the afternoon week peak hour was found to be between 4:15pm – 5:15 pm. Whilst the Saturday peak hour was to be between 11:15am – 12:15am.

The peak hours volumes for each intersection are shown in the network diagrams in Appendix B.

Initial review of the intersection operations notes the following:

- Existing Ashmore Road / Benowa Road has a higher Degree of Saturation (0.80) and Level of Service (LoS E) in the Thu PM Peak.
    - Weekday PM likely to be the critical assessment period for the roads, (depending on the proposed uses)
    - Ashmore Road is generally busy across the weekday afternoon, with a late school/early commuter peak being highest.
- School peak period (2:30pm – 3:30pm) is the main road peak for the northern side of the site along Benowa Road and Carrara Street.
    - This peak would not reflect the typical peak for the traffic generation associated with the subject site.

2.4. Public and Active Transport Facilities

2.4.1. Public Transport

Bus Services

There are several bus stops on the surrounding roads within a 400m walk of the site. An indicative map of the bus stops within the vicinity of the site is shown in Figure 2.3.

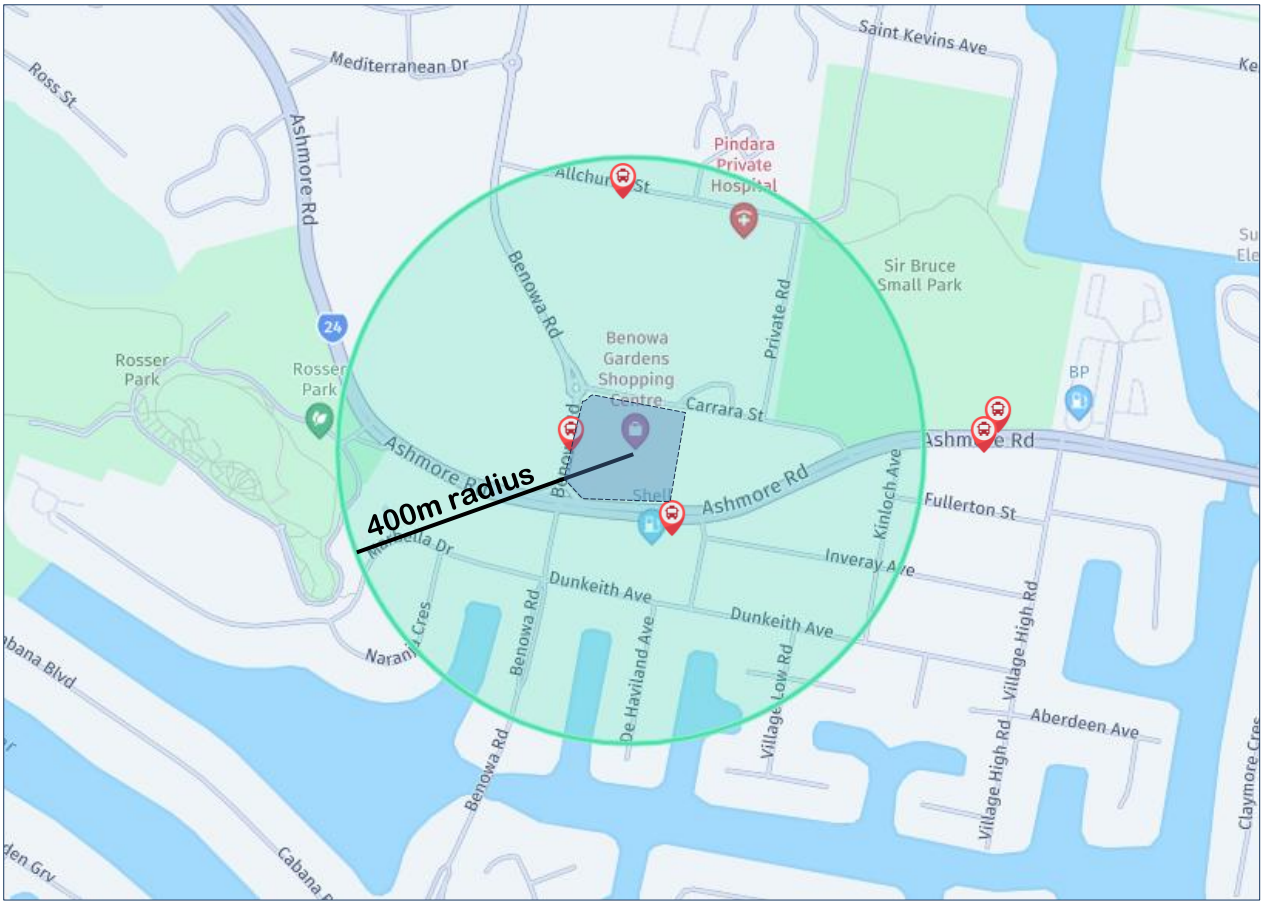


Figure 2.3 Bus Stops at the vicinity of the proposed development Map Source: Nearmap

The following is a summary of the surrounding bus routes and its itinerary:

- **737:** This route connects Ashmore to Southport, with services running seven days a week. On weekdays, weekends and public holidays the service runs from 9.10am to 4.30pm with a frequency of generally 60 minutes.
- **741:** This route connects Broadbeach South station to Southport, with services running seven days a week. On weekdays the service runs from 6.15am to 9.15pm with a frequency of 60 minutes. On weekends and public holidays, the service runs from 7.10am to 5.10 pm with a frequency of 60 minutes.

Train Services

Train services are not available in the nearby area.

2.4.2. Active Transport

Bicycle

The site offers a convenient location for cyclists, with a range of cycling routes available in the surrounding area. These routes are mapped out by the Google Maps Cycling Overlay, an extract of this overlay is shown in Figure 2.4.

In general, the surrounding roads offers a dedicated cycling lane, connecting to a wider cycling network to the East, West and North. Overall, the development offers excellent access to a cycling structure, making it an ideal location for cyclists looking for convenient and safe commuting options.

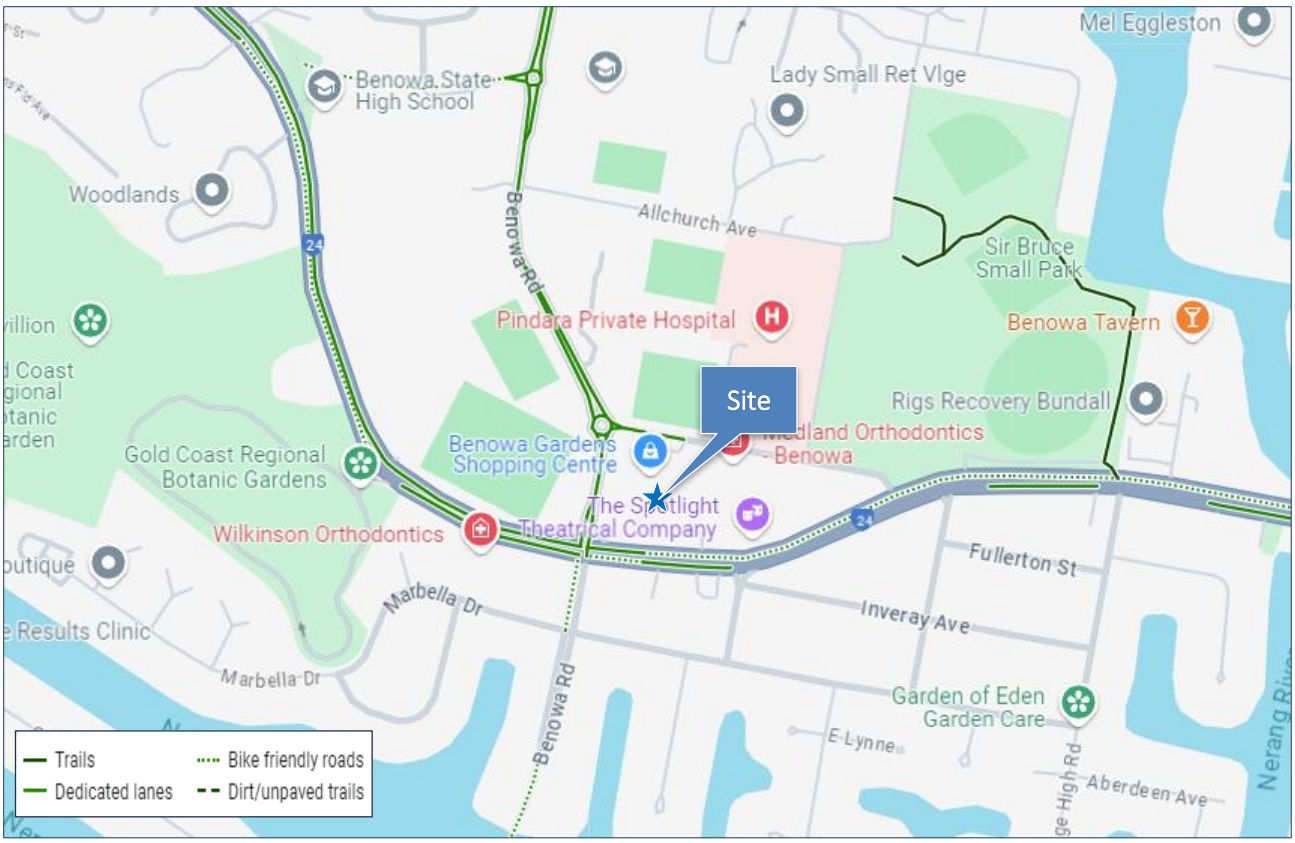


Figure 2.4: Overall bicycle provisions around the proposed development. Source: Google Maps.

Pedestrians

Formal pedestrian footpaths are located on both sides of the roads in the immediate vicinity, with kerb ramps provided at all intersections. Pedestrian crossing facilities are provided at the majority of the surrounding intersections. These are provided in the form of signalised crossings, zebra-crossing or crossing points. Figure 2.5 illustrates the pedestrian crossing facilities within the proximity of the site.

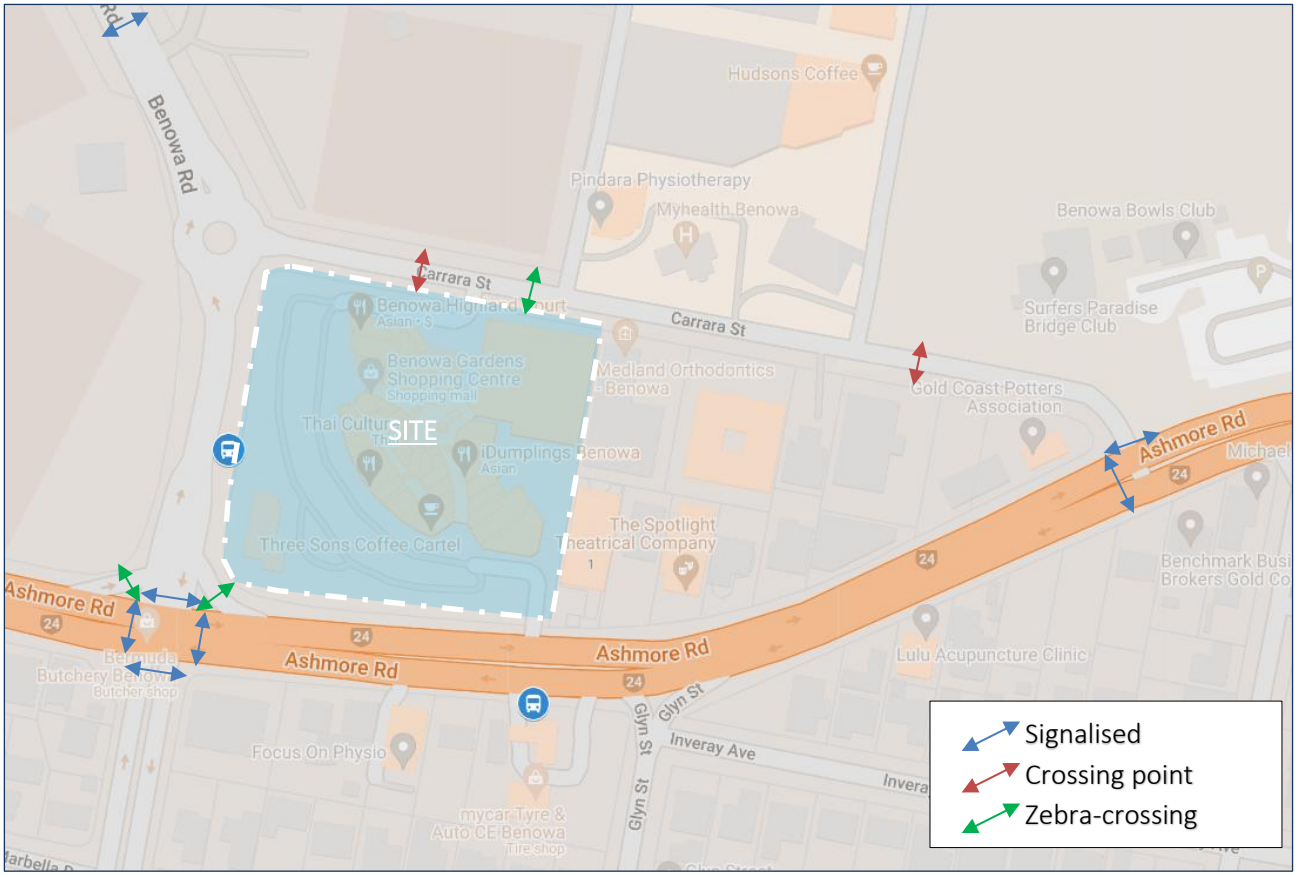


Figure 2.5: Pedestrian provisions around the development. Map Source: Google Maps

2.5. Transport Planning

A review of the City Plan LGIP indicates that the intersection of Ashmore Road/Benowa Road is expected to be upgraded by 2031.

3. The Proposed Development

3.1. Existing Development

The existing development includes:

A mix of retail and service tenancies

- Approximately 370 formalized on site car parking spaces.
- Two vehicle crossovers
  - 16m wide crossover on Carrara Street
    - All turning movements permitted.
  - 16m wide crossover on Ashmore Road
    - Left In / Left Out movements permitted.
    - Deceleration lane for left entry movements.
- Four dedicated pedestrian crossing
  - Ashmore Road, adjacent to the vehicle access.
  - Two on Benowa Road, one near the bus stop and one near the roundabout.
  - Carrara Street, adjacent to the vehicle access.

3.2. Proposed Development Profile

The proposed development includes planning for a mix of uses, the project team has been testing two (2) options for the development.

A copy of the architectural plans, prepared by Neylan Architecture, is included in Appendix A.

A summary of the two options under consideration are outlined in Table 3.1.

Table 3.1: Preliminary Development Yields – Subject to Ongoing Review

Use	Indicative Yield	Notes
Option 1		
Shopping Centre (Shop / Supermarket / Specialities)	10,000m^2 GFA	Mix of Supermarket, Shop and Food and Drink outlets.
Commercial Level	3,000m^2 GFA	Mix of Office and Gym uses.
Perimeter Use (Health Care)	8,800m^2 GFA	
Multiple Dwelling (Apartment)	397 Units	306 x 2 bedroom units 91 x 3 bedroom units
Option 2		

Shopping Centre (Shop / Supermarket / Specialities)	10,000m² GFA	Mix of Supermarket, Shop and Food and Drink outlets.
Commercial Level	3,000m² GFA	Mix of Child Care Centre, Office and Gym uses.
Perimeter Use (Short Term Accommodation / Hote / Multiple Dwelling)	85 units/rooms (approximately 8,800m² GFA)	41 Short term accommodation. 44 Multiple Dwellings (1 bedroom).
Multiple Dwelling (Apartment)	397 Units	306 x 2 bedroom units 91 x 3 bedroom units

A summary of some of the other traffic design elements is provided below:

- Approximately 1,460 on-site car parking spaces on site.
  - Including provision for a hotel drop off area.
  - Final proposed supply subject to further carpark design review.
- Three vehicle crossovers
  - Left in / Left out movements proposed to Ashmore Road.
  - All movements crossover to Carrara Street, at the eastern end of the site.
  - All movements crossover to Carrara Street, located in the middle of the site frontage.
- Current planning includes 300 bicycle parking spaces
  - 100 staff and 200 visitor spaces.
- Dedicated pedestrian accesses to be provide to all street frontages.
- Current planning for servicing is aiming to accommodate vehicles up to a 19m Articulated Vehicle (AV).

TTM has undertaken a preliminary review of the potential development. The findings of the initial review are outlined below. Please note that the following review findings are subject to ongoing review and may change as the preliminary designs and the project understanding progresses.

3.3. Parking

Current development planning includes a total of 1,460 parking spaces across 5 levels. Car parking provisions are summarised in Table 3.2:

Table 3.2: Preliminary Parking Provisions

Level	Number of Spaces	Intended User
Basement 3	460 spaces	270 Perimeter Use 190 Retail Parking

Basement 2	260 spaces	Retail
Basement 1	250 spaces	Retail
Ground Floor	-	
Level 1	-	
Level 2	220 spaces	Residential
Level 3	270 spaces	Residential
Total	**440 spaces***	**30 spaces**

A total of 300 bike parking is currently proposed for the site:

- Basement 2 – 100 bicycle spaces for staff, 86 bicycle spaces for visitors
- Basement 1 – 114 bicycle spaces for visitors

Further details regarding the proposed car and bicycle parking provisions are included in Section 4.

3.4. Access

The preliminary development plan includes the following access arrangements:

Ashmore Road

The proposal includes a 8.5m wide crossover on Ashmore Road, which will accommodate passenger and service vehicles, with only Left in – Left Out movements permitted.

Carrara Street West

The proposal includes a 7m wide crossover on Carrara Street, which will accommodate passenger vehicles, with all movements permitted.

Carrara Street East

The proposal includes a 8.5m wide crossover on Carrara Street, which will accommodate passenger vehicles, with all movements permitted.

Pedestrians will have access to the development from the Ashmore Road, Benowa Road and Carrara Street frontages.

Further details regarding the proposed access arrangements are included in Section 5.

3.5. Servicing

The development plans allow for vehicles up to the size of a 19m Articulated Vehicle (AV) to access the site. Located next to the bin store collection, the following service bays are to be provided.

- 19m Articulated Vehicle (AV)
- Refuse Collection Vehicle (RCV)

The design of the servicing bays should not conflict with vehicles entering/departing from the loading area.

Further details regarding the proposed servicing arrangements are included in Section 6

4. Parking Arrangements

4.1. Parking Supply

4.1.1. Car parking

The currently proposed development configuration includes approximately 1,460 carparking spaces on site. The alignment and specific configuration of the parking areas on site are subject to ongoing design and will be progressed as the design continues.

Table 4.1 provides a summary of the parking supply recommendations for the two current development scheme options being tested.

Table 4.1: Preliminary Recommended Car Parking Supply.

Use	Indicative Yield	GCCC Parking Rate	Recommended Parking Supply
Option 1			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m² GFA	Shopping Centre • 5 spaces / 100m² GFA	500 spaces
Commercial Level	3,000m² GFA Office 2,500m² GFA Gym 500m² GFA	Office 3 spaces / 100m² GFA or Shop/Gym 5 spaces / 100m² GFA	75 spaces 25 spaces
Perimeter Use (Health Care)	8,800m² GFA	Health 5 spaces / 100m² GFA or 2 spaces / consulting room + 1 per staff	440 spaces
Multiple Dwelling (Apartment)	394 Units 301 x 2 bedroom units 93 x 3 bedroom units	Resident spaces • 1 space / 1 bedroom • 1.25 spaces / 2 bedroom • 1.5 spaces / 3 bedroom • 2 spaces / 4 bedroom Visitor 3 spaces + 1 spaces / 10 units (50% of visitor spaces to be in a single consolidated location)	519 residential spaces • 382.5 residential spaces • 136.5 residential spaces 43 visitor spaces
Option 1 Total			**1,602 spaces**
Option 2			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m² GFA	Shopping Centre 5 spaces / 100m² GFA	500 spaces
Commercial Level	3,000m² GFA 100 place Child Care Office 500m² GFA Gym 500m² GFA	Shopping Centre/Gym 5 spaces / 100m² GFA Office 3 spaces / 100m² GFA Child Care 1 space / 4 children	25 spaces 15 spaces 25 spaces

Perimeter Use (Short Term Accommodation / Hote / Multiple Dwelling)	85 units/rooms (approximately 8,800m^2 GFA)	Hotel/ Short Term Accom 1 space / short term / serviced apartment plus queuing capacity for 10 vehicles Health 5 spaces / 100m^2 GFA or 2 spaces / consulting room + 1 per staff	85 spaces
Multiple Dwelling (Apartment)	397 Units 306 x 2 bedroom units 91 x 3 bedroom units	Resident spaces • 1 space / 1 bedroom • 1.25 spaces / 2 bedroom • 1.5 spaces / 3 bedroom • 2 spaces / 4 bedroom Visitor 3 spaces + 1 spaces / 10 units (50% of visitor spaces to be in a single consolidated location)	519 residential spaces • 382.5 residential spaces • 136.5 residential spaces 43 visitor spaces
Option 2 Total			**1,212 spaces**

TTM notes that the preliminary design parking supply recommendation has a significant range of supply rates (1,212 to 1,600 spaces), depending on the specific uses proposed. With a variation of GCCC compliant parking space provisions depending on the development option.

Given the range of uses on site, the specific peak parking demand will vary for each specific uses. This variation in parking demand timings, may allow for the time-based sharing of communal parking on site potentially reducing the overall supply requirements (e.g. a shop uses typically peak on a weekend or weekday evening, when an office / health use would be closed).

Additionally, there is potential for linked trips, internalisation of trips and shared parking to occur, with a patron visiting multiple tenancies on site or residents visiting on site retail, reducing the potential parking demands.

TTM are also aware of mixed use retail precinct car parking studies which indicate that generally shopping centre peak parking demands could be lower than the 5 spaces / 100m^2 that is typically nominated by planning schemes. Depending on the scale of the development a retail parking provision of 4.5 spaces / 100m^2 could be appropriate to accommodate retail parking demands. PWD parking spaces are recommended to be provided at a rate of 1 PWD space per 50 general parking spaces, with PWD parking spread throughout the site, located close to accessible access points (i.e. lift core and DDA ramps).

The carparking supply will evolve as the development progresses through the design and approval process, with more detailed car parking supply and layout review documentation to be provided later.

4.2. Parking Layout

The GCC City Plan refers to the Australian Standards for the parking layout. Therefore, Table 4.2 identifies the characteristics of the proposed parking layouts for the development with respect to the AS2890 design provisions.

Table 4.2: AS2890 Parking Design Parameters

Design Aspect	Min SCC Standard (AS2890.1)	Recommended Provision
Parking space length – Standard bay – Motorbike	 5.4m 2.5m	 5.4m 2.5m
Parking space width: – Residential (Class 1A) – Visitor (Class 3A) – Motorbike	 2.4m 2.7m 1.2m	 2.6m 2.7m 1.2m
Aisle Width: – Parking aisle – Circulation aisle (passenger vehicles)	 6.2 – 6.6m 5.5m + 0.6m clearances	 6.2m 6.2m (with localised widening)
Parking envelope clearance – space adjacent to wall	Space 0.3m clear of wall	Space 0.3m clear of wall
Parking envelope clearance - Column adjacent to bay	Located between 0.75m and 1.75m of aisle	Located between 0.75m and 1.75m of aisle
Maximum Gradient: – PWD parking bay – Parking bay – Parking aisle	 1:40 (2.5%) 1:20 (5.0%) 1:16 (6.25%)	 1:40 (2.5%) 1:20 (5.0%) 1:16 (6.25%)
Height Clearance – General Min. – PWD – Service Vehicles	 2.2m (2.2m PWD) 2.5m above parking space and shared 4.5m	 2.2m min 2.5m above parking space and shared 4.5m (Potentially higher depending on refuse collections)
Parking Aisle Extension	1m beyond last bay	1m beyond last bay

The development parking layouts are expected to achieve consistent with the provisions of the AS2890.1. Further details in relation to deemed compliance of required provisions or justification for design aspects resolved with performance solutions would be reviewed and provided as part of future development applications.

5. Access Arrangements

5.1. Vehicular Access

The development plan involves three designated car parking areas. The primary car park, located underneath the main building, will be accessible via Ashmore Road and Carrara Street (via a total of 3 accesses). The second car park, located in Basement 2, will have access through Carrara Street. The third parking area is to be accessed via the internal roadway on the western side of the site, connecting to Ashmore Road and Carrara Street. The design provisions of the access and their recommended provisions of the AS2890.1 are detailed in Table 5.1., respectively. Given the preliminary nature of the application, finer details of the access arrangements are to be resolved as part of subsequent development applications.

Table 5.1: Design and provisions of Carrara Street access

Design Aspect	AS2890 Provision	Recommended Provision
Width / Crossover Type to accommodate: • Cars[12] • Service vehicles[13]	6-9m	 7.0m min 7.0m min
Sight Distance[12]	55m (desirable) 35m (minimum)	>70m to the east[4] >70m to the west[4]
Driveway Sight Splays	2.0m wide x 2.5m deep (on exit side)	2.0m wide x 2.5m deep (on each side)
Minimum Queuing Provisions [1]	5 vehicles for the first 200 plus 1% of capacity over 200 **Total 17 vehicles across the entire site**	6 vehicles / 36m at each access
Maximum Driveway grade	1:20 (5%) maximum within first 6m	1:20 (5%) maximum within first 6m

[1] Based on Carrara St being classed as a 'minor road' and speed limit of 40km/h.

[2] Based on the access servicing >500 medium turnover car parking spaces.

[3] Based on the access servicing service vehicles up to the size of an SRV.

[4] Assuming visibility around/past vehicles parked within the existing marked on-street parking spaces.

Table 5.2: Design and provisions of Ashmore Road access.

Design Aspect	AS2890 Provision	Proposed Provision
Width / Crossover Type to accommodate: • Cars[12] • Service vehicles[13]	 6-8m with separated entry/exit 6-8m with separated entry/exit	 10m 10m
Sight Distance[12]	83m (desirable) 65m (minimum)	>140m to the west
Driveway Sight Splays	2.0m wide x 2.5m deep (on exit side)	2.0m wide x 5.0m deep (on each side)
Minimum Queuing Provisions [1]	5 vehicles for the first 200 plus 1% of capacity over 200 **Total 17 vehicles across the entire site**	6 vehicles / 36m at each access
Maximum Driveway grade	1:20 (5%) maximum within first 6m	1:20 (5%) maximum within first 6m

[1] Based on Ashmore being classed as a 'major road' and speed limit of 60km/h.

[2] Based on the access servicing >500 medium turnover car parking spaces.

[3] Based on the access servicing service vehicles up to the size of an AV.

Vehicle movements internally will be signed and managed to direct users to Ashmore Road as the primary access to/from the site. With Carrara Street providing supplemental access and connectivity to the surrounding road network.

5.2. Active Transport Access

Pedestrian accesses are provided to all three road frontages, Ashmore Road, Benowa Road and Carrara Street. Allowing for access to the existing pedestrian network.

Cyclists access the site via the driveway located the sites frontages, or via the pedestrian access locations, before circulating to the respective parking areas for bikes.

6. Service Vehicle Arrangements

6.1. GCCC Servicing Recommendations

Table 9.4.13-9 of the Transport Code recommends the following service vehicles:

- Shop / Supermarket
  - 400m^2 – 1,500m^2 – Heavy Rigid Vehicle (HRV)
  - >1,500m^2 – 19m Articulated Vehicle (AV)
- Food and Drink Outlet
  - Heavy Rigid Vehicle (HRV)
- Indoor Sport and Recreation
  - Small Rigid Vehicle (SRV)
- Multiple Dwelling
  - Standing area for Medium Rigid Vehicle (MRV)
- Office
  - Van

6.2. Proposed Loading Provisions

The proposed development is expected to accommodate on site servicing and refuse collection within a dedicated loading area. The main shared loading area is to be located in the northeastern corner of the site, adjacent to the internal circulation roadway.

Service vehicles are proposed to access the site via the revised southeastern Left In-Left Out vehicle access on Ashmore Road. Vehicles accessing the site are expected to enter and exit the site in a forward gear travelling along the internal roadway to access the dedicated loading area located in the northeastern corner of the site.

The design vehicle is expected to be an 19m Articulated Vehicle (AV), 12.5m Heavy Rigid Vehicle (HRV) and 10.5m Refuse Collection Vehicle (RCV). This is generally consistent with the current on-site operations of the Shopping Centre use.

The specific loading requirements will be refined as the specific uses on site are confirmed and the site design progresses.

7. Development Transport Demands

7.1. Existing Site Traffic Demands

To establish the traffic generation of the existing site uses, TTM conducted AM and PM peak hour traffic surveys for the existing site, which has access to Ashmore Road and Carrara Street. The surveyed existing traffic generation for the subject site is summarised in Table 7.1.

Table 7.1: Existing Site Traffic Generation (Surveyed)

Generation	Weekend AM Peak Hour (11:15am-12:15pm) vph			Thursday PM Peak Hour (4:15pm-5:15pm) vph		
	In	Out	Total	In	Out	Total
Existing Site	291	301	592	277	298	575

Volumes associated with the existing site operations have been removed from the base background volumes as part of the completed traffic assessment.

7.2. Development Traffic Demands

7.2.1. Traffic Generation

To assess the impact of the proposed development on the adjacent road network, it is necessary to predict the likely volume of vehicles that will be generated by the proposed land uses. The traffic generation rates adopted for the respective land uses, and also the respective inbound/outbound splits, have been assumed as follows.

Colliers notes that this assessment will be refined further as the project and the proposed uses and use areas are more refined as the development layout is progressed into DA stage.

Multi-Unit Dwelling

This has been based on the Roads and Traffic Authority (RTA) *Guide to Traffic Generating Developments,* which recommends a weekday peak hour traffic generation rate of 0.29vph per unit for high-density residential developments. With respect to the Saturday peak hour period, it is recognised that there is little guidance in the RTA guide. Therefore, it is also proposed to adopt a similar rate of 0.29vph per unit.

Generation for Short-Term Accommodation

For Short-Term Accommodation, Colliers has adopted the following rates, which recognise the constrained parking associated with this component of the development:

- Car park generation of up to 0.17vph per parking space in peak hour periods.
- Set-down movement generation of up to 0.2vph per unit in the peak hour periods.

In terms of inbound/outbound movement splits for Multi-Dwelling Units and Short-Term Accommodation, it is proposed to adopt the following:

- 65% in/35% out in the PM peak hour
- 50% in/50% out in the Saturday peak hour

These splits are consistent with generally accepted practice and reflect the predominantly 'tidal' flow behaviour of traffic movements from residential developments in weekday peak hours and the expectation of balanced flows on weekends (which peak around lunchtime when residents are equally likely to be coming and going).

Non-Residential (Shop/Retail/Food & Drinks) Uses

The non-residential uses provide a reduced parking supply. Therefore, adopting traffic generation rates of comparable land uses as detailed in the various guideline documents (such as the RTA guide), which is generally based on the 'unconstrained' parking supply/generation, would overestimate the traffic generation potential of the land uses in this instance. As such, it is instead proposed to estimate the traffic generation demands on a 'per parking space' basis based on the quantity of parking to be provided on-site. Colliers has conducted numerous surveys of similar kinds of retail developments (with constrained parking) within the inner-city area of Brisbane, including:

- Gasworks, Newstead
- The Barracks, Petrie Terrace
- The Markets, West End

Surveys were conducted on a typical peak weekday (i.e., Thursday) and Saturday, and generation related back to the parking supply provided on-site to give a reasonable estimate on a 'per parking space' basis. From a detailed review of this previous survey data, Colliers believes the traffic generation rates, as detailed in Table 7.2, are appropriate to adopt for the proposed development. Of note, these rates generally were the worst case for any of the sites surveyed and have been rounded up where applicable to provide an added level of conservativeness.

Table 7.2: Traffic Generation Assumptions for the Non-Residential Parking Supply

Peak Period	Traffic Generation	Inbound Split	Outbound Split
PM Peak Hour	1.75 vph/space	50%	50%
Saturday Peak Hour	2.0 vph/space	50%	50%

Office

It is recognised that the car parking provided for non-residential uses will typically be for staff/employee parking only. As per the generation rate of the existing employee parking on-site (which is also consistent with RMS), it is proposed to adopt a generation rate of 0.5vph per space.

In terms of inbound/outbound movement splits it is proposed to adopt the following:

- 10% in/90% out in the PM peak hour
- 50% in/50% out in the Saturday peak hour

Based on the above traffic generation rates for the various land uses, a summary of the potential traffic generation of the proposed development is provided in Table 7.3.

Table 7.3: Development Traffic Generation

Use	Indicative Yield	Adopted Generation Rate	Estimated Traffic Generation
Option 1			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m^2 GFA 500 carparking spaces	PM 1.75 trips per parking space Sat 2.0 trips per parking space	875 trips 1,000 trips
Commercial Level	3,000m^2 GFA 85 carparking spaces	PM 0.5 trips per parking space Sat 0.1 trips per parking space	43 trips 9 trips
Perimeter Use (Health Care)	8,800m^2 GFA	PM 5.7 trips / 100m^2 GFA Sat 1.5 trips / 100m^2 GFA *(Sourced from DTMR Traffic Generation Surveys)*	502 trips 132 trips
Multiple Dwelling (Apartment)	397 Units	PM 0.29 trips / dwelling Sat 0.29 trips / dwelling (RMS 2013 Generation Rates)	115 trips 115 trips
Option 1 Total			**PM 1,535 trips** **Sat 1,256 trips**
Option 2			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m^2 GFA 500 carparking spaces	PM 1.75 trips per parking space Sat 2.0 trips per parking space	875 trips 1,000 trips
Commercial Level	3,000m^2 GFA 100 place Child Care	Commercial PM 0.5 trips per parking space Sat 0.1 trips per parking space Child Care PM 0.7 trips per child Sat 0 trips per child	Commercial 43 trips 9 trips Child Care 70 trips 0 trips
Perimeter Use (Short Term Accommodation / Hote / Multiple Dwelling)	85 units/rooms (approximately 8,800m^2 GFA)	PM 0.2 trips / unit Sat 0.2 trips / unit *(RMS 2013 Generation Rates)*	17 trips 17 trips
Multiple Dwelling (Apartment)	397 Units	PM 0.29 trips / dwelling Sat 0.29 trips / dwelling *(RMS 2013 Generation Rates)*	115 trips 115 trips
Option 2 Total			**PM 1,050 trips** **Sat 1,141 trips**

Given the potential variation of the uses proposed, Colliers has considered the worst-case traffic generation associated with two options being considered above (i.e. Option 1).

7.2.2. Traffic Distribution

Based on a review of the surrounding land uses and road network configuration, Colliers has adopted a traffic distribution reflective of the surveyed existing site travel paths. As the proposed site has comparable uses to a significant portion of the existing site this was seen to be a good base for the proposed development.

8. Base Traffic Demands

8.1. Assessment Years and Traffic Growth

It is expected that the development will be completed by 2028. On this basis, the following assessment years have been considered for the TIA:

- Opening Year: 2028
- Design Horizon (Opening + 10 years): 2038

To assess future traffic demands in 2028 and 2038, a base traffic growth assumption of 1.5% p.a. has been adopted. This growth rate is consistent with the LGIP planning estimates.

Background traffic has been determined for the 2028 and 2038 design horizon base volumes. Removed the existing site traffic volumes from the 2024 survey volumes. Applied the 1.5%p.a. growth rate to the corrected volumes, to scale to the 2038 10 year design scenario (consistent with LGIP planning).

8.2. Future Year Scenarios

The following future year scenarios have been derived for the purposes of the TIA:

- 2024 Survey Scenario
- 2028/2038 Base Case Scenario
- 2028/2038 Base + Development Case Scenario
  - This is a net difference between the existing on site operations and the proposed new development.

Based on the surveyed traffic demands (Section 2.3), base traffic growth assumption (Section 8.1) and development transport demand estimates (Section 7), future traffic movement demands at the intersections next to the development have been derived. These are presented in **Appendix C.**

9. Traffic Impact Assessment

This TIA has been limited to an assessment of the following intersections:

- Ashmore Road/Benowa Road.
- Benowa Road/Carrara Street.
- Ashmore Road / Carrara Street.
- Ashmore Road / Site Access South.
- Carrara Street / Site Access North.

To evaluate the performance of the surrounding intersections, modelling was conducted using the SIDRA Intersection 9.0 software package. The primary intersection operational outputs used to assess intersection operations were considered to be intersection Degree of Saturation (DOS), overall intersection and worst movement delays, Level of Service (LOS) and queuing.

The cycle/phasing timing for assessed intersections was derived from analysis of survey volume video footage.

9.1. Ashmore Road/Benowa Road

The SIDRA Intersection 9.0 software package has been used to assess the future traffic operations of Ashmore Road / Benowa Road signalised intersection. Default SIDRA inputs were used for the analysis.

Figure 9.2 shows the existing configuration of the Ashmore Road/Benowa Road intersection adopted in the SIDRA analysis for all scenarios. Table 9.1 summarises the SIDRA analysis results.

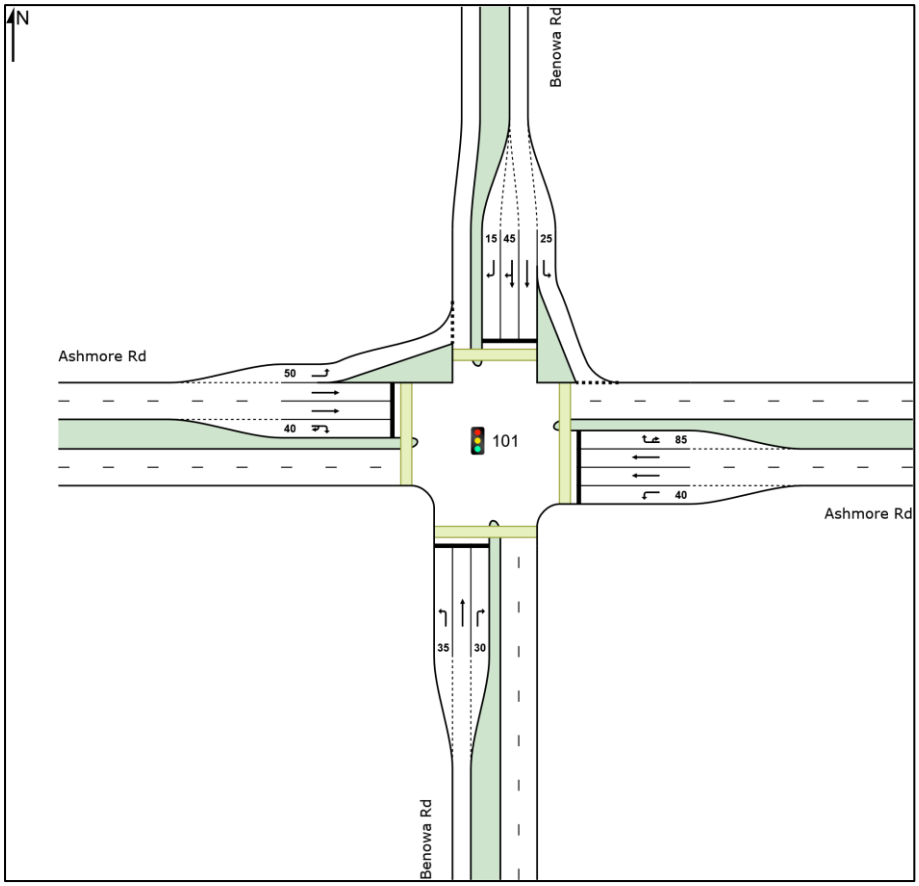


Figure 9.1: Ashmore Road / Benowa Road Intersection (Existing Configuration) – SIDRA Layout

Table 9.1 summarises the analysis outputs. Detailed analysis output summaries are included in **Appendix D**.

Table 9.1: Ashmore Road / Benowa Road Intersection – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2024 Survey	**56.3%**	34.8 sec	73.7 sec	C	38.0m	54.2m	111.3m	135.0m
2028 Base	59.9%	35 sec	74.2 sec	D	41.3m	57.7m	118.8m	144.7m
2028 Base + Development	61.3%	35.7 sec	74.2 sec	D	55.6m	57.7m	119.1m	150.5m
2038 Base	68.9%	36.1 sec	75.6 sec	D	49.2m	69.0m	145.4m	173.5m
2038 Base + Development	71.0%	36.6 sec	75.6 sec	D	59.6m	69.0m	145.4m	178.2m
Weekday PM Peak Hour								
2024 Survey	80.5%	42.7 sec	74.9 sec	D	71.1m	46.4m	196.4m	122.7m
2028 Base	87.7%	46.8 sec	75.2 sec	D	80.4m	49.3m	233.8m	132.5m
2028 Base + Development	90.6%	49.1 sec	77.5 sec	D	120.9m	66.3m	250.1m	151.4m
2038 Base	100.3%	64.3 sec	118.8 sec	E	159.2m	58.0m	343.3m	158.8m
2038 Base + Development	105.2%	76.2 sec	147.5 sec	E	184.6m	76.6m	406.6m	180.9m

The analysis indicates that the intersection is expected to operate beyond suitable levels up to the 2038 design horizon, with and without development traffic included. With the assessed worst-case DOS 105.2% and LOS E. The analysis indicates that the proposed development expansion may have some impacts on vehicle queuing and intersection delays.

There appears to be scope to provide lane extensions on the Ashmore Road approaches that could improve the overall intersection operations. This could also be supplemented with the extension of the dual right turn lanes for the northern approach.

Colliers have tested an initial mitigation option where the Ashmore Road and Benowa Road turn lanes are extended to increase storage capacity and provide additional throughput. The tested upgrades were:

- Increase the western approach right tun lane to 100m (+60m).
- Increase the eastern approach right tun lane to 125m (+40m).
- Increase the northern approach right turn lanes to 40m (+25m) and 60m (+15m) lanes.

This upgraded configuration is shown in Figure 9.2.

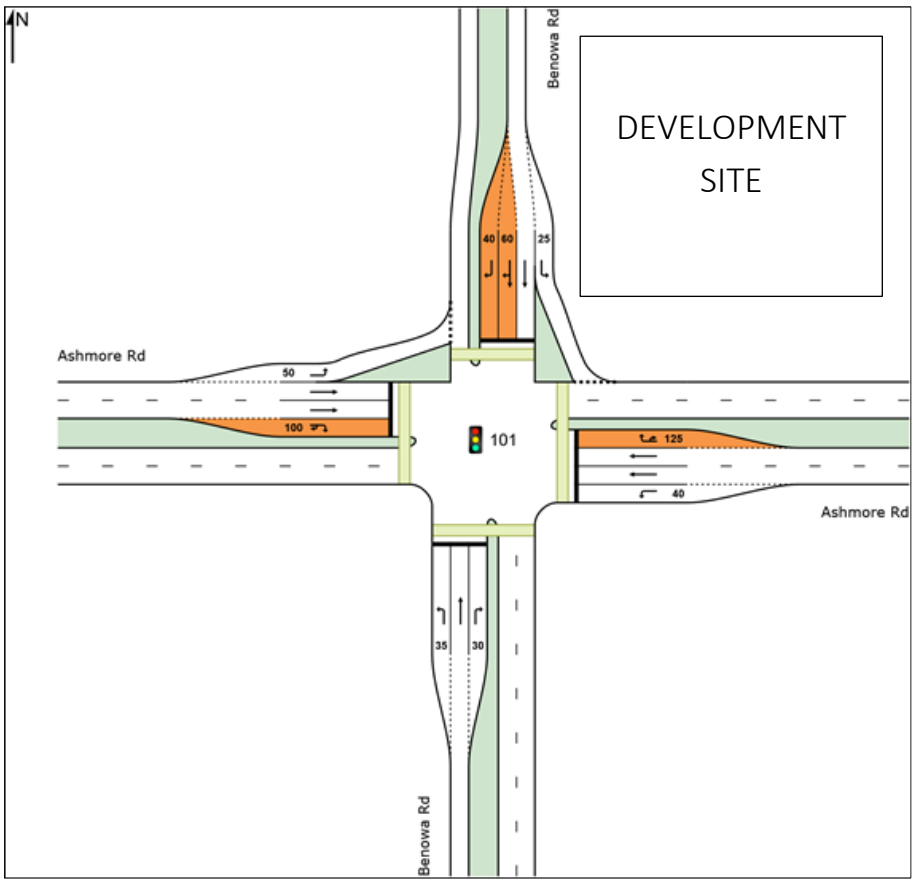


Figure 9.2: Ashmore Road / Benowa Road Intersection (Upgraded Configuration) – SIDRA Layout

Table 9.2 summarises the analysis outputs. Detailed analysis output summaries are included in **Appendix D** and a preliminary concept for the upgrade works are provided in **Appendix B**.

Table 9.2: Ashmore Road / Benowa Road Upgraded Intersection – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2028 Base + Development Upgraded	56.4%	35.9 sec	72.3 sec	D	48.4m	57.7m	119.1m	162.2m
2038 Base + Development Upgraded	68.9%	36.6 sec	75.6 sec	D	53.7m	69.0m	145.4m	180.9m
Weekday PM Peak Hour								
2028 Base + Development Upgraded	74.6%	41.1 sec	75.2 sec	D	87.2m	66.3m	200.4m	156.6m
2038 Base + Development Upgraded	88.3%	46.4 sec	76.4 sec	D	105.6m	76.6m	265.0m	176.1m

The analysis confirms that the upgraded intersection should function appropriately at the opening-year and 10 year design horizon of the proposed development. Based on this assessment, the proposed intersection configuration and the proposed upgrade works area considered suitable from a traffic operations perspective.

9.2. Benowa Road / Carrara Street

Figure 9.3: shows the existing configuration of the Benowa Street / Carrara Street roundabout intersection adopted in the SIDRA analysis.

Figure 9.3: Benowa Road / Carrara Street Intersection (Existing Configuration) – SIDRA Layout

The results of the SIDRA analysis for the survey and the full development scenarios tested are summarised in Table 9.3.

Table 9.3: Benowa Road / Carrara Street Intersection – SIDRA Summary.

Scenario	DOS	Average Delay	LOS	95th Percentile Critical Queue (m)		
		Worst Movement		North	South	East
Weekend AM Peak Hour						
2024 Survey	31.0%	11.0 sec	A	12.7m	8.3m	12.7m
2028 Base	33.3%	11.1 sec	A	13.8m	1.3m	13.9m
2028 Base + Development	51.4%	11.7 sec	A	23.1m	12.0m	26.9m
2038 Base	39.8%	11.5 sec	A	17.4m	11.4m	17.7m
2038 Base + Development	55.1%	11.9 sec	A	26.7m	14.2m	29.7m
Weekday PM Peak Hour						
2024 Survey	53.8%	11.8 sec	A	14.4m	7.9m	28.7m
2028 Base	57.5%	12.0 sec	A	14.6m	7.0m	32.0m
2028 Base + Development	77.0%	14.6 sec	A	29.7m	13.6m	74..1m
2038 Base	69.6%	14.1 sec	A	20.0m	11.1m	53.7m
2038 Base + Development	86.4%	19.2 sec	B	35.1m	16.3m	117.9m

The analysis indicates that the intersection is expected to operate at suitable levels up to the 2038 design horizon, with an overall LOS B in the assessed peak hours.

The above results are within the generally acceptable limits for roundabout intersections, that being a DOS of <85% and LOS D limit. While the DOS exceeds the 85% threshold for roundabouts, the delays are noted to be limited. Based on this assessment, the proposed development is considered to have limited adverse impact on the operations of this intersection. Based on this assessment, the proposed intersection configuration is considered suitable from a traffic operations perspective.

9.3. Ashmore Road / Carrara Street

Figure 9.4 shows the existing configuration of the Ashmore Road / Carrara Street T-intersection adopted in the SIDRA analysis.

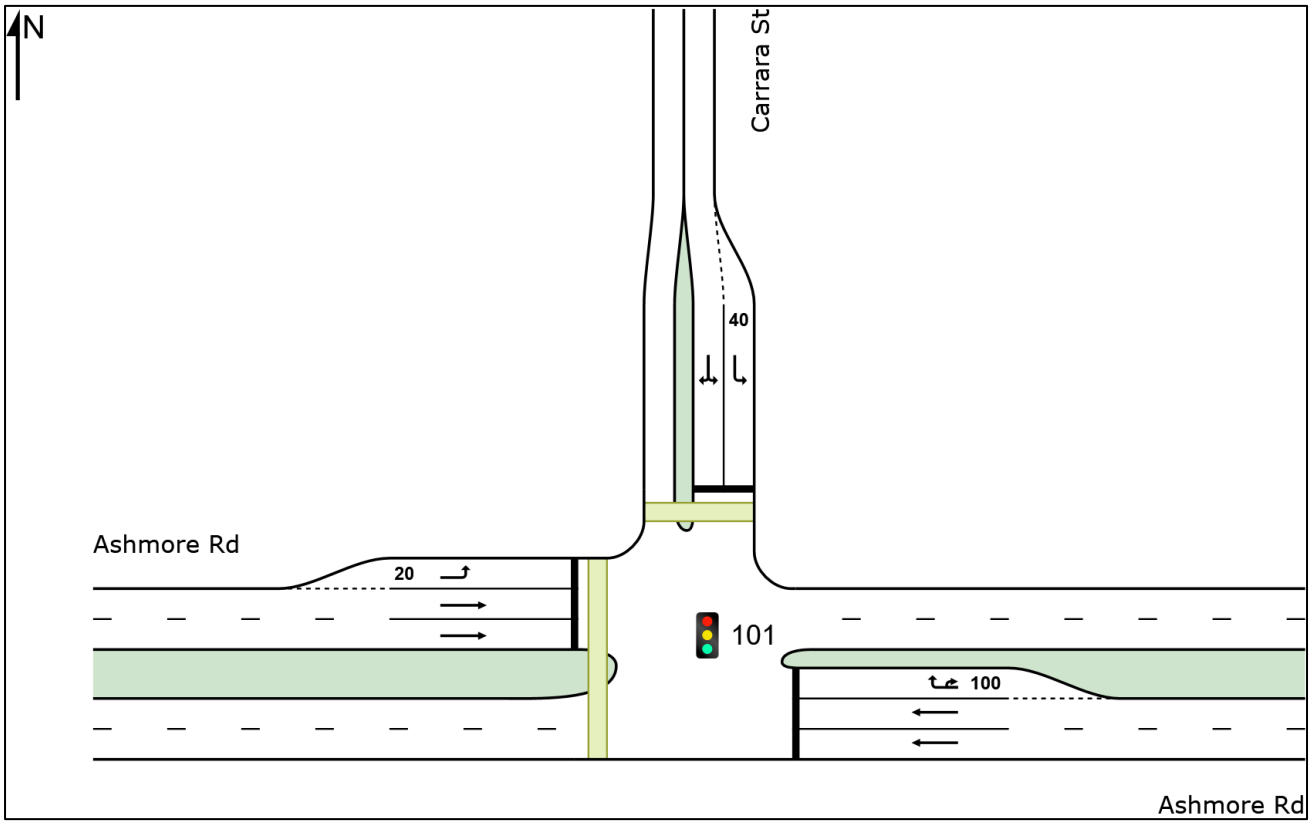


Figure 9.4: SIDRA intersection layout of Station Rd/Westminster Road.

The results of the SIDRA analysis for the existing scenario and full development scenarios tested are summarised in Table 9.4.

Table 9.4: Ashmore Road / Carrara Street Intersection – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)		
		Overall	Worst Movement		North	West	East
Weekend AM Peak Hour							
2024 Survey	72.3%	20.4 sec	47.5 sec	C	20.5m	152.0m	53.6m
2028 Base	76.7%	21.4 sec	47.6 sec	C	21.7m	170.2m	57.6m
2028 Base + Development	82.3%	24.6 sec	48.2 sec	C	27.9m	199.0m	72.3m
2038 Base	89.0%	27.6 sec	48.0 sec	C	25.5m	247.5m	70.5m
2038 Base + Development	94.2%	34.7 sec	52.7 sec	C	30.7m	303.0m	79.6m
Weekday PM Peak Hour							
2024 Survey	70.1%	20.9 sec	49.4 sec	C	41.7m	145.8m	72.7m
2028 Base	70.0%	21.0 sec	49.7 sec	C	44.6m	145.5m	78.9m
2028 Base + Development	88.6%	28.1 sec	52.8 sec	C	59.7m	198.1m	135.5m
2038 Base	86.5%	25.9 sec	51.3 sec	C	53.5m	226.5m	97.8m
2038 Base + Development	94.3%	37.6 sec	56.4 sec	D	69.8m	294.8m	177.4m

The analysis indicates that the intersection may exceed recommended design thresholds in the assessed 2038 with development peak hour period. The assessed scenario indicates that the 2038 with development might reach a DOS of 94.2% – 94.3%. Exceeding the typically adopted threshold of 90% for signalised intersections.

The results are slightly above the generally acceptable limits for signalised intersections, that being a DOS of <90% and LOS D limit.

Colliers had investigated some turn lane treatments to improve storage capacity of the possible queues indicated by the analysis. Based on prelodgement feedback from Council, the preference is to maintain the existing kerbside parking in proximity to this intersection. Based on this feedback, no improvement works are proposed for this intersection.

9.4. Site Accesses

Colliers has undertaken preliminary assessments of the proposed Ashmore Road Left in/Left out (LILO) site access. The results of the SIDRA analysis for the development scenarios tested are summarised in Table 9.5.

Table 9.5: Ashmore Road / Site Access – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2028 Base + Development	27.0%	1.3 sec	7.0 sec	A	3.8m	-	-	0.0m
2038 Base + Development	31.3%	1.2 sec	7.6 sec	A	4.2m	-	-	0.0m
Weekday PM Peak Hour								
2028 Base + Development	24.7%	1.9 sec	6.9 sec	A	5.4m	-	-	0.0m
2038 Base + Development	28.7%	1.7 sec	7.4 sec	A	5.8m	-	-	0.0m

Based on this assessment, the proposed site access configuration is considered suitable from a traffic operations perspective.

Colliers has undertaken preliminary assessments of the proposed Carrara Street site access. This assessment is a preliminary assessment of a combined demand focused on a single crossover on the Carrara Street frontage. The analysis may therefore be showing impacts which will be diffused across the two crossovers. The finer details and demand splits of which are expected to be reviewed and resolved as part of subsequent development applications. The results of the SIDRA analysis for the development scenarios tested are summarised in Table 9.6

Table 9.6: Carrara Street / Site Access – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2028 Base + Development	43.4%	5.0 sec	9.9 sec	A	-	17.6m	0.0m	12.8m
2038 Base + Development	44.7%	5.0 sec	10.6 sec	A	-	19.6m	0.0m	13.7m
Weekday PM Peak Hour								
2028 Base + Development	63.7%	7.1 sec	17.7 sec	A	-	38.7m	0.0m	29.5m
2038 Base + Development	69.9%	7.8 sec	21.0 sec	A	-	45.2m	0.0m	35.1m

Based on this assessment, the assessed vehicle demands for the Carrara Street frontage should operate appropriately and future accesses should therefore be suitable from a traffic operations perspective.

10. Summary and Conclusions

10.1. Parking Arrangements

The total site is anticipated to provide approximately 1,470 car parking spaces.

Colliers notes that the parking supply recommendation has a significant range of supply rates (1,210 to 1,580 spaces), depending on the specific uses proposed. With a variation of compliant parking space provisions depending on the development option.

The range of uses on site, the specific peak parking demand will vary for each specific uses. This variation in parking demand timings, may allow for the time-based sharing of communal parking on site potentially reducing the overall supply requirements (e.g. a shop uses typically peak on a weekend or weekday evening, when an office / health use would be closed).

The carparking supply will evolve as the development progresses through the design and approval process, with more detailed car parking supply and layout review documentation to be provided as part of subsequent approvals.

Overall, Colliers considers the preliminary car parking arrangements for the development to be appropriate.

10.2. Access Arrangements

The proposed access arrangements for the development are considered acceptable to support the development. Overall, Colliers considers the access arrangements for the development to be acceptable.

10.3. Service Vehicle Arrangements

Service vehicles are proposed to access the site via the revised southeastern vehicle access on Ashmore Road. Vehicles accessing the site are expected to enter and exit the site in a forward gear accessing the dedicated loading area located in the northeastern corner of the site.

The specific loading requirements will be refined as the specific uses on site are confirmed and the site design progresses.

10.4. Traffic Impact Assessment

Based on the traffic analysis, the recommended traffic impact mitigation relates to the Ashmore Road/Benowa Road intersection. At this intersection, it is recommended that the east/west turn lanes are extended to increase storage and operational capacity.

The analysis also indicates that the development traffic should not create significant adverse impacts on the Benowa Road /Carrara Street or Ashmore Road/Carrara Street intersections.

10.5. Conclusion

Based on the assessment contained within this report, Colliers sees no traffic engineering reason why the relevant preliminary approvals should not be granted.

Appendix A Development Plans

BENOWA GARDENS MASTER PLAN

SITE INFORMATION

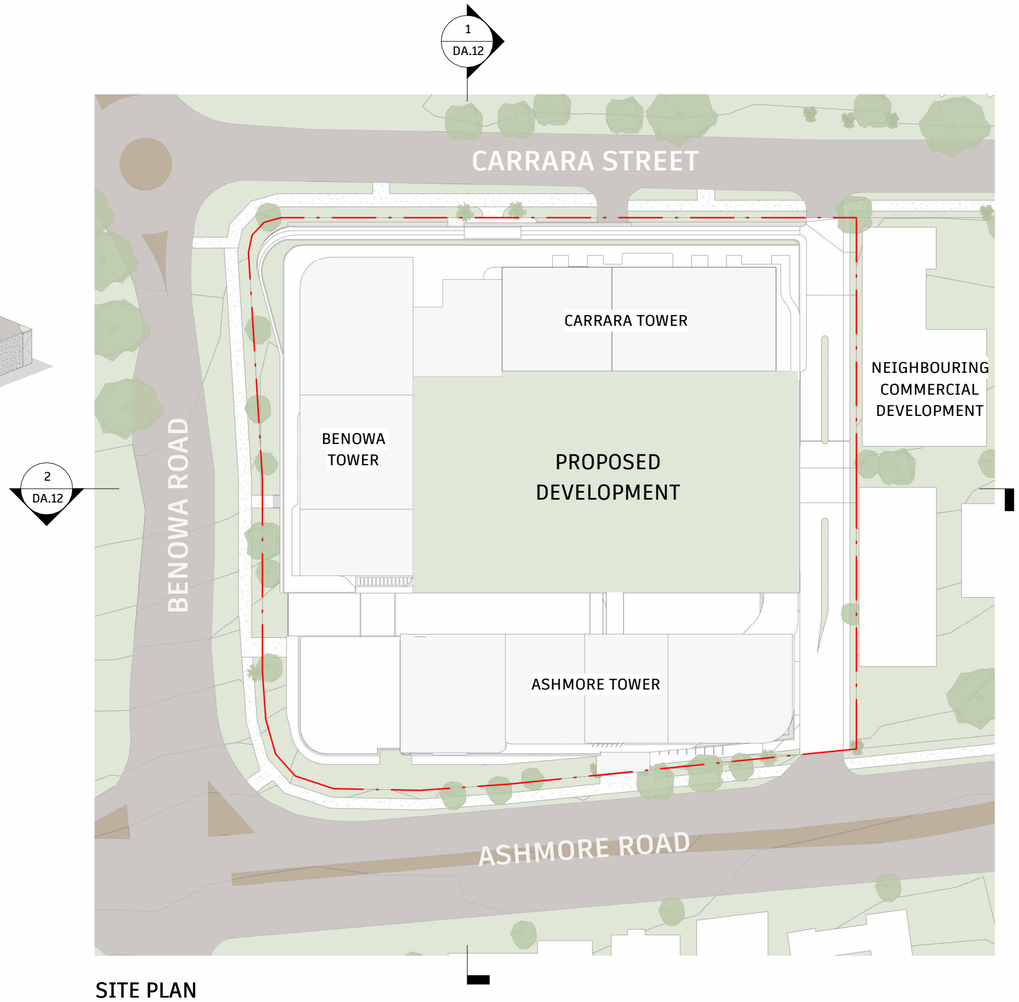
ADDRESS 203 ASHMORE ROAD
BENOWA QLD 4217

RPD LOT/DP: RP839746

SITE AREA 17,658m^2

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE



SITE PLAN

1 : 1000

APARTMENT TYPES

	LEVELS	2 x BED	3 x BED	TOTAL
CARRARA TOWER	PER LEVEL (x 9)	12	3	15
	TOTAL PER TOWER	108	27	135
BENOWA TOWER	PER LEVEL (x 8)	12	4	16
	TOTAL PER TOWER	96	32	128
ASHMORE TOWER	PER LEVEL (x 7)	14	4	18
	PER HALF LEVEL (x 1)	4	4	8
	TOTAL PER TOWER	102	32	134
TOTAL APARTMENTS		**306**	**91**	**397**

PERIMETER USE: 8,400m^2

	SHORT STAY ACCOMMODATION	RESIDENTIAL 1 BED		HEALTH CARE
BASEMENT 2	130m^2 TUA (LOBBY)	-		-
BASEMENT 1	11	-		1,200m^2 TUA
GROUND (SHOPPING CENTRE)	15	-		1,200m^2 TUA
CARRARA LEVEL 1	15	-	**OR**	1,200m^2 TUA
CARRARA LEVEL 2	-	22		2,400m^2 TUA
CARRARA LEVEL 3	-	22		2,400m^2 TUA
TOTAL	**41**	**44**		**8,400m^2**

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

AREA CALCULATIONS

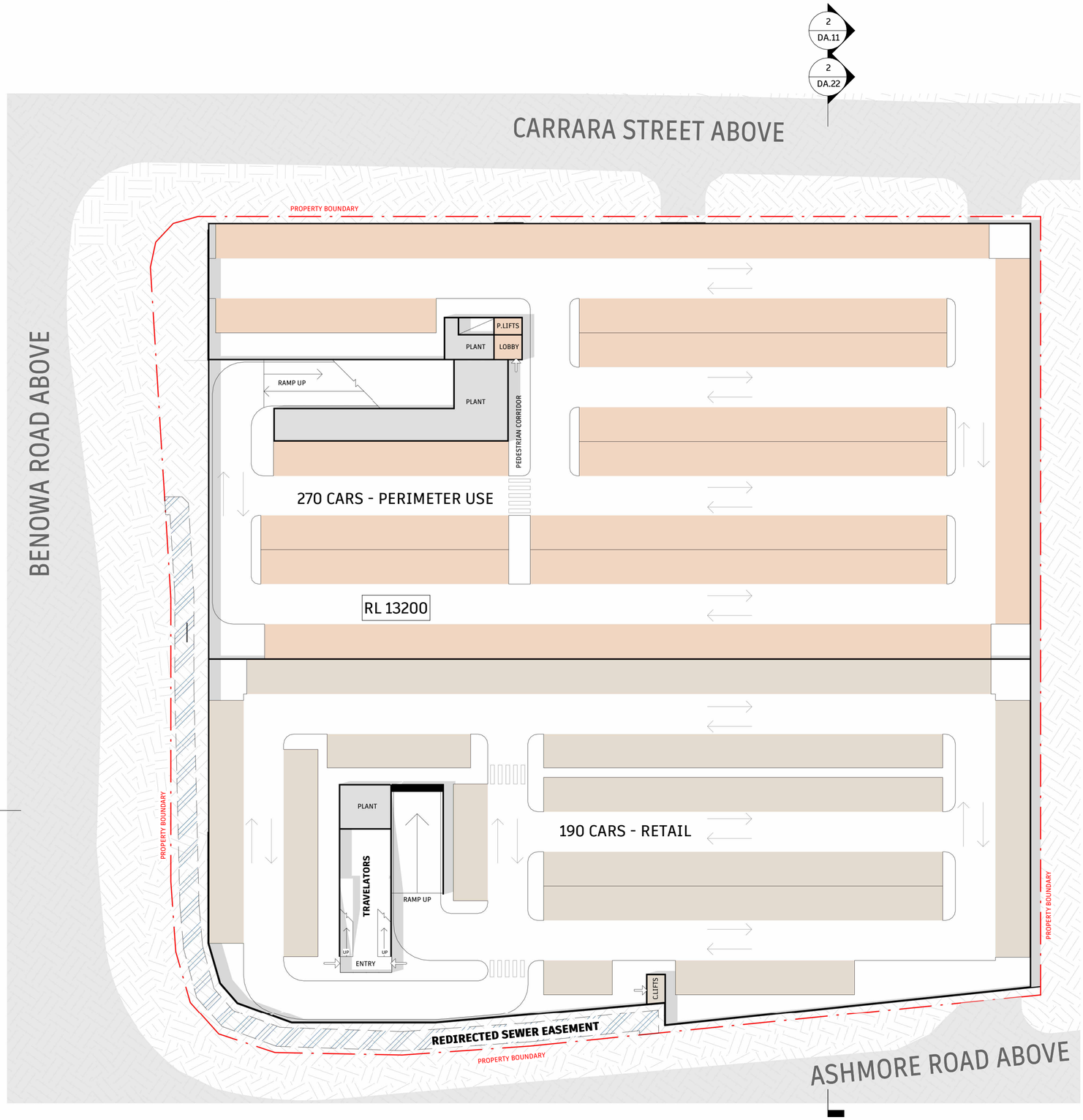
RETAIL AREA

SUPERMARKET	**4,000m^2**
SPECIALTY SHOPS:	**6,000m^2**
RETAIL BASEMENT 2 LEVEL:	**700m^2**
RETAIL BASEMENT 1 LEVEL:	**300m^2**
SHOPPING CENTRE LEVEL:	**5,000m^2**
TOTAL RETAIL	**10,000m^2**

COMMERCIAL AREA

LEVEL 1:	**2,500m^2**
LEVEL 2:	**500m^2**
TOTAL COMMERCIAL	**3,000m^2**

FLOOR PLAN-BASEMENT 3 (RETAIL)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

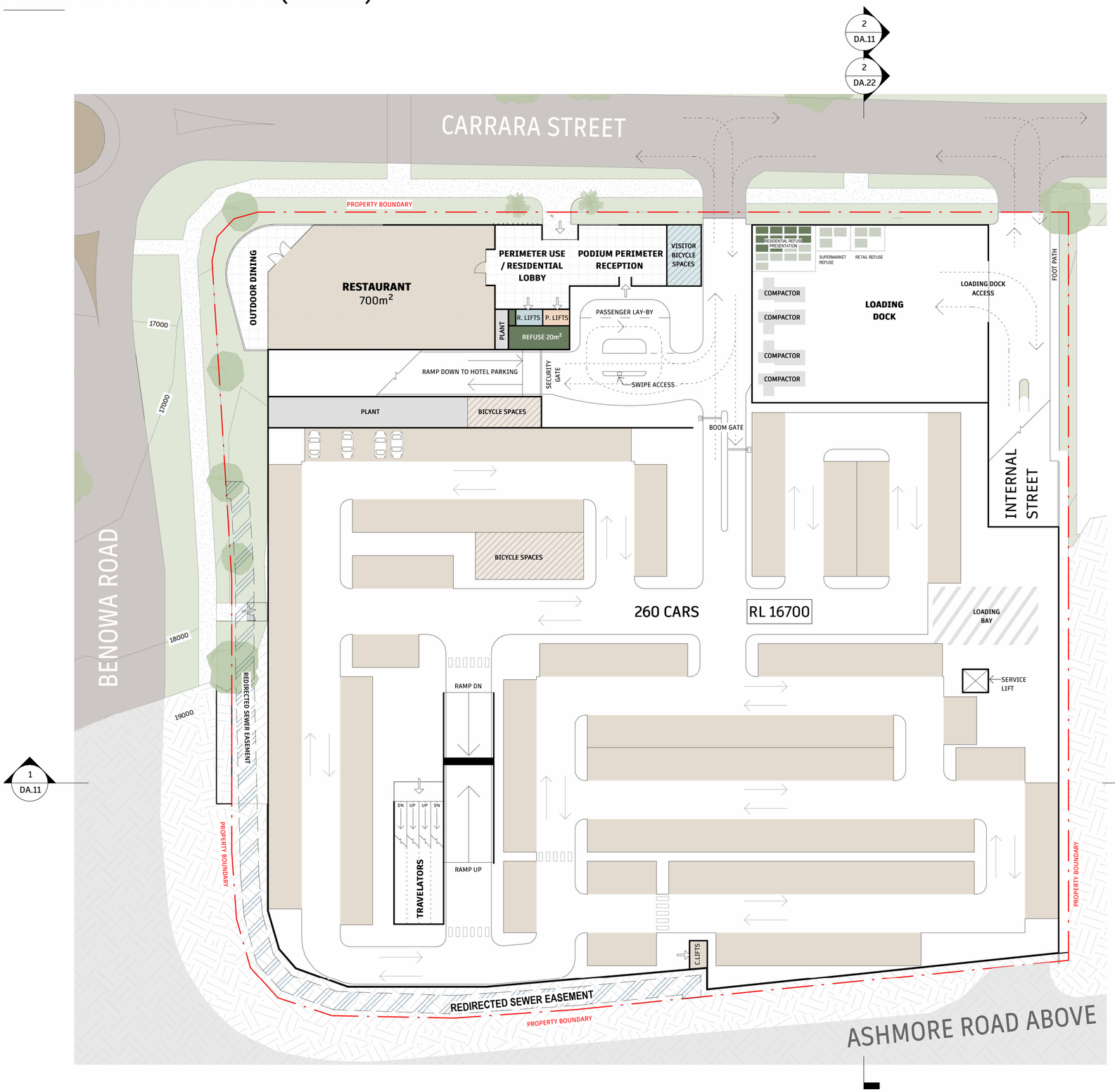
TOTAL CARPARKS	1,460

BASEMENT 3 CARPARK - RETAIL / HOTEL

1 : 500

0 5 10 25 45m

FLOOR PLAN-BASEMENT 2 (RETAIL)



BASEMENT 2 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

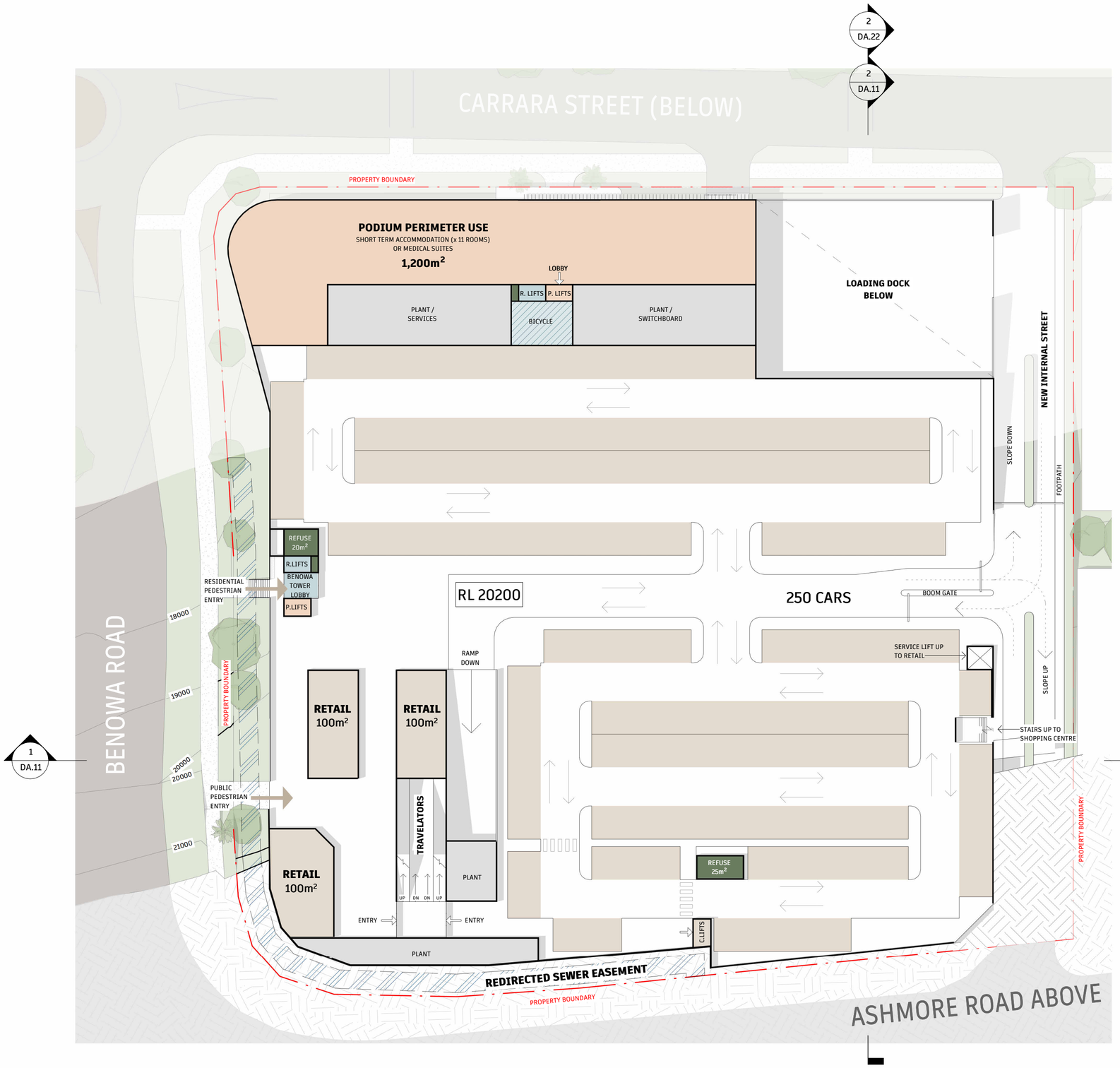
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-BASEMENT 1 (RETAIL)



BASEMENT 1 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

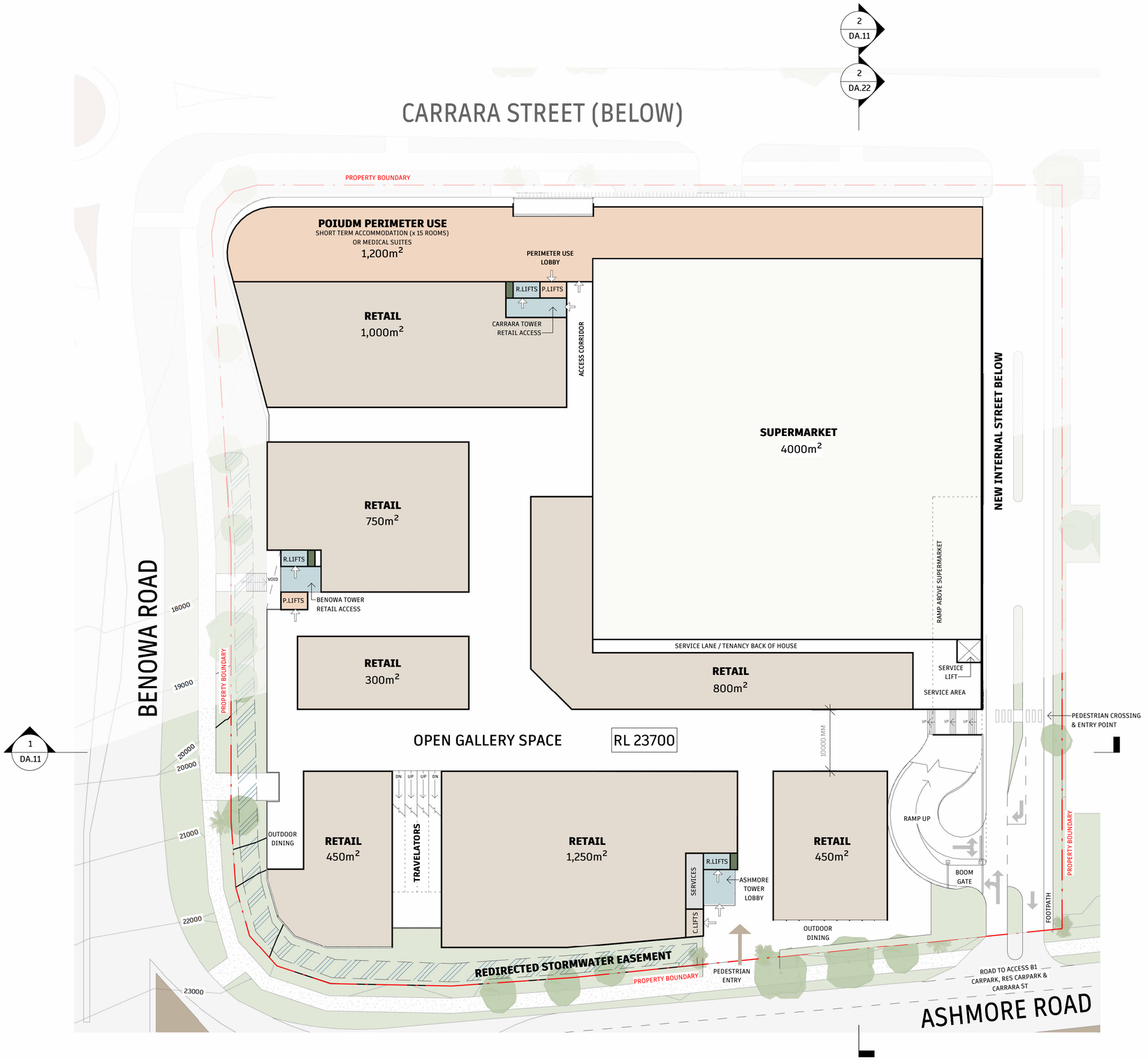
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-SHOPPING CENTRE



LEGEND

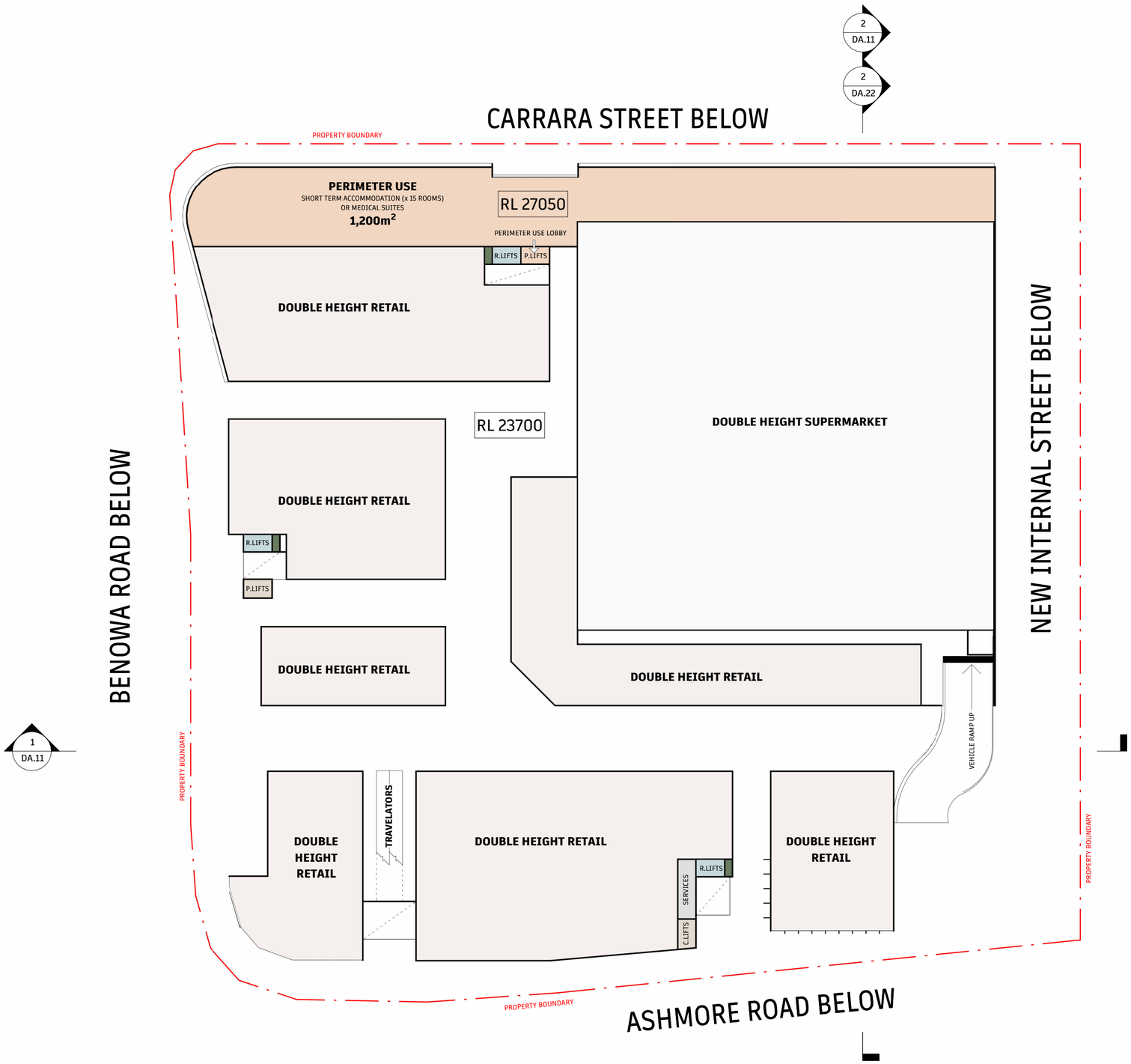
- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

SHOPPING CENTRE

1 : 500

0 5 10 25 45m

FLOOR PLAN LEVEL 1 - PERIMETER USE MEZZANINE



LEVEL 1 - MEZZANINE

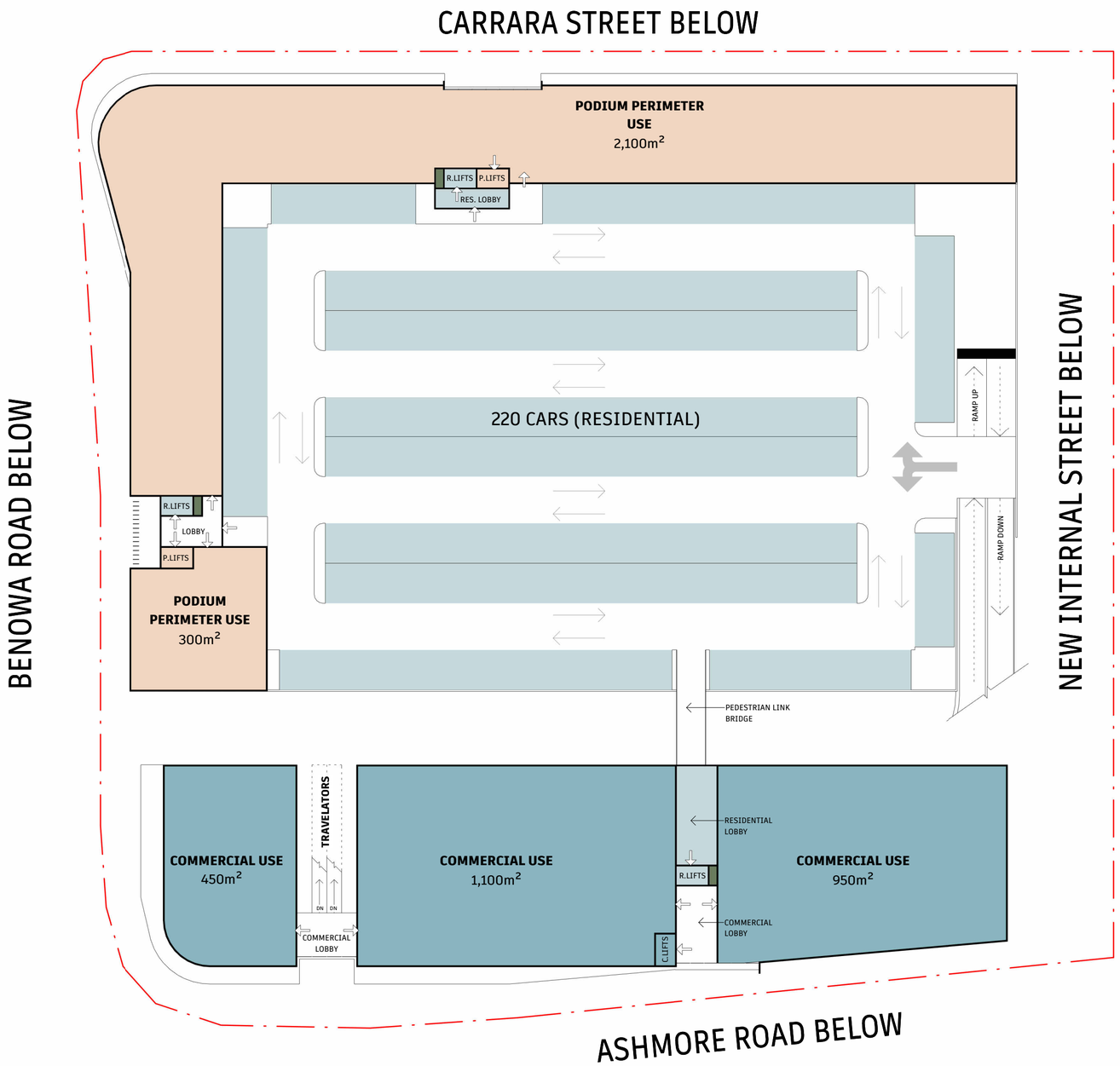
1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

0 5 10 25 45m

FLOOR PLAN-LEVEL 2 (RESIDENTIAL CARPARK)



L2_CARARRA

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

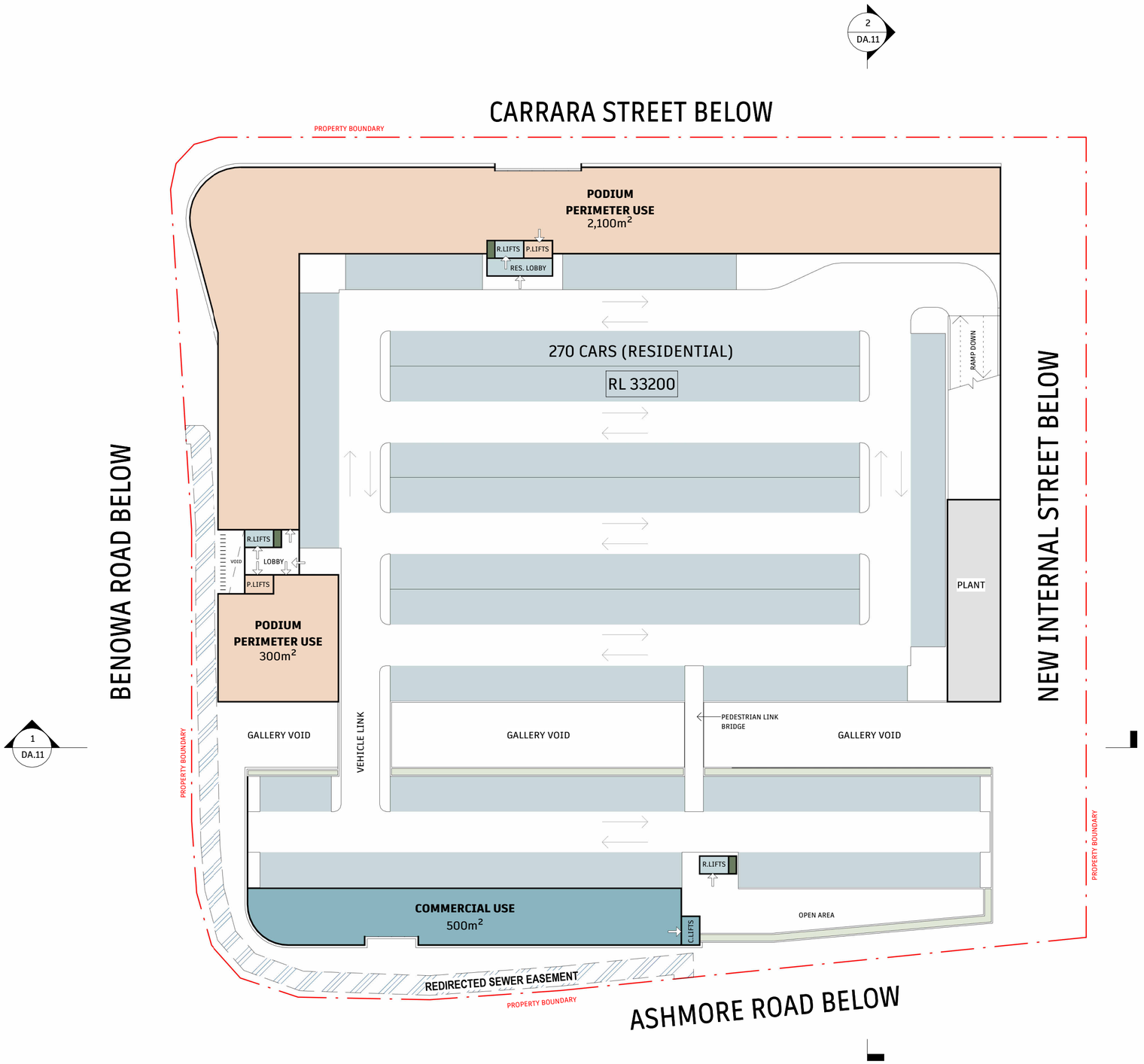
PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

0 5 10 25 45m

FLOOR PLAN-LEVEL 3 (RESIDENTIAL CARPARK)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

L3_RESIDENTIAL CAR PARK

1 : 500

0 5 10 25 45m

Appendix B TTM Swept Path Drawings

NOTES:

1. MAPPING UNDERLAY PROVIDED BY NEARMAP. MAY BE SUBJECT TO DETAILED DESIGN & SITE SURVEY.
2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	05-02-25	PRELIMINARY INTERSECTION CONCEPT	MGr	MGr	

SCALE: SCALE 1:800 @ A3

NORTH

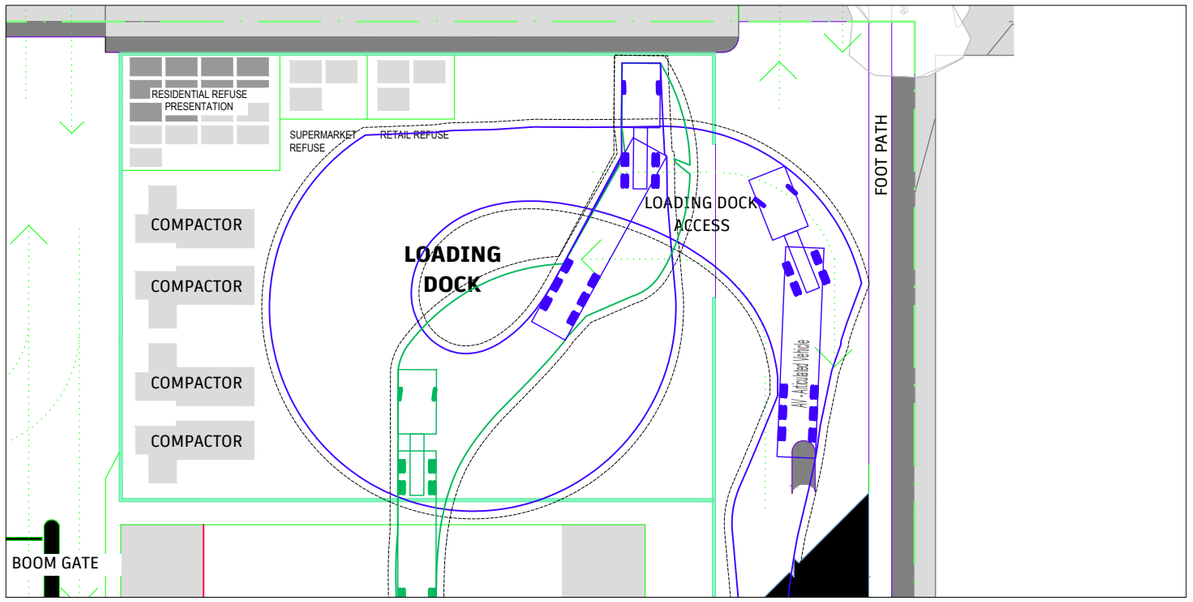
CLIENT: NEYLAN ARCHITECTURE

TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

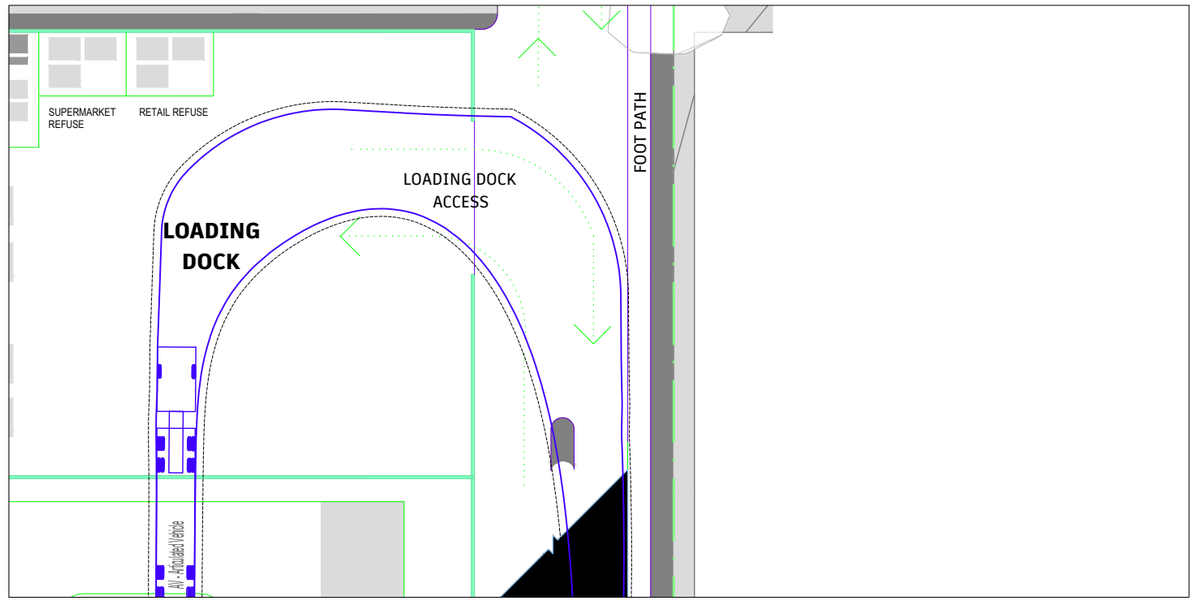
PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**

DRAWING TITLE: **ASHMORE ROAD / BENOWA ROAD INTERSECTION**
HIGH LEVEL INTERSECTION CONCEPT SKETCH

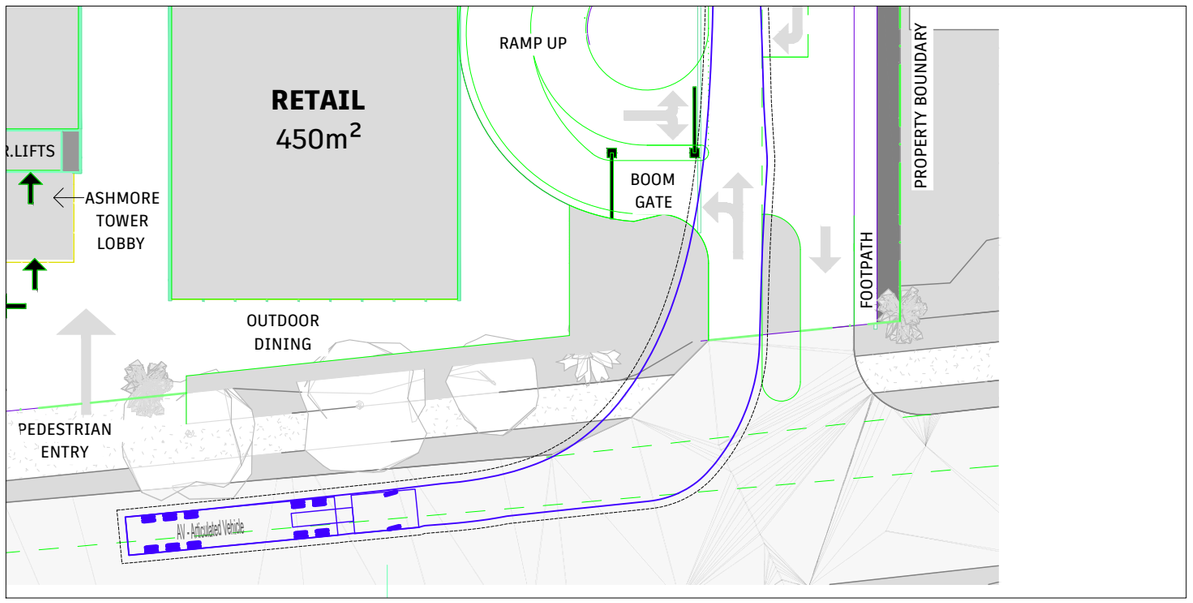
PROJECT NUMBER	ORIGINAL SIZE
24BRT0224	A3
DRAWING NUMBER	REVISION
24BRT0224-01	A
DATE	SHEET
5 Feb 2025	1 OF 1



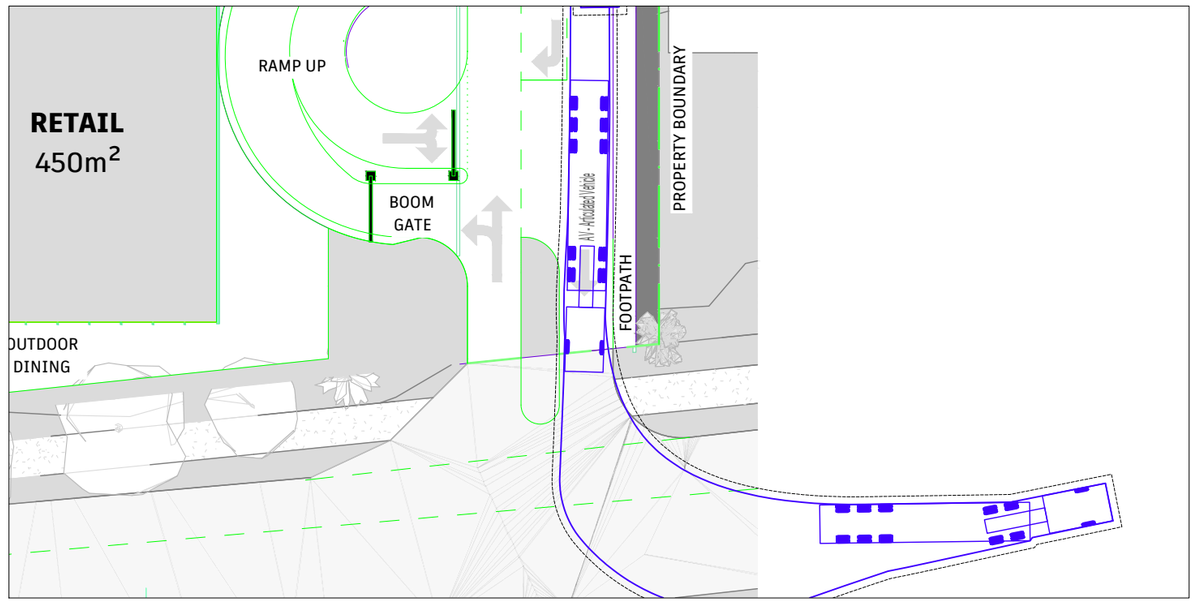
AV INGRESS (LOADING DOCK)



AV EGRESS (LOADING DOCK)

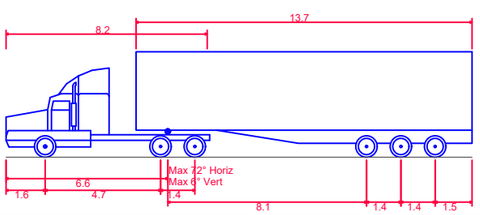


AV INGRESS (ASHMORE ROAD)



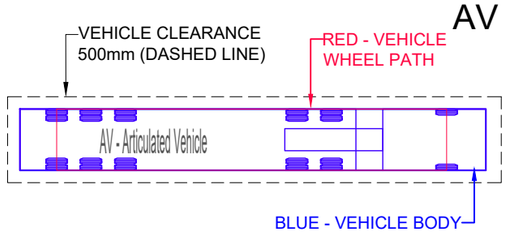
AV EGRESS (ASHMORE ROAD)

VEHICLE PROFILES



AV - Articulated Vehicle

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m
Design Speed Forward	5.0km/h
Clearance Envelope	0.500m



NOTES:
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2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

PRELIMINARY ADVICE ONLY
7 February 2025

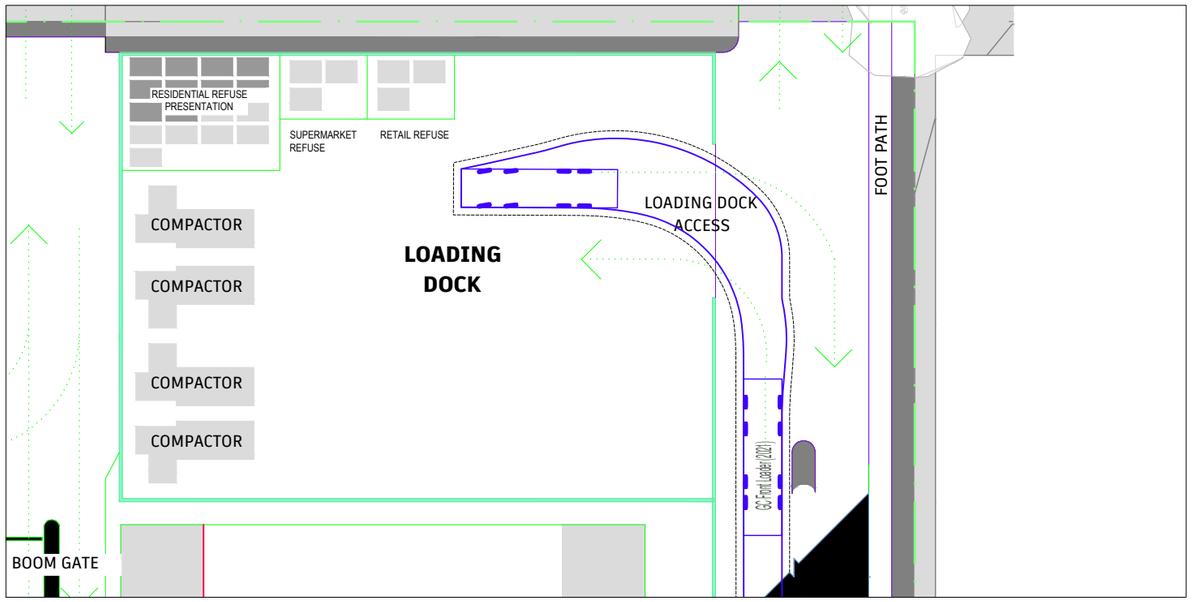
REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	07-02-25	SERVICE VEHICLE SWEPT PATHS (ORIGINAL ISSUE)	MGr	MGr	MGr

SCALE: SCALE 1:400 @ A3
NORTH
CLIENT: NEYLAN ARCHITECTURE

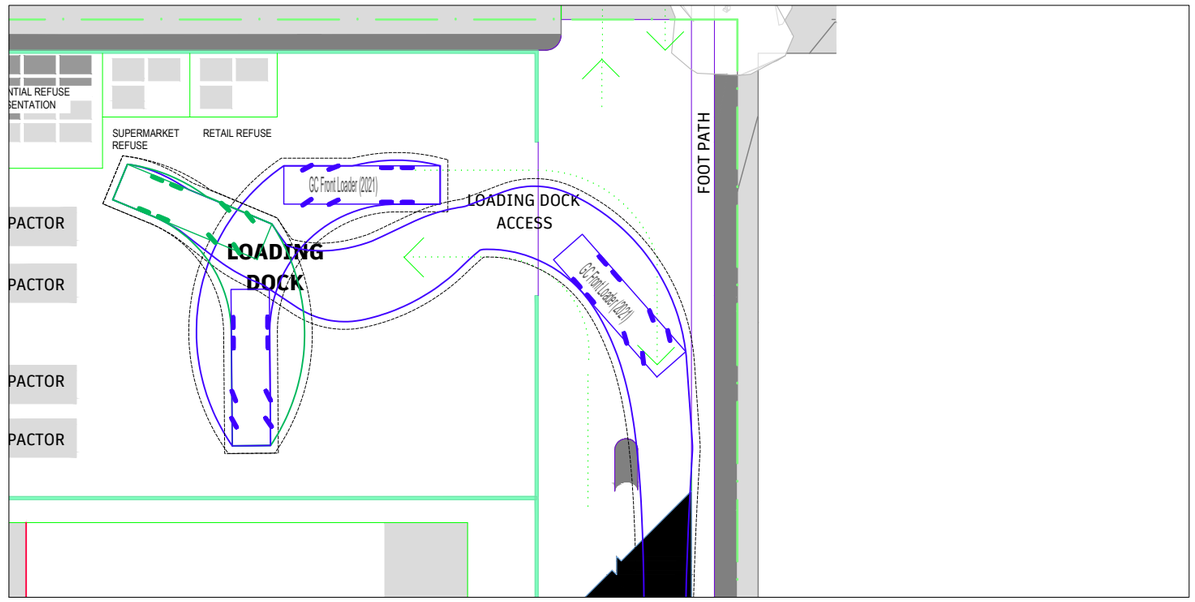
TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**
DRAWING TITLE: **SERVICE VEHICLE SWEPT PATH ANALYSIS**
19m ARTICULATED VEHICLE (AV)

PROJECT NUMBER	24BRT0224
ORIGINAL SIZE	A3
DRAWING NUMBER	24BRT0224-02
REVISION	A
DATE	5 Feb 2025
SHEET	1 OF 1



RCV INGRESS (LOADING DOCK)



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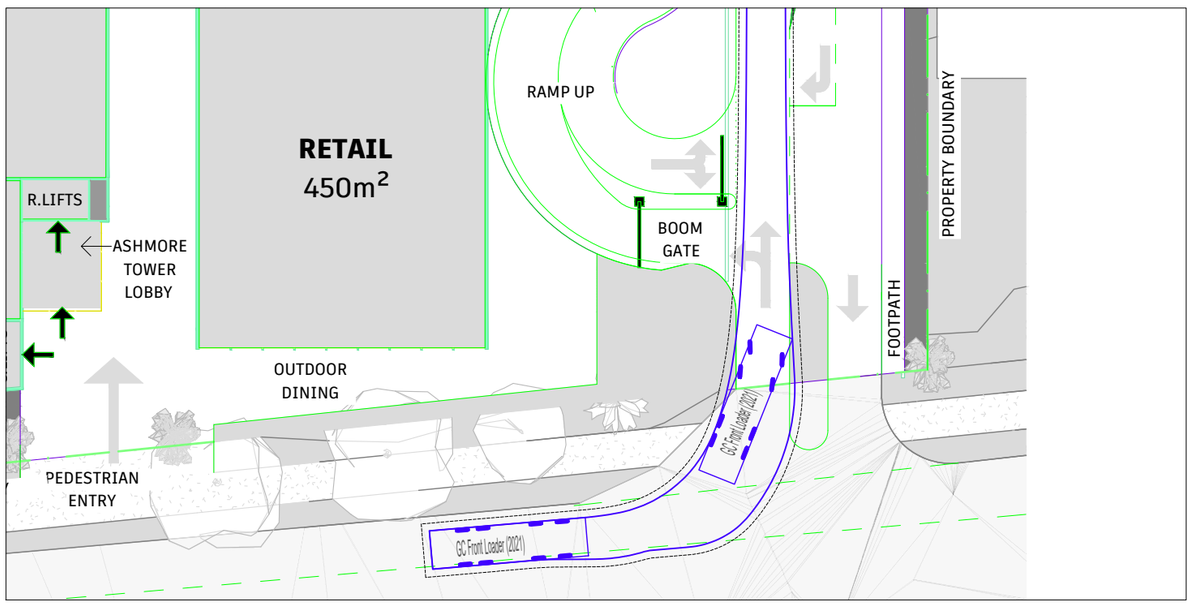

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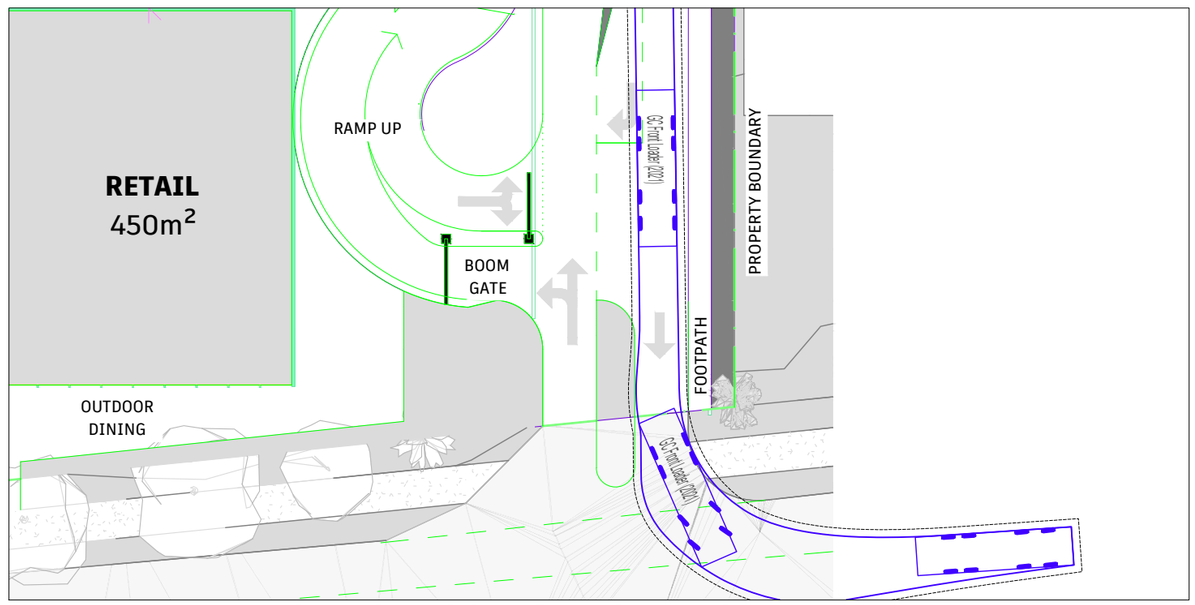
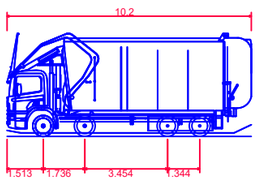


RCV EGRESS (ASHMORE ROAD)



GC Front Loader (2021)

Overall Length	10.200m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.150m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.300m

NOTES:
1. MAPPING UNDERLAY PROVIDED BY NEARMAP. MAY BE SUBJECT TO DETAILED DESIGN & SITE SURVEY.
2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

PRELIMINARY ADVICE ONLY
7 February 2025

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	07-02-25	SERVICE VEHICLE SWEPT PATHS (ORIGINAL ISSUE)	MGr	MGr	MGr

SCALE: SCALE 1:400 @ A3

NORTH

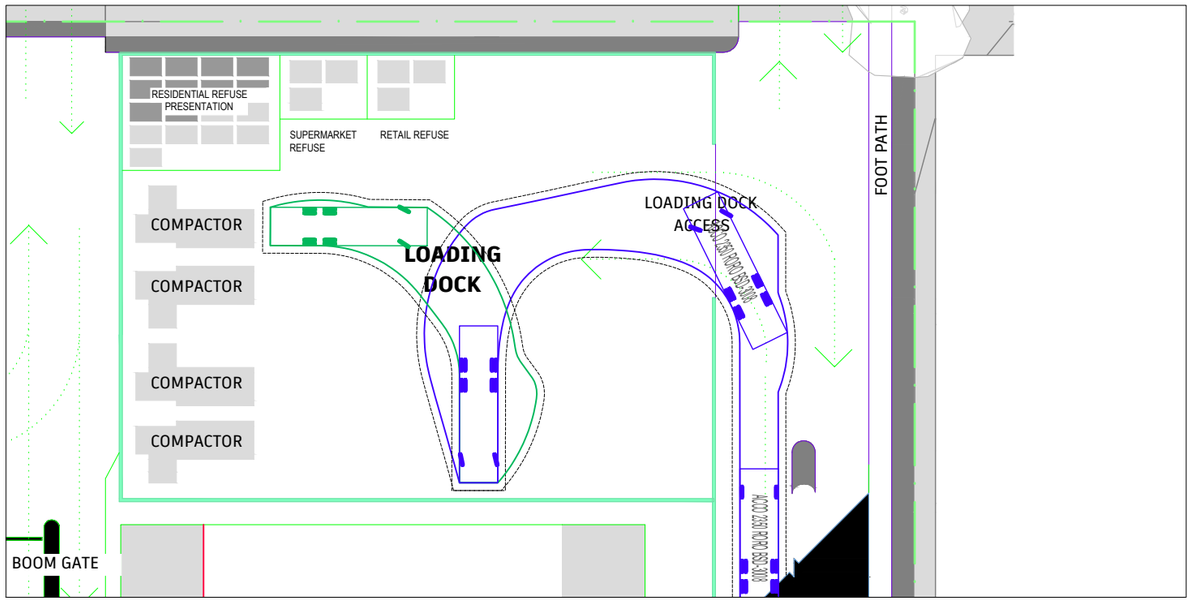
CLIENT: NEYLAN ARCHITECTURE

TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**

DRAWING TITLE: **SERVICE VEHICLE SWEPT PATH ANALYSIS**
10.2m FRONT LIFT REFUSE COLLECTION VEHICLE (RCV)

PROJECT NUMBER	24BRT0224
ORIGINAL SIZE	A3
DRAWING NUMBER	24BRT0224-03
REVISION	A
DATE	5 Feb 2025
SHEET	1 OF 1



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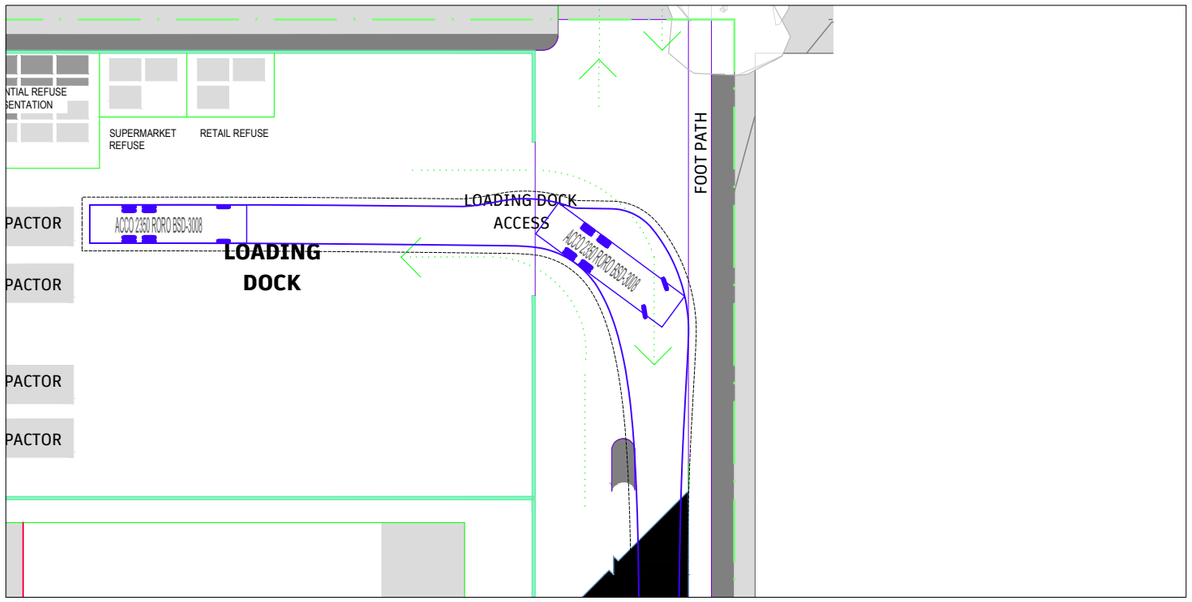
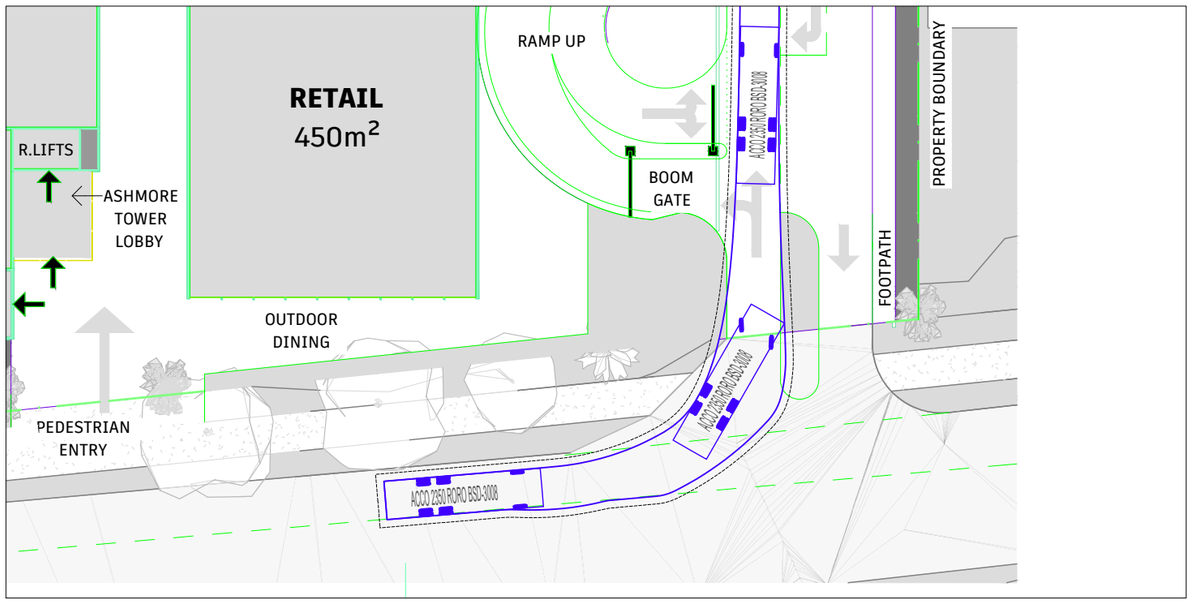
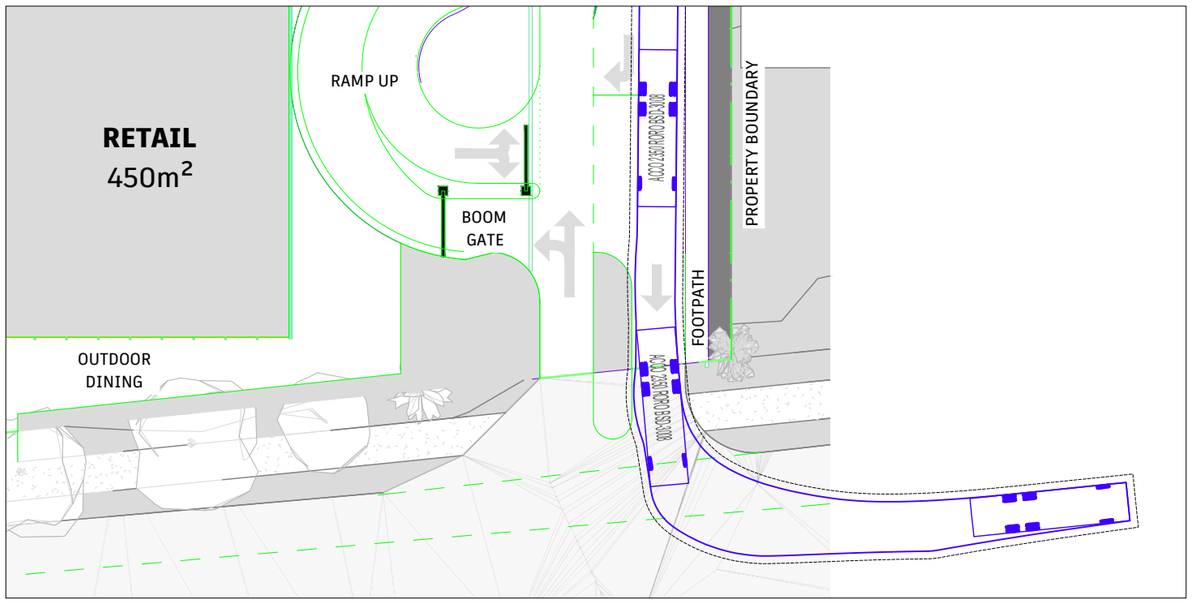


RCV EGRESS (LOADING DOCK)



RCV INGRESS (ASHMORE ROAD)



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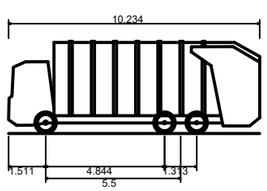

ACCO 2350 RORO BSD-3008

ACCO 2350 RORO BSD-3008	
Overall Length	10.234m
Overall Width	2.500m
Overall Body Height	3.751m
Min Body Ground Clearance	0.304m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.757m

NOTES:
1. MAPPING UNDERLAY PROVIDED BY NEARMAP. MAY BE SUBJECT TO DETAILED DESIGN & SITE SURVEY.
2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

PRELIMINARY ADVICE ONLY
7 February 2025

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	07-02-25	SERVICE VEHICLE SWEPT PATHS (ORIGINAL ISSUE)	MGr	MGr	MGr

SCALE: SCALE 1:400 @ A3
NORTH
CLIENT: NEYLAN ARCHITECTURE

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ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
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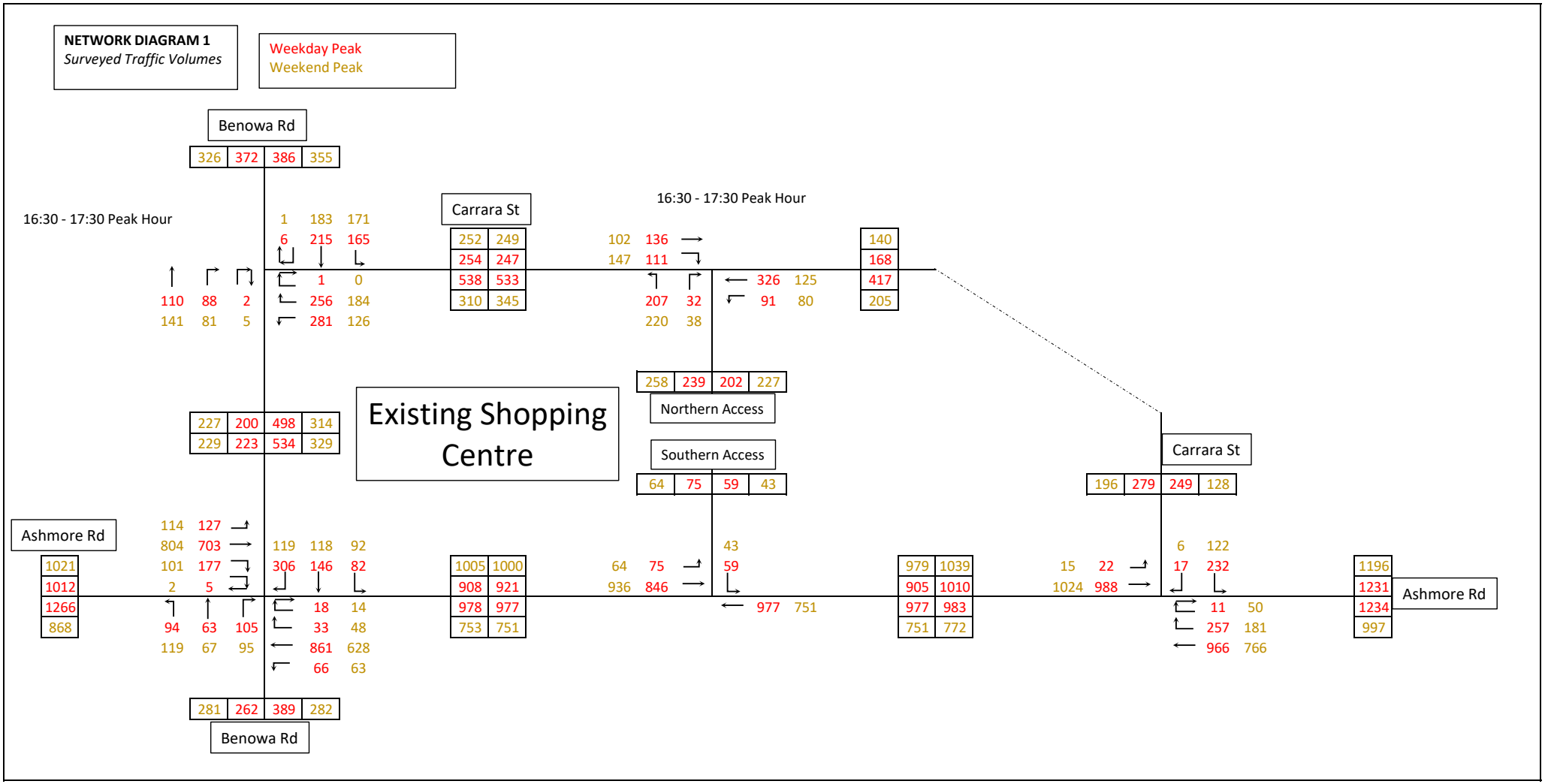
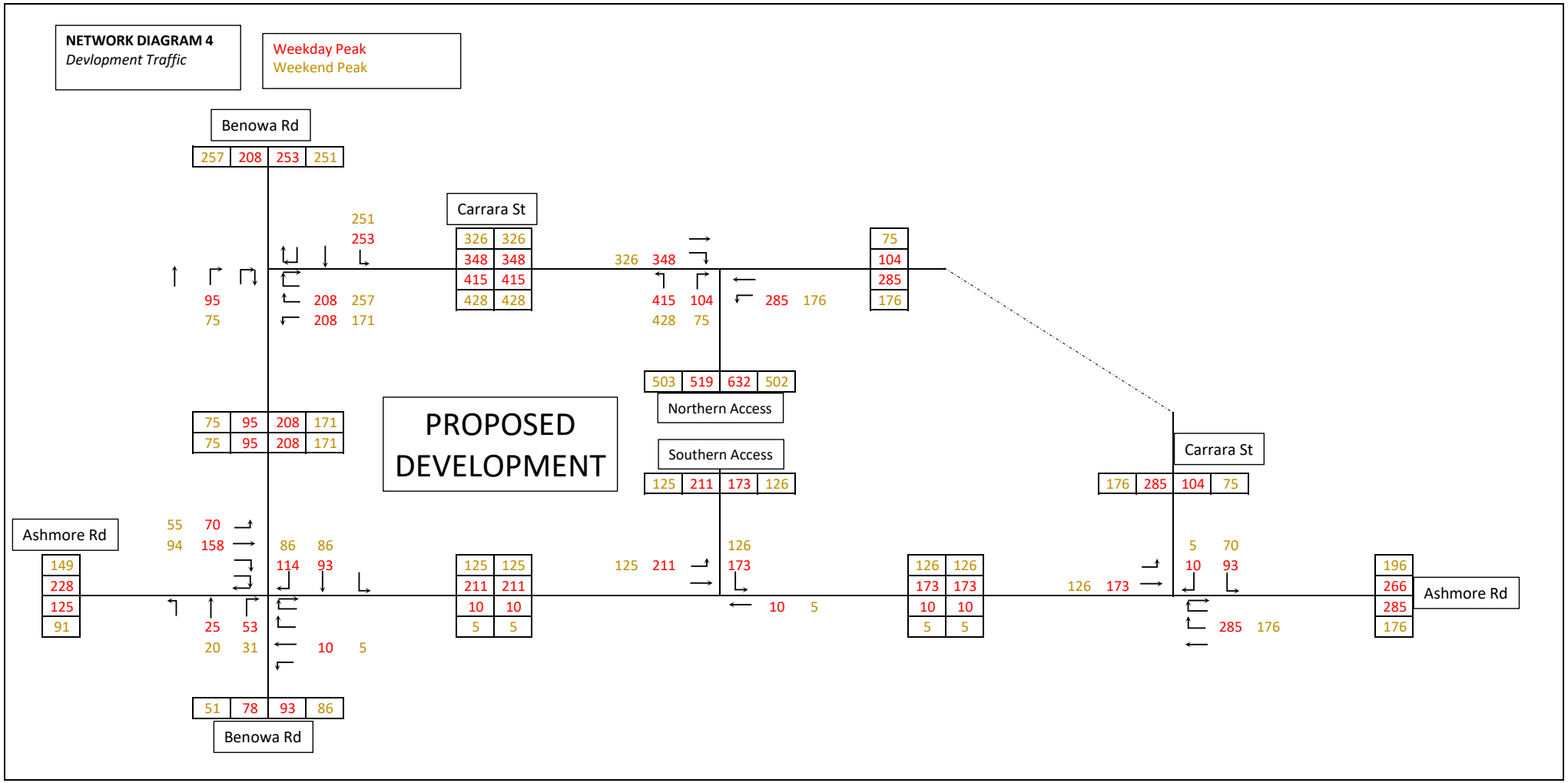
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

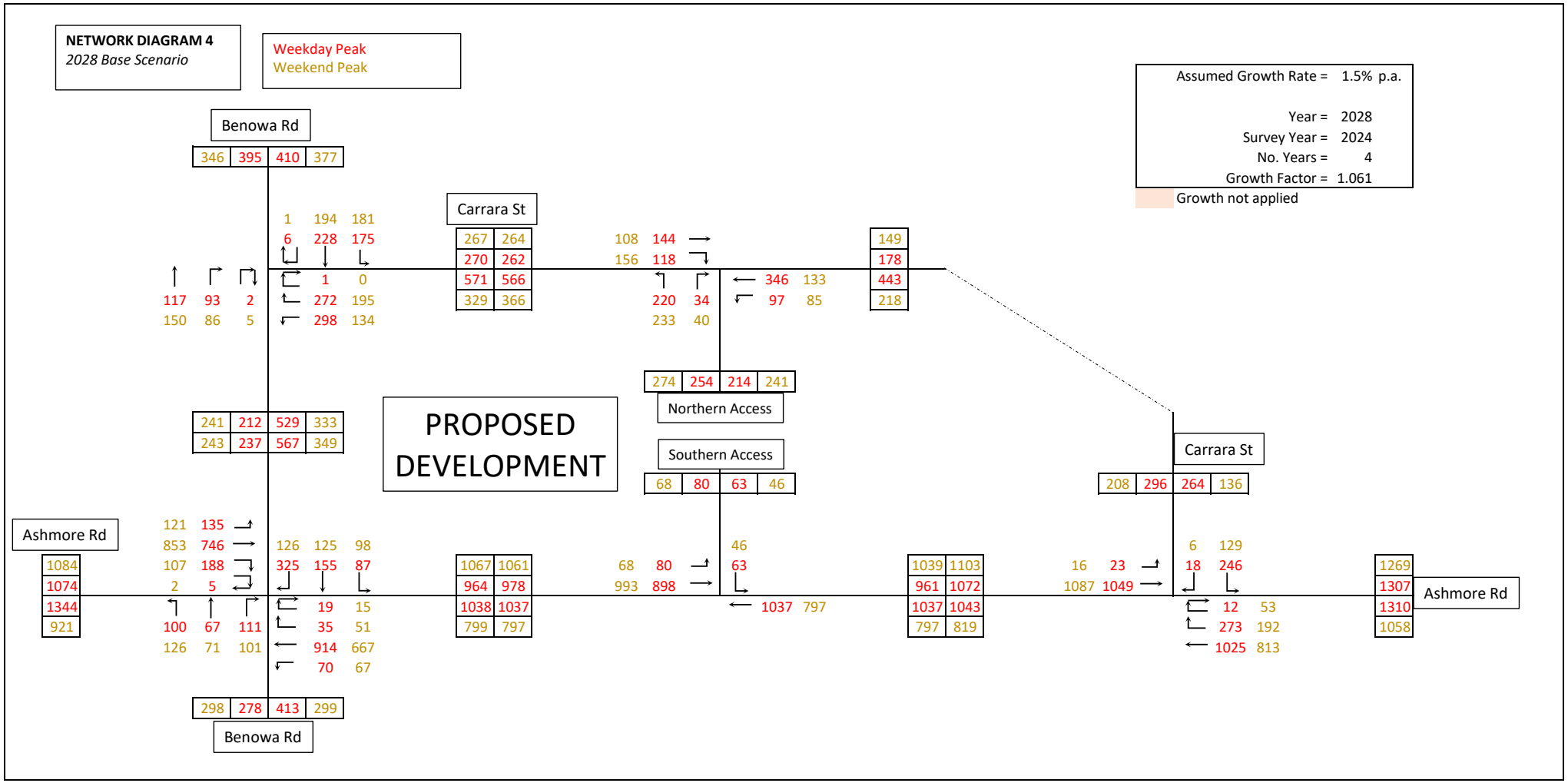
PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**
DRAWING TITLE: **SERVICE VEHICLE SWEPT PATH ANALYSIS**
10.2m REAR LIFT REFUSE COLLECTION VEHICLE (RCV)

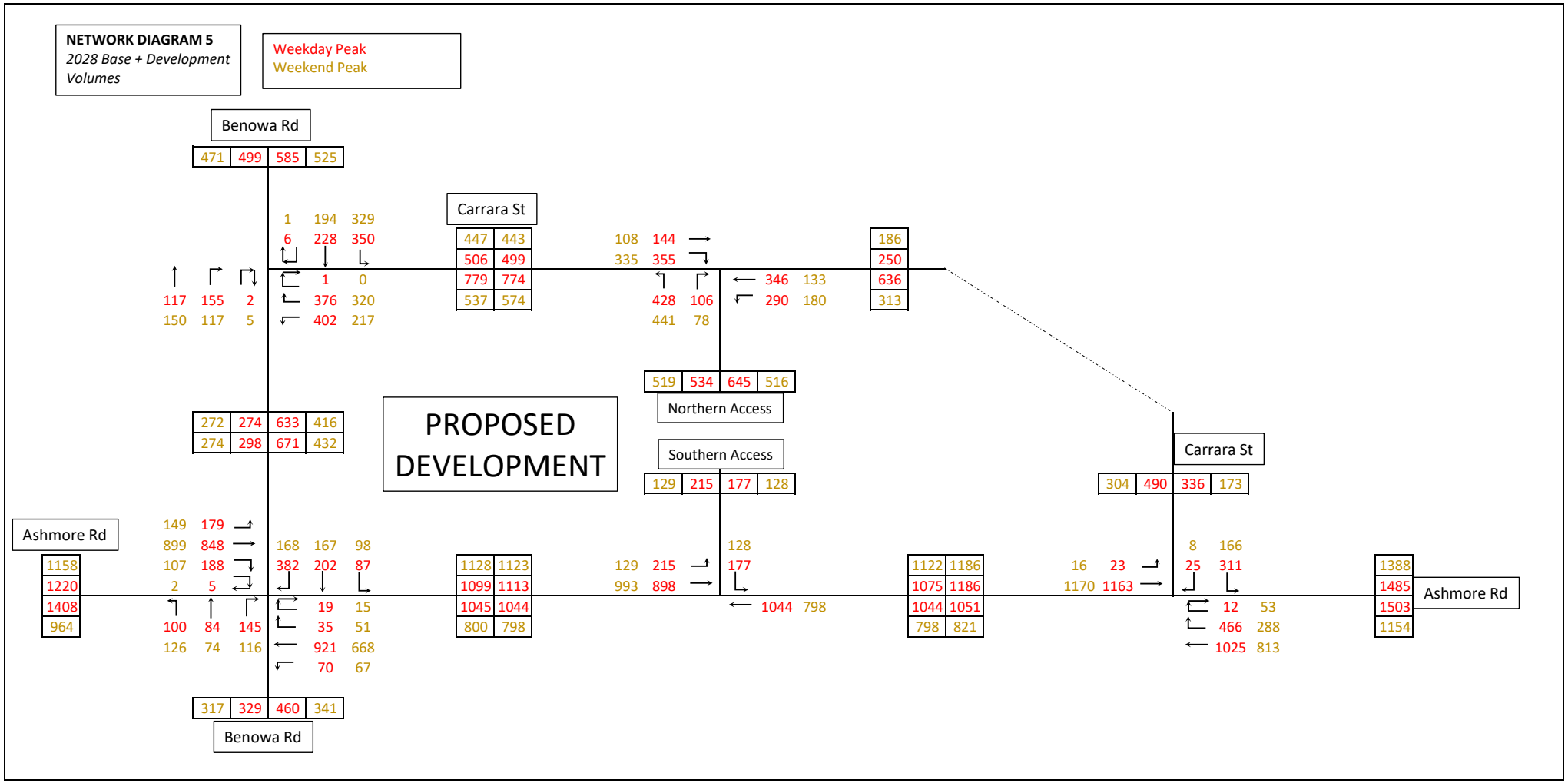
PROJECT NUMBER	ORIGINAL SIZE
24BRT0224	A3
DRAWING NUMBER	REVISION
24BRT0224-04	A
DATE	SHEET
5 Feb 2025	1 OF 1

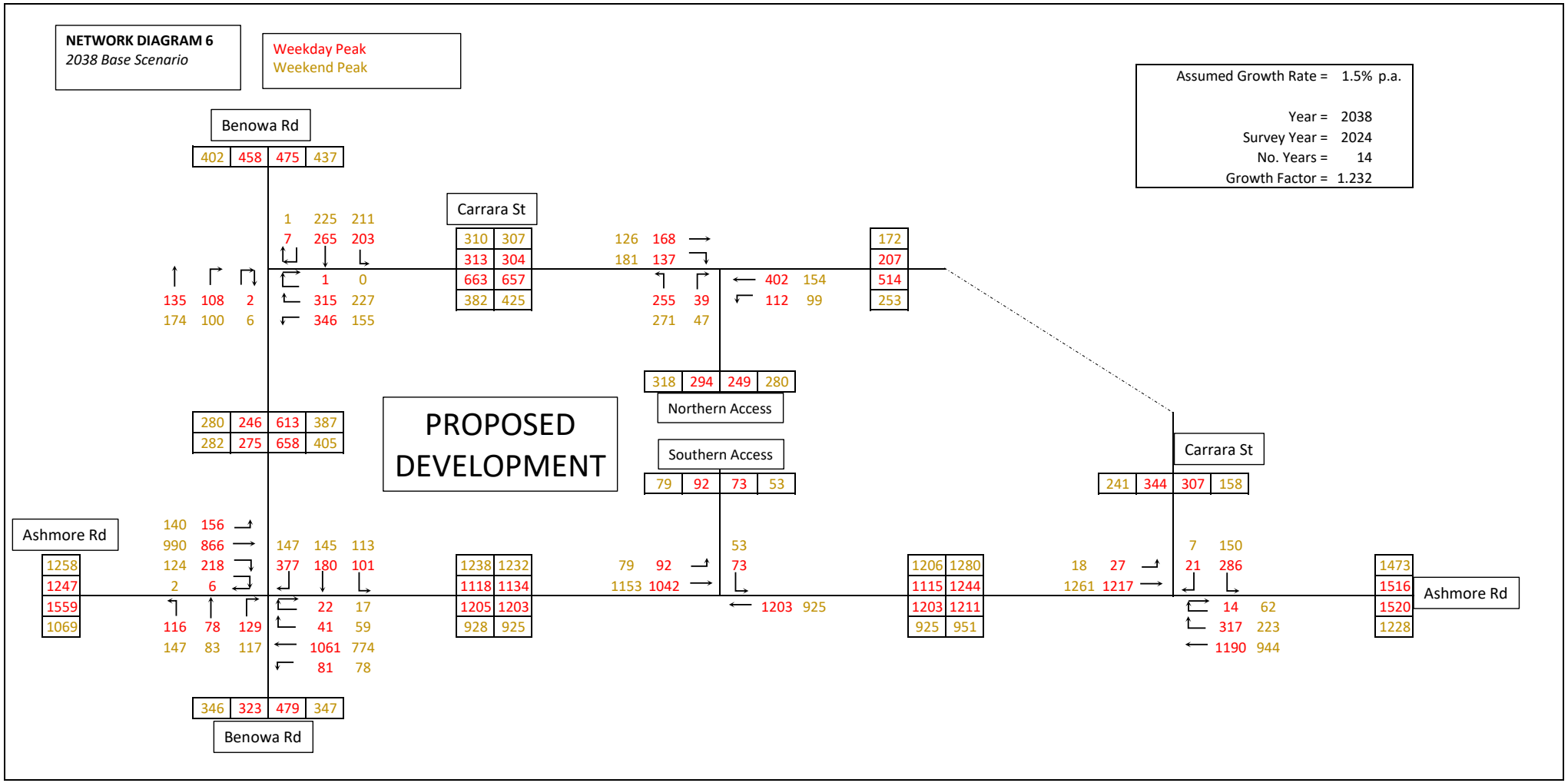
Appendix C Traffic Network Diagrams

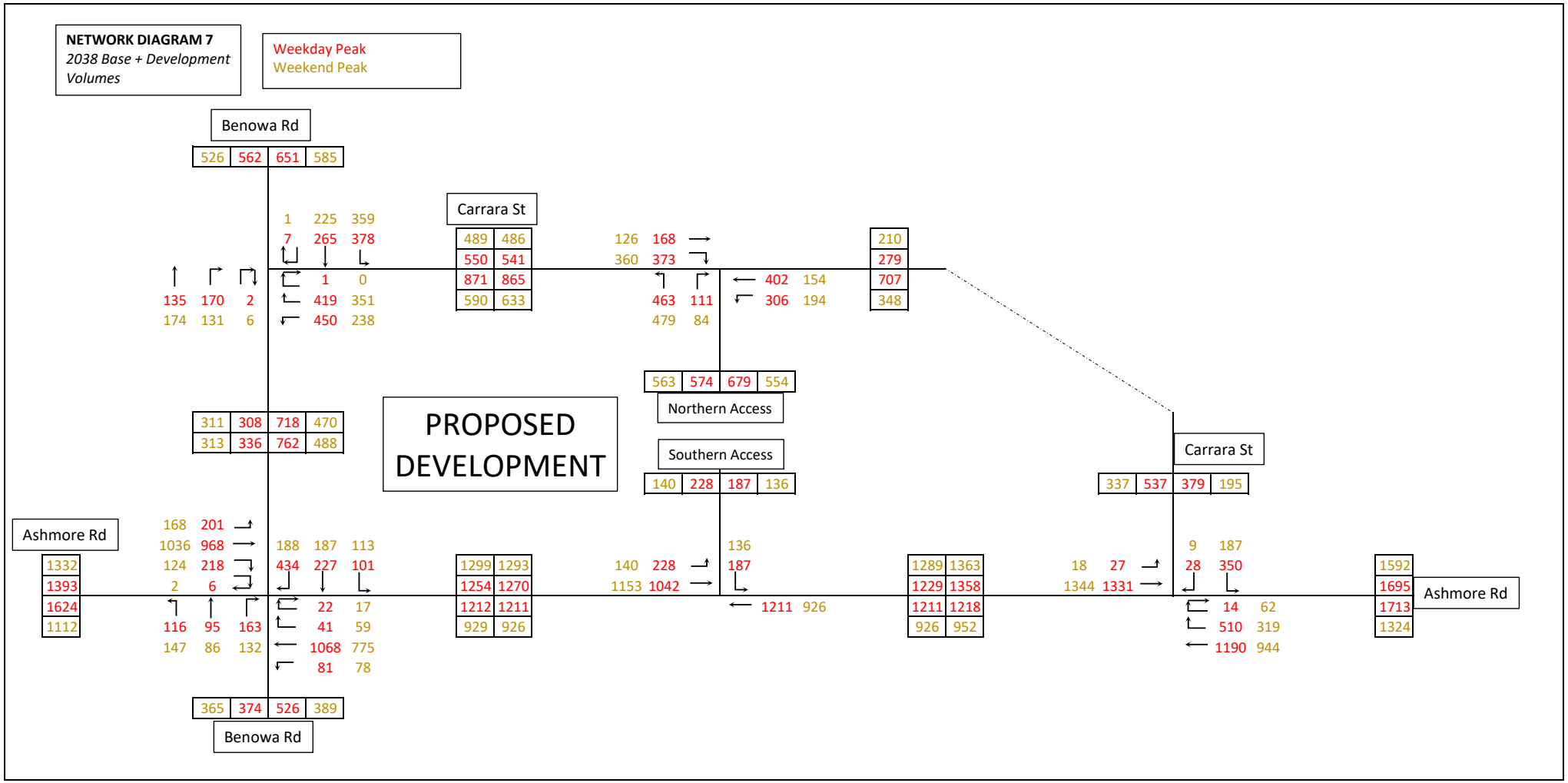

NETWORK DIAGRAM 1
Surveyed Traffic Volumes
Weekday Peak
Weekend Peak
Benowa Rd
326 372 386 355
16:30 - 17:30 Peak Hour
Carrara St
252 249
254 247
538 533
310 345
1 183 171
6 215 165
1 0
256 184
281 126
110 88 2
141 81 5
102 136
147 111
207 32
220 38
326 125
91 80
140
168
417
205
16:30 - 17:30 Peak Hour
258 239 202 227
Northern Access
Southern Access
64 75 59 43
227 200 498 314
229 223 534 329
Existing Shopping Centre
Carrara St
196 279 249 128
Ashmore Rd
1021
1012
1266
868
114 127
804 703
101 177
2 5
94 63 105
119 67 95
119 118 92
306 146 82
18 14
33 48
861 628
66 63
1005 1000
908 921
978 977
753 751
64 75
936 846
43
59
977 751
979 1039
905 1010
977 983
751 772
15 22
1024 988
6 122
17 232
11 50
257 181
966 766
1196
1231
1234
997
Ashmore Rd
281 262 389 282
Benowa Rd


NETWORK DIAGRAM 4
Devlopment Traffic
Weekday Peak
Weekend Peak
Benowa Rd
257 208 253 251
Carrara St
326 326
348 348
415 415
428 428
75
104
285
176
503 519 632 502
Northern Access
Southern Access
125 211 173 126
176 285 104 75
PROPOSED DEVELOPMENT
Ashmore Rd
149
228
125
91
125 125
211 211
10 10
5 5
126 126
173 173
10 10
5 5
196
266
285
176
Ashmore Rd
75 95 208 171
75 95 208 171
51 78 93 86
Benowa Rd


NETWORK DIAGRAM 4
2028 Base Scenario
Weekday Peak
Weekend Peak
Assumed Growth Rate = 1.5% p.a.
Year = 2028
Survey Year = 2024
No. Years = 4
Growth Factor = 1.061
Growth not applied
Benowa Rd
346 395 410 377
Carrara St
267 264
270 262
571 566
329 366
149
178
443
218
Northern Access
274 254 214 241
Southern Access
68 80 63 46
Carrara St
208 296 264 136
241 212 529 333
243 237 567 349
PROPOSED DEVELOPMENT
Ashmore Rd
1084
1074
1344
921
1067 1061
964 978
1038 1037
799 797
1039 1103
961 1072
1037 1043
797 819
1269
1307
1310
1058
Ashmore Rd
298 278 413 299
Benowa Rd


NETWORK DIAGRAM 5
2028 Base + Development Volumes
Weekday Peak
Weekend Peak
Benowa Rd
471 499 585 525
Carrara St
1 194 329
6 228 350
1 0
376 320
402 217
117 155 2
150 117 5
447 443
506 499
779 774
537 574
108 144
335 355
428 106
441 78
346 133
290 180
186
250
636
313
519 534 645 516
Northern Access
272 274 633 416
274 298 671 432
PROPOSED DEVELOPMENT
Southern Access
129 215 177 128
Carrara St
304 490 336 173
Ashmore Rd
149 179
899 848
107 188
2 5
168 167 98
382 202 87
19 15
35 51
921 668
70 67
100 84 145
126 74 116
1158
1220
1408
964
1128 1123
1099 1113
1045 1044
800 798
129 215
993 898
128
177
1044 798
1122 1186
1075 1186
1044 1051
798 821
16 23
1170 1163
8 166
25 311
12 53
466 288
1025 813
1388
1485
1503
1154
Ashmore Rd
317 329 460 341
Benowa Rd


NETWORK DIAGRAM 6
2038 Base Scenario
Weekday Peak
Weekend Peak
Assumed Growth Rate = 1.5% p.a.
Year = 2038
Survey Year = 2024
No. Years = 14
Growth Factor = 1.232
Benowa Rd
Carrara St
Northern Access
Southern Access
Carrara St
Ashmore Rd
Ashmore Rd
Benowa Rd
PROPOSED DEVELOPMENT


NETWORK DIAGRAM 7
2038 Base + Development Volumes
Weekday Peak
Weekend Peak
Benowa Rd
526 562 651 585
Carrara St
489 486
550 541
871 865
590 633
210
279
707
348
1 225 359
7 265 378
1 0
419 351
450 238
135 170 2
174 131 6
126 168
360 373
463 111
479 84
402 154
306 194
563 574 679 554
Northern Access
311 308 718 470
313 336 762 488
PROPOSED DEVELOPMENT
Southern Access
140 228 187 136
Carrara St
337 537 379 195
Ashmore Rd
168 201
1036 968
124 218
2 6
116 95 163
147 86 132
188 187 113
434 227 101
22 17
41 59
1068 775
81 78
1332
1393
1624
1112
1299 1293
1254 1270
1212 1211
929 926
140 228
1153 1042
136
187
1211 926
1289 1363
1229 1358
1211 1218
926 952
18 27
1344 1331
9 187
28 350
14 62
510 319
1190 944
1592
1695
1713
1324
Ashmore Rd
365 374 526 389
Benowa Rd

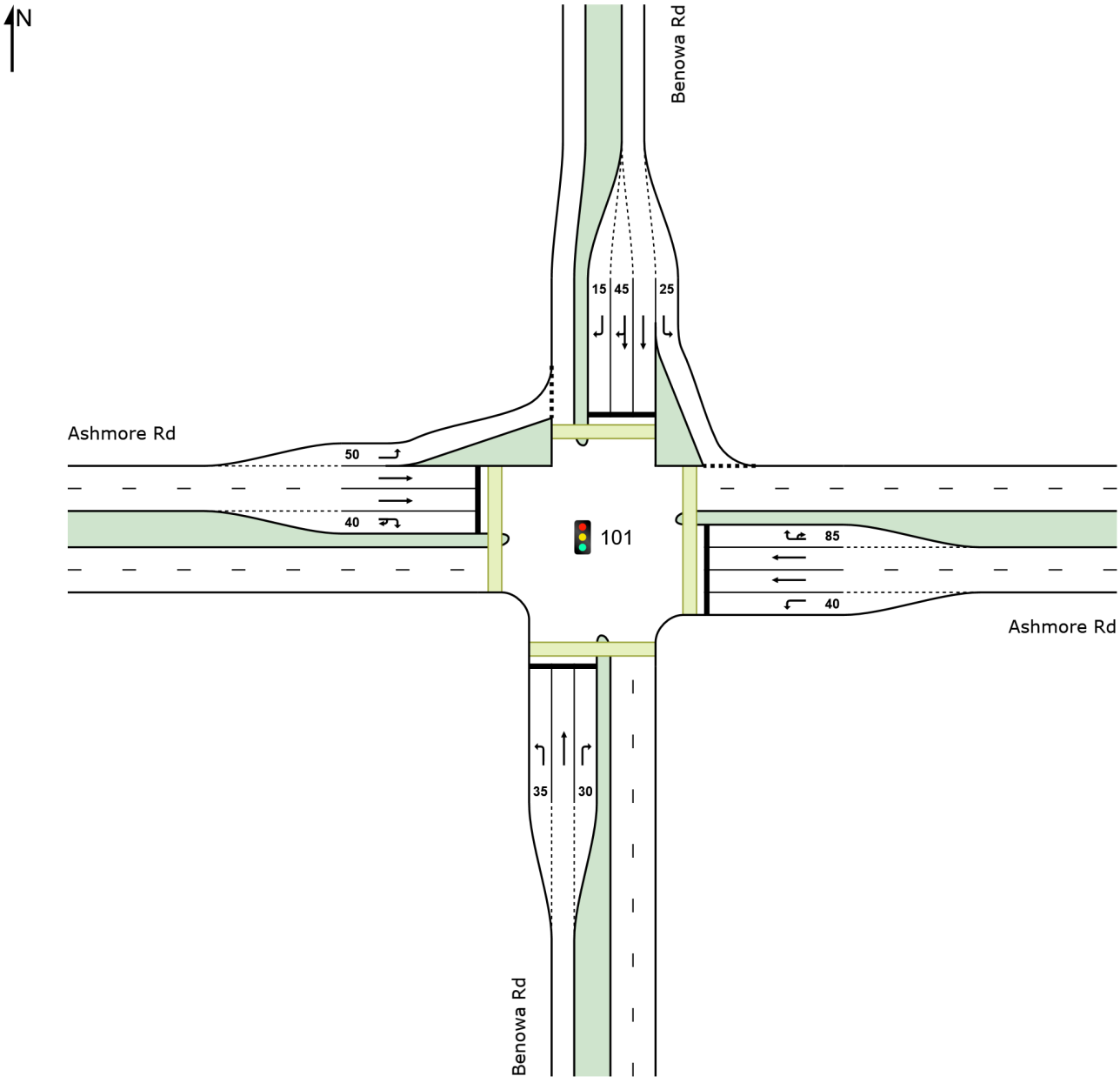
Appendix D SIDRA Output Reports

SITE LAYOUT

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	94	2.1	99	2.1	0.414	62.1	LOS E	5.9	42.1	0.96	0.78	0.96	21.4
2	T1	63	0.0	66	0.0	0.260	55.6	LOS E	3.8	26.9	0.94	0.72	0.94	11.8
3	R2	105	0.0	111	0.0	* 0.455	62.5	LOS E	6.6	46.4	0.97	0.79	0.97	19.1
Approach		262	0.8	276	0.8	0.455	60.7	LOS E	6.6	46.4	0.96	0.77	0.96	18.7
East: Ashmore Rd														
4	L2	66	0.0	69	0.0	0.084	16.7	LOS B	1.3	9.0	0.60	0.70	0.60	36.2
5	T1	861	2.0	906	2.0	* 0.805	46.0	LOS D	27.6	196.4	0.96	0.89	1.02	32.7
6	R2	33	6.1	35	6.1	0.538	73.8	LOS E	3.5	25.6	1.00	0.76	1.02	18.2
6u	U	18	0.0	19	0.0	0.538	74.9	LOS E	3.5	25.6	1.00	0.76	1.02	23.5
Approach		978	1.9	1029	1.9	0.805	45.5	LOS D	27.6	196.4	0.94	0.87	0.99	32.1
North: Benowa Rd														
7	L2	82	1.2	86	1.2	0.091	10.6	LOS B	1.5	10.5	0.34	0.64	0.34	44.5
8	T1	146	0.0	154	0.0	0.522	52.0	LOS D	8.8	61.6	0.94	0.76	0.94	12.5
9	R2	306	1.0	322	1.0	* 0.799	64.3	LOS E	10.1	71.1	0.95	0.89	1.16	22.4
Approach		534	0.7	562	0.7	0.799	52.7	LOS D	10.1	71.1	0.85	0.82	0.97	22.1
West: Ashmore Rd														
10	L2	127	0.0	134	0.0	0.085	6.4	LOS A	0.9	6.0	0.16	0.59	0.16	50.5
11	T1	703	1.1	740	1.1	0.515	26.2	LOS C	17.4	122.7	0.73	0.64	0.73	40.7
12	R2	177	1.1	186	1.1	* 0.785	62.0	LOS E	11.8	83.5	0.95	0.88	1.11	21.3
12u	U	5	0.0	5	0.0	0.785	63.1	LOS E	11.8	83.5	0.95	0.88	1.11	29.2
Approach		1012	1.0	1065	1.0	0.785	30.1	LOS C	17.4	122.7	0.70	0.68	0.73	37.1
All Vehicles		2786	1.3	2933	1.3	0.805	42.7	LOS D	27.6	196.4	0.84	0.78	0.89	30.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2024_Survey_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	119	2.1	125	2.1	*0.524	63.2	LOS E	7.6	54.2	0.98	0.80	0.98	21.2
2	T1	67	0.0	71	0.0	0.277	55.8	LOS E	4.1	28.7	0.94	0.73	0.94	11.8
3	R2	95	0.0	100	0.0	0.412	62.1	LOS E	6.0	41.7	0.96	0.78	0.96	19.2
Approach		281	0.9	296	0.9	0.524	61.0	LOS E	7.6	54.2	0.97	0.77	0.97	18.8
East: Ashmore Rd														
4	L2	63	0.0	66	0.0	0.067	13.5	LOS B	1.1	7.4	0.51	0.68	0.51	38.7
5	T1	628	2.0	661	2.0	0.444	30.1	LOS C	15.6	111.3	0.77	0.67	0.77	38.8
6	R2	48	6.1	51	6.1	*0.563	72.7	LOS E	4.3	31.0	1.00	0.77	1.02	18.4
6u	U	14	0.0	15	0.0	0.563	73.7	LOS E	4.3	31.0	1.00	0.77	1.02	23.7
Approach		753	2.0	793	2.0	0.563	32.2	LOS C	15.6	111.3	0.77	0.68	0.77	36.8
North: Benowa Rd														
7	L2	92	1.2	97	1.2	0.108	11.0	LOS B	1.7	12.3	0.35	0.64	0.35	44.2
8	T1	118	0.0	124	0.0	*0.330	54.3	LOS D	5.4	38.0	0.94	0.74	0.94	11.9
9	R2	119	1.0	125	1.0	0.330	59.6	LOS E	4.5	31.6	0.93	0.76	0.93	23.6
Approach		329	0.7	346	0.7	0.330	44.1	LOS D	5.4	38.0	0.77	0.72	0.77	23.2
West: Ashmore Rd														
10	L2	114	0.0	120	0.0	0.077	6.5	LOS A	0.8	5.8	0.17	0.59	0.17	50.4
11	T1	804	1.1	846	1.1	*0.542	24.9	LOS C	19.1	135.0	0.73	0.64	0.73	41.4
12	R2	101	1.1	106	1.1	0.428	62.0	LOS E	6.4	45.5	0.96	0.79	0.96	21.3
12u	U	2	0.0	2	0.0	0.428	63.1	LOS E	6.4	45.5	0.96	0.79	0.96	29.2
Approach		1021	1.0	1075	1.0	0.542	26.6	LOS C	19.1	135.0	0.69	0.65	0.69	39.4
All Vehicles		2384	1.3	2509	1.3	0.563	34.8	LOS C	19.1	135.0	0.76	0.68	0.76	33.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	100	2.1	105	2.1	0.440	62.4	LOS E	6.3	45.0	0.97	0.78	0.97	21.3
2	T1	67	0.0	71	0.0	0.277	55.8	LOS E	4.1	28.7	0.94	0.73	0.94	11.8
3	R2	111	0.0	117	0.0	* 0.481	62.8	LOS E	7.0	49.3	0.97	0.79	0.97	19.1
Approach		278	0.8	293	0.8	0.481	60.9	LOS E	7.0	49.3	0.96	0.77	0.96	18.6
East: Ashmore Rd														
4	L2	70	0.0	74	0.0	0.090	17.1	LOS B	1.4	9.8	0.61	0.70	0.61	36.0
5	T1	914	2.0	962	2.0	* 0.877	54.9	LOS D	32.8	233.8	0.99	1.00	1.16	30.1
6	R2	35	6.1	37	6.1	0.570	74.2	LOS E	3.8	27.2	1.00	0.77	1.04	18.2
6u	U	19	0.0	20	0.0	0.570	75.2	LOS E	3.8	27.2	1.00	0.77	1.04	23.4
Approach		1038	1.9	1093	1.9	0.877	53.4	LOS D	32.8	233.8	0.96	0.97	1.11	29.7
North: Benowa Rd														
7	L2	87	1.2	92	1.2	0.099	11.2	LOS B	1.7	11.9	0.36	0.65	0.36	43.9
8	T1	155	0.0	163	0.0	0.568	52.3	LOS D	9.4	65.8	0.95	0.77	0.95	12.4
9	R2	325	1.0	342	1.0	* 0.863	70.6	LOS E	11.4	80.4	0.96	0.95	1.29	21.1
Approach		567	0.7	597	0.7	0.863	56.5	LOS E	11.4	80.4	0.86	0.85	1.05	21.1
West: Ashmore Rd														
10	L2	135	0.0	142	0.0	0.091	6.4	LOS A	0.9	6.4	0.16	0.59	0.16	50.5
11	T1	746	1.1	785	1.1	0.556	26.6	LOS C	18.7	132.5	0.75	0.65	0.75	40.5
12	R2	188	1.1	198	1.1	* 0.864	68.6	LOS E	13.5	95.1	0.95	0.94	1.25	20.0
12u	U	5	0.0	5	0.0	0.864	69.8	LOS E	13.5	95.1	0.95	0.94	1.25	27.8
Approach		1074	1.0	1131	1.0	0.864	31.6	LOS C	18.7	132.5	0.71	0.70	0.76	36.4
All Vehicles		2957	1.3	3113	1.3	0.877	46.8	LOS D	32.8	233.8	0.85	0.83	0.96	29.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	126	2.1	133	2.1	*0.554	63.4	LOS E	8.1	57.7	0.99	0.80	0.99	21.1
2	T1	71	0.0	75	0.0	0.293	55.9	LOS E	4.4	30.5	0.95	0.73	0.95	11.8
3	R2	101	0.0	106	0.0	0.438	62.4	LOS E	6.4	44.5	0.97	0.78	0.97	19.2
Approach		298	0.9	314	0.9	0.554	61.3	LOS E	8.1	57.7	0.97	0.78	0.97	18.7
East: Ashmore Rd														
4	L2	67	0.0	71	0.0	0.071	13.3	LOS B	1.1	7.9	0.50	0.68	0.50	38.9
5	T1	667	2.0	702	2.0	0.464	29.7	LOS C	16.7	118.8	0.78	0.67	0.78	39.0
6	R2	51	6.1	54	6.1	*0.599	73.1	LOS E	4.6	33.2	1.00	0.79	1.05	18.4
6u	U	15	0.0	16	0.0	0.599	74.2	LOS E	4.6	33.2	1.00	0.79	1.05	23.7
Approach		800	2.0	842	2.0	0.599	31.9	LOS C	16.7	118.8	0.77	0.68	0.77	36.9
North: Benowa Rd														
7	L2	98	1.2	103	1.2	0.118	11.6	LOS B	2.0	14.0	0.37	0.65	0.37	43.5
8	T1	125	0.0	132	0.0	*0.357	54.5	LOS D	5.9	41.3	0.94	0.75	0.94	11.9
9	R2	126	1.0	133	1.0	0.357	59.8	LOS E	4.7	33.1	0.93	0.76	0.93	23.6
Approach		349	0.7	367	0.7	0.357	44.4	LOS D	5.9	41.3	0.78	0.72	0.78	23.1
West: Ashmore Rd														
10	L2	121	0.0	127	0.0	0.082	6.6	LOS A	1.0	6.7	0.17	0.60	0.17	50.3
11	T1	853	1.1	898	1.1	*0.579	25.3	LOS C	20.5	144.7	0.74	0.65	0.74	41.1
12	R2	107	1.1	113	1.1	0.479	63.4	LOS E	6.9	48.9	0.97	0.79	0.97	21.0
12u	U	2	0.0	2	0.0	0.479	64.5	LOS E	6.9	48.9	0.97	0.79	0.97	28.9
Approach		1083	1.0	1140	1.0	0.579	27.0	LOS C	20.5	144.7	0.70	0.66	0.70	39.2
All Vehicles		2530	1.3	2663	1.3	0.599	35.0	LOS D	20.5	144.7	0.77	0.69	0.77	33.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	100	2.1	105	2.1	0.440	62.4	LOS E	6.3	45.0	0.97	0.78	0.97	21.3
2	T1	83	0.0	87	0.0	0.343	56.4	LOS E	5.1	36.0	0.95	0.74	0.95	11.7
3	R2	144	0.0	152	0.0	* 0.686	65.0	LOS E	9.5	66.3	1.00	0.83	1.06	18.6
Approach		327	0.7	344	0.7	0.686	62.0	LOS E	9.5	66.3	0.98	0.80	1.00	18.2
East: Ashmore Rd														
4	L2	70	0.0	74	0.0	0.092	17.4	LOS B	1.4	9.8	0.62	0.70	0.62	35.7
5	T1	921	2.0	969	2.0	* 0.906	61.1	LOS E	35.1	250.1	1.00	1.06	1.23	28.5
6	R2	35	6.1	37	6.1	0.651	76.5	LOS E	3.9	27.9	1.00	0.80	1.12	17.8
6u	U	19	0.0	20	0.0	0.651	77.5	LOS E	3.9	27.9	1.00	0.80	1.12	23.0
Approach		1045	1.9	1100	1.9	0.906	59.0	LOS E	35.1	250.1	0.97	1.02	1.18	28.2
North: Benowa Rd														
7	L2	87	1.2	92	1.2	0.106	13.0	LOS B	1.9	13.7	0.40	0.66	0.40	42.3
8	T1	199	0.0	209	0.0	0.641	52.7	LOS D	12.3	85.9	0.97	0.80	0.97	12.4
9	R2	379	1.0	399	1.0	* 0.882	72.8	LOS E	17.1	120.9	0.98	0.97	1.31	20.7
Approach		665	0.7	700	0.7	0.882	59.0	LOS E	17.1	120.9	0.90	0.88	1.09	20.3
West: Ashmore Rd														
10	L2	178	0.0	187	0.0	0.120	6.6	LOS A	1.4	9.5	0.17	0.60	0.17	50.4
11	T1	844	1.1	888	1.1	0.651	27.5	LOS C	21.4	151.4	0.77	0.68	0.77	40.0
12	R2	188	1.1	198	1.1	* 0.893	73.5	LOS E	14.0	99.1	0.95	0.97	1.33	19.1
12u	U	5	0.0	5	0.0	0.893	74.7	LOS E	14.0	99.1	0.95	0.97	1.33	26.8
Approach		1215	1.0	1279	1.0	0.893	31.8	LOS C	21.4	151.4	0.71	0.71	0.77	36.4
All Vehicles		3252	1.2	3423	1.2	0.906	49.1	LOS D	35.1	250.1	0.86	0.85	0.99	28.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	126	2.1	133	2.1	*0.554	63.4	LOS E	8.1	57.7	0.99	0.80	0.99	21.1
2	T1	73	0.0	77	0.0	0.301	56.0	LOS E	4.5	31.4	0.95	0.73	0.95	11.8
3	R2	115	0.0	121	0.0	0.498	62.9	LOS E	7.3	51.2	0.98	0.79	0.98	19.1
Approach		314	0.9	331	0.9	0.554	61.5	LOS E	8.1	57.7	0.97	0.78	0.97	18.7
East: Ashmore Rd														
4	L2	67	0.0	71	0.0	0.071	13.3	LOS B	1.1	7.9	0.50	0.68	0.50	38.9
5	T1	668	2.0	703	2.0	0.465	29.7	LOS C	16.7	119.1	0.78	0.67	0.78	39.0
6	R2	51	6.1	54	6.1	*0.599	73.1	LOS E	4.6	33.2	1.00	0.79	1.05	18.4
6u	U	15	0.0	16	0.0	0.599	74.2	LOS E	4.6	33.2	1.00	0.79	1.05	23.7
Approach		801	2.0	843	2.0	0.599	31.9	LOS C	16.7	119.1	0.77	0.68	0.78	36.9
North: Benowa Rd														
7	L2	98	1.2	103	1.2	0.122	12.0	LOS B	2.0	14.4	0.38	0.65	0.38	43.2
8	T1	164	0.0	173	0.0	*0.547	55.6	LOS E	7.9	55.6	0.96	0.77	0.96	11.7
9	R2	165	1.0	174	1.0	0.547	60.7	LOS E	6.2	43.9	0.95	0.77	0.95	23.4
Approach		427	0.7	449	0.7	0.547	47.5	LOS D	7.9	55.6	0.82	0.75	0.82	22.0
West: Ashmore Rd														
10	L2	147	0.0	155	0.0	0.100	6.7	LOS A	1.2	8.3	0.18	0.60	0.18	50.3
11	T1	896	1.1	943	1.1	*0.613	25.7	LOS C	21.3	150.5	0.75	0.67	0.75	40.9
12	R2	107	1.1	113	1.1	0.479	63.4	LOS E	6.9	48.9	0.97	0.79	0.97	21.0
12u	U	2	0.0	2	0.0	0.479	64.5	LOS E	6.9	48.9	0.97	0.79	0.97	28.9
Approach		1152	1.0	1213	1.0	0.613	26.8	LOS C	21.3	150.5	0.70	0.67	0.70	39.2
All Vehicles		2694	1.2	2836	1.2	0.613	35.7	LOS D	21.3	150.5	0.77	0.70	0.77	33.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	116	2.1	122	2.1	0.510	63.0	LOS E	7.4	52.7	0.98	0.79	0.98	21.2
2	T1	78	0.0	82	0.0	0.322	56.2	LOS E	4.8	33.7	0.95	0.74	0.95	11.8
3	R2	129	0.0	136	0.0	* 0.582	63.5	LOS E	8.3	58.0	0.99	0.80	0.99	18.9
Approach		323	0.8	340	0.8	0.582	61.6	LOS E	8.3	58.0	0.97	0.78	0.97	18.5
East: Ashmore Rd														
4	L2	81	0.0	85	0.0	0.101	16.6	LOS B	1.6	11.5	0.60	0.70	0.60	36.3
5	T1	1061	2.0	1117	2.0	* 0.976	83.5	LOS F	48.2	343.3	1.00	1.22	1.42	23.9
6	R2	41	6.1	43	6.1	0.664	75.4	LOS E	4.5	32.3	1.00	0.81	1.12	18.0
6u	U	22	0.0	23	0.0	0.664	76.4	LOS E	4.5	32.3	1.00	0.81	1.12	23.2
Approach		1205	1.9	1268	1.9	0.976	78.6	LOS E	48.2	343.3	0.97	1.17	1.35	24.0
North: Benowa Rd														
7	L2	101	1.2	106	1.2	0.127	13.1	LOS B	2.3	16.1	0.41	0.66	0.41	42.2
8	T1	180	0.0	189	0.0	0.764	58.4	LOS E	11.8	82.7	0.98	0.87	1.10	11.4
9	R2	377	1.0	397	1.0	* 1.003	117.3	LOS F	22.5	159.2	1.00	1.14	1.74	14.8
Approach		658	0.7	693	0.7	1.003	85.2	LOS F	22.5	159.2	0.90	1.00	1.36	15.9
West: Ashmore Rd														
10	L2	156	0.0	164	0.0	0.106	6.7	LOS A	1.3	8.8	0.18	0.60	0.18	50.3
11	T1	866	1.1	912	1.1	0.651	26.2	LOS C	22.5	158.8	0.76	0.67	0.76	40.7
12	R2	218	1.1	229	1.1	* 1.003	117.7	LOS F	22.1	156.0	1.00	1.13	1.71	13.7
12u	U	6	0.0	6	0.0	1.003	118.8	LOS F	22.1	156.0	1.00	1.13	1.71	20.2
Approach		1246	1.0	1312	1.0	1.003	40.2	LOS D	22.5	158.8	0.73	0.74	0.86	33.0
All Vehicles		3432	1.3	3613	1.3	1.003	64.3	LOS E	48.2	343.3	0.87	0.94	1.14	24.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	147	2.1	155	2.1	*0.674	65.0	LOS E	9.7	69.0	1.00	0.83	1.04	20.8
2	T1	83	0.0	87	0.0	0.343	56.4	LOS E	5.1	36.0	0.95	0.74	0.95	11.7
3	R2	117	0.0	123	0.0	0.507	63.0	LOS E	7.5	52.2	0.98	0.79	0.98	19.0
Approach		347	0.9	365	0.9	0.674	62.3	LOS E	9.7	69.0	0.98	0.80	1.00	18.5
East: Ashmore Rd														
4	L2	78	0.0	82	0.0	0.082	13.4	LOS B	1.3	9.3	0.51	0.68	0.51	38.9
5	T1	774	2.0	815	2.0	0.545	30.8	LOS C	20.4	145.4	0.81	0.71	0.81	38.5
6	R2	59	6.1	62	6.1	*0.689	74.5	LOS E	5.4	39.0	1.00	0.83	1.13	18.1
6u	U	17	0.0	18	0.0	0.689	75.6	LOS E	5.4	39.0	1.00	0.83	1.13	23.4
Approach		928	2.0	977	2.0	0.689	32.9	LOS C	20.4	145.4	0.80	0.71	0.81	36.4
North: Benowa Rd														
7	L2	113	1.2	119	1.2	0.147	13.6	LOS B	2.7	18.8	0.43	0.67	0.43	41.7
8	T1	145	0.0	153	0.0	*0.455	55.1	LOS E	7.0	49.2	0.95	0.76	0.95	11.8
9	R2	147	1.0	155	1.0	0.455	60.2	LOS E	5.5	38.5	0.94	0.77	0.94	23.5
Approach		405	0.7	426	0.7	0.455	45.4	LOS D	7.0	49.2	0.80	0.74	0.80	22.8
West: Ashmore Rd														
10	L2	140	0.0	147	0.0	0.096	6.8	LOS A	1.2	8.4	0.19	0.60	0.19	50.1
11	T1	990	1.1	1042	1.1	*0.680	26.6	LOS C	24.5	173.5	0.78	0.70	0.78	40.5
12	R2	124	1.1	131	1.1	0.553	64.1	LOS E	8.1	57.2	0.99	0.80	0.99	20.9
12u	U	2	0.0	2	0.0	0.553	65.2	LOS E	8.1	57.2	0.99	0.80	0.99	28.8
Approach		1256	1.0	1322	1.0	0.680	28.2	LOS C	24.5	173.5	0.74	0.70	0.74	38.6
All Vehicles		2936	1.3	3091	1.3	0.689	36.1	LOS D	24.5	173.5	0.79	0.72	0.80	33.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	116	2.1	122	2.1	0.510	63.0	LOS E	7.4	52.7	0.98	0.79	0.98	21.2
2	T1	93	0.0	98	0.0	0.384	56.8	LOS E	5.8	40.6	0.96	0.75	0.96	11.7
3	R2	159	0.0	167	0.0	* 0.792	68.7	LOS E	10.9	76.6	1.00	0.89	1.18	17.9
Approach		368	0.7	387	0.7	0.792	63.9	LOS E	10.9	76.6	0.98	0.83	1.06	17.8
East: Ashmore Rd														
4	L2	81	0.0	85	0.0	0.105	17.2	LOS B	1.6	11.2	0.62	0.71	0.62	35.9
5	T1	1067	2.0	1123	2.0	* 1.028	115.1	LOS F	57.1	406.6	1.00	1.39	1.64	19.3
6	R2	41	6.1	43	6.1	0.759	78.6	LOS E	4.6	33.2	1.00	0.86	1.25	17.5
6u	U	22	0.0	23	0.0	0.759	79.6	LOS E	4.6	33.2	1.00	0.86	1.25	22.6
Approach		1211	1.9	1275	1.9	1.028	106.7	LOS F	57.1	406.6	0.97	1.32	1.55	19.6
North: Benowa Rd														
7	L2	101	1.2	106	1.2	0.132	15.5	LOS B	2.6	18.7	0.47	0.68	0.47	40.1
8	T1	216	0.0	227	0.0	0.774	56.5	LOS E	14.1	98.6	0.98	0.88	1.09	11.7
9	R2	421	1.0	443	1.0	* 1.019	125.8	LOS F	26.2	184.6	1.00	1.17	1.78	14.0
Approach		738	0.7	777	0.7	1.019	90.4	LOS F	26.2	184.6	0.92	1.02	1.40	15.1
West: Ashmore Rd														
10	L2	195	0.0	205	0.0	0.133	6.8	LOS A	1.7	12.1	0.19	0.60	0.19	50.1
11	T1	955	1.1	1005	1.1	0.762	29.0	LOS C	25.6	180.9	0.81	0.72	0.81	39.3
12	R2	218	1.1	229	1.1	* 1.052	146.4	LOS F	24.9	175.8	1.00	1.22	1.91	11.4
12u	U	6	0.0	6	0.0	1.052	147.5	LOS F	24.9	175.8	1.00	1.22	1.91	17.2
Approach		1374	1.0	1446	1.0	1.052	45.0	LOS D	25.6	180.9	0.75	0.78	0.90	31.2
All Vehicles		3691	1.2	3885	1.2	1.052	76.2	LOS E	57.1	406.6	0.88	1.01	1.23	22.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	147	2.1	155	2.1	*0.673	65.0	LOS E	9.7	69.0	1.00	0.83	1.04	20.8
2	T1	82	0.0	86	0.0	0.338	56.3	LOS E	5.1	35.5	0.95	0.74	0.95	11.7
3	R2	129	0.0	136	0.0	0.583	63.5	LOS E	8.3	58.0	0.99	0.80	0.99	18.9
Approach		358	0.9	377	0.9	0.673	62.5	LOS E	9.7	69.0	0.98	0.80	1.00	18.5
East: Ashmore Rd														
4	L2	78	0.0	82	0.0	0.082	13.4	LOS B	1.3	9.3	0.51	0.68	0.51	38.9
5	T1	774	2.0	815	2.0	0.545	30.8	LOS C	20.4	145.4	0.81	0.71	0.81	38.5
6	R2	59	6.1	62	6.1	*0.689	74.5	LOS E	5.4	39.0	1.00	0.83	1.13	18.1
6u	U	17	0.0	18	0.0	0.689	75.6	LOS E	5.4	39.0	1.00	0.83	1.13	23.4
Approach		928	2.0	977	2.0	0.689	32.9	LOS C	20.4	145.4	0.80	0.71	0.81	36.4
North: Benowa Rd														
7	L2	113	1.2	119	1.2	0.151	14.4	LOS B	2.8	19.8	0.45	0.67	0.45	41.1
8	T1	177	0.0	186	0.0	*0.617	56.0	LOS E	8.5	59.6	0.97	0.78	0.97	11.6
9	R2	178	1.0	187	1.0	0.617	61.3	LOS E	6.9	48.2	0.96	0.79	0.98	23.2
Approach		468	0.7	493	0.7	0.617	48.0	LOS D	8.5	59.6	0.84	0.76	0.85	21.9
West: Ashmore Rd														
10	L2	162	0.0	171	0.0	0.111	6.8	LOS A	1.4	9.9	0.19	0.60	0.19	50.1
11	T1	1025	1.1	1079	1.1	*0.710	26.9	LOS C	25.2	178.2	0.79	0.71	0.79	40.3
12	R2	124	1.1	131	1.1	0.553	64.1	LOS E	8.1	57.2	0.99	0.80	0.99	20.9
12u	U	2	0.0	2	0.0	0.553	65.2	LOS E	8.1	57.2	0.99	0.80	0.99	28.8
Approach		1313	1.0	1382	1.0	0.710	28.0	LOS C	25.2	178.2	0.74	0.70	0.74	38.6
All Vehicles		3067	1.2	3228	1.2	0.710	36.6	LOS D	25.2	178.2	0.80	0.73	0.81	33.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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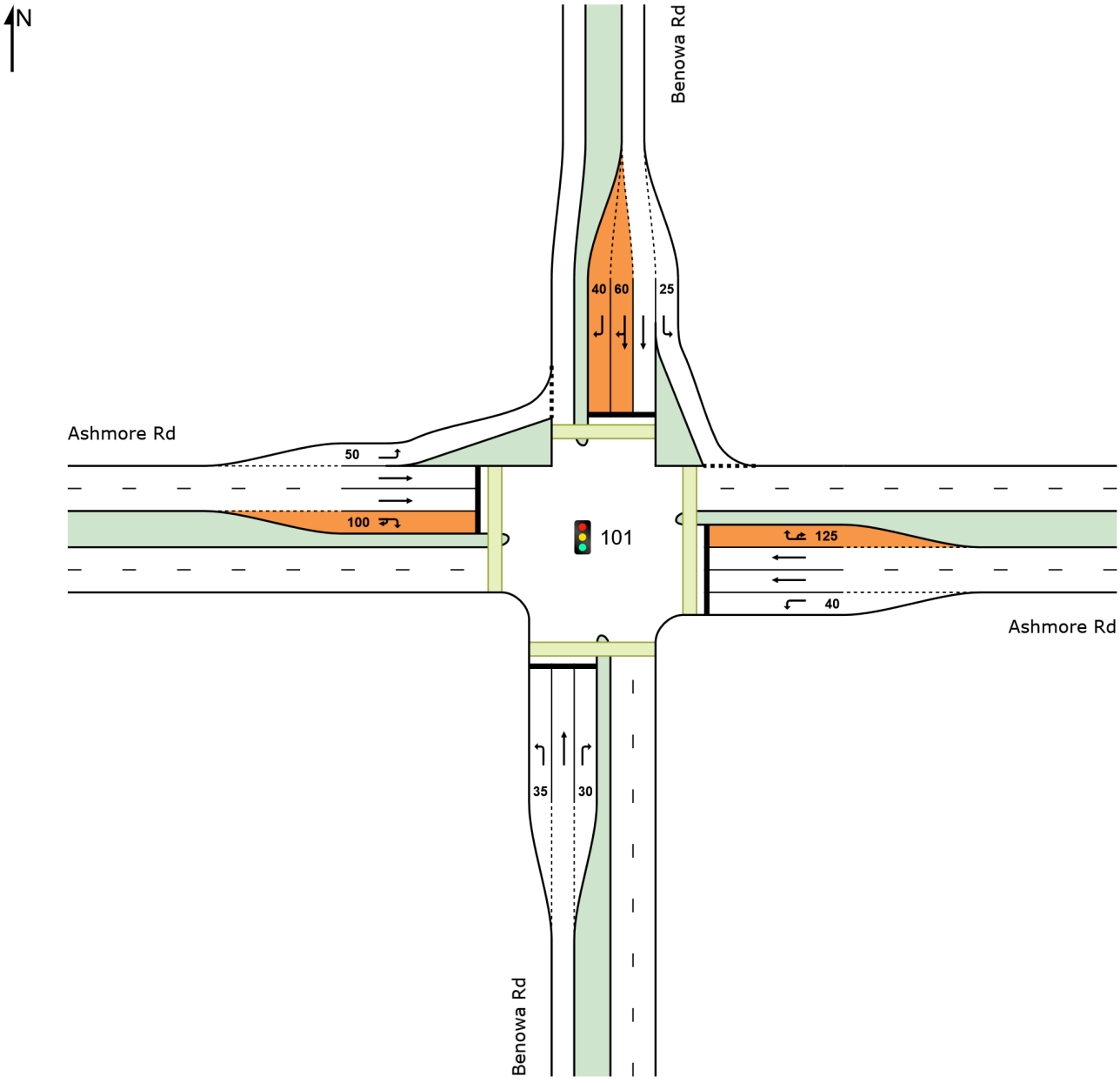
SITE LAYOUT

Site: 101 [2028_BG+DEV_THU_PM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	100	2.1	105	2.1	0.440	62.4	LOS E	6.3	45.0	0.97	0.78	0.97	21.3
2	T1	83	0.0	87	0.0	0.343	56.4	LOS E	5.1	36.0	0.95	0.74	0.95	11.7
3	R2	144	0.0	152	0.0	* 0.686	65.0	LOS E	9.5	66.3	1.00	0.83	1.06	18.6
Approach		327	0.7	344	0.7	0.686	62.0	LOS E	9.5	66.3	0.98	0.80	1.00	18.2
East: Ashmore Rd														
4	L2	70	0.0	74	0.0	0.082	15.3	LOS B	1.3	9.4	0.56	0.69	0.56	37.3
5	T1	921	2.0	969	2.0	* 0.746	38.9	LOS D	28.2	200.4	0.93	0.82	0.93	35.2
6	R2	35	6.1	37	6.1	0.570	74.2	LOS E	3.8	27.2	1.00	0.77	1.04	18.2
6u	U	19	0.0	20	0.0	0.570	75.2	LOS E	3.8	27.2	1.00	0.77	1.04	23.4
Approach		1045	1.9	1100	1.9	0.746	39.1	LOS D	28.2	200.4	0.91	0.81	0.91	34.3
North: Benowa Rd														
7	L2	87	1.2	92	1.2	0.107	13.3	LOS B	2.0	14.0	0.41	0.66	0.41	42.0
8	T1	199	0.0	209	0.0	* 0.729	55.4	LOS E	12.4	86.7	0.97	0.84	1.05	11.9
9	R2	379	1.0	399	1.0	0.729	61.5	LOS E	12.4	87.2	0.98	0.85	1.05	23.0
Approach		665	0.7	700	0.7	0.729	53.4	LOS D	12.4	87.2	0.90	0.82	0.97	21.7
West: Ashmore Rd														
10	L2	178	0.0	187	0.0	0.120	6.6	LOS A	1.4	9.5	0.17	0.60	0.17	50.4
11	T1	844	1.1	888	1.1	0.556	27.5	LOS C	22.2	156.6	0.77	0.68	0.77	40.0
12	R2	188	1.1	198	1.1	* 0.723	64.6	LOS E	12.8	90.4	1.00	0.85	1.06	20.8
12u	U	5	0.0	5	0.0	0.723	65.7	LOS E	12.8	90.4	1.00	0.85	1.06	28.6
Approach		1215	1.0	1279	1.0	0.723	30.4	LOS C	22.2	156.6	0.72	0.70	0.73	37.0
All Vehicles		3252	1.2	3423	1.2	0.746	41.1	LOS D	28.2	200.4	0.84	0.77	0.86	31.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	126	2.1	133	2.1	* 0.554	63.4	LOS E	8.1	57.7	0.99	0.80	0.99	21.1
2	T1	73	0.0	77	0.0	0.301	56.0	LOS E	4.5	31.4	0.95	0.73	0.95	11.8
3	R2	115	0.0	121	0.0	0.498	62.9	LOS E	7.3	51.2	0.98	0.79	0.98	19.1
Approach		314	0.9	331	0.9	0.554	61.5	LOS E	8.1	57.7	0.97	0.78	0.97	18.7
East: Ashmore Rd														
4	L2	67	0.0	71	0.0	0.071	13.3	LOS B	1.1	7.9	0.50	0.68	0.50	38.9
5	T1	668	2.0	703	2.0	0.465	29.7	LOS C	16.7	119.1	0.78	0.67	0.78	39.0
6	R2	51	6.1	54	6.1	* 0.539	71.2	LOS E	4.5	32.6	1.00	0.77	1.00	18.7
6u	U	15	0.0	16	0.0	0.539	72.3	LOS E	4.5	32.6	1.00	0.77	1.00	24.0
Approach		801	2.0	843	2.0	0.539	31.8	LOS C	16.7	119.1	0.77	0.68	0.77	37.0
North: Benowa Rd														
7	L2	98	1.2	103	1.2	0.122	12.7	LOS B	2.1	15.2	0.40	0.66	0.40	42.5
8	T1	164	0.0	173	0.0	* 0.423	55.2	LOS E	6.9	48.4	0.95	0.76	0.95	11.7
9	R2	165	1.0	174	1.0	0.423	61.0	LOS E	6.9	48.4	0.96	0.78	0.96	23.3
Approach		427	0.7	449	0.7	0.423	47.7	LOS D	6.9	48.4	0.83	0.75	0.83	22.0
West: Ashmore Rd														
10	L2	147	0.0	155	0.0	0.100	6.7	LOS A	1.2	8.2	0.18	0.60	0.18	50.3
11	T1	896	1.1	943	1.1	* 0.564	26.5	LOS C	22.9	162.2	0.77	0.68	0.77	40.5
12	R2	107	1.1	113	1.1	0.479	63.4	LOS E	6.9	48.9	0.97	0.79	0.97	21.0
12u	U	2	0.0	2	0.0	0.479	64.5	LOS E	6.9	48.9	0.97	0.79	0.97	28.9
Approach		1152	1.0	1213	1.0	0.564	27.5	LOS C	22.9	162.2	0.71	0.68	0.71	38.9
All Vehicles		2694	1.2	2836	1.2	0.564	35.9	LOS D	22.9	162.2	0.78	0.70	0.78	33.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	116	2.1	122	2.1	0.510	63.0	LOS E	7.4	52.7	0.98	0.79	0.98	21.2
2	T1	93	0.0	98	0.0	0.384	56.8	LOS E	5.8	40.6	0.96	0.75	0.96	11.7
3	R2	159	0.0	167	0.0	* 0.792	68.7	LOS E	10.9	76.6	1.00	0.89	1.18	17.9
Approach		368	0.7	387	0.7	0.792	63.9	LOS E	10.9	76.6	0.98	0.83	1.06	17.8
East: Ashmore Rd														
4	L2	81	0.0	85	0.0	0.093	15.1	LOS B	1.6	10.9	0.56	0.69	0.56	37.5
5	T1	1067	2.0	1123	2.0	* 0.866	48.2	LOS D	37.2	265.0	0.97	0.96	1.09	32.0
6	R2	41	6.1	43	6.1	0.664	75.4	LOS E	4.5	32.3	1.00	0.81	1.12	18.0
6u	U	22	0.0	23	0.0	0.664	76.4	LOS E	4.5	32.3	1.00	0.81	1.12	23.2
Approach		1211	1.9	1275	1.9	0.866	47.5	LOS D	37.2	265.0	0.94	0.93	1.06	31.5
North: Benowa Rd														
7	L2	101	1.2	106	1.2	0.132	15.0	LOS B	2.6	18.2	0.46	0.67	0.46	40.5
8	T1	216	0.0	227	0.0	0.839	61.7	LOS E	14.9	104.1	0.99	0.95	1.20	10.9
9	R2	421	1.0	443	1.0	* 0.863	70.4	LOS E	15.0	105.6	0.99	0.95	1.26	21.1
Approach		738	0.7	777	0.7	0.863	60.3	LOS E	15.0	105.6	0.92	0.91	1.14	20.1
West: Ashmore Rd														
10	L2	195	0.0	205	0.0	0.133	6.8	LOS A	1.7	12.1	0.19	0.60	0.19	50.1
11	T1	955	1.1	1005	1.1	0.683	28.6	LOS C	24.9	176.1	0.81	0.71	0.81	39.5
12	R2	218	1.1	229	1.1	* 0.883	76.1	LOS E	16.8	118.4	1.00	0.96	1.30	18.7
12u	U	6	0.0	6	0.0	0.883	77.2	LOS E	16.8	118.4	1.00	0.96	1.30	26.3
Approach		1374	1.0	1446	1.0	0.883	33.3	LOS C	24.9	176.1	0.75	0.74	0.80	35.7
All Vehicles		3691	1.2	3885	1.2	0.883	46.4	LOS D	37.2	265.0	0.87	0.85	0.98	29.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	147	2.1	155	2.1	*0.673	65.0	LOS E	9.7	69.0	1.00	0.83	1.04	20.8
2	T1	82	0.0	86	0.0	0.338	56.3	LOS E	5.1	35.5	0.95	0.74	0.95	11.7
3	R2	129	0.0	136	0.0	0.583	63.5	LOS E	8.3	58.0	0.99	0.80	0.99	18.9
Approach		358	0.9	377	0.9	0.673	62.5	LOS E	9.7	69.0	0.98	0.80	1.00	18.5
East: Ashmore Rd														
4	L2	78	0.0	82	0.0	0.082	13.4	LOS B	1.3	9.3	0.51	0.68	0.51	38.9
5	T1	774	2.0	815	2.0	0.545	30.8	LOS C	20.4	145.4	0.81	0.71	0.81	38.5
6	R2	59	6.1	62	6.1	*0.689	74.5	LOS E	5.4	39.0	1.00	0.83	1.13	18.1
6u	U	17	0.0	18	0.0	0.689	75.6	LOS E	5.4	39.0	1.00	0.83	1.13	23.4
Approach		928	2.0	977	2.0	0.689	32.9	LOS C	20.4	145.4	0.80	0.71	0.81	36.4
North: Benowa Rd														
7	L2	113	1.2	119	1.2	0.151	14.4	LOS B	2.8	19.8	0.45	0.67	0.45	41.1
8	T1	177	0.0	186	0.0	*0.465	55.4	LOS E	7.6	53.7	0.96	0.77	0.96	11.7
9	R2	178	1.0	187	1.0	0.465	61.4	LOS E	7.6	53.7	0.96	0.79	0.96	23.2
Approach		468	0.7	493	0.7	0.465	47.8	LOS D	7.6	53.7	0.84	0.75	0.84	22.0
West: Ashmore Rd														
10	L2	162	0.0	171	0.0	0.111	6.8	LOS A	1.4	9.9	0.19	0.60	0.19	50.1
11	T1	1025	1.1	1079	1.1	*0.686	27.0	LOS C	25.6	180.9	0.79	0.71	0.79	40.3
12	R2	124	1.1	131	1.1	0.553	64.1	LOS E	8.1	57.2	0.99	0.80	0.99	20.9
12u	U	2	0.0	2	0.0	0.553	65.2	LOS E	8.1	57.2	0.99	0.80	0.99	28.8
Approach		1313	1.0	1382	1.0	0.686	28.0	LOS C	25.6	180.9	0.74	0.70	0.74	38.6
All Vehicles		3067	1.2	3228	1.2	0.689	36.6	LOS D	25.6	180.9	0.80	0.72	0.80	33.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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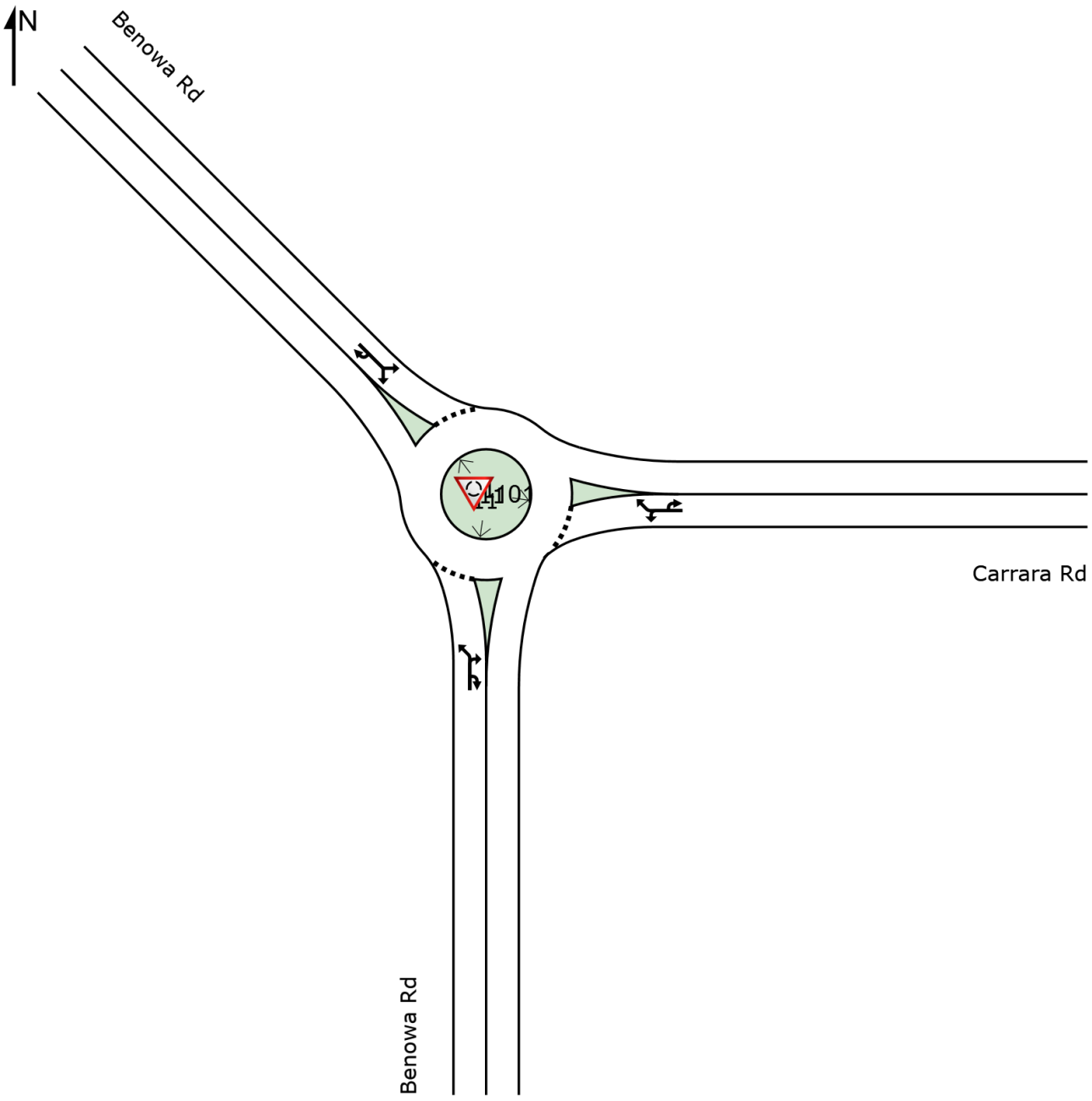
SITE LAYOUT

Site: 101 [2024_Survey_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [2024_Survey_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	110	2.3	116	2.3	0.209	5.9	LOS A	1.1	7.9	0.40	0.63	0.40	45.4
3	R2	88	1.9	93	1.9	0.209	9.6	LOS A	1.1	7.9	0.40	0.63	0.40	46.4
3u	U	2	0.0	2	0.0	0.209	11.2	LOS B	1.1	7.9	0.40	0.63	0.40	37.3
Approach		200	2.1	211	2.1	0.209	7.6	LOS A	1.1	7.9	0.40	0.63	0.40	45.8
East: Carrara Rd														
4	L2	281	0.9	296	0.9	0.538	6.8	LOS A	4.1	28.7	0.52	0.66	0.52	45.1
6a	R1	256	0.4	269	0.4	0.538	9.3	LOS A	4.1	28.7	0.52	0.66	0.52	48.4
6u	U	1	0.0	1	0.0	0.538	11.8	LOS B	4.1	28.7	0.52	0.66	0.52	50.2
Approach		538	0.7	566	0.7	0.538	8.0	LOS A	4.1	28.7	0.52	0.66	0.52	46.9
NorthWest: Benowa Rd														
27a	L1	165	0.8	174	0.8	0.321	4.8	LOS A	2.0	14.4	0.28	0.57	0.28	50.1
29a	R1	215	0.8	226	0.8	0.321	7.7	LOS A	2.0	14.4	0.28	0.57	0.28	45.7
29u	U	6	0.0	6	0.0	0.321	10.2	LOS B	2.0	14.4	0.28	0.57	0.28	50.1
Approach		386	0.8	406	0.8	0.321	6.5	LOS A	2.0	14.4	0.28	0.57	0.28	48.0
All Vehicles		1124	1.0	1183	1.0	0.538	7.4	LOS A	4.1	28.7	0.42	0.62	0.42	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024_Survey_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	141	2.3	148	2.3	0.219	5.4	LOS A	1.2	8.3	0.34	0.59	0.34	46.2
3	R2	81	1.9	85	1.9	0.219	9.1	LOS A	1.2	8.3	0.34	0.59	0.34	47.1
3u	U	5	0.0	5	0.0	0.219	10.7	LOS B	1.2	8.3	0.34	0.59	0.34	38.1
Approach		227	2.1	239	2.1	0.219	6.9	LOS A	1.2	8.3	0.34	0.59	0.34	46.4
East: Carrara Rd														
4	L2	126	0.9	133	0.9	0.310	6.0	LOS A	1.8	12.7	0.39	0.63	0.39	45.6
6a	R1	184	0.4	194	0.4	0.310	8.6	LOS A	1.8	12.7	0.39	0.63	0.39	48.9
6u	U	1	0.0	1	0.0	0.310	11.0	LOS B	1.8	12.7	0.39	0.63	0.39	50.7
Approach		311	0.6	327	0.6	0.310	7.5	LOS A	1.8	12.7	0.39	0.63	0.39	47.8
NorthWest: Benowa Rd														
27a	L1	171	0.8	180	0.8	0.294	4.8	LOS A	1.8	12.7	0.26	0.56	0.26	50.3
29a	R1	183	0.8	193	0.8	0.294	7.7	LOS A	1.8	12.7	0.26	0.56	0.26	46.0
29u	U	1	0.0	1	0.0	0.294	10.1	LOS B	1.8	12.7	0.26	0.56	0.26	50.4
Approach		355	0.8	374	0.8	0.294	6.3	LOS A	1.8	12.7	0.26	0.56	0.26	48.4
All Vehicles		893	1.1	940	1.1	0.310	6.9	LOS A	1.8	12.7	0.32	0.59	0.32	47.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	117	2.3	123	2.3	0.188	6.0	LOS A	1.0	7.0	0.41	0.62	0.41	45.8
3	R2	58	1.9	61	1.9	0.188	9.7	LOS A	1.0	7.0	0.41	0.62	0.41	46.8
3u	U	2	0.0	2	0.0	0.188	11.3	LOS B	1.0	7.0	0.41	0.62	0.41	37.7
Approach		177	2.1	186	2.1	0.188	7.3	LOS A	1.0	7.0	0.41	0.62	0.41	46.1
East: Carrara Rd														
4	L2	298	0.9	314	0.9	0.575	7.0	LOS A	4.6	32.0	0.55	0.67	0.55	44.8
6a	R1	272	0.4	286	0.4	0.575	9.6	LOS A	4.6	32.0	0.55	0.67	0.55	48.2
6u	U	1	0.0	1	0.0	0.575	12.0	LOS B	4.6	32.0	0.55	0.67	0.55	49.9
Approach		571	0.7	601	0.7	0.575	8.2	LOS A	4.6	32.0	0.55	0.67	0.55	46.6
NorthWest: Benowa Rd														
27a	L1	175	0.8	184	0.8	0.321	4.6	LOS A	2.1	14.6	0.22	0.56	0.22	50.3
29a	R1	228	0.8	240	0.8	0.321	7.5	LOS A	2.1	14.6	0.22	0.56	0.22	45.9
29u	U	6	0.0	6	0.0	0.321	10.0	LOS A	2.1	14.6	0.22	0.56	0.22	50.3
Approach		409	0.8	431	0.8	0.321	6.3	LOS A	2.1	14.6	0.22	0.56	0.22	48.2
All Vehicles		1157	0.9	1218	0.9	0.575	7.4	LOS A	4.6	32.0	0.41	0.62	0.41	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	150	2.3	158	2.3	0.235	5.5	LOS A	1.3	9.0	0.35	0.60	0.35	46.1
3	R2	86	1.9	91	1.9	0.235	9.2	LOS A	1.3	9.0	0.35	0.60	0.35	47.0
3u	U	5	0.0	5	0.0	0.235	10.8	LOS B	1.3	9.0	0.35	0.60	0.35	38.0
Approach		241	2.1	254	2.1	0.235	6.9	LOS A	1.3	9.0	0.35	0.60	0.35	46.3
East: Carrara Rd														
4	L2	134	0.9	141	0.9	0.333	6.1	LOS A	2.0	13.9	0.41	0.63	0.41	45.5
6a	R1	195	0.4	205	0.4	0.333	8.7	LOS A	2.0	13.9	0.41	0.63	0.41	48.8
6u	U	1	0.0	1	0.0	0.333	11.1	LOS B	2.0	13.9	0.41	0.63	0.41	50.5
Approach		330	0.6	347	0.6	0.333	7.7	LOS A	2.0	13.9	0.41	0.63	0.41	47.6
NorthWest: Benowa Rd														
27a	L1	181	0.8	191	0.8	0.313	4.8	LOS A	2.0	13.8	0.27	0.56	0.27	50.3
29a	R1	194	0.8	204	0.8	0.313	7.7	LOS A	2.0	13.8	0.27	0.56	0.27	45.9
29u	U	1	0.0	1	0.0	0.313	10.2	LOS B	2.0	13.8	0.27	0.56	0.27	50.3
Approach		376	0.8	396	0.8	0.313	6.3	LOS A	2.0	13.8	0.27	0.56	0.27	48.4
All Vehicles		947	1.1	997	1.1	0.333	7.0	LOS A	2.0	13.9	0.34	0.60	0.34	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	117	2.3	123	2.3	0.323	6.9	LOS A	1.9	13.6	0.53	0.71	0.53	43.7
3	R2	153	1.9	161	1.9	0.323	10.6	LOS B	1.9	13.6	0.53	0.71	0.53	44.8
3u	U	2	0.0	2	0.0	0.323	12.2	LOS B	1.9	13.6	0.53	0.71	0.53	35.5
Approach		272	2.0	286	2.0	0.323	9.1	LOS A	1.9	13.6	0.53	0.71	0.53	44.3
East: Carrara Rd														
4	L2	396	0.9	417	0.9	0.770	9.6	LOS A	10.5	74.1	0.74	0.75	0.84	42.0
6a	R1	369	0.4	388	0.4	0.770	12.2	LOS B	10.5	74.1	0.74	0.75	0.84	45.8
6u	U	1	0.0	1	0.0	0.770	14.6	LOS B	10.5	74.1	0.74	0.75	0.84	47.5
Approach		766	0.7	806	0.7	0.770	10.9	LOS B	10.5	74.1	0.74	0.75	0.84	44.1
NorthWest: Benowa Rd														
27a	L1	346	0.8	364	0.8	0.521	5.6	LOS A	4.2	29.7	0.46	0.59	0.46	49.8
29a	R1	228	0.8	240	0.8	0.521	8.5	LOS A	4.2	29.7	0.46	0.59	0.46	45.4
29u	U	6	0.0	6	0.0	0.521	11.0	LOS B	4.2	29.7	0.46	0.59	0.46	49.8
Approach		580	0.8	611	0.8	0.521	6.8	LOS A	4.2	29.7	0.46	0.59	0.46	48.4
All Vehicles		1618	1.0	1703	1.0	0.770	9.1	LOS A	10.5	74.1	0.60	0.69	0.65	45.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	150	2.3	158	2.3	0.293	6.4	LOS A	1.7	12.0	0.46	0.66	0.46	44.8
3	R2	114	1.9	120	1.9	0.293	10.2	LOS B	1.7	12.0	0.46	0.66	0.46	45.8
3u	U	5	0.0	5	0.0	0.293	11.7	LOS B	1.7	12.0	0.46	0.66	0.46	36.6
Approach		269	2.1	283	2.1	0.293	8.1	LOS A	1.7	12.0	0.46	0.66	0.46	45.1
East: Carrara Rd														
4	L2	211	0.9	222	0.9	0.514	6.5	LOS A	3.8	26.9	0.49	0.65	0.49	45.1
6a	R1	312	0.4	328	0.4	0.514	9.0	LOS A	3.8	26.9	0.49	0.65	0.49	48.5
6u	U	1	0.0	1	0.0	0.514	11.5	LOS B	3.8	26.9	0.49	0.65	0.49	50.2
Approach		524	0.6	552	0.6	0.514	8.0	LOS A	3.8	26.9	0.49	0.65	0.49	47.3
NorthWest: Benowa Rd														
27a	L1	323	0.8	340	0.8	0.444	5.2	LOS A	3.3	23.1	0.37	0.56	0.37	50.3
29a	R1	194	0.8	204	0.8	0.444	8.1	LOS A	3.3	23.1	0.37	0.56	0.37	45.9
29u	U	1	0.0	1	0.0	0.444	10.5	LOS B	3.3	23.1	0.37	0.56	0.37	50.3
Approach		518	0.8	545	0.8	0.444	6.3	LOS A	3.3	23.1	0.37	0.56	0.37	49.0
All Vehicles		1311	1.0	1380	1.0	0.514	7.3	LOS A	3.8	26.9	0.44	0.62	0.44	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2038_BG_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	135	2.3	142	2.3	0.275	6.4	LOS A	1.6	11.1	0.48	0.67	0.48	44.8
3	R2	108	1.9	114	1.9	0.275	10.2	LOS B	1.6	11.1	0.48	0.67	0.48	45.8
3u	U	2	0.0	2	0.0	0.275	11.7	LOS B	1.6	11.1	0.48	0.67	0.48	36.6
Approach		245	2.1	258	2.1	0.275	8.1	LOS A	1.6	11.1	0.48	0.67	0.48	45.2
East: Carrara Rd														
4	L2	346	0.9	364	0.9	0.696	9.1	LOS A	7.6	53.7	0.68	0.75	0.76	42.6
6a	R1	315	0.4	332	0.4	0.696	11.6	LOS B	7.6	53.7	0.68	0.75	0.76	46.3
6u	U	1	0.0	1	0.0	0.696	14.1	LOS B	7.6	53.7	0.68	0.75	0.76	48.0
Approach		662	0.7	697	0.7	0.696	10.3	LOS B	7.6	53.7	0.68	0.75	0.76	44.5
NorthWest: Benowa Rd														
27a	L1	203	0.8	214	0.8	0.404	5.0	LOS A	2.8	20.0	0.34	0.58	0.34	49.8
29a	R1	265	0.8	279	0.8	0.404	8.0	LOS A	2.8	20.0	0.34	0.58	0.34	45.4
29u	U	7	0.0	7	0.0	0.404	10.4	LOS B	2.8	20.0	0.34	0.58	0.34	49.9
Approach		475	0.8	500	0.8	0.404	6.8	LOS A	2.8	20.0	0.34	0.58	0.34	47.7
All Vehicles		1382	1.0	1455	1.0	0.696	8.7	LOS A	7.6	53.7	0.53	0.68	0.57	45.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [2038_BG_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	174	2.3	183	2.3	0.282	5.8	LOS A	1.6	11.4	0.40	0.62	0.40	45.8
3	R2	100	1.9	105	1.9	0.282	9.5	LOS A	1.6	11.4	0.40	0.62	0.40	46.7
3u	U	6	0.0	6	0.0	0.282	11.1	LOS B	1.6	11.4	0.40	0.62	0.40	37.7
Approach		280	2.1	295	2.1	0.282	7.2	LOS A	1.6	11.4	0.40	0.62	0.40	46.0
East: Carrara Rd														
4	L2	155	0.9	163	0.9	0.398	6.5	LOS A	2.5	17.7	0.46	0.65	0.46	45.0
6a	R1	227	0.4	239	0.4	0.398	9.1	LOS A	2.5	17.7	0.46	0.65	0.46	48.4
6u	U	1	0.0	1	0.0	0.398	11.5	LOS B	2.5	17.7	0.46	0.65	0.46	50.1
Approach		383	0.6	403	0.6	0.398	8.1	LOS A	2.5	17.7	0.46	0.65	0.46	47.2
NorthWest: Benowa Rd														
27a	L1	211	0.8	222	0.8	0.370	5.0	LOS A	2.5	17.4	0.32	0.57	0.32	50.1
29a	R1	225	0.8	237	0.8	0.370	7.9	LOS A	2.5	17.4	0.32	0.57	0.32	45.7
29u	U	1	0.0	1	0.0	0.370	10.3	LOS B	2.5	17.4	0.32	0.57	0.32	50.1
Approach		437	0.8	460	0.8	0.370	6.5	LOS A	2.5	17.4	0.32	0.57	0.32	48.2
All Vehicles		1100	1.1	1158	1.1	0.398	7.2	LOS A	2.5	17.7	0.39	0.61	0.39	47.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	174	2.3	183	2.3	0.333	6.6	LOS A	2.0	14.2	0.49	0.67	0.49	44.7
3	R2	121	1.9	127	1.9	0.333	10.3	LOS B	2.0	14.2	0.49	0.67	0.49	45.7
3u	U	6	0.0	6	0.0	0.333	11.9	LOS B	2.0	14.2	0.49	0.67	0.49	36.5
Approach		301	2.1	317	2.1	0.333	8.2	LOS A	2.0	14.2	0.49	0.67	0.49	45.0
East: Carrara Rd														
4	L2	218	0.9	229	0.9	0.551	6.9	LOS A	4.2	29.7	0.55	0.67	0.55	44.7
6a	R1	321	0.4	338	0.4	0.551	9.4	LOS A	4.2	29.7	0.55	0.67	0.55	48.1
6u	U	1	0.0	1	0.0	0.551	11.9	LOS B	4.2	29.7	0.55	0.67	0.55	49.8
Approach		540	0.6	568	0.6	0.551	8.4	LOS A	4.2	29.7	0.55	0.67	0.55	46.9
NorthWest: Benowa Rd														
27a	L1	335	0.8	353	0.8	0.484	5.3	LOS A	3.8	26.7	0.40	0.57	0.40	50.1
29a	R1	225	0.8	237	0.8	0.484	8.2	LOS A	3.8	26.7	0.40	0.57	0.40	45.7
29u	U	1	0.0	1	0.0	0.484	10.7	LOS B	3.8	26.7	0.40	0.57	0.40	50.1
Approach		561	0.8	591	0.8	0.484	6.5	LOS A	3.8	26.7	0.40	0.57	0.40	48.6
All Vehicles		1402	1.0	1476	1.0	0.551	7.6	LOS A	4.2	29.7	0.47	0.63	0.47	47.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	135	2.3	142	2.3	0.372	7.2	LOS A	2.3	16.3	0.57	0.74	0.57	43.5
3	R2	162	1.9	171	1.9	0.372	10.9	LOS B	2.3	16.3	0.57	0.74	0.57	44.5
3u	U	2	0.0	2	0.0	0.372	12.5	LOS B	2.3	16.3	0.57	0.74	0.57	35.2
Approach		299	2.1	315	2.1	0.372	9.3	LOS A	2.3	16.3	0.57	0.74	0.57	44.0
East: Carrara Rd														
4	L2	426	0.9	448	0.9	0.864	14.2	LOS B	16.7	117.9	0.88	0.89	1.19	38.0
6a	R1	395	0.4	416	0.4	0.864	16.7	LOS B	16.7	117.9	0.88	0.89	1.19	42.1
6u	U	1	0.0	1	0.0	0.864	19.2	LOS B	16.7	117.9	0.88	0.89	1.19	43.8
Approach		822	0.7	865	0.7	0.864	15.4	LOS B	16.7	117.9	0.88	0.89	1.19	40.2
NorthWest: Benowa Rd														
27a	L1	360	0.8	379	0.8	0.573	5.8	LOS A	5.0	35.1	0.50	0.61	0.50	49.6
29a	R1	265	0.8	279	0.8	0.573	8.7	LOS A	5.0	35.1	0.50	0.61	0.50	45.1
29u	U	7	0.0	7	0.0	0.573	11.2	LOS B	5.0	35.1	0.50	0.61	0.50	49.6
Approach		632	0.8	665	0.8	0.573	7.1	LOS A	5.0	35.1	0.50	0.61	0.50	48.0
All Vehicles		1753	1.0	1845	1.0	0.864	11.4	LOS B	16.7	117.9	0.69	0.76	0.84	43.3

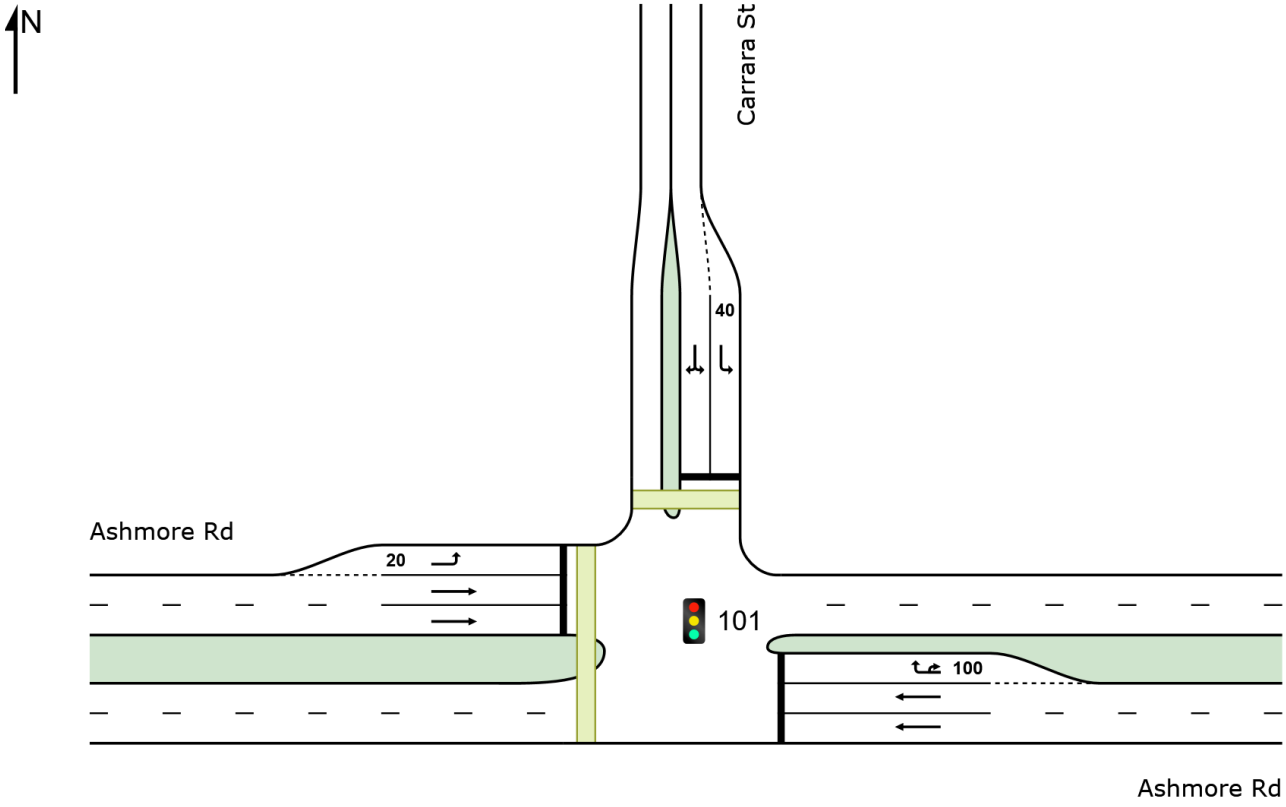
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: C:\Users\MGrierson\TTM\2024 Synergy Projects - Documents\TotalSynergy\24BRT0224 Benowa Gardens - 203 Ashmore Road Benowa\6 - Analysis\241125 - Update\24BRT0224 SA01 E.sip9

MOVEMENT SUMMARY

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	966	1.3	1017	1.3	0.390	7.3	LOS A	10.3	72.7	0.48	0.42	0.48	50.7
6	R2	257	0.0	271	0.0	*0.504	24.8	LOS C	8.2	57.3	0.87	0.81	0.87	34.9
6u	U	11	0.0	12	0.0	0.504	26.0	LOS C	8.2	57.3	0.87	0.81	0.87	32.0
Approach		1234	1.1	1299	1.1	0.504	11.1	LOS B	10.3	72.7	0.56	0.51	0.56	46.4
North: Carrara St														
7	L2	232	0.0	244	0.0	0.559	49.4	LOS D	6.0	41.7	0.99	0.79	0.99	25.2
9	R2	17	0.0	18	0.0	*0.559	49.4	LOS D	6.0	41.7	0.99	0.79	0.99	28.4
Approach		249	0.0	262	0.0	0.559	49.4	LOS D	6.0	41.7	0.99	0.79	0.99	25.4
West: Ashmore Rd														
10	L2	22	0.0	23	0.0	0.024	12.3	LOS B	0.3	2.4	0.51	0.65	0.51	46.0
11	T1	988	1.0	1040	1.0	*0.701	26.1	LOS C	20.6	145.8	0.90	0.79	0.90	36.2
Approach		1010	1.0	1063	1.0	0.701	25.8	LOS C	20.6	145.8	0.89	0.79	0.89	36.4
All Vehicles		2493	0.9	2624	0.9	0.701	20.9	LOS C	20.6	145.8	0.74	0.65	0.74	38.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2024_Survey_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	766	1.3	806	1.3	0.310	6.8	LOS A	7.6	53.6	0.44	0.39	0.44	51.3
6	R2	181	0.0	191	0.0	*0.460	23.8	LOS C	7.0	49.3	0.85	0.79	0.85	35.4
6u	U	50	0.0	53	0.0	0.460	24.9	LOS C	7.0	49.3	0.85	0.79	0.85	32.4
Approach		997	1.0	1049	1.0	0.460	10.8	LOS B	7.6	53.6	0.54	0.48	0.54	46.6
North: Carrara St														
7	L2	122	0.0	128	0.0	0.287	47.5	LOS D	2.9	20.5	0.95	0.75	0.95	25.7
9	R2	6	0.0	6	0.0	*0.287	47.5	LOS D	2.9	20.5	0.95	0.75	0.95	29.0
Approach		128	0.0	135	0.0	0.287	47.5	LOS D	2.9	20.5	0.95	0.75	0.95	25.9
West: Ashmore Rd														
10	L2	15	0.0	16	0.0	0.016	12.2	LOS B	0.2	1.7	0.51	0.64	0.51	46.0
11	T1	1024	1.0	1078	1.0	*0.723	26.5	LOS C	21.5	152.0	0.91	0.80	0.91	36.0
Approach		1039	1.0	1094	1.0	0.723	26.3	LOS C	21.5	152.0	0.90	0.80	0.90	36.2
All Vehicles		2164	1.0	2278	1.0	0.723	20.4	LOS C	21.5	152.0	0.74	0.65	0.74	39.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1025	1.3	1079	1.3	0.414	7.4	LOS A	11.1	78.9	0.49	0.44	0.49	50.6
6	R2	273	0.0	287	0.0	*0.537	25.9	LOS C	8.7	61.0	0.88	0.83	0.88	34.3
6u	U	12	0.0	13	0.0	0.537	27.0	LOS C	8.7	61.0	0.88	0.83	0.88	31.4
Approach		1310	1.1	1379	1.1	0.537	11.5	LOS B	11.1	78.9	0.57	0.52	0.57	46.1
North: Carrara St														
7	L2	246	0.0	259	0.0	0.592	49.7	LOS D	6.4	44.6	0.99	0.80	1.00	25.1
9	R2	18	0.0	19	0.0	*0.592	49.7	LOS D	6.4	44.6	0.99	0.80	1.00	28.3
Approach		264	0.0	278	0.0	0.592	49.7	LOS D	6.4	44.6	0.99	0.80	1.00	25.3
West: Ashmore Rd														
10	L2	23	0.0	24	0.0	0.025	12.3	LOS B	0.4	2.6	0.51	0.65	0.51	46.0
11	T1	986	1.0	1038	1.0	*0.700	26.1	LOS C	20.6	145.5	0.89	0.79	0.89	36.2
Approach		1009	1.0	1062	1.0	0.700	25.8	LOS C	20.6	145.5	0.89	0.79	0.89	36.4
All Vehicles		2583	0.9	2719	0.9	0.700	21.0	LOS C	20.6	145.5	0.74	0.65	0.74	38.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	813	1.3	856	1.3	0.329	6.9	LOS A	8.2	57.9	0.45	0.40	0.45	51.2
6	R2	192	0.0	202	0.0	*0.488	24.3	LOS C	7.5	52.6	0.86	0.80	0.86	35.1
6u	U	53	0.0	56	0.0	0.488	25.5	LOS C	7.5	52.6	0.86	0.80	0.86	32.1
Approach		1058	1.0	1114	1.0	0.488	11.0	LOS B	8.2	57.9	0.55	0.49	0.55	46.4
North: Carrara St														
7	L2	129	0.0	136	0.0	0.303	47.6	LOS D	3.1	21.7	0.95	0.76	0.95	25.7
9	R2	6	0.0	6	0.0	*0.303	47.6	LOS D	3.1	21.7	0.95	0.76	0.95	29.0
Approach		135	0.0	142	0.0	0.303	47.6	LOS D	3.1	21.7	0.95	0.76	0.95	25.9
West: Ashmore Rd														
10	L2	16	0.0	17	0.0	0.018	12.3	LOS B	0.3	1.8	0.51	0.65	0.51	46.0
11	T1	1087	1.0	1144	1.0	*0.767	28.4	LOS C	24.1	170.2	0.93	0.85	0.96	35.0
Approach		1103	1.0	1161	1.0	0.767	28.2	LOS C	24.1	170.2	0.92	0.85	0.96	35.1
All Vehicles		2296	1.0	2417	1.0	0.767	21.4	LOS C	24.1	170.2	0.75	0.68	0.77	38.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1025	1.3	1079	1.3	0.414	7.4	LOS A	11.1	78.9	0.49	0.44	0.49	50.6
6	R2	461	0.0	485	0.0	*0.886	46.1	LOS D	19.4	135.5	1.00	1.08	1.26	26.1
6u	U	12	0.0	13	0.0	0.886	47.2	LOS D	19.4	135.5	1.00	1.08	1.26	23.4
Approach		1498	0.9	1577	0.9	0.886	19.6	LOS B	19.4	135.5	0.65	0.64	0.73	39.5
North: Carrara St														
7	L2	309	0.0	325	0.0	0.749	52.8	LOS D	8.5	59.7	1.00	0.88	1.16	24.2
9	R2	25	0.0	26	0.0	*0.749	52.8	LOS D	8.5	59.7	1.00	0.88	1.16	27.5
Approach		334	0.0	352	0.0	0.749	52.8	LOS D	8.5	59.7	1.00	0.88	1.16	24.5
West: Ashmore Rd														
10	L2	23	0.0	24	0.0	0.025	12.3	LOS B	0.4	2.6	0.51	0.65	0.51	46.0
11	T1	1159	1.0	1220	1.0	*0.822	32.1	LOS C	28.1	198.1	0.96	0.93	1.05	33.2
Approach		1182	1.0	1244	1.0	0.822	31.7	LOS C	28.1	198.1	0.95	0.92	1.04	33.4
All Vehicles		3014	0.8	3173	0.8	0.886	28.1	LOS C	28.1	198.1	0.81	0.78	0.90	34.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	813	1.3	856	1.3	0.329	6.9	LOS A	8.2	57.9	0.45	0.40	0.45	51.2
6	R2	283	0.0	298	0.0	*0.657	29.4	LOS C	10.3	72.3	0.92	0.89	0.92	32.5
6u	U	53	0.0	56	0.0	0.657	30.5	LOS C	10.3	72.3	0.92	0.89	0.92	29.6
Approach		1149	1.0	1209	1.0	0.657	13.5	LOS B	10.3	72.3	0.59	0.54	0.59	44.0
North: Carrara St														
7	L2	164	0.0	173	0.0	0.384	48.2	LOS D	4.0	27.9	0.96	0.77	0.96	25.5
9	R2	7	0.0	7	0.0	*0.384	48.2	LOS D	4.0	27.9	0.96	0.77	0.96	28.8
Approach		171	0.0	180	0.0	0.384	48.2	LOS D	4.0	27.9	0.96	0.77	0.96	25.7
West: Ashmore Rd														
10	L2	16	0.0	17	0.0	0.018	12.3	LOS B	0.3	1.8	0.51	0.65	0.51	46.0
11	T1	1167	1.0	1228	1.0	*0.823	32.3	LOS C	28.2	199.0	0.96	0.93	1.05	33.1
Approach		1183	1.0	1245	1.0	0.823	32.0	LOS C	28.2	199.0	0.95	0.93	1.05	33.3
All Vehicles		2503	0.9	2635	0.9	0.823	24.6	LOS C	28.2	199.0	0.79	0.74	0.83	36.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2038_BG_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1190	1.3	1253	1.3	0.481	7.9	LOS A	13.8	97.8	0.52	0.47	0.52	50.0
6	R2	317	0.0	334	0.0	*0.623	28.4	LOS C	10.1	71.0	0.91	0.88	0.91	33.0
6u	U	14	0.0	15	0.0	0.623	29.6	LOS C	10.1	71.0	0.91	0.88	0.91	30.1
Approach		1521	1.1	1601	1.1	0.623	12.4	LOS B	13.8	97.8	0.61	0.56	0.61	45.2
North: Carrara St														
7	L2	286	0.0	301	0.0	0.689	51.3	LOS D	7.6	53.5	1.00	0.84	1.09	24.6
9	R2	21	0.0	22	0.0	*0.689	51.3	LOS D	7.6	53.5	1.00	0.84	1.09	27.9
Approach		307	0.0	323	0.0	0.689	51.3	LOS D	7.6	53.5	1.00	0.84	1.09	24.9
West: Ashmore Rd														
10	L2	27	0.0	28	0.0	0.030	12.3	LOS B	0.4	3.0	0.51	0.66	0.51	46.0
11	T1	1217	1.0	1281	1.0	*0.865	36.7	LOS D	32.1	226.5	0.98	1.00	1.14	31.2
Approach		1244	1.0	1309	1.0	0.865	36.2	LOS D	32.1	226.5	0.97	1.00	1.13	31.5
All Vehicles		3072	0.9	3234	0.9	0.865	25.9	LOS C	32.1	226.5	0.79	0.76	0.87	35.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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Project: C:\Users\MGrierson\TTM\2024 Synergy Projects - Documents\TotalSynergy\24BRT0224 Benowa Gardens - 203 Ashmore Road Benowa\6 - Analysis\241125 - Update\24BRT0224 SA01 E.sip9

MOVEMENT SUMMARY

Site: 101 [2038_BG_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	944	1.3	994	1.3	0.382	7.2	LOS A	10.0	70.5	0.47	0.42	0.47	50.8
6	R2	223	0.0	235	0.0	*0.568	26.9	LOS C	8.8	61.3	0.89	0.85	0.89	33.7
6u	U	62	0.0	65	0.0	0.568	28.1	LOS C	8.8	61.3	0.89	0.85	0.89	30.7
Approach		1229	1.0	1294	1.0	0.568	11.8	LOS B	10.0	70.5	0.57	0.52	0.57	45.6
North: Carrara St														
7	L2	150	0.0	158	0.0	0.352	48.0	LOS D	3.6	25.5	0.96	0.77	0.96	25.6
9	R2	7	0.0	7	0.0	*0.352	48.0	LOS D	3.6	25.5	0.96	0.77	0.96	28.9
Approach		157	0.0	165	0.0	0.352	48.0	LOS D	3.6	25.5	0.96	0.77	0.96	25.8
West: Ashmore Rd														
10	L2	18	0.0	19	0.0	0.020	12.3	LOS B	0.3	2.0	0.51	0.65	0.51	46.0
11	T1	1261	1.0	1327	1.0	*0.890	40.7	LOS D	35.0	247.5	1.00	1.06	1.21	29.7
Approach		1279	1.0	1346	1.0	0.890	40.3	LOS D	35.0	247.5	0.99	1.05	1.20	29.8
All Vehicles		2665	1.0	2805	1.0	0.890	27.6	LOS C	35.0	247.5	0.79	0.79	0.89	35.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1190	1.3	1253	1.3	0.481	7.9	LOS A	13.8	97.8	0.52	0.47	0.52	50.0
6	R2	489	0.0	515	0.0	*0.943	59.6	LOS E	25.3	177.4	1.00	1.16	1.43	22.6
6u	U	14	0.0	15	0.0	0.943	60.7	LOS E	25.3	177.4	1.00	1.16	1.43	20.0
Approach		1693	0.9	1782	0.9	0.943	23.3	LOS C	25.3	177.4	0.66	0.68	0.79	37.2
North: Carrara St														
7	L2	344	0.0	362	0.0	0.832	56.4	LOS E	10.0	69.8	1.00	0.94	1.29	23.3
9	R2	27	0.0	28	0.0	*0.832	56.4	LOS E	10.0	69.8	1.00	0.94	1.29	26.5
Approach		371	0.0	391	0.0	0.832	56.4	LOS E	10.0	69.8	1.00	0.94	1.29	23.6
West: Ashmore Rd														
10	L2	27	0.0	28	0.0	0.030	12.3	LOS B	0.4	3.0	0.51	0.66	0.51	46.0
11	T1	1317	1.0	1386	1.0	*0.935	51.2	LOS D	41.8	294.8	1.00	1.17	1.34	26.2
Approach		1344	1.0	1415	1.0	0.935	50.5	LOS D	41.8	294.8	0.99	1.16	1.32	26.5
All Vehicles		3408	0.9	3587	0.9	0.943	37.6	LOS D	41.8	294.8	0.83	0.89	1.06	30.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	944	1.3	994	1.3	0.382	7.2	LOS A	10.0	70.5	0.47	0.42	0.47	50.8
6	R2	300	0.0	316	0.0	*0.711	31.4	LOS C	11.4	79.6	0.94	0.92	0.97	31.6
6u	U	62	0.0	65	0.0	0.711	32.5	LOS C	11.4	79.6	0.94	0.92	0.97	28.7
Approach		1306	1.0	1375	1.0	0.711	14.0	LOS B	11.4	79.6	0.60	0.56	0.61	43.7
North: Carrara St														
7	L2	179	0.0	188	0.0	0.420	48.4	LOS D	4.4	30.7	0.97	0.78	0.97	25.5
9	R2	8	0.0	8	0.0	*0.420	48.4	LOS D	4.4	30.7	0.97	0.78	0.97	28.7
Approach		187	0.0	197	0.0	0.420	48.4	LOS D	4.4	30.7	0.97	0.78	0.97	25.6
West: Ashmore Rd														
10	L2	18	0.0	19	0.0	0.020	12.3	LOS B	0.3	2.0	0.51	0.65	0.51	46.0
11	T1	1334	1.0	1404	1.0	*0.942	53.3	LOS D	42.9	303.0	1.00	1.19	1.36	25.6
Approach		1352	1.0	1423	1.0	0.942	52.7	LOS D	42.9	303.0	0.99	1.18	1.35	25.8
All Vehicles		2845	0.9	2995	0.9	0.942	34.7	LOS C	42.9	303.0	0.81	0.87	0.98	31.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_THU_PM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	173	3.4	182	3.4	0.182	6.9	LOS A	0.7	5.4	0.50	0.71	0.50	41.0
Approach		173	3.4	182	3.4	0.182	6.9	LOS A	0.7	5.4	0.50	0.71	0.50	41.0
West: Ashmore Rd														
10	L2	211	2.7	222	2.7	0.122	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	898	3.0	945	3.0	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1109	2.9	1167	2.9	0.247	1.1	NA	0.0	0.0	0.00	0.11	0.00	55.6
All Vehicles		1282	3.0	1349	3.0	0.247	1.9	NA	0.7	5.4	0.07	0.19	0.07	53.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	126	1.0	133	1.0	0.137	7.0	LOS A	0.5	3.8	0.51	0.72	0.51	41.3
Approach		126	1.0	133	1.0	0.137	7.0	LOS A	0.5	3.8	0.51	0.72	0.51	41.3
West: Ashmore Rd														
10	L2	125	1.0	132	1.0	0.071	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	993	1.0	1045	1.0	0.270	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1118	1.0	1177	1.0	0.270	0.6	NA	0.0	0.0	0.00	0.06	0.00	57.4
All Vehicles		1244	1.0	1309	1.0	0.270	1.3	NA	0.5	3.8	0.05	0.13	0.05	55.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_THU_PM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	173	3.4	182	3.4	0.200	7.4	LOS A	0.8	5.8	0.54	0.76	0.54	40.2
Approach		173	3.4	182	3.4	0.200	7.4	LOS A	0.8	5.8	0.54	0.76	0.54	40.2
West: Ashmore Rd														
10	L2	211	2.7	222	2.7	0.122	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	1042	3.0	1097	3.0	0.287	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1253	3.0	1319	3.0	0.287	1.0	NA	0.0	0.0	0.00	0.10	0.00	56.1
All Vehicles		1426	3.0	1501	3.0	0.287	1.7	NA	0.8	5.8	0.07	0.18	0.07	53.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	126	1.0	133	1.0	0.153	7.6	LOS A	0.6	4.2	0.55	0.77	0.55	40.5
Approach		126	1.0	133	1.0	0.153	7.6	LOS A	0.6	4.2	0.55	0.77	0.55	40.5
West: Ashmore Rd														
10	L2	125	1.0	132	1.0	0.071	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	1153	1.0	1214	1.0	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1278	1.0	1345	1.0	0.313	0.6	NA	0.0	0.0	0.00	0.06	0.00	57.7
All Vehicles		1404	1.0	1478	1.0	0.313	1.2	NA	0.6	4.2	0.05	0.12	0.05	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_THU_PM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	415	0.5	437	0.5	0.637	8.8	LOS A	5.5	38.7	0.62	0.96	1.13	17.4
3	R2	104	0.0	109	0.0	0.637	17.7	LOS C	5.5	38.7	0.62	0.96	1.13	36.5
Approach		519	0.4	546	0.4	0.637	10.6	LOS B	5.5	38.7	0.62	0.96	1.13	21.3
East: Carrara St														
4	L2	285	1.2	300	1.2	0.350	5.6	LOS A	0.0	0.0	0.00	0.27	0.00	47.9
5	T1	346	0.4	364	0.4	0.350	0.1	LOS A	0.0	0.0	0.00	0.27	0.00	53.5
Approach		631	0.7	664	0.7	0.350	2.6	NA	0.0	0.0	0.00	0.27	0.00	50.9
West: Carrara St														
11	T1	144	0.4	152	0.4	0.505	5.6	LOS A	4.2	29.5	0.72	0.73	1.12	41.6
12	R2	348	0.0	366	0.0	0.505	10.9	LOS B	4.2	29.5	0.72	0.73	1.12	25.6
Approach		492	0.1	518	0.1	0.505	9.3	NA	4.2	29.5	0.72	0.73	1.12	31.5
All Vehicles		1642	0.5	1728	0.5	0.637	7.1	NA	5.5	38.7	0.41	0.62	0.69	34.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_SAT_AM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	428	0.5	451	0.5	0.434	5.1	LOS A	2.5	17.6	0.31	0.59	0.33	20.4
3	R2	75	0.0	79	0.0	0.434	9.9	LOS A	2.5	17.6	0.31	0.59	0.33	42.6
Approach		503	0.4	529	0.4	0.434	5.8	LOS A	2.5	17.6	0.31	0.59	0.33	23.8
East: Carrara St														
4	L2	176	1.0	185	1.0	0.173	5.6	LOS A	0.0	0.0	0.00	0.34	0.00	46.7
5	T1	133	1.0	140	1.0	0.173	0.0	LOS A	0.0	0.0	0.00	0.34	0.00	52.2
Approach		309	1.0	325	1.0	0.173	3.2	NA	0.0	0.0	0.00	0.34	0.00	49.0
West: Carrara St														
11	T1	108	0.4	114	0.4	0.320	1.4	LOS A	1.8	12.8	0.48	0.51	0.48	47.5
12	R2	326	0.0	343	0.0	0.320	6.6	LOS A	1.8	12.8	0.48	0.51	0.48	31.1
Approach		434	0.1	457	0.1	0.320	5.3	NA	1.8	12.8	0.48	0.51	0.48	36.6
All Vehicles		1246	0.5	1312	0.5	0.434	5.0	NA	2.5	17.6	0.30	0.50	0.30	33.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_THU_PM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	415	0.5	437	0.5	0.699	10.4	LOS B	6.4	45.2	0.67	1.11	1.43	16.4
3	R2	104	0.0	109	0.0	0.699	21.0	LOS C	6.4	45.2	0.67	1.11	1.43	34.4
Approach		519	0.4	546	0.4	0.699	12.5	LOS B	6.4	45.2	0.67	1.11	1.43	20.1
East: Carrara St														
4	L2	285	1.2	300	1.2	0.380	5.6	LOS A	0.0	0.0	0.00	0.25	0.00	48.2
5	T1	402	0.4	423	0.4	0.380	0.1	LOS A	0.0	0.0	0.00	0.25	0.00	54.0
Approach		687	0.7	723	0.7	0.380	2.4	NA	0.0	0.0	0.00	0.25	0.00	51.5
West: Carrara St														
11	T1	168	0.4	177	0.4	0.559	6.8	LOS A	5.0	35.1	0.79	0.74	1.32	40.1
12	R2	348	0.0	366	0.0	0.559	12.2	LOS B	5.0	35.1	0.79	0.74	1.32	24.3
Approach		516	0.1	543	0.1	0.559	10.4	NA	5.0	35.1	0.79	0.74	1.32	30.7
All Vehicles		1722	0.5	1813	0.5	0.699	7.8	NA	6.4	45.2	0.44	0.65	0.83	34.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_SAT_AM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	428	0.5	451	0.5	0.447	5.4	LOS A	2.8	19.6	0.35	0.61	0.39	20.2
3	R2	75	0.0	79	0.0	0.447	10.6	LOS B	2.8	19.6	0.35	0.61	0.39	42.1
Approach		503	0.4	529	0.4	0.447	6.2	LOS A	2.8	19.6	0.35	0.61	0.39	23.5
East: Carrara St														
4	L2	176	1.0	185	1.0	0.184	5.6	LOS A	0.0	0.0	0.00	0.31	0.00	47.1
5	T1	154	1.0	162	1.0	0.184	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	52.6
Approach		330	1.0	347	1.0	0.184	3.0	NA	0.0	0.0	0.00	0.31	0.00	49.6
West: Carrara St														
11	T1	126	0.4	133	0.4	0.336	1.6	LOS A	2.0	13.7	0.51	0.50	0.51	47.6
12	R2	326	0.0	343	0.0	0.336	6.8	LOS A	2.0	13.7	0.51	0.50	0.51	31.2
Approach		452	0.1	476	0.1	0.336	5.3	NA	2.0	13.7	0.51	0.50	0.51	37.3
All Vehicles		1285	0.5	1353	0.5	0.447	5.0	NA	2.8	19.6	0.31	0.50	0.33	34.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Transport Engineering Report

Proposed Mixed-Use Development – Preliminary Approval

203 Ashmore Road Benowa

About TTM

For 30 years, we've been at the centre of the Australian development and infrastructure industry. Our unique combination of acoustics, data, traffic and waste services is fundamental to the success of any architectural or development project.

We have over 50 staff, with an unrivalled depth of experience. Our industry knowledge, technical expertise and commercial insight allow us to deliver an exceptional and reliable service.

T: (07) 3327 9500
F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au

Revision Record

No.	Author	Reviewed/Approved	Description	Date
1.	B. Vanetti/ M. Grierson	M. Grierson	Preliminary Approval Report	05/02/2025
2.	B. Vanetti/ M. Grierson	M. Grierson	Preliminary Report - Update	07/02/2025
3.				
4.				

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Level 8, 369 Ann Street, Brisbane. PO Box 12015 George Street Brisbane 4003

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1. Introduction

1.1. Purpose

Colliers International Engineering and Design (TTMC) Pty Ltd has been engaged by Neylan Architecture to prepare a Transport Engineering Report investigating a proposed Mixed-Use Development located at 203 Ashmore Road Benowa. It is understood this report will accompany a Development Application for a Preliminary Approval for a Mixed Use development to be lodged with the Gold Coast City Council (GCC).

1.2. Scope

The scope of the preliminary transport aspects investigated includes:

- Reviewing the prevailing traffic and transport conditions surrounding the site.
- Identifying at a high level the likely parking supply required to cater for development demands.
- Assessing the access configuration to provide efficient and safe manoeuvring between the site and the public road network for cars, service vehicles, cyclists and pedestrians.
- Identifying the preliminary service vehicle needs for the site.
- Reviewing access to a suitable level of public and active transport provisions.
- Identification of likely traffic volumes and traffic distribution from the development.
- Identification of likely traffic impacts of development on the surrounding road network.

The development plans have been assessed against the following guidelines and planning documents:

- Gold Coast City Council Planning Scheme (City Plan 2014), specifically:
  - *9.4.13 Transport Code (Transport Code)*
- Australian Standards for Parking Facilities, specifically:
  - *Part 1: Off-street car parking (AS2890.1:2004)*
  - *Part 2: Off-street commercial vehicle facilities (AS2890.2:2019)*
  - *Part 3: Bicycle parking (AS2890.3:2015)*
  - *Part 6: Off-street parking for people with disabilities (AS2890.6:2009).*
- Austroads "Guide to Traffic Management" (GTM)

2. Site Context and Travel Environment

2.1. Site Location

The site is located between the intersections of Benowa Road/Carrara Street and Ashmore Road/Benowa Road, Benowa. The property description is Lot 822 on RP 839746 and has a total site area of 17,660m^2. The site is currently occupied by a Shopping Centre, with approximately 17 different business and with vehicle access to Carrara Street and Ashmore Road.

The subject site is currently zoned as Neighbourhood Centre under the City Plan. The surrounding area of the site is zoned as Innovation and Community Facilities.

Figure 2.1 shows the subject site and the surroundings. Figure 2.2 is shown an immediate context of the site location.

Figure 2.1: Site location (Surrounding Context) Map Source: Google Maps

Figure 2.2: Site Location (Immediate Context) Map Source: Nearmap

2.2. The Road Network

The hierarchy and characteristics of roads in the immediate vicinity of the site are shown in Table 2.1.

Table 2.1: Local Road Hierarchy

Road	Speed Limit	Road Configuration			Classification under the City Plan
		Reserve Width	Carriageway Width	Lane Configuration	
Carrara St	40km/h	20m	12m	• 2 Traffic lanes. • Undivided. • Parking permitted on both sides. • Shared cycle lane.	Local Access Road
Ashmore Rd	60km/h	33m	24m	• 4 Traffic lanes. • Median divided. • Parking permitted on both sides. • Cycle lane on both sides.	Arterial Road
Benowa Rd	60km/h	20m	10m – 27m	• 2 Traffic lanes. • Median divided/undivided • Parking permitted on both sides/ no parking. • Cycle lane on both sides.	Distributor Road

Ashmore Road / Benowa Road and Ashmore Road / Carrara Street intersections are both signal-controlled.

2.3. Existing Traffic Volumes

TTM conducted traffic surveys at the Benowa Road / Carrara Street, Ashmore Road / Benowa Road, Ashmore Road / Carrara Street, Shopping Centre Northern Access / Carrara Street and Shopping Centre Southern Access / Ashmore Road intersections. The surveys were conducted on Thursday, June 20th and Saturday, June 15th. From the surveys, peak hour movements were derived. In general, the afternoon week peak hour was found to be between 4:15pm – 5:15 pm. Whilst the Saturday peak hour was to be between 11:15am – 12:15am.

The peak hours volumes for each intersection are shown in the network diagrams in Appendix B.

Initial review of the intersection operations notes the following:

- Existing Ashmore Road / Benowa Road has a higher Degree of Saturation (0.80) and Level of Service (LoS E) in the Thu PM Peak.
    - Weekday PM likely to be the critical assessment period for the roads, (depending on the proposed uses)
    - Ashmore Road is generally busy across the weekday afternoon, with a late school/early commuter peak being highest.
- School peak period (2:30pm – 3:30pm) is the main road peak for the northern side of the site along Benowa Road and Carrara Street.
    - This peak would not reflect the typical peak for the traffic generation associated with the subject site.

2.4. Public and Active Transport Facilities

2.4.1. Public Transport

Bus Services

There are several bus stops on the surrounding roads within a 400m walk of the site. An indicative map of the bus stops within the vicinity of the site is shown in Figure 2.3.

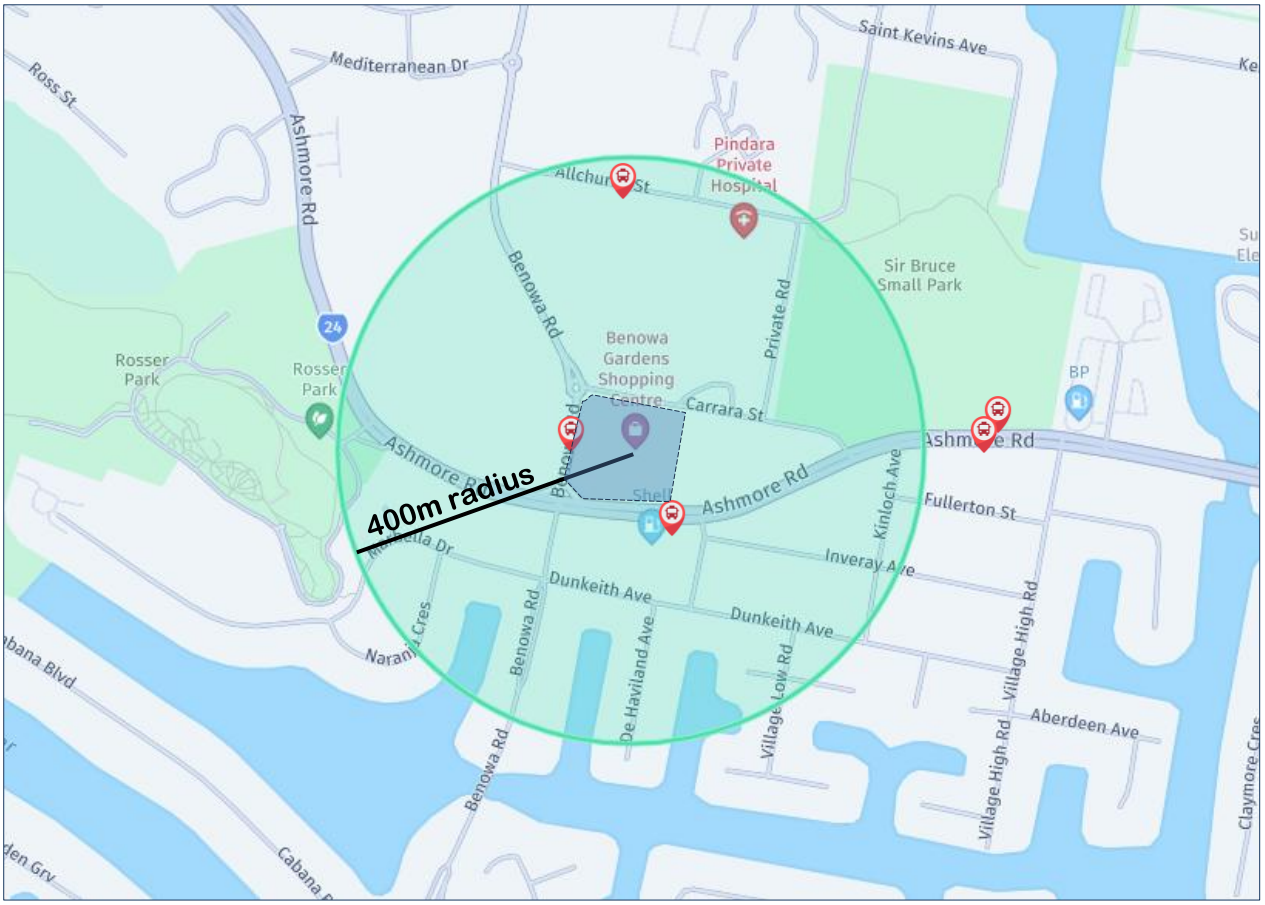


Figure 2.3 Bus Stops at the vicinity of the proposed development Map Source: Nearmap

The following is a summary of the surrounding bus routes and its itinerary:

- **737:** This route connects Ashmore to Southport, with services running seven days a week. On weekdays, weekends and public holidays the service runs from 9.10am to 4.30pm with a frequency of generally 60 minutes.
- **741:** This route connects Broadbeach South station to Southport, with services running seven days a week. On weekdays the service runs from 6.15am to 9.15pm with a frequency of 60 minutes. On weekends and public holidays, the service runs from 7.10am to 5.10 pm with a frequency of 60 minutes.

Train Services

Train services are not available in the nearby area.

2.4.2. Active Transport

Bicycle

The site offers a convenient location for cyclists, with a range of cycling routes available in the surrounding area. These routes are mapped out by the Google Maps Cycling Overlay, an extract of this overlay is shown in Figure 2.4.

In general, the surrounding roads offers a dedicated cycling lane, connecting to a wider cycling network to the East, West and North. Overall, the development offers excellent access to a cycling structure, making it an ideal location for cyclists looking for convenient and safe commuting options.

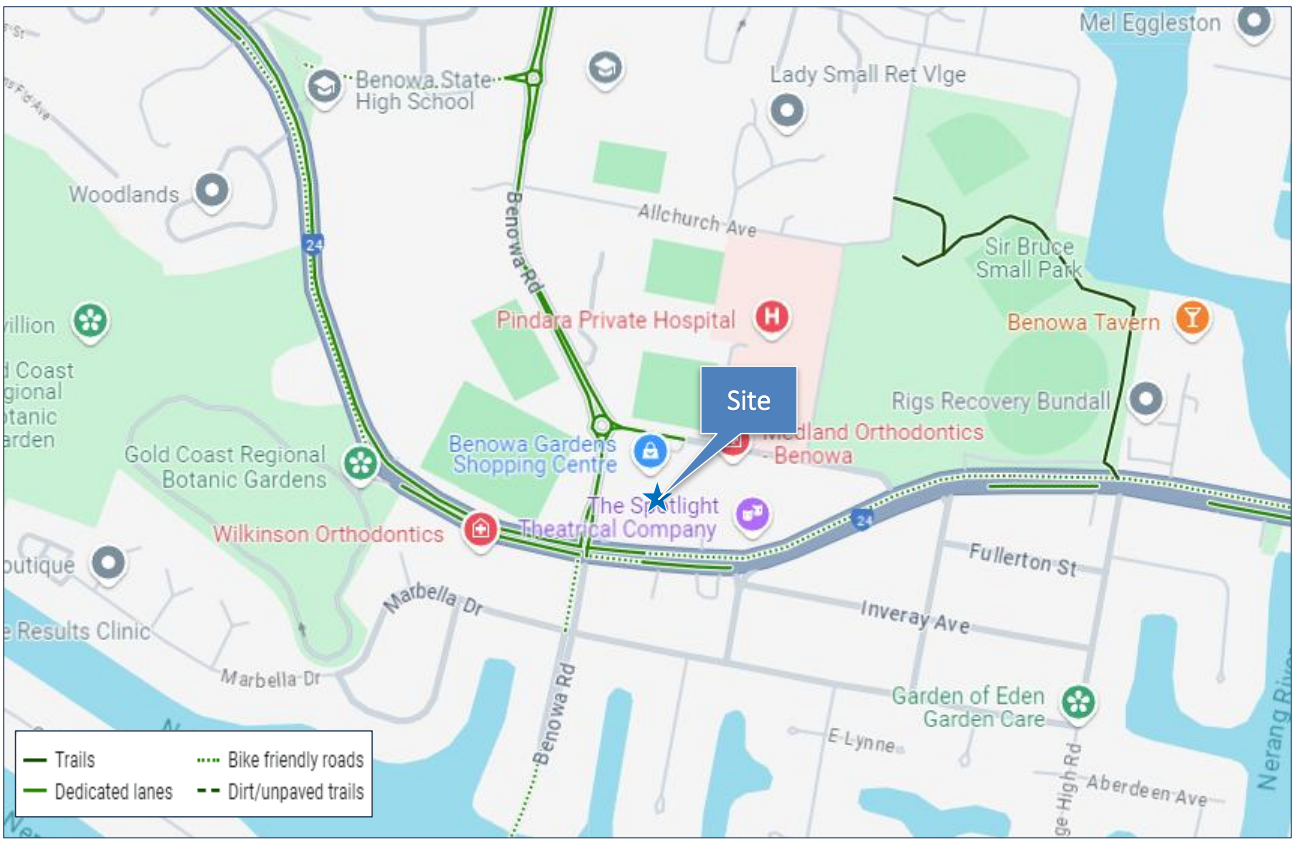


Figure 2.4: Overall bicycle provisions around the proposed development. Source: Google Maps.

Pedestrians

Formal pedestrian footpaths are located on both sides of the roads in the immediate vicinity, with kerb ramps provided at all intersections. Pedestrian crossing facilities are provided at the majority of the surrounding intersections. These are provided in the form of signalised crossings, zebra-crossing or crossing points. Figure 2.5 illustrates the pedestrian crossing facilities within the proximity of the site.

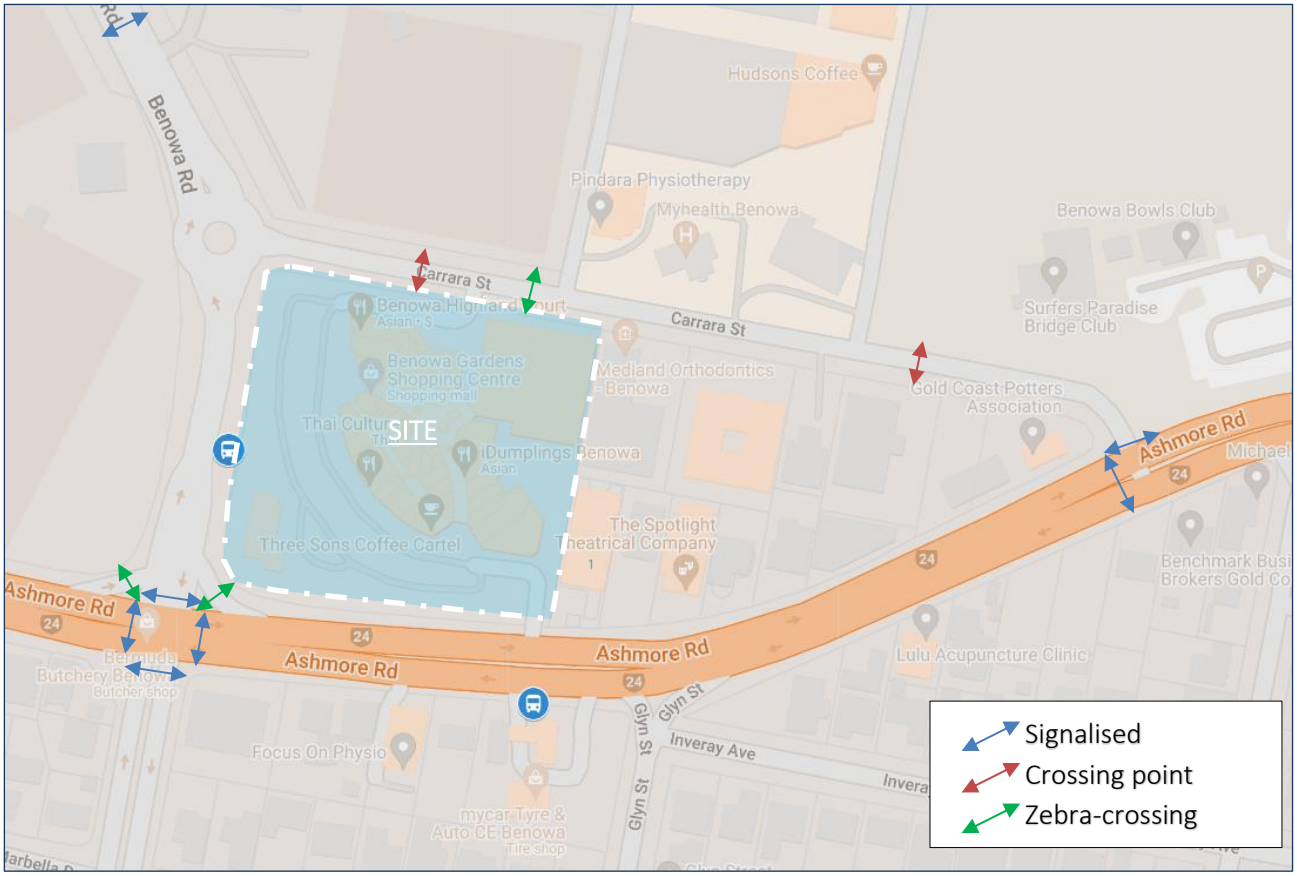


Figure 2.5: Pedestrian provisions around the development. Map Source: Google Maps

2.5. Transport Planning

A review of the City Plan LGIP indicates that the intersection of Ashmore Road/Benowa Road is expected to be upgraded by 2031.

3. The Proposed Development

3.1. Existing Development

The existing development includes:

A mix of retail and service tenancies

- Approximately 370 formalized on site car parking spaces.
- Two vehicle crossovers
  - 16m wide crossover on Carrara Street
    - All turning movements permitted.
  - 16m wide crossover on Ashmore Road
    - Left In / Left Out movements permitted.
    - Deceleration lane for left entry movements.
- Four dedicated pedestrian crossing
  - Ashmore Road, adjacent to the vehicle access.
  - Two on Benowa Road, one near the bus stop and one near the roundabout.
  - Carrara Street, adjacent to the vehicle access.

3.2. Proposed Development Profile

The proposed development includes planning for a mix of uses, the project team has been testing two (2) options for the development.

A copy of the architectural plans, prepared by Neylan Architecture, is included in Appendix A.

A summary of the two options under consideration are outlined in Table 3.1.

Table 3.1: Preliminary Development Yields – Subject to Ongoing Review

Use	Indicative Yield	Notes
Option 1		
Shopping Centre (Shop / Supermarket / Specialities)	10,000m^2 GFA	Mix of Supermarket, Shop and Food and Drink outlets.
Commercial Level	3,000m^2 GFA	Mix of Office and Gym uses.
Perimeter Use (Health Care)	8,800m^2 GFA	
Multiple Dwelling (Apartment)	397 Units	306 x 2 bedroom units 91 x 3 bedroom units
Option 2		

Shopping Centre (Shop / Supermarket / Specialities)	10,000m² GFA	Mix of Supermarket, Shop and Food and Drink outlets.
Commercial Level	3,000m² GFA	Mix of Child Care Centre, Office and Gym uses.
Perimeter Use (Short Term Accommodation / Hote / Multiple Dwelling)	85 units/rooms (approximately 8,800m² GFA)	41 Short term accommodation. 44 Multiple Dwellings (1 bedroom).
Multiple Dwelling (Apartment)	397 Units	306 x 2 bedroom units 91 x 3 bedroom units

A summary of some of the other traffic design elements is provided below:

- Approximately 1,460 on-site car parking spaces on site.
  - Including provision for a hotel drop off area.
  - Final proposed supply subject to further carpark design review.
- Three vehicle crossovers
  - Left in / Left out movements proposed to Ashmore Road.
  - All movements crossover to Carrara Street, at the eastern end of the site.
  - All movements crossover to Carrara Street, located in the middle of the site frontage.
- Current planning includes 300 bicycle parking spaces
  - 100 staff and 200 visitor spaces.
- Dedicated pedestrian accesses to be provide to all street frontages.
- Current planning for servicing is aiming to accommodate vehicles up to a 19m Articulated Vehicle (AV).

TTM has undertaken a preliminary review of the potential development. The findings of the initial review are outlined below. Please note that the following review findings are subject to ongoing review and may change as the preliminary designs and the project understanding progresses.

3.3. Parking

Current development planning includes a total of 1,460 parking spaces across 5 levels. Car parking provisions are summarised in Table 3.2:

Table 3.2: Preliminary Parking Provisions

Level	Number of Spaces	Intended User
Basement 3	460 spaces	270 Perimeter Use 190 Retail Parking

Basement 2	260 spaces	Retail
Basement 1	250 spaces	Retail
Ground Floor	-	
Level 1	-	
Level 2	220 spaces	Residential
Level 3	270 spaces	Residential
Total	**440 spaces***	**30 spaces**

A total of 300 bike parking is currently proposed for the site:

- Basement 2 – 100 bicycle spaces for staff, 86 bicycle spaces for visitors
- Basement 1 – 114 bicycle spaces for visitors

Further details regarding the proposed car and bicycle parking provisions are included in Section 4.

3.4. Access

The preliminary development plan includes the following access arrangements:

Ashmore Road

The proposal includes a 8.5m wide crossover on Ashmore Road, which will accommodate passenger and service vehicles, with only Left in – Left Out movements permitted.

Carrara Street West

The proposal includes a 7m wide crossover on Carrara Street, which will accommodate passenger vehicles, with all movements permitted.

Carrara Street East

The proposal includes a 8.5m wide crossover on Carrara Street, which will accommodate passenger vehicles, with all movements permitted.

Pedestrians will have access to the development from the Ashmore Road, Benowa Road and Carrara Street frontages.

Further details regarding the proposed access arrangements are included in Section 5.

3.5. Servicing

The development plans allow for vehicles up to the size of a 19m Articulated Vehicle (AV) to access the site. Located next to the bin store collection, the following service bays are to be provided.

- 19m Articulated Vehicle (AV)
- Refuse Collection Vehicle (RCV)

The design of the servicing bays should not conflict with vehicles entering/departing from the loading area.

Further details regarding the proposed servicing arrangements are included in Section 6

4. Parking Arrangements

4.1. Parking Supply

4.1.1. Car parking

The currently proposed development configuration includes approximately 1,460 carparking spaces on site. The alignment and specific configuration of the parking areas on site are subject to ongoing design and will be progressed as the design continues.

Table 4.1 provides a summary of the parking supply recommendations for the two current development scheme options being tested.

Table 4.1: Preliminary Recommended Car Parking Supply.

Use	Indicative Yield	GCCC Parking Rate	Recommended Parking Supply
Option 1			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m² GFA	Shopping Centre • 5 spaces / 100m² GFA	500 spaces
Commercial Level	3,000m² GFA Office 2,500m² GFA Gym 500m² GFA	Office 3 spaces / 100m² GFA or Shop/Gym 5 spaces / 100m² GFA	75 spaces 25 spaces
Perimeter Use (Health Care)	8,800m² GFA	Health 5 spaces / 100m² GFA or 2 spaces / consulting room + 1 per staff	440 spaces
Multiple Dwelling (Apartment)	394 Units 301 x 2 bedroom units 93 x 3 bedroom units	Resident spaces • 1 space / 1 bedroom • 1.25 spaces / 2 bedroom • 1.5 spaces / 3 bedroom • 2 spaces / 4 bedroom Visitor 3 spaces + 1 spaces / 10 units (50% of visitor spaces to be in a single consolidated location)	519 residential spaces • 382.5 residential spaces • 136.5 residential spaces 43 visitor spaces
Option 1 Total			**1,602 spaces**
Option 2			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m² GFA	Shopping Centre 5 spaces / 100m² GFA	500 spaces
Commercial Level	3,000m² GFA 100 place Child Care Office 500m² GFA Gym 500m² GFA	Shopping Centre/Gym 5 spaces / 100m² GFA Office 3 spaces / 100m² GFA Child Care 1 space / 4 children	25 spaces 15 spaces 25 spaces

Perimeter Use (Short Term Accommodation / Hote / Multiple Dwelling)	85 units/rooms (approximately 8,800m^2 GFA)	Hotel/ Short Term Accom 1 space / short term / serviced apartment plus queuing capacity for 10 vehicles Health 5 spaces / 100m^2 GFA or 2 spaces / consulting room + 1 per staff	85 spaces
Multiple Dwelling (Apartment)	397 Units 306 x 2 bedroom units 91 x 3 bedroom units	Resident spaces • 1 space / 1 bedroom • 1.25 spaces / 2 bedroom • 1.5 spaces / 3 bedroom • 2 spaces / 4 bedroom Visitor 3 spaces + 1 spaces / 10 units (50% of visitor spaces to be in a single consolidated location)	519 residential spaces • 382.5 residential spaces • 136.5 residential spaces 43 visitor spaces
Option 2 Total			**1,212 spaces**

TTM notes that the preliminary design parking supply recommendation has a significant range of supply rates (1,212 to 1,600 spaces), depending on the specific uses proposed. With a variation of GCCC compliant parking space provisions depending on the development option.

Given the range of uses on site, the specific peak parking demand will vary for each specific uses. This variation in parking demand timings, may allow for the time-based sharing of communal parking on site potentially reducing the overall supply requirements (e.g. a shop uses typically peak on a weekend or weekday evening, when an office / health use would be closed).

Additionally, there is potential for linked trips, internalisation of trips and shared parking to occur, with a patron visiting multiple tenancies on site or residents visiting on site retail, reducing the potential parking demands.

TTM are also aware of mixed use retail precinct car parking studies which indicate that generally shopping centre peak parking demands could be lower than the 5 spaces / 100m^2 that is typically nominated by planning schemes. Depending on the scale of the development a retail parking provision of 4.5 spaces / 100m^2 could be appropriate to accommodate retail parking demands. PWD parking spaces are recommended to be provided at a rate of 1 PWD space per 50 general parking spaces, with PWD parking spread throughout the site, located close to accessible access points (i.e. lift core and DDA ramps).

The carparking supply will evolve as the development progresses through the design and approval process, with more detailed car parking supply and layout review documentation to be provided later.

4.2. Parking Layout

The GCC City Plan refers to the Australian Standards for the parking layout. Therefore, Table 4.2 identifies the characteristics of the proposed parking layouts for the development with respect to the AS2890 design provisions.

Table 4.2: AS2890 Parking Design Parameters

Design Aspect	Min SCC Standard (AS2890.1)	Recommended Provision
Parking space length – Standard bay – Motorbike	 5.4m 2.5m	 5.4m 2.5m
Parking space width: – Residential (Class 1A) – Visitor (Class 3A) – Motorbike	 2.4m 2.7m 1.2m	 2.6m 2.7m 1.2m
Aisle Width: – Parking aisle – Circulation aisle (passenger vehicles)	 6.2 – 6.6m 5.5m + 0.6m clearances	 6.2m 6.2m (with localised widening)
Parking envelope clearance – space adjacent to wall	Space 0.3m clear of wall	Space 0.3m clear of wall
Parking envelope clearance - Column adjacent to bay	Located between 0.75m and 1.75m of aisle	Located between 0.75m and 1.75m of aisle
Maximum Gradient: – PWD parking bay – Parking bay – Parking aisle	 1:40 (2.5%) 1:20 (5.0%) 1:16 (6.25%)	 1:40 (2.5%) 1:20 (5.0%) 1:16 (6.25%)
Height Clearance – General Min. – PWD – Service Vehicles	 2.2m (2.2m PWD) 2.5m above parking space and shared 4.5m	 2.2m min 2.5m above parking space and shared 4.5m (Potentially higher depending on refuse collections)
Parking Aisle Extension	1m beyond last bay	1m beyond last bay

The development parking layouts are expected to achieve consistent with the provisions of the AS2890.1. Further details in relation to deemed compliance of required provisions or justification for design aspects resolved with performance solutions would be reviewed and provided as part of future development applications.

5. Access Arrangements

5.1. Vehicular Access

The development plan involves three designated car parking areas. The primary car park, located underneath the main building, will be accessible via Ashmore Road and Carrara Street (via a total of 3 accesses). The second car park, located in Basement 2, will have access through Carrara Street. The third parking area is to be accessed via the internal roadway on the western side of the site, connecting to Ashmore Road and Carrara Street. The design provisions of the access and their recommended provisions of the AS2890.1 are detailed in Table 5.1., respectively. Given the preliminary nature of the application, finer details of the access arrangements are to be resolved as part of subsequent development applications.

Table 5.1: Design and provisions of Carrara Street access

Design Aspect	AS2890 Provision	Recommended Provision
Width / Crossover Type to accommodate: • Cars[12] • Service vehicles[13]	6-9m	 7.0m min 7.0m min
Sight Distance[12]	55m (desirable) 35m (minimum)	>70m to the east[4] >70m to the west[4]
Driveway Sight Splays	2.0m wide x 2.5m deep (on exit side)	2.0m wide x 2.5m deep (on each side)
Minimum Queuing Provisions [1]	5 vehicles for the first 200 plus 1% of capacity over 200 **Total 17 vehicles across the entire site**	6 vehicles / 36m at each access
Maximum Driveway grade	1:20 (5%) maximum within first 6m	1:20 (5%) maximum within first 6m

[1] Based on Carrara St being classed as a 'minor road' and speed limit of 40km/h.

[2] Based on the access servicing >500 medium turnover car parking spaces.

[3] Based on the access servicing service vehicles up to the size of an SRV.

[4] Assuming visibility around/past vehicles parked within the existing marked on-street parking spaces.

Table 5.2: Design and provisions of Ashmore Road access.

Design Aspect	AS2890 Provision	Proposed Provision
Width / Crossover Type to accommodate: • Cars[12] • Service vehicles[13]	 6-8m with separated entry/exit 6-8m with separated entry/exit	 10m 10m
Sight Distance[12]	83m (desirable) 65m (minimum)	>140m to the west
Driveway Sight Splays	2.0m wide x 2.5m deep (on exit side)	2.0m wide x 5.0m deep (on each side)
Minimum Queuing Provisions [1]	5 vehicles for the first 200 plus 1% of capacity over 200 **Total 17 vehicles across the entire site**	6 vehicles / 36m at each access
Maximum Driveway grade	1:20 (5%) maximum within first 6m	1:20 (5%) maximum within first 6m

[1] Based on Ashmore being classed as a 'major road' and speed limit of 60km/h.

[2] Based on the access servicing >500 medium turnover car parking spaces.

[3] Based on the access servicing service vehicles up to the size of an AV.

Vehicle movements internally will be signed and managed to direct users to Ashmore Road as the primary access to/from the site. With Carrara Street providing supplemental access and connectivity to the surrounding road network.

5.2. Active Transport Access

Pedestrian accesses are provided to all three road frontages, Ashmore Road, Benowa Road and Carrara Street. Allowing for access to the existing pedestrian network.

Cyclists access the site via the driveway located the sites frontages, or via the pedestrian access locations, before circulating to the respective parking areas for bikes.

6. Service Vehicle Arrangements

6.1. GCCC Servicing Recommendations

Table 9.4.13-9 of the Transport Code recommends the following service vehicles:

- Shop / Supermarket
  - 400m^2 – 1,500m^2 – Heavy Rigid Vehicle (HRV)
  - >1,500m^2 – 19m Articulated Vehicle (AV)
- Food and Drink Outlet
  - Heavy Rigid Vehicle (HRV)
- Indoor Sport and Recreation
  - Small Rigid Vehicle (SRV)
- Multiple Dwelling
  - Standing area for Medium Rigid Vehicle (MRV)
- Office
  - Van

6.2. Proposed Loading Provisions

The proposed development is expected to accommodate on site servicing and refuse collection within a dedicated loading area. The main shared loading area is to be located in the northeastern corner of the site, adjacent to the internal circulation roadway.

Service vehicles are proposed to access the site via the revised southeastern Left In-Left Out vehicle access on Ashmore Road. Vehicles accessing the site are expected to enter and exit the site in a forward gear travelling along the internal roadway to access the dedicated loading area located in the northeastern corner of the site.

The design vehicle is expected to be an 19m Articulated Vehicle (AV), 12.5m Heavy Rigid Vehicle (HRV) and 10.5m Refuse Collection Vehicle (RCV). This is generally consistent with the current on-site operations of the Shopping Centre use.

The specific loading requirements will be refined as the specific uses on site are confirmed and the site design progresses.

7. Development Transport Demands

7.1. Existing Site Traffic Demands

To establish the traffic generation of the existing site uses, TTM conducted AM and PM peak hour traffic surveys for the existing site, which has access to Ashmore Road and Carrara Street. The surveyed existing traffic generation for the subject site is summarised in Table 7.1.

Table 7.1: Existing Site Traffic Generation (Surveyed)

Generation	Weekend AM Peak Hour (11:15am-12:15pm) vph			Thursday PM Peak Hour (4:15pm-5:15pm) vph		
	In	Out	Total	In	Out	Total
Existing Site	291	301	592	277	298	575

Volumes associated with the existing site operations have been removed from the base background volumes as part of the completed traffic assessment.

7.2. Development Traffic Demands

7.2.1. Traffic Generation

To assess the impact of the proposed development on the adjacent road network, it is necessary to predict the likely volume of vehicles that will be generated by the proposed land uses. The traffic generation rates adopted for the respective land uses, and also the respective inbound/outbound splits, have been assumed as follows.

Colliers notes that this assessment will be refined further as the project and the proposed uses and use areas are more refined as the development layout is progressed into DA stage.

Multi-Unit Dwelling

This has been based on the Roads and Traffic Authority (RTA) *Guide to Traffic Generating Developments,* which recommends a weekday peak hour traffic generation rate of 0.29vph per unit for high-density residential developments. With respect to the Saturday peak hour period, it is recognised that there is little guidance in the RTA guide. Therefore, it is also proposed to adopt a similar rate of 0.29vph per unit.

Generation for Short-Term Accommodation

For Short-Term Accommodation, Colliers has adopted the following rates, which recognise the constrained parking associated with this component of the development:

- Car park generation of up to 0.17vph per parking space in peak hour periods.
- Set-down movement generation of up to 0.2vph per unit in the peak hour periods.

In terms of inbound/outbound movement splits for Multi-Dwelling Units and Short-Term Accommodation, it is proposed to adopt the following:

- 65% in/35% out in the PM peak hour
- 50% in/50% out in the Saturday peak hour

These splits are consistent with generally accepted practice and reflect the predominantly 'tidal' flow behaviour of traffic movements from residential developments in weekday peak hours and the expectation of balanced flows on weekends (which peak around lunchtime when residents are equally likely to be coming and going).

Non-Residential (Shop/Retail/Food & Drinks) Uses

The non-residential uses provide a reduced parking supply. Therefore, adopting traffic generation rates of comparable land uses as detailed in the various guideline documents (such as the RTA guide), which is generally based on the 'unconstrained' parking supply/generation, would overestimate the traffic generation potential of the land uses in this instance. As such, it is instead proposed to estimate the traffic generation demands on a 'per parking space' basis based on the quantity of parking to be provided on-site. Colliers has conducted numerous surveys of similar kinds of retail developments (with constrained parking) within the inner-city area of Brisbane, including:

- Gasworks, Newstead
- The Barracks, Petrie Terrace
- The Markets, West End

Surveys were conducted on a typical peak weekday (i.e., Thursday) and Saturday, and generation related back to the parking supply provided on-site to give a reasonable estimate on a 'per parking space' basis. From a detailed review of this previous survey data, Colliers believes the traffic generation rates, as detailed in Table 7.2, are appropriate to adopt for the proposed development. Of note, these rates generally were the worst case for any of the sites surveyed and have been rounded up where applicable to provide an added level of conservativeness.

Table 7.2: Traffic Generation Assumptions for the Non-Residential Parking Supply

Peak Period	Traffic Generation	Inbound Split	Outbound Split
PM Peak Hour	1.75 vph/space	50%	50%
Saturday Peak Hour	2.0 vph/space	50%	50%

Office

It is recognised that the car parking provided for non-residential uses will typically be for staff/employee parking only. As per the generation rate of the existing employee parking on-site (which is also consistent with RMS), it is proposed to adopt a generation rate of 0.5vph per space.

In terms of inbound/outbound movement splits it is proposed to adopt the following:

- 10% in/90% out in the PM peak hour
- 50% in/50% out in the Saturday peak hour

Based on the above traffic generation rates for the various land uses, a summary of the potential traffic generation of the proposed development is provided in Table 7.3.

Table 7.3: Development Traffic Generation

Use	Indicative Yield	Adopted Generation Rate	Estimated Traffic Generation
Option 1			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m^2 GFA 500 carparking spaces	PM 1.75 trips per parking space Sat 2.0 trips per parking space	875 trips 1,000 trips
Commercial Level	3,000m^2 GFA 85 carparking spaces	PM 0.5 trips per parking space Sat 0.1 trips per parking space	43 trips 9 trips
Perimeter Use (Health Care)	8,800m^2 GFA	PM 5.7 trips / 100m^2 GFA Sat 1.5 trips / 100m^2 GFA *(Sourced from DTMR Traffic Generation Surveys)*	502 trips 132 trips
Multiple Dwelling (Apartment)	397 Units	PM 0.29 trips / dwelling Sat 0.29 trips / dwelling (RMS 2013 Generation Rates)	115 trips 115 trips
Option 1 Total			**PM 1,535 trips** **Sat 1,256 trips**
Option 2			
Shopping Centre (Shop / Supermarket / Specialities)	10,000m^2 GFA 500 carparking spaces	PM 1.75 trips per parking space Sat 2.0 trips per parking space	875 trips 1,000 trips
Commercial Level	3,000m^2 GFA 100 place Child Care	Commercial PM 0.5 trips per parking space Sat 0.1 trips per parking space Child Care PM 0.7 trips per child Sat 0 trips per child	Commercial 43 trips 9 trips Child Care 70 trips 0 trips
Perimeter Use (Short Term Accommodation / Hote / Multiple Dwelling)	85 units/rooms (approximately 8,800m^2 GFA)	PM 0.2 trips / unit Sat 0.2 trips / unit *(RMS 2013 Generation Rates)*	17 trips 17 trips
Multiple Dwelling (Apartment)	397 Units	PM 0.29 trips / dwelling Sat 0.29 trips / dwelling *(RMS 2013 Generation Rates)*	115 trips 115 trips
Option 2 Total			**PM 1,050 trips** **Sat 1,141 trips**

Given the potential variation of the uses proposed, Colliers has considered the worst-case traffic generation associated with two options being considered above (i.e. Option 1).

7.2.2. Traffic Distribution

Based on a review of the surrounding land uses and road network configuration, Colliers has adopted a traffic distribution reflective of the surveyed existing site travel paths. As the proposed site has comparable uses to a significant portion of the existing site this was seen to be a good base for the proposed development.

8. Base Traffic Demands

8.1. Assessment Years and Traffic Growth

It is expected that the development will be completed by 2028. On this basis, the following assessment years have been considered for the TIA:

- Opening Year: 2028
- Design Horizon (Opening + 10 years): 2038

To assess future traffic demands in 2028 and 2038, a base traffic growth assumption of 1.5% p.a. has been adopted. This growth rate is consistent with the LGIP planning estimates.

Background traffic has been determined for the 2028 and 2038 design horizon base volumes. Removed the existing site traffic volumes from the 2024 survey volumes. Applied the 1.5%p.a. growth rate to the corrected volumes, to scale to the 2038 10 year design scenario (consistent with LGIP planning).

8.2. Future Year Scenarios

The following future year scenarios have been derived for the purposes of the TIA:

- 2024 Survey Scenario
- 2028/2038 Base Case Scenario
- 2028/2038 Base + Development Case Scenario
  - This is a net difference between the existing on site operations and the proposed new development.

Based on the surveyed traffic demands (Section 2.3), base traffic growth assumption (Section 8.1) and development transport demand estimates (Section 7), future traffic movement demands at the intersections next to the development have been derived. These are presented in **Appendix C.**

9. Traffic Impact Assessment

This TIA has been limited to an assessment of the following intersections:

- Ashmore Road/Benowa Road.
- Benowa Road/Carrara Street.
- Ashmore Road / Carrara Street.
- Ashmore Road / Site Access South.
- Carrara Street / Site Access North.

To evaluate the performance of the surrounding intersections, modelling was conducted using the SIDRA Intersection 9.0 software package. The primary intersection operational outputs used to assess intersection operations were considered to be intersection Degree of Saturation (DOS), overall intersection and worst movement delays, Level of Service (LOS) and queuing.

The cycle/phasing timing for assessed intersections was derived from analysis of survey volume video footage.

9.1. Ashmore Road/Benowa Road

The SIDRA Intersection 9.0 software package has been used to assess the future traffic operations of Ashmore Road / Benowa Road signalised intersection. Default SIDRA inputs were used for the analysis.

Figure 9.2 shows the existing configuration of the Ashmore Road/Benowa Road intersection adopted in the SIDRA analysis for all scenarios. Table 9.1 summarises the SIDRA analysis results.

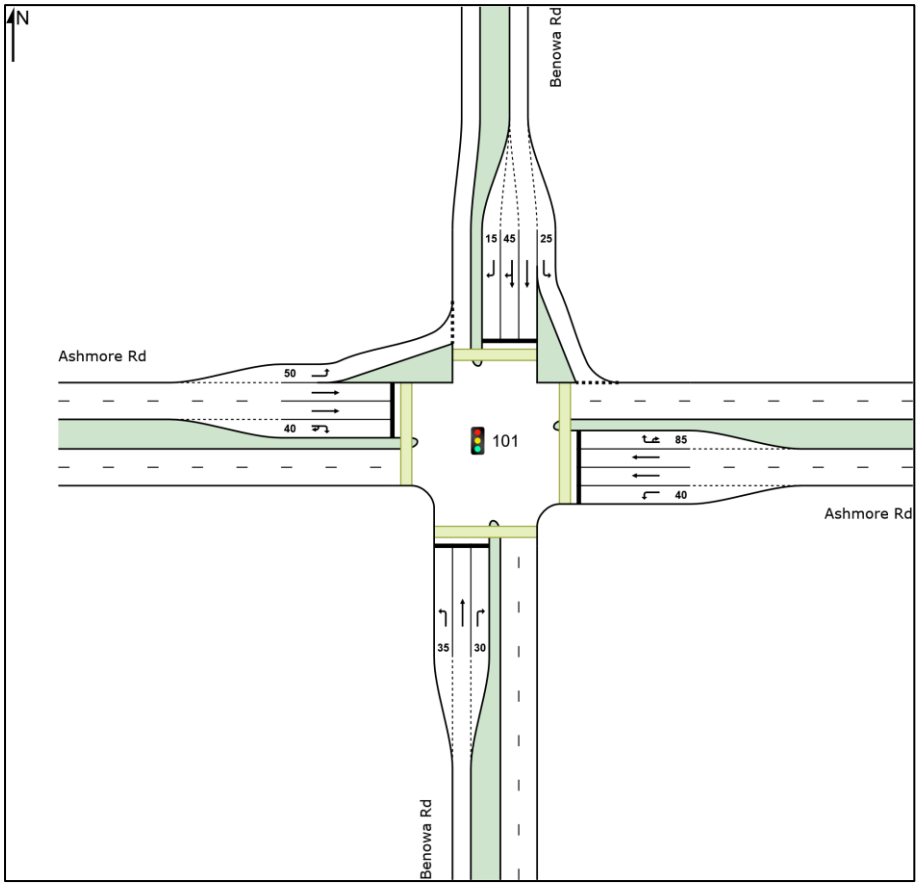


Figure 9.1: Ashmore Road / Benowa Road Intersection (Existing Configuration) – SIDRA Layout

Table 9.1 summarises the analysis outputs. Detailed analysis output summaries are included in **Appendix D**.

Table 9.1: Ashmore Road / Benowa Road Intersection – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2024 Survey	**56.3%**	34.8 sec	73.7 sec	C	38.0m	54.2m	111.3m	135.0m
2028 Base	59.9%	35 sec	74.2 sec	D	41.3m	57.7m	118.8m	144.7m
2028 Base + Development	61.3%	35.7 sec	74.2 sec	D	55.6m	57.7m	119.1m	150.5m
2038 Base	68.9%	36.1 sec	75.6 sec	D	49.2m	69.0m	145.4m	173.5m
2038 Base + Development	71.0%	36.6 sec	75.6 sec	D	59.6m	69.0m	145.4m	178.2m
Weekday PM Peak Hour								
2024 Survey	80.5%	42.7 sec	74.9 sec	D	71.1m	46.4m	196.4m	122.7m
2028 Base	87.7%	46.8 sec	75.2 sec	D	80.4m	49.3m	233.8m	132.5m
2028 Base + Development	90.6%	49.1 sec	77.5 sec	D	120.9m	66.3m	250.1m	151.4m
2038 Base	100.3%	64.3 sec	118.8 sec	E	159.2m	58.0m	343.3m	158.8m
2038 Base + Development	105.2%	76.2 sec	147.5 sec	E	184.6m	76.6m	406.6m	180.9m

The analysis indicates that the intersection is expected to operate beyond suitable levels up to the 2038 design horizon, with and without development traffic included. With the assessed worst-case DOS 105.2% and LOS E. The analysis indicates that the proposed development expansion may have some impacts on vehicle queuing and intersection delays.

There appears to be scope to provide lane extensions on the Ashmore Road approaches that could improve the overall intersection operations. This could also be supplemented with the extension of the dual right turn lanes for the northern approach.

Colliers have tested an initial mitigation option where the Ashmore Road and Benowa Road turn lanes are extended to increase storage capacity and provide additional throughput. The tested upgrades were:

- Increase the western approach right tun lane to 100m (+60m).
- Increase the eastern approach right tun lane to 125m (+40m).
- Increase the northern approach right turn lanes to 40m (+25m) and 60m (+15m) lanes.

This upgraded configuration is shown in Figure 9.2.

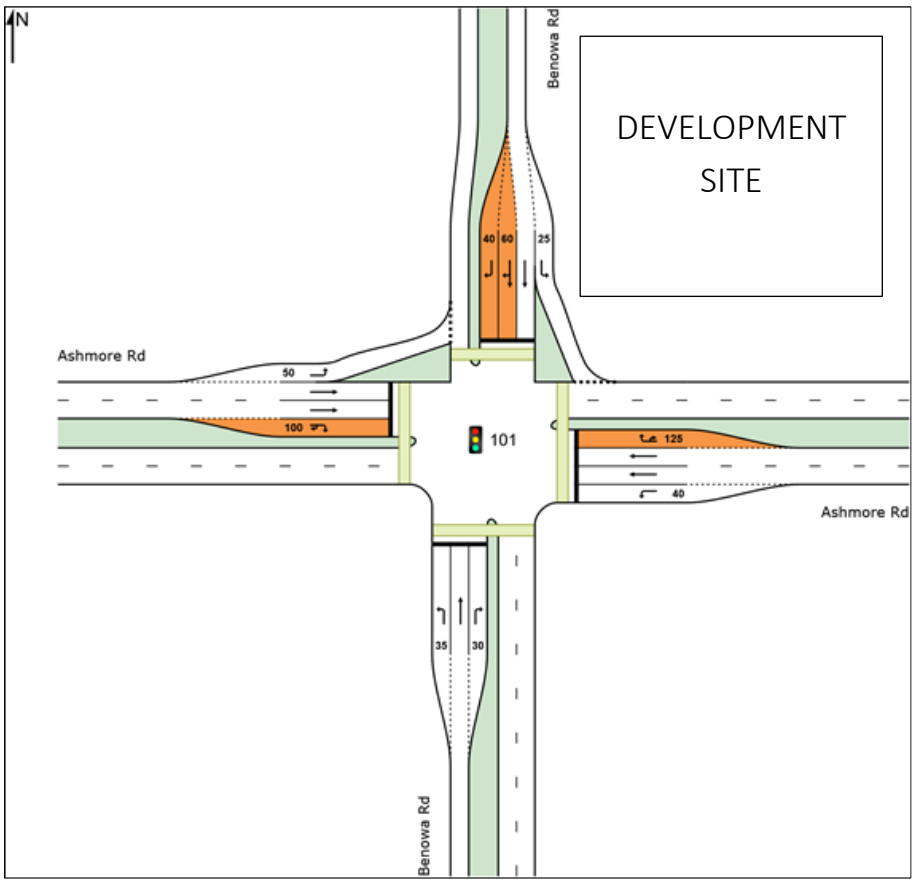


Figure 9.2: Ashmore Road / Benowa Road Intersection (Upgraded Configuration) – SIDRA Layout

Table 9.2 summarises the analysis outputs. Detailed analysis output summaries are included in **Appendix D** and a preliminary concept for the upgrade works are provided in **Appendix B**.

Table 9.2: Ashmore Road / Benowa Road Upgraded Intersection – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2028 Base + Development Upgraded	56.4%	35.9 sec	72.3 sec	D	48.4m	57.7m	119.1m	162.2m
2038 Base + Development Upgraded	68.9%	36.6 sec	75.6 sec	D	53.7m	69.0m	145.4m	180.9m
Weekday PM Peak Hour								
2028 Base + Development Upgraded	74.6%	41.1 sec	75.2 sec	D	87.2m	66.3m	200.4m	156.6m
2038 Base + Development Upgraded	88.3%	46.4 sec	76.4 sec	D	105.6m	76.6m	265.0m	176.1m

The analysis confirms that the upgraded intersection should function appropriately at the opening-year and 10 year design horizon of the proposed development. Based on this assessment, the proposed intersection configuration and the proposed upgrade works area considered suitable from a traffic operations perspective.

9.2. Benowa Road / Carrara Street

Figure 9.3: shows the existing configuration of the Benowa Street / Carrara Street roundabout intersection adopted in the SIDRA analysis.

Figure 9.3: Benowa Road / Carrara Street Intersection (Existing Configuration) – SIDRA Layout

The results of the SIDRA analysis for the survey and the full development scenarios tested are summarised in Table 9.3.

Table 9.3: Benowa Road / Carrara Street Intersection – SIDRA Summary.

Scenario	DOS	Average Delay	LOS	95th Percentile Critical Queue (m)		
		Worst Movement		North	South	East
Weekend AM Peak Hour						
2024 Survey	31.0%	11.0 sec	A	12.7m	8.3m	12.7m
2028 Base	33.3%	11.1 sec	A	13.8m	1.3m	13.9m
2028 Base + Development	51.4%	11.7 sec	A	23.1m	12.0m	26.9m
2038 Base	39.8%	11.5 sec	A	17.4m	11.4m	17.7m
2038 Base + Development	55.1%	11.9 sec	A	26.7m	14.2m	29.7m
Weekday PM Peak Hour						
2024 Survey	53.8%	11.8 sec	A	14.4m	7.9m	28.7m
2028 Base	57.5%	12.0 sec	A	14.6m	7.0m	32.0m
2028 Base + Development	77.0%	14.6 sec	A	29.7m	13.6m	74..1m
2038 Base	69.6%	14.1 sec	A	20.0m	11.1m	53.7m
2038 Base + Development	86.4%	19.2 sec	B	35.1m	16.3m	117.9m

The analysis indicates that the intersection is expected to operate at suitable levels up to the 2038 design horizon, with an overall LOS B in the assessed peak hours.

The above results are within the generally acceptable limits for roundabout intersections, that being a DOS of <85% and LOS D limit. While the DOS exceeds the 85% threshold for roundabouts, the delays are noted to be limited. Based on this assessment, the proposed development is considered to have limited adverse impact on the operations of this intersection. Based on this assessment, the proposed intersection configuration is considered suitable from a traffic operations perspective.

9.3. Ashmore Road / Carrara Street

Figure 9.4 shows the existing configuration of the Ashmore Road / Carrara Street T-intersection adopted in the SIDRA analysis.

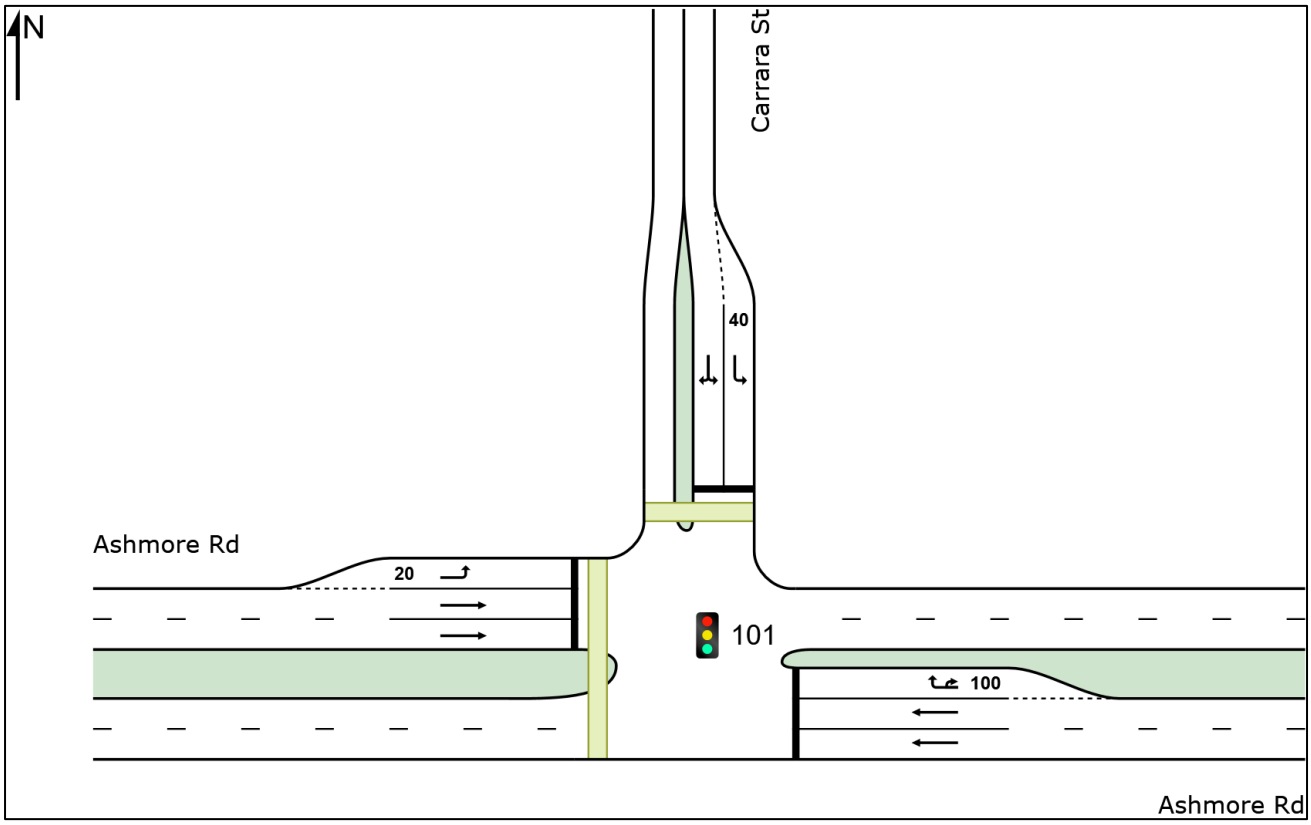


Figure 9.4: SIDRA intersection layout of Station Rd/Westminster Road.

The results of the SIDRA analysis for the existing scenario and full development scenarios tested are summarised in Table 9.4.

Table 9.4: Ashmore Road / Carrara Street Intersection – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)		
		Overall	Worst Movement		North	West	East
Weekend AM Peak Hour							
2024 Survey	72.3%	20.4 sec	47.5 sec	C	20.5m	152.0m	53.6m
2028 Base	76.7%	21.4 sec	47.6 sec	C	21.7m	170.2m	57.6m
2028 Base + Development	82.3%	24.6 sec	48.2 sec	C	27.9m	199.0m	72.3m
2038 Base	89.0%	27.6 sec	48.0 sec	C	25.5m	247.5m	70.5m
2038 Base + Development	94.2%	34.7 sec	52.7 sec	C	30.7m	303.0m	79.6m
Weekday PM Peak Hour							
2024 Survey	70.1%	20.9 sec	49.4 sec	C	41.7m	145.8m	72.7m
2028 Base	70.0%	21.0 sec	49.7 sec	C	44.6m	145.5m	78.9m
2028 Base + Development	88.6%	28.1 sec	52.8 sec	C	59.7m	198.1m	135.5m
2038 Base	86.5%	25.9 sec	51.3 sec	C	53.5m	226.5m	97.8m
2038 Base + Development	94.3%	37.6 sec	56.4 sec	D	69.8m	294.8m	177.4m

The analysis indicates that the intersection may exceed recommended design thresholds in the assessed 2038 with development peak hour period. The assessed scenario indicates that the 2038 with development might reach a DOS of 94.2% – 94.3%. Exceeding the typically adopted threshold of 90% for signalised intersections.

The results are slightly above the generally acceptable limits for signalised intersections, that being a DOS of <90% and LOS D limit.

Colliers had investigated some turn lane treatments to improve storage capacity of the possible queues indicated by the analysis. Based on prelodgement feedback from Council, the preference is to maintain the existing kerbside parking in proximity to this intersection. Based on this feedback, no improvement works are proposed for this intersection.

9.4. Site Accesses

Colliers has undertaken preliminary assessments of the proposed Ashmore Road Left in/Left out (LILO) site access. The results of the SIDRA analysis for the development scenarios tested are summarised in Table 9.5.

Table 9.5: Ashmore Road / Site Access – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2028 Base + Development	27.0%	1.3 sec	7.0 sec	A	3.8m	-	-	0.0m
2038 Base + Development	31.3%	1.2 sec	7.6 sec	A	4.2m	-	-	0.0m
Weekday PM Peak Hour								
2028 Base + Development	24.7%	1.9 sec	6.9 sec	A	5.4m	-	-	0.0m
2038 Base + Development	28.7%	1.7 sec	7.4 sec	A	5.8m	-	-	0.0m

Based on this assessment, the proposed site access configuration is considered suitable from a traffic operations perspective.

Colliers has undertaken preliminary assessments of the proposed Carrara Street site access. This assessment is a preliminary assessment of a combined demand focused on a single crossover on the Carrara Street frontage. The analysis may therefore be showing impacts which will be diffused across the two crossovers. The finer details and demand splits of which are expected to be reviewed and resolved as part of subsequent development applications. The results of the SIDRA analysis for the development scenarios tested are summarised in Table 9.6

Table 9.6: Carrara Street / Site Access – SIDRA Summary.

Scenario	DOS	Average Delay		LOS	95th Percentile Critical Queue (m)			
		Overall	Worst Movement		North	South	East	West
Weekend AM Peak Hour								
2028 Base + Development	43.4%	5.0 sec	9.9 sec	A	-	17.6m	0.0m	12.8m
2038 Base + Development	44.7%	5.0 sec	10.6 sec	A	-	19.6m	0.0m	13.7m
Weekday PM Peak Hour								
2028 Base + Development	63.7%	7.1 sec	17.7 sec	A	-	38.7m	0.0m	29.5m
2038 Base + Development	69.9%	7.8 sec	21.0 sec	A	-	45.2m	0.0m	35.1m

Based on this assessment, the assessed vehicle demands for the Carrara Street frontage should operate appropriately and future accesses should therefore be suitable from a traffic operations perspective.

10. Summary and Conclusions

10.1. Parking Arrangements

The total site is anticipated to provide approximately 1,470 car parking spaces.

Colliers notes that the parking supply recommendation has a significant range of supply rates (1,210 to 1,580 spaces), depending on the specific uses proposed. With a variation of compliant parking space provisions depending on the development option.

The range of uses on site, the specific peak parking demand will vary for each specific uses. This variation in parking demand timings, may allow for the time-based sharing of communal parking on site potentially reducing the overall supply requirements (e.g. a shop uses typically peak on a weekend or weekday evening, when an office / health use would be closed).

The carparking supply will evolve as the development progresses through the design and approval process, with more detailed car parking supply and layout review documentation to be provided as part of subsequent approvals.

Overall, Colliers considers the preliminary car parking arrangements for the development to be appropriate.

10.2. Access Arrangements

The proposed access arrangements for the development are considered acceptable to support the development. Overall, Colliers considers the access arrangements for the development to be acceptable.

10.3. Service Vehicle Arrangements

Service vehicles are proposed to access the site via the revised southeastern vehicle access on Ashmore Road. Vehicles accessing the site are expected to enter and exit the site in a forward gear accessing the dedicated loading area located in the northeastern corner of the site.

The specific loading requirements will be refined as the specific uses on site are confirmed and the site design progresses.

10.4. Traffic Impact Assessment

Based on the traffic analysis, the recommended traffic impact mitigation relates to the Ashmore Road/Benowa Road intersection. At this intersection, it is recommended that the east/west turn lanes are extended to increase storage and operational capacity.

The analysis also indicates that the development traffic should not create significant adverse impacts on the Benowa Road /Carrara Street or Ashmore Road/Carrara Street intersections.

10.5. Conclusion

Based on the assessment contained within this report, Colliers sees no traffic engineering reason why the relevant preliminary approvals should not be granted.

Appendix A Development Plans

BENOWA GARDENS MASTER PLAN

SITE INFORMATION

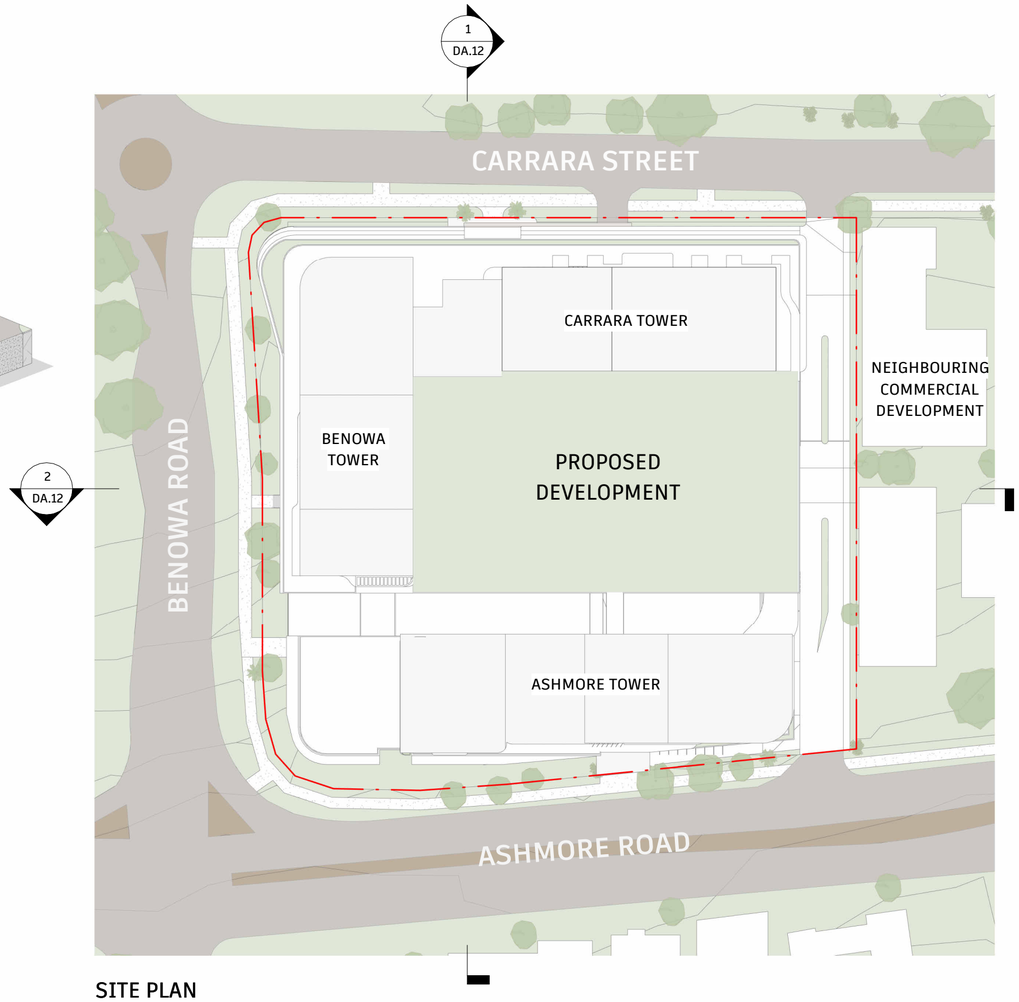
ADDRESS 203 ASHMORE ROAD
BENOWA QLD 4217

RPD LOT/DP: RP839746

SITE AREA 17,658m^2

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE



SITE PLAN

1 : 1000

APARTMENT TYPES

	LEVELS	2 x BED	3 x BED	TOTAL
CARRARA TOWER	PER LEVEL (x 9)	12	3	15
	TOTAL PER TOWER	108	27	135
BENOWA TOWER	PER LEVEL (x 8)	12	4	16
	TOTAL PER TOWER	96	32	128
ASHMORE TOWER	PER LEVEL (x 7)	14	4	18
	PER HALF LEVEL (x 1)	4	4	8
	TOTAL PER TOWER	102	32	134
TOTAL APARTMENTS		**306**	**91**	**397**

PERIMETER USE: 8,400m^2

	SHORT STAY ACCOMMODATION	RESIDENTIAL 1 BED		HEALTH CARE
BASEMENT 2	130m^2 TUA (LOBBY)	-		-
BASEMENT 1	11	-		1,200m^2 TUA
GROUND (SHOPPING CENTRE)	15	-		1,200m^2 TUA
CARRARA LEVEL 1	15	-	**OR**	1,200m^2 TUA
CARRARA LEVEL 2	-	22		2,400m^2 TUA
CARRARA LEVEL 3	-	22		2,400m^2 TUA
TOTAL	**41**	**44**		**8,400m^2**

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

AREA CALCULATIONS

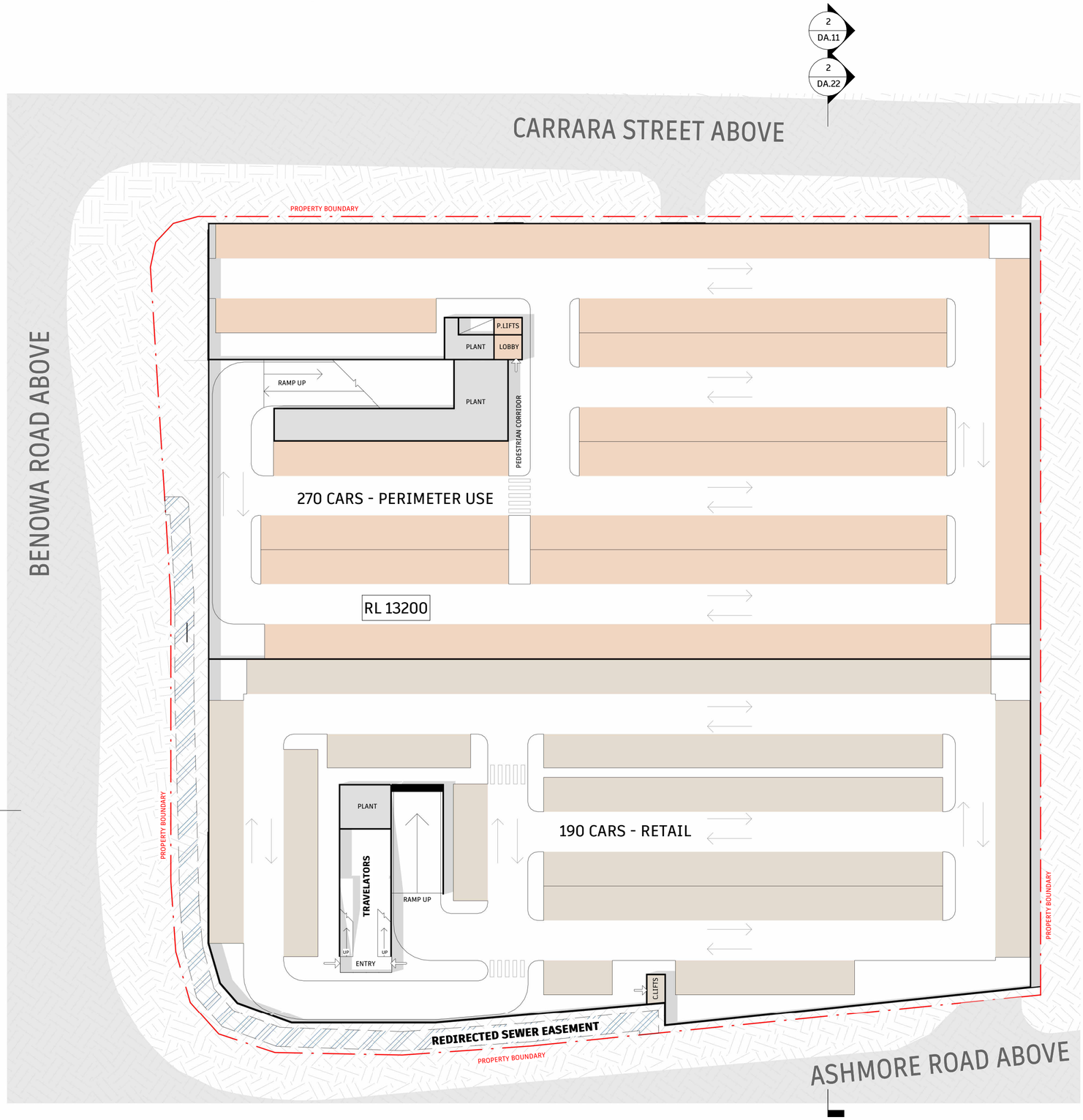
RETAIL AREA

SUPERMARKET	**4,000m^2**
SPECIALTY SHOPS:	**6,000m^2**
RETAIL BASEMENT 2 LEVEL:	**700m^2**
RETAIL BASEMENT 1 LEVEL:	**300m^2**
SHOPPING CENTRE LEVEL:	**5,000m^2**
TOTAL RETAIL	**10,000m^2**

COMMERCIAL AREA

LEVEL 1:	**2,500m^2**
LEVEL 2:	**500m^2**
TOTAL COMMERCIAL	**3,000m^2**

FLOOR PLAN-BASEMENT 3 (RETAIL)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

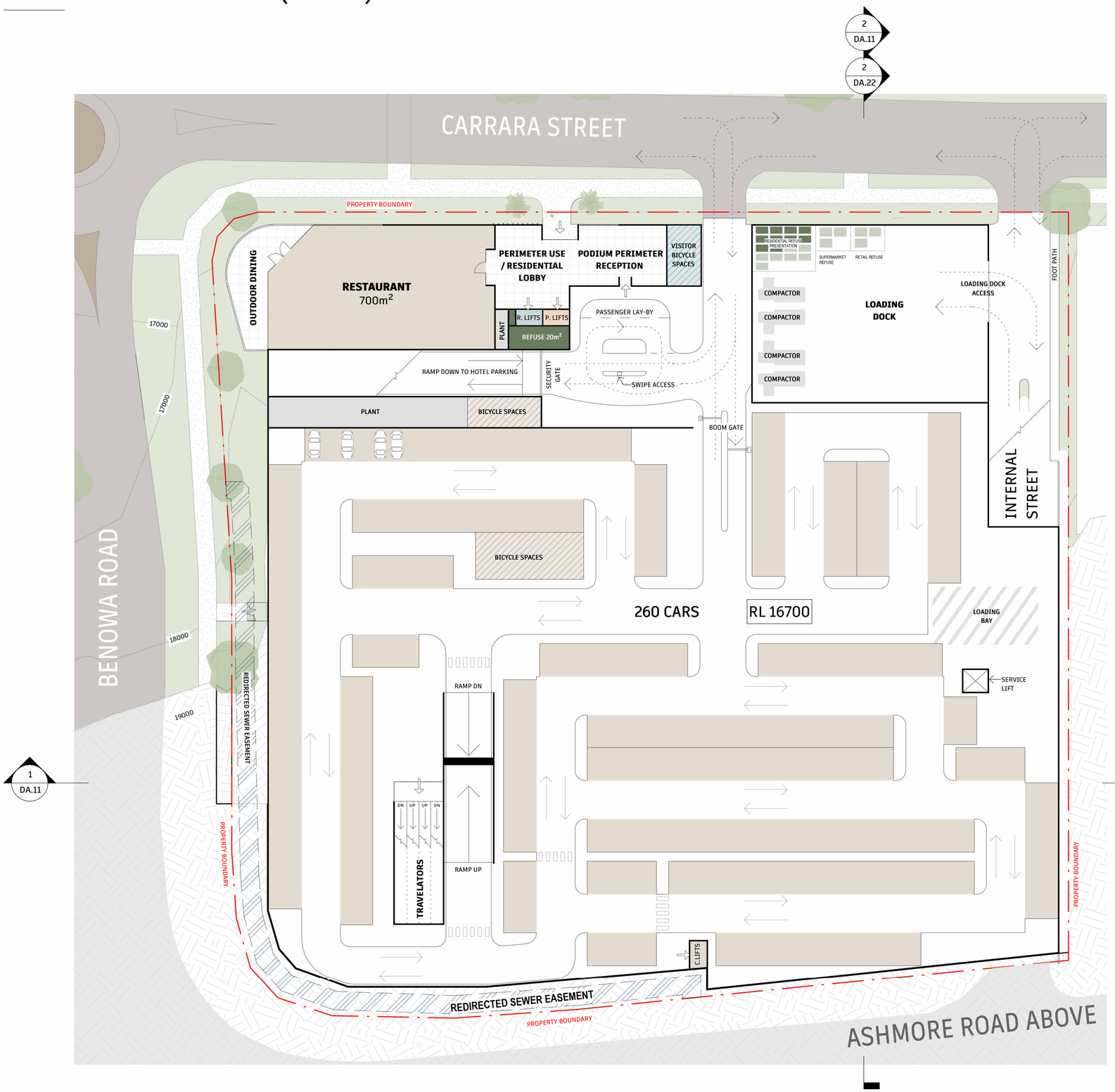
TOTAL CARPARKS	1,460

BASEMENT 3 CARPARK - RETAIL / HOTEL

1 : 500

0 5 10 25 45m

FLOOR PLAN-BASEMENT 2 (RETAIL)



BASEMENT 2 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

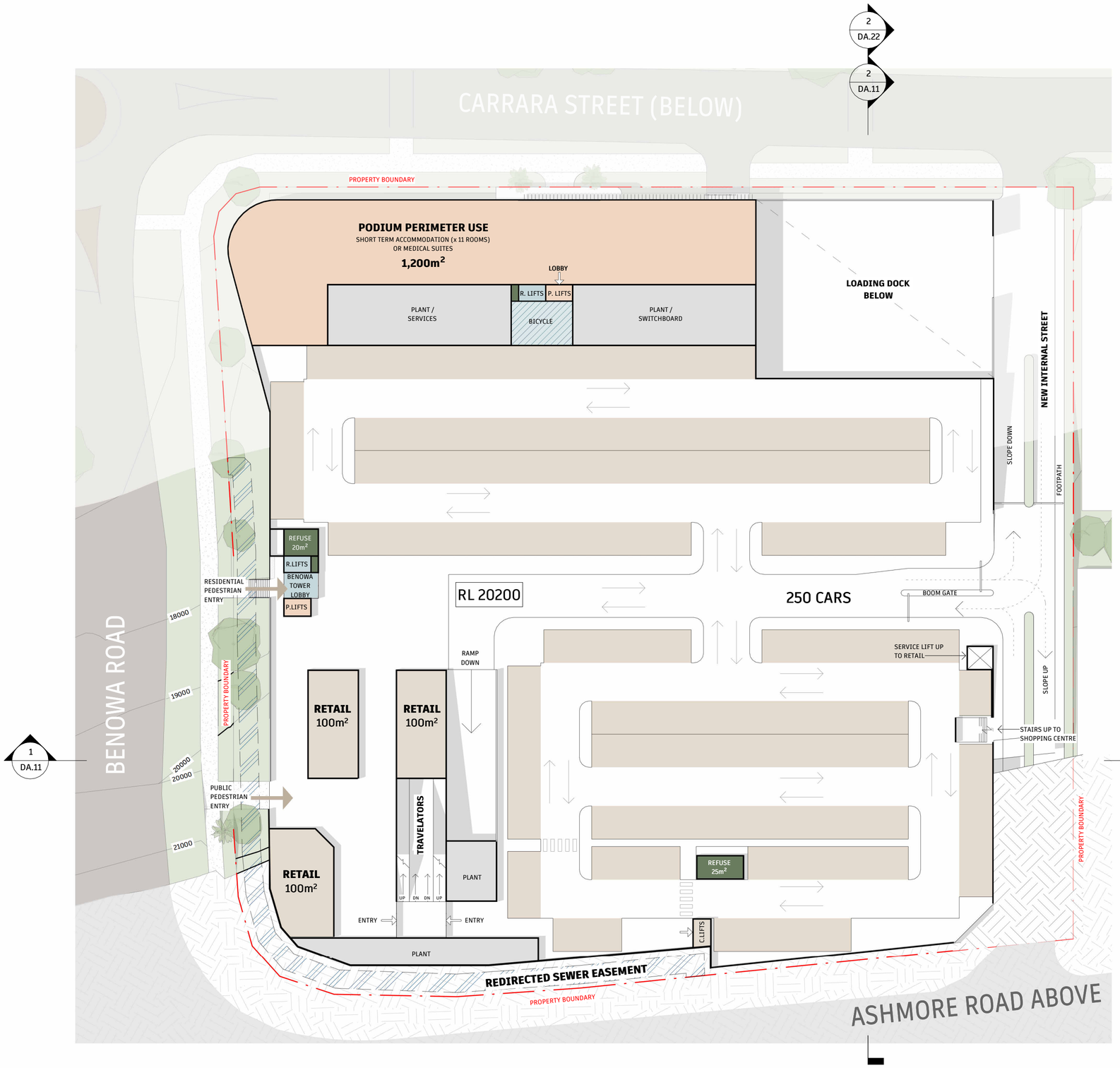
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-BASEMENT 1 (RETAIL)



BASEMENT 1 CARPARK - RETAIL

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	**100 SPACES**
TOTAL STAFF SPACES	**100 SPACES**

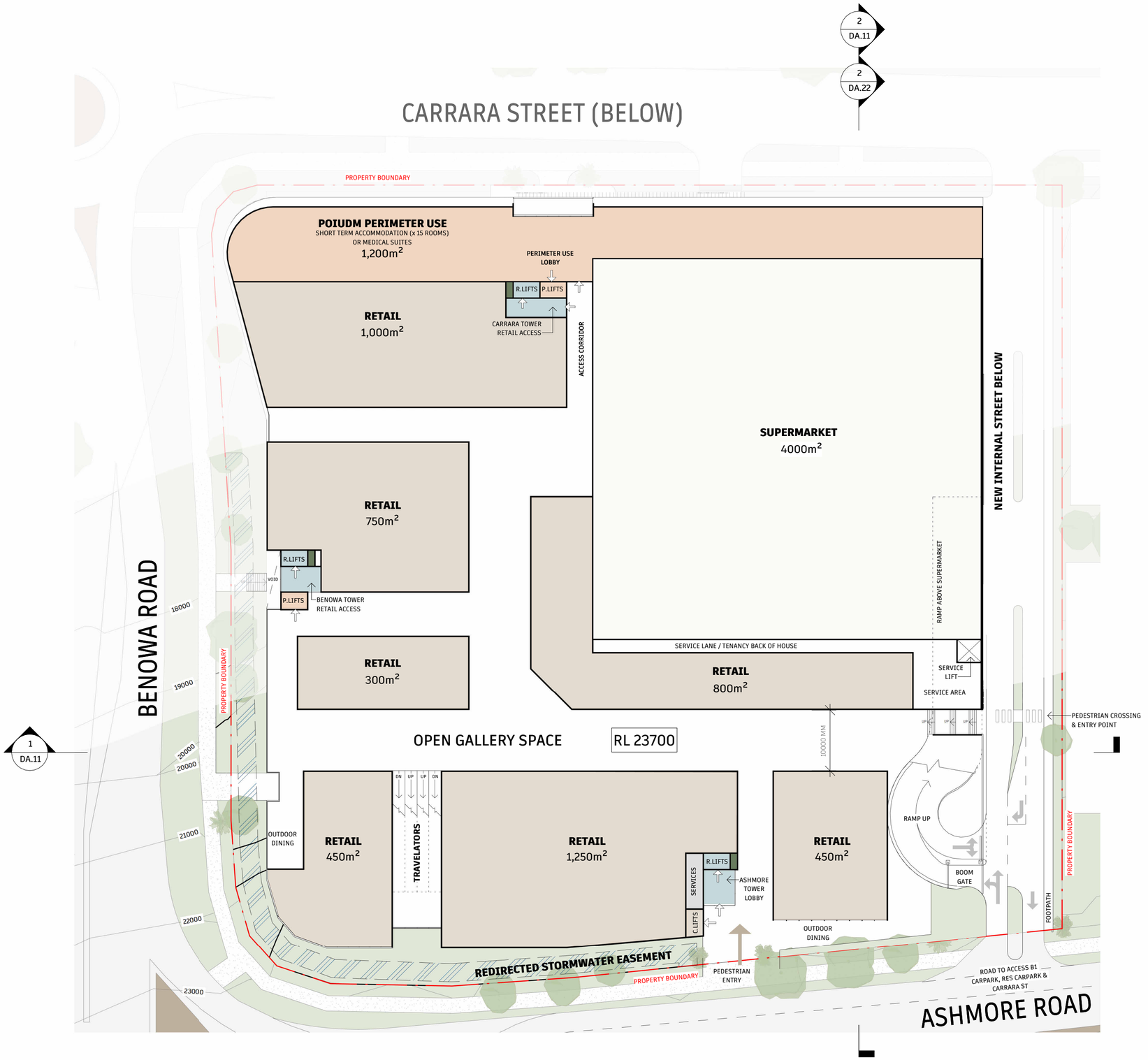
VISITOR

BASEMENT 2	**86 SPACES**
BASEMENT 1	**114 SPACES**
TOTAL STAFF SPACES	**200 SPACES**

TOTAL BICYCLE SPACES	300

0 5 10 25 45m

FLOOR PLAN-SHOPPING CENTRE



LEGEND

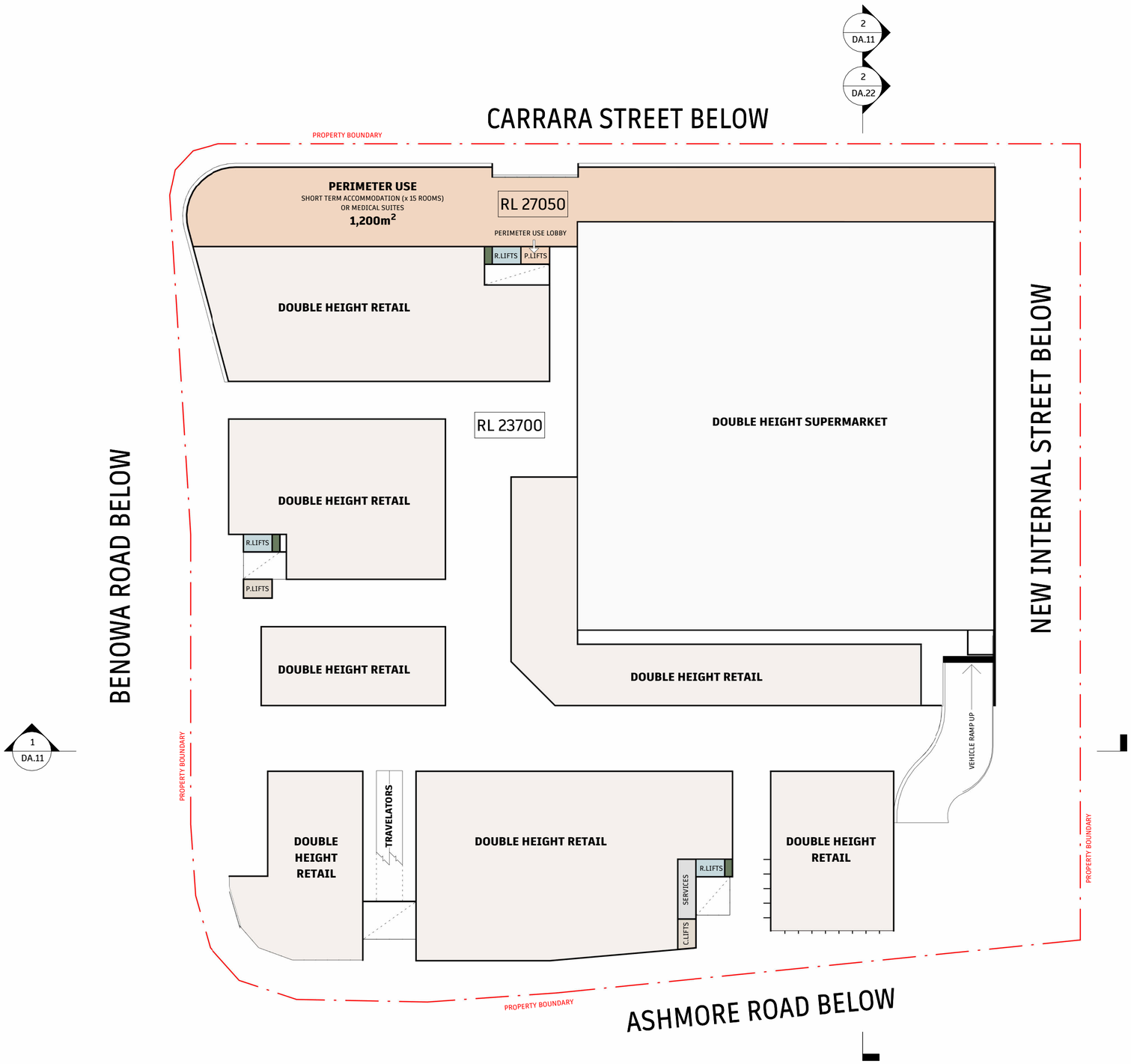
- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

SHOPPING CENTRE

1 : 500

0 5 10 25 45m

FLOOR PLAN LEVEL 1 - PERIMETER USE MEZZANINE



LEVEL 1 - MEZZANINE

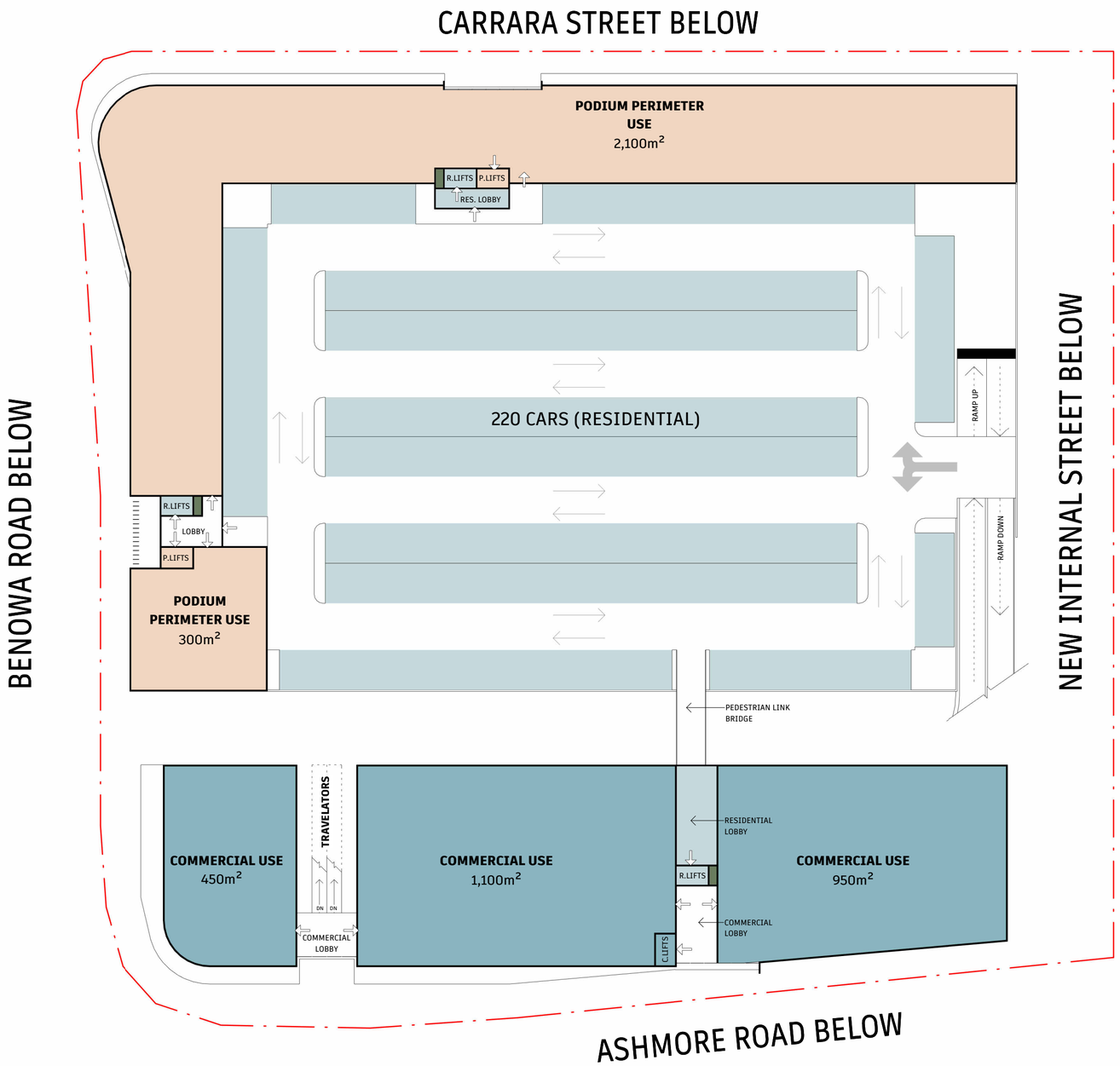
1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

0 5 10 25 45m

FLOOR PLAN-LEVEL 2 (RESIDENTIAL CARPARK)



L2_CARARRA

1 : 500

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

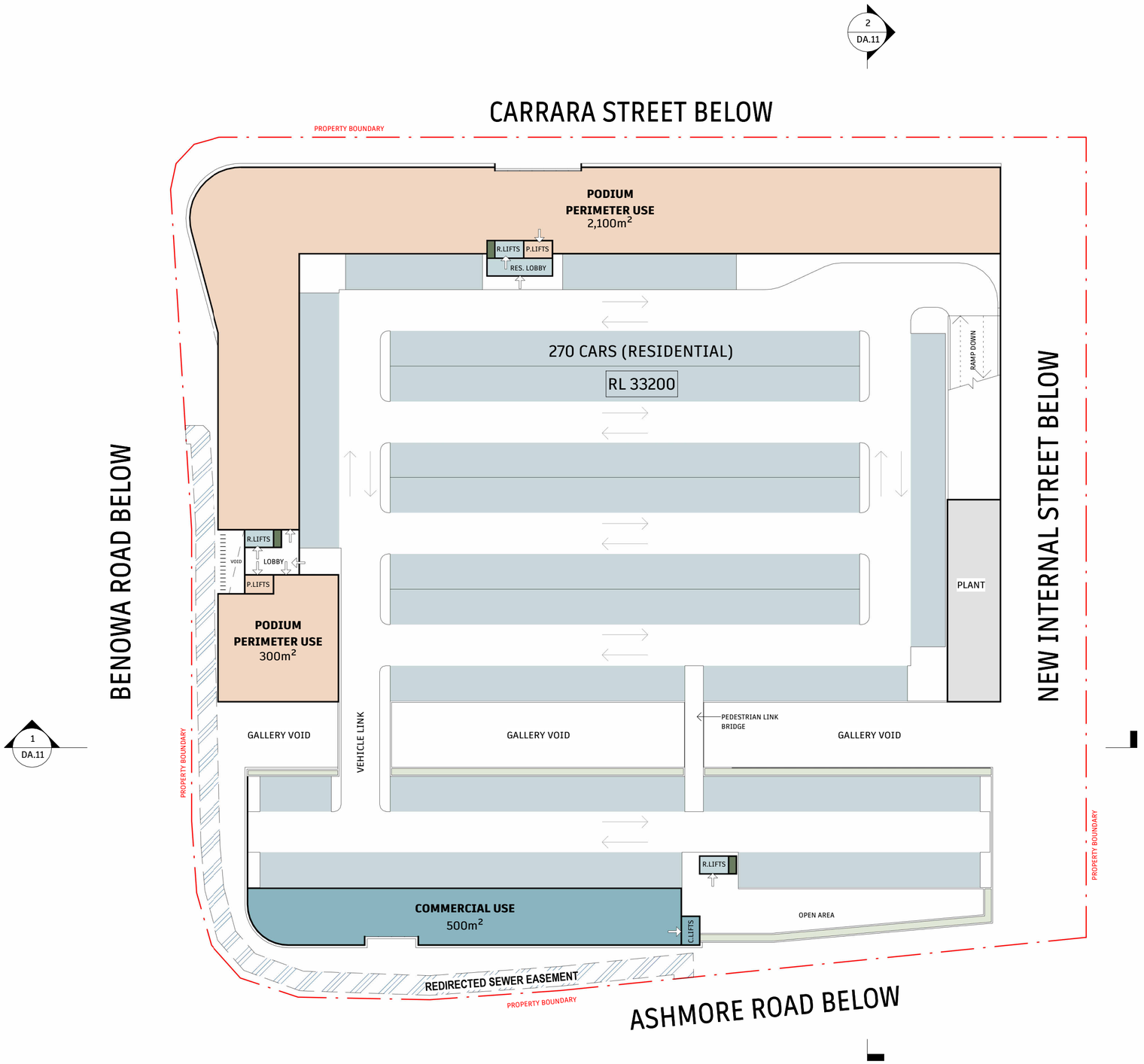
PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

0 5 10 25 45m

FLOOR PLAN-LEVEL 3 (RESIDENTIAL CARPARK)



LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	**190 CARS**
BASEMENT 2	**260 CARS**
BASEMENT 1	**250 CARS**
TOTAL RETAIL CARPARKS	**700 CARS**

RESIDENTIAL

LEVEL 2	**220 CARS**
LEVEL 3	**270 CARS**
TOTAL RESIDENTIAL CARPARKS	**490 CARS**

PERIMETER USE

BASEMENT 3	**270 CARS**
TOTAL PERIMETER USE CARPARKS	**270 CARS**

TOTAL CARPARKS	1,460

L3_RESIDENTIAL CAR PARK

1 : 500

0 5 10 25 45m

Appendix B TTM Swept Path Drawings

NOTES:

1. MAPPING UNDERLAY PROVIDED BY NEARMAP. MAY BE SUBJECT TO DETAILED DESIGN & SITE SURVEY.
2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	05-02-25	PRELIMINARY INTERSECTION CONCEPT	MGr	MGr	

SCALE: SCALE 1:800 @ A3

NORTH

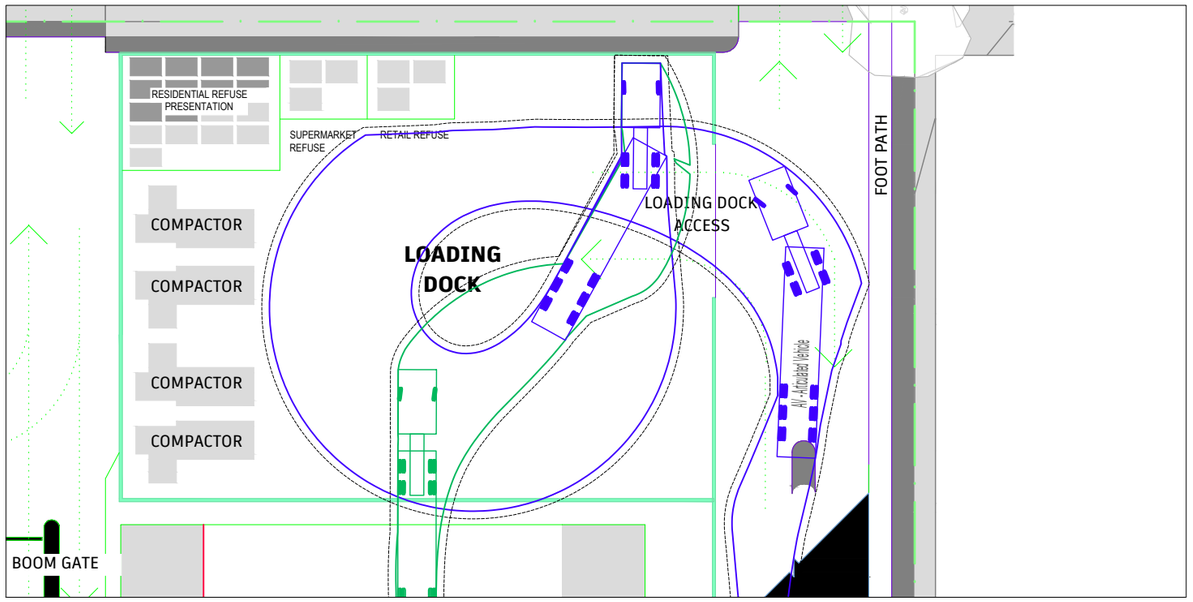
CLIENT: NEYLAN ARCHITECTURE

TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

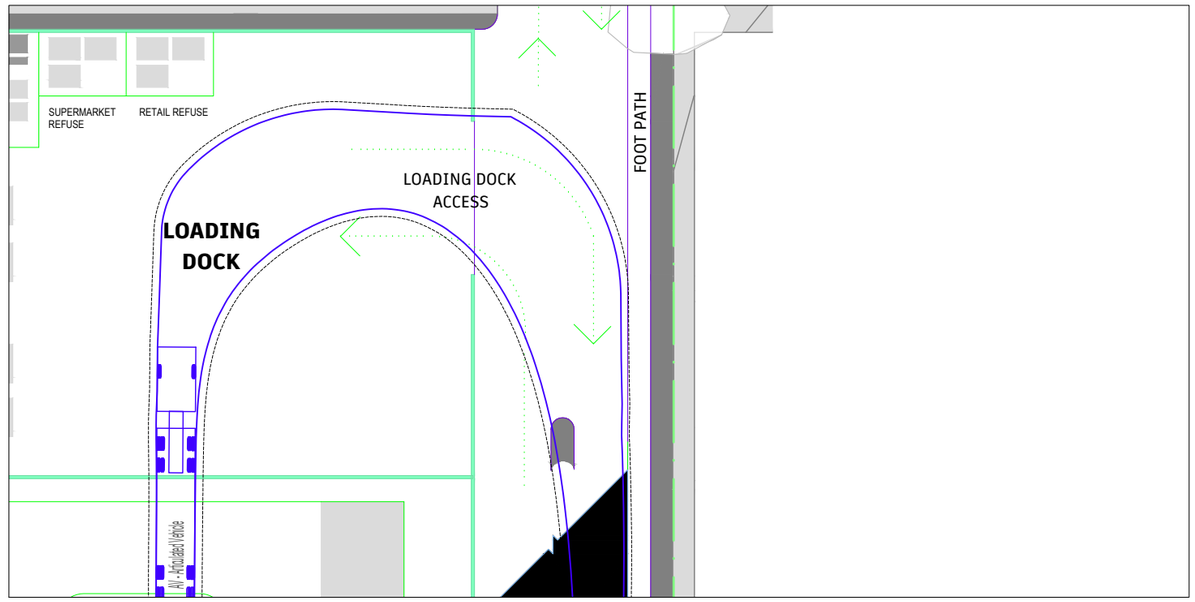
PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**

DRAWING TITLE: **ASHMORE ROAD / BENOWA ROAD INTERSECTION**
HIGH LEVEL INTERSECTION CONCEPT SKETCH

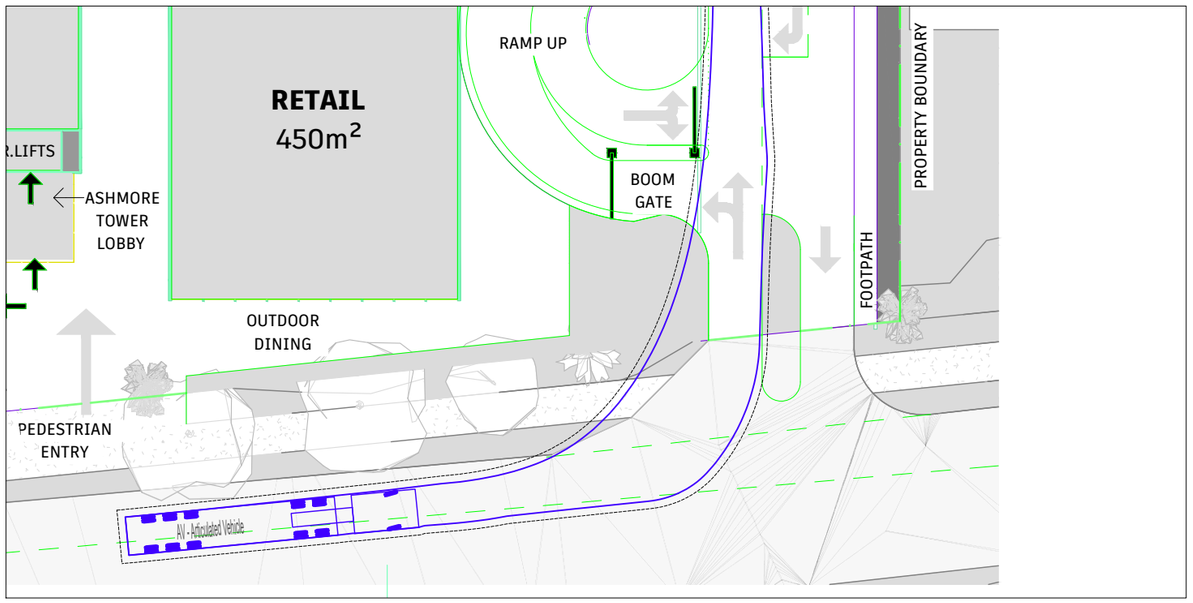
PROJECT NUMBER	ORIGINAL SIZE
24BRT0224	A3
DRAWING NUMBER	REVISION
24BRT0224-01	A
DATE	SHEET
5 Feb 2025	1 OF 1



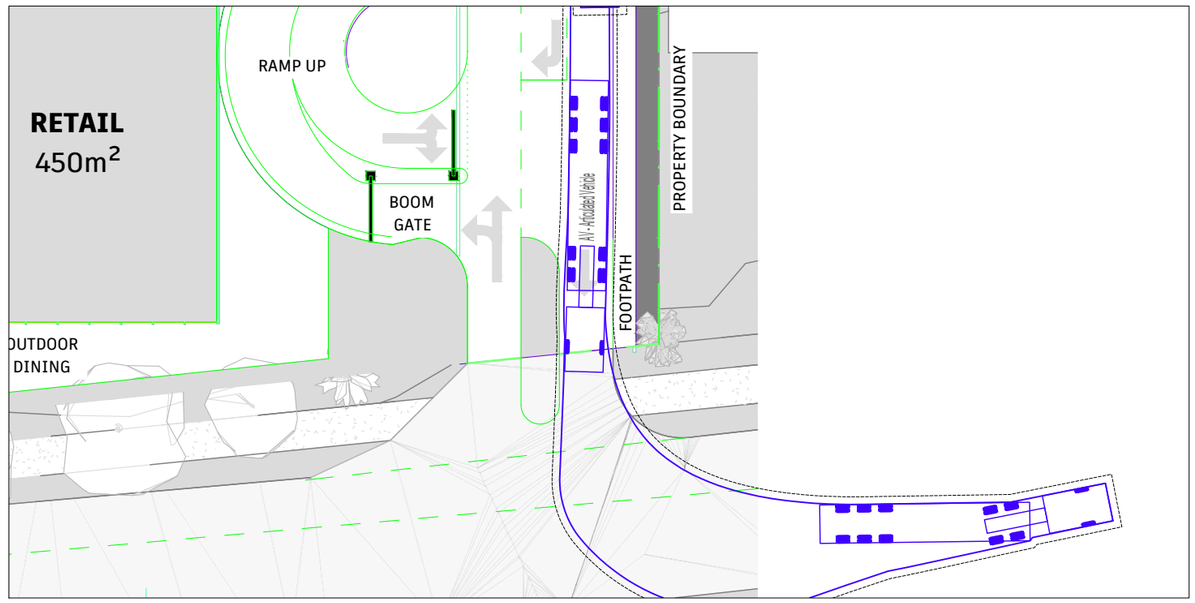
AV INGRESS (LOADING DOCK)



AV EGRESS (LOADING DOCK)

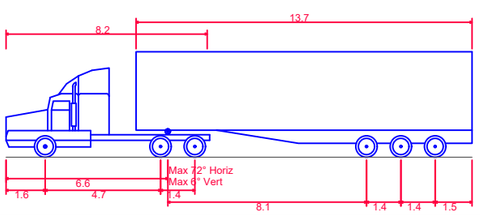


AV INGRESS (ASHMORE ROAD)



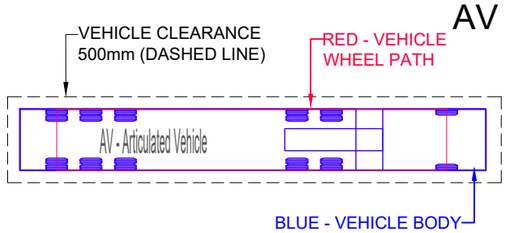
AV EGRESS (ASHMORE ROAD)

VEHICLE PROFILES



AV - Articulated Vehicle

Overall Length	19.000m
Overall Width	2.500m
Overall Body Height	4.301m
Min Body Ground Clearance	0.418m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.500m
Design Speed Forward	5.0km/h
Clearance Envelope	0.500m



NOTES:
1. MAPPING UNDERLAY PROVIDED BY NEARMAP. MAY BE SUBJECT TO DETAILED DESIGN & SITE SURVEY.
2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

PRELIMINARY ADVICE ONLY
7 February 2025

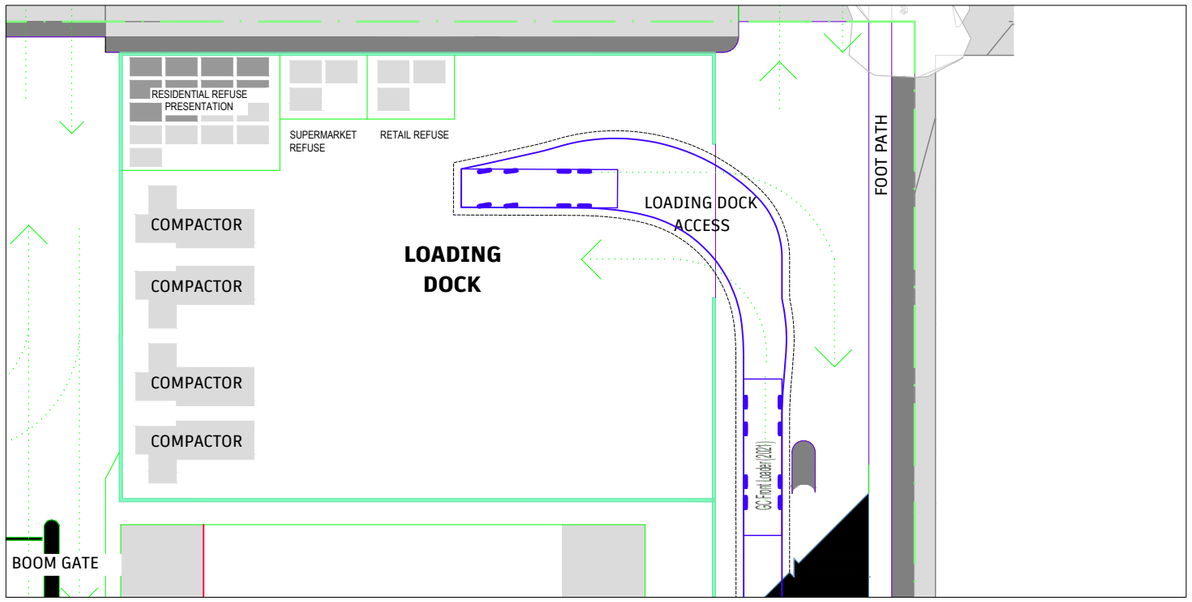
REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	07-02-25	SERVICE VEHICLE SWEPT PATHS (ORIGINAL ISSUE)	MGr	MGr	MGr

SCALE: SCALE 1:400 @ A3
NORTH
CLIENT: NEYLAN ARCHITECTURE

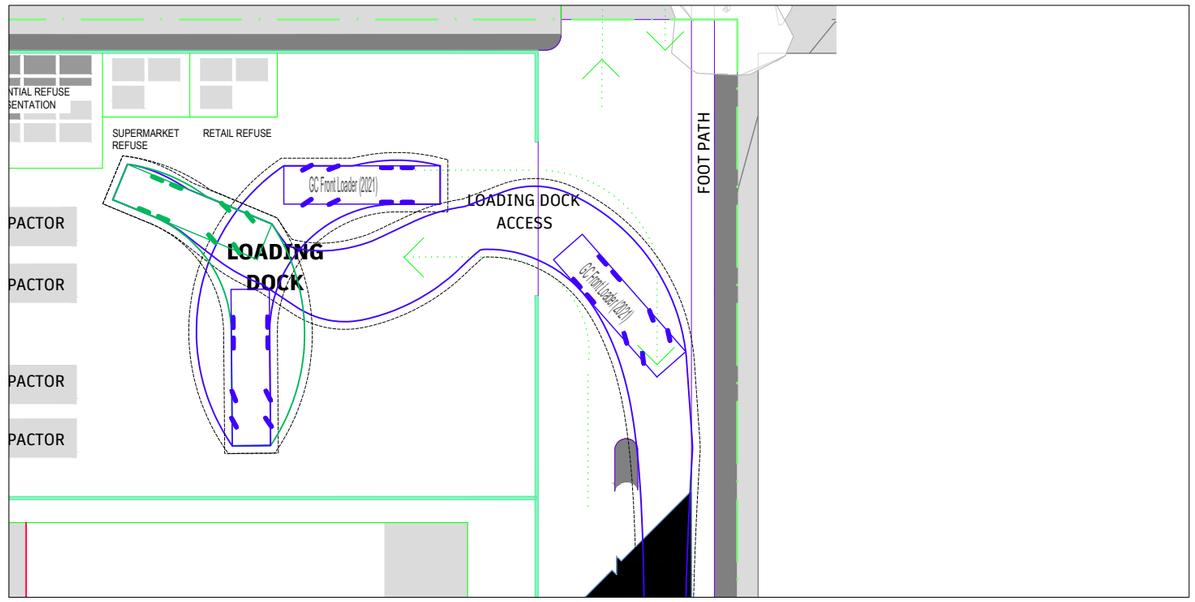
TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**
DRAWING TITLE: **SERVICE VEHICLE SWEPT PATH ANALYSIS**
19m ARTICULATED VEHICLE (AV)

PROJECT NUMBER	24BRT0224
ORIGINAL SIZE	A3
DRAWING NUMBER	24BRT0224-02
REVISION	A
DATE	5 Feb 2025
SHEET	1 OF 1



RCV INGRESS (LOADING DOCK)



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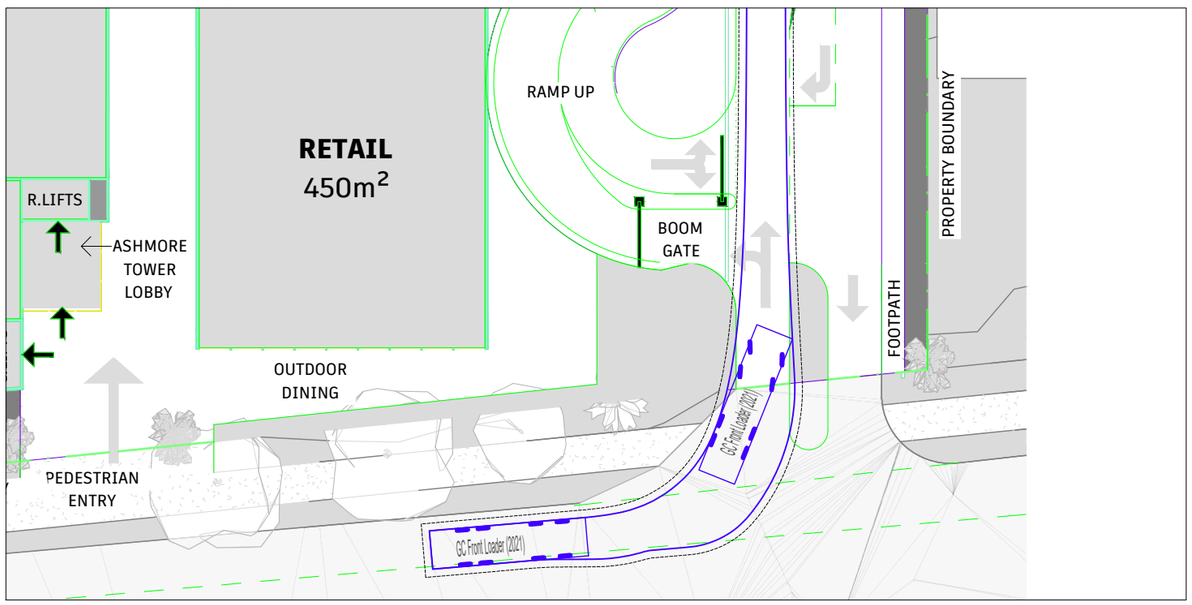
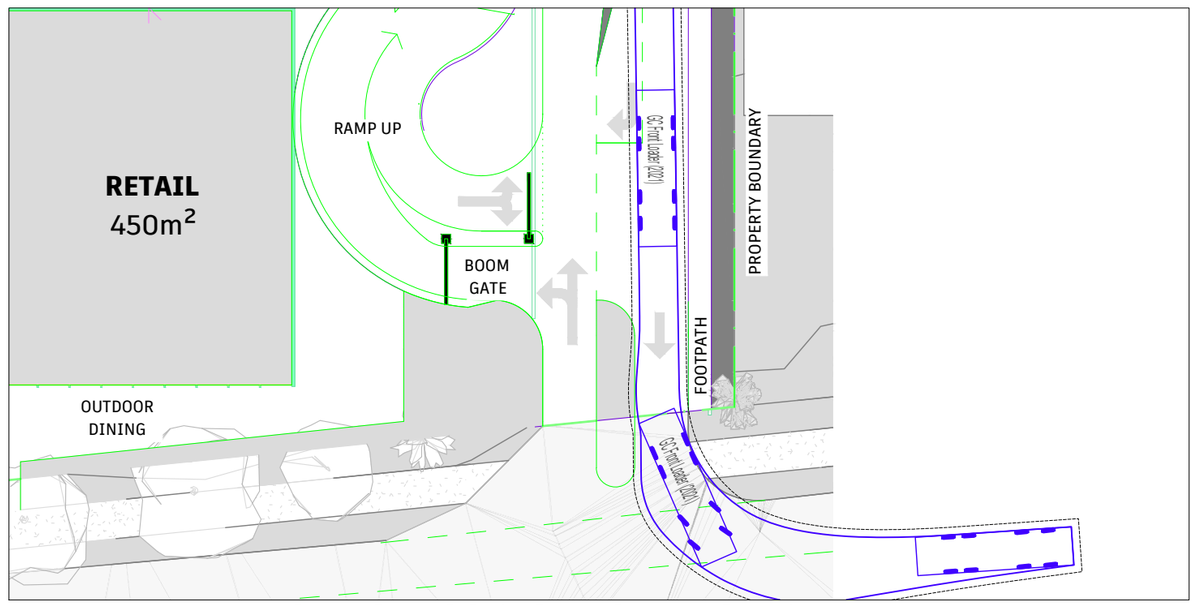
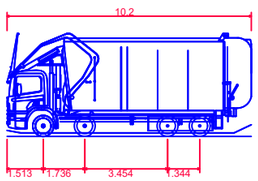


RCV INGRESS (ASHMORE ROAD)



RCV EGRESS (ASHMORE ROAD)



GC Front Loader (2021)

Overall Length	10.200m
Overall Width	2.500m
Overall Body Height	4.300m
Min Body Ground Clearance	0.150m
Track Width	2.500m
Lock-to-lock time	6.00s
Curb to Curb Turning Radius	12.300m

NOTES:
1. MAPPING UNDERLAY PROVIDED BY NEARMAP. MAY BE SUBJECT TO DETAILED DESIGN & SITE SURVEY.
2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

PRELIMINARY ADVICE ONLY
7 February 2025

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	07-02-25	SERVICE VEHICLE SWEPT PATHS (ORIGINAL ISSUE)	MGr	MGr	MGr

SCALE: SCALE 1:400 @ A3

NORTH

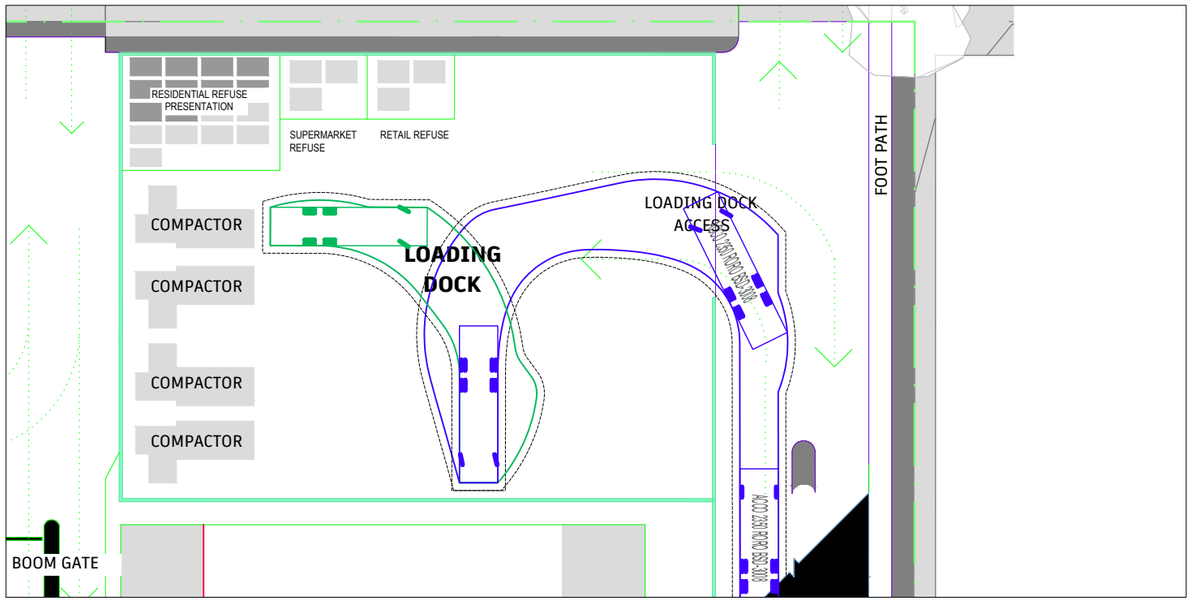
CLIENT: NEYLAN ARCHITECTURE

TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**

DRAWING TITLE: **SERVICE VEHICLE SWEPT PATH ANALYSIS**
10.2m FRONT LIFT REFUSE COLLECTION VEHICLE (RCV)

PROJECT NUMBER	24BRT0224
ORIGINAL SIZE	A3
DRAWING NUMBER	24BRT0224-03
REVISION	A
DATE	5 Feb 2025
SHEET	1 OF 1



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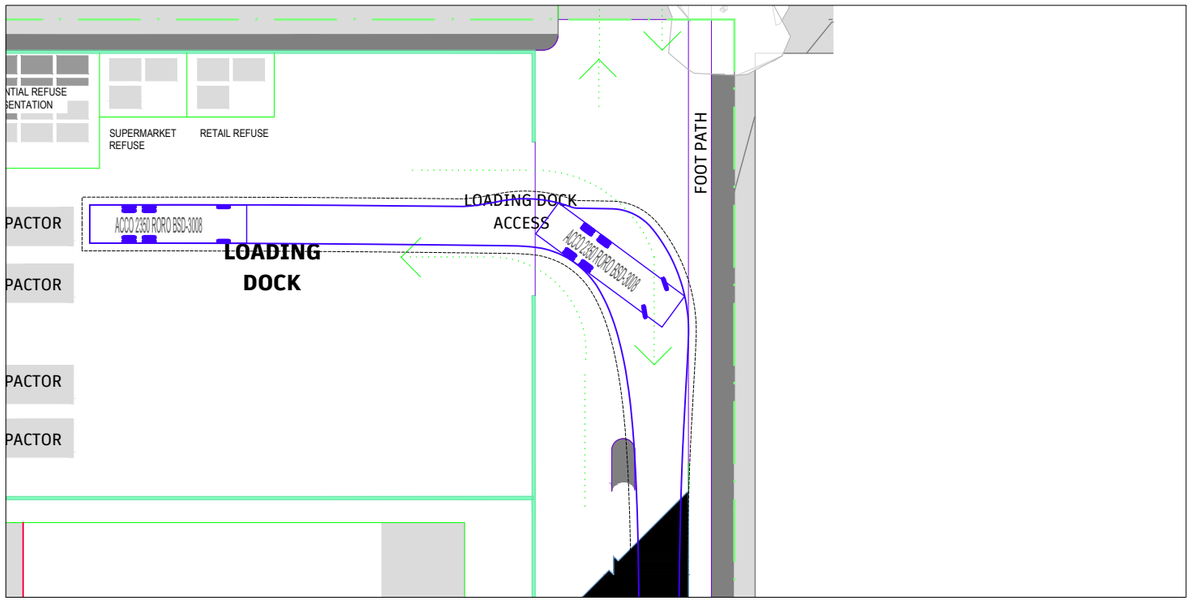
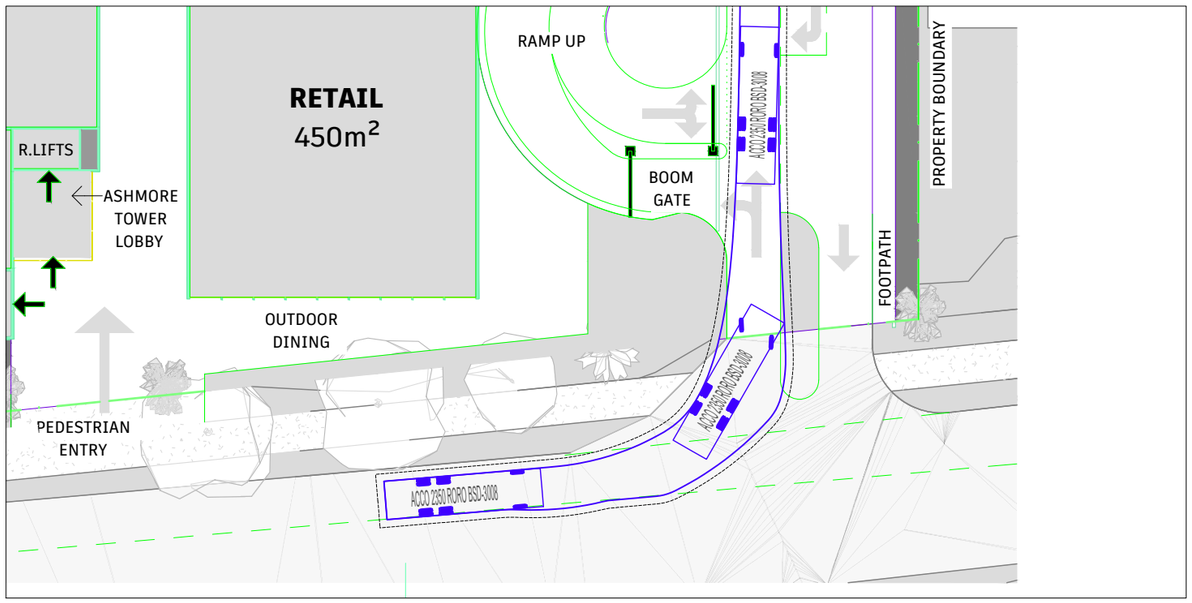
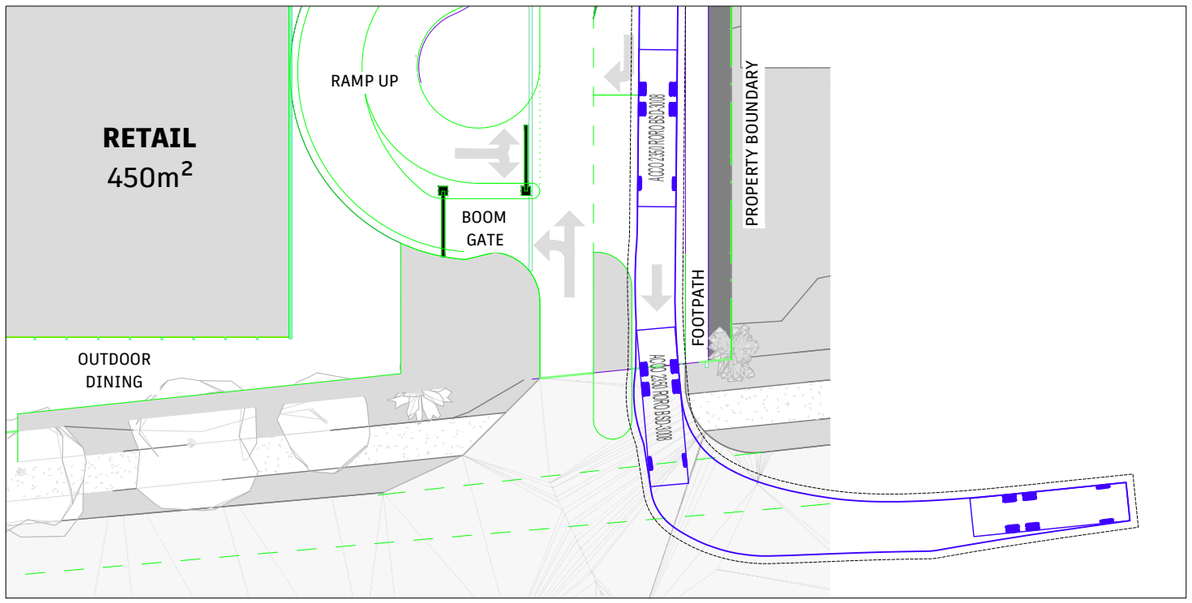


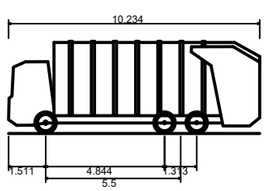
RCV EGRESS (LOADING DOCK)



RCV INGRESS (ASHMORE ROAD)



RCV EGRESS (ASHMORE ROAD)



ACCO 2350 RORO BSD-3008

ACCO 2350 RORO BSD-3008	
Overall Length	10.234m
Overall Width	2.500m
Overall Body Height	3.751m
Min Body Ground Clearance	0.304m
Track Width	2.500m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	9.757m

NOTES:
1. MAPPING UNDERLAY PROVIDED BY NEARMAP. MAY BE SUBJECT TO DETAILED DESIGN & SITE SURVEY.
2. ALL UNITS SHOWN ARE IN METERS (m) UNLESS OTHERWISE NOTED

PRELIMINARY ADVICE ONLY
7 February 2025

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	07-02-25	SERVICE VEHICLE SWEPT PATHS (ORIGINAL ISSUE)	MGr	MGr	MGr

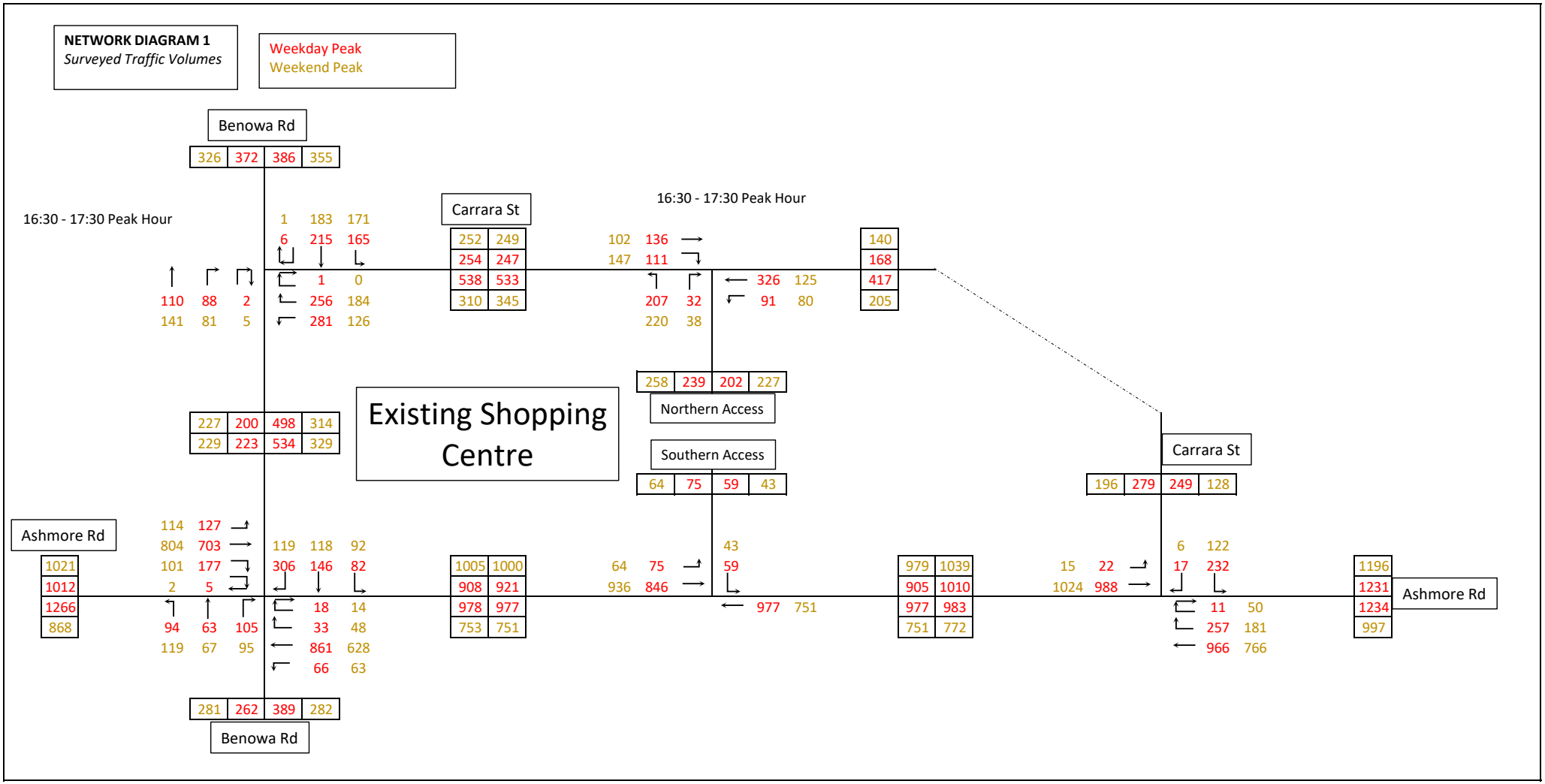
SCALE: SCALE 1:400 @ A3
NORTH
CLIENT: NEYLAN ARCHITECTURE

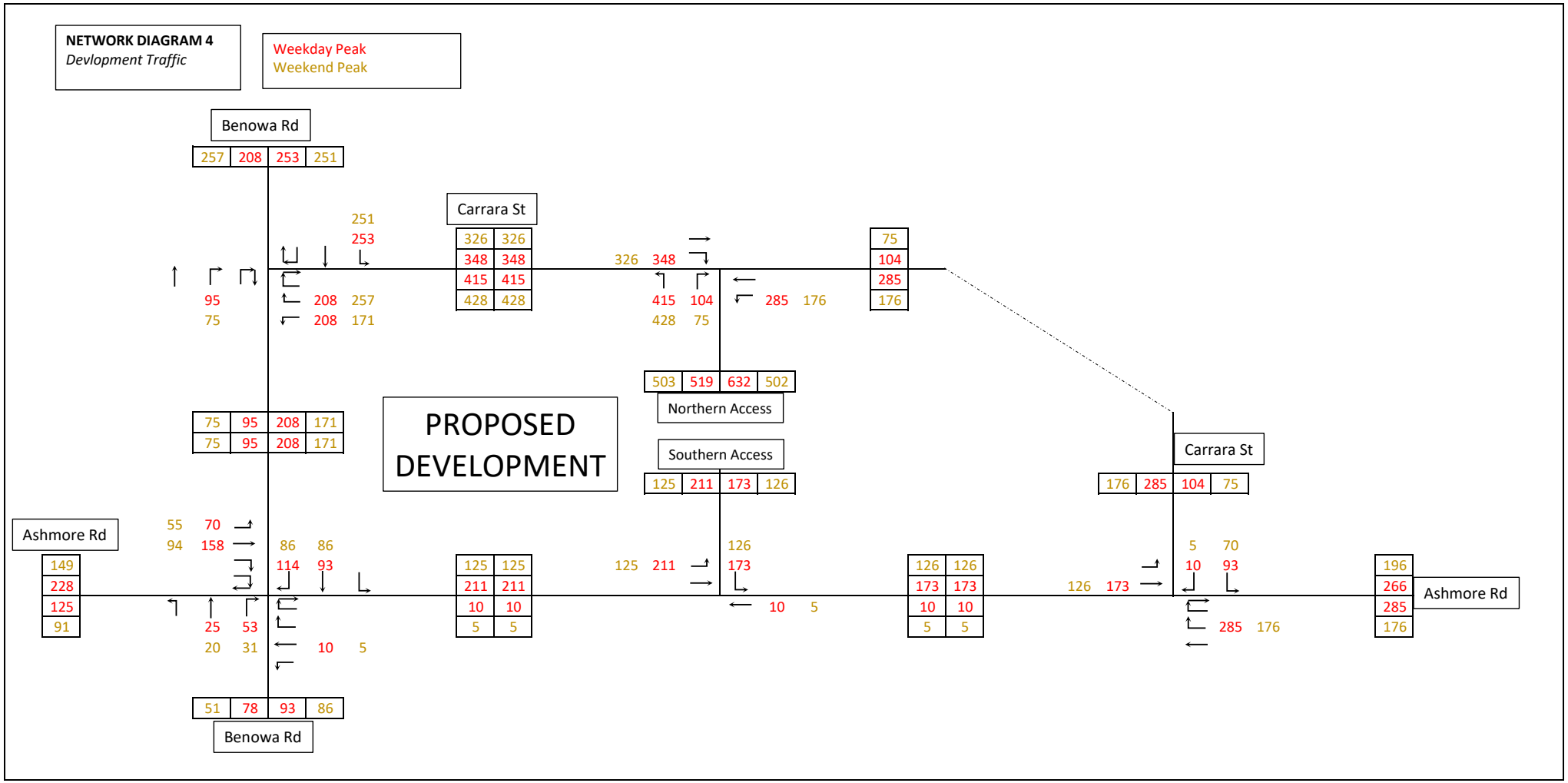
TTM CONSULTING PTY LTD
ABN 65 010 868 621
LEVEL 8, 369 Ann Street, BRISBANE QLD 4000
P.O. BOX 12015, BRISBANE QLD 4003
T: (07) 3327 9500 F: (07) 3327 9501
E: ttmbris@ttmgroup.com.au W: www.ttmgroup.com.au

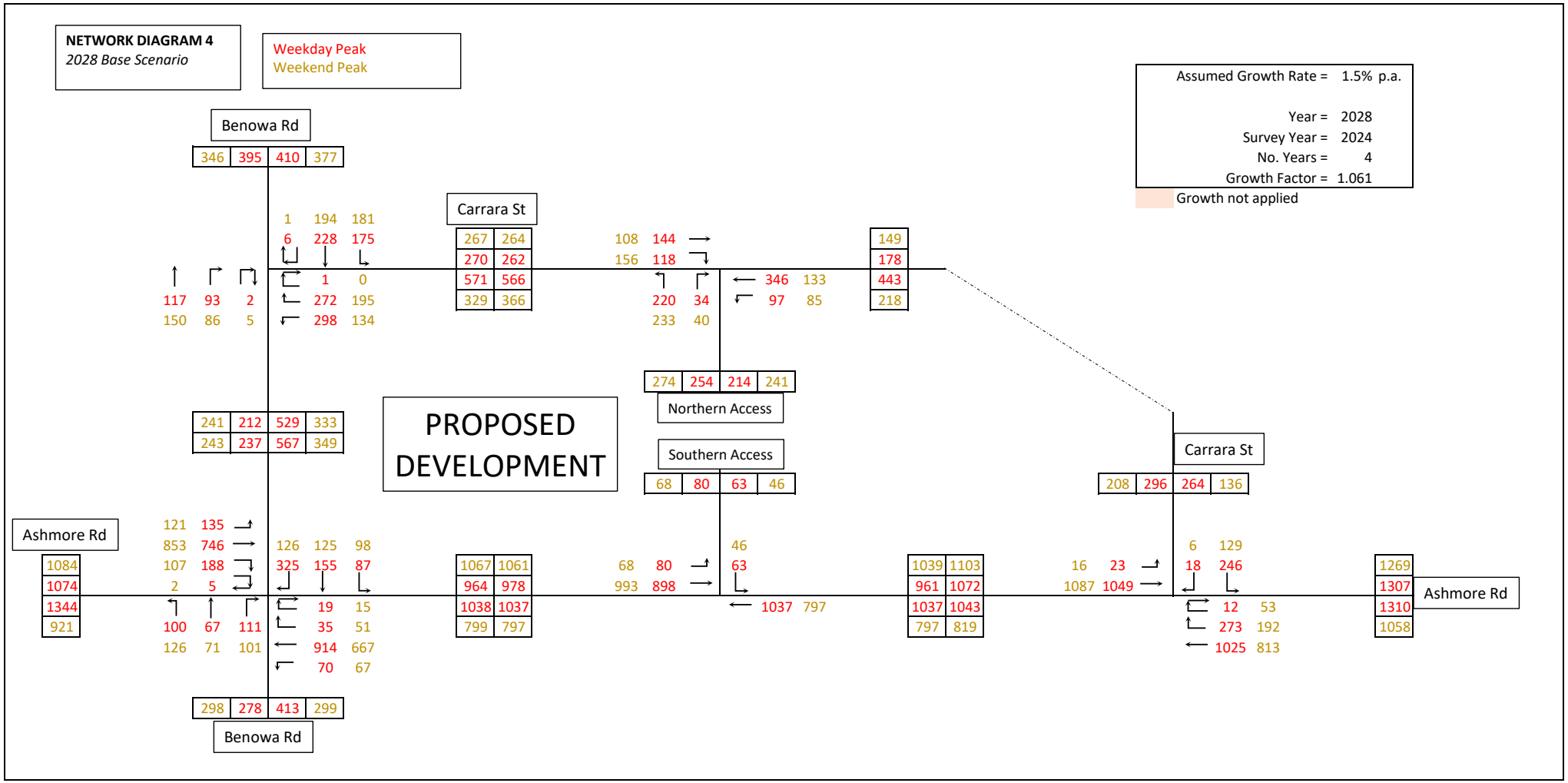
PROJECT: **BENOWA GARDENS - PRELIMINARY APPROVAL**
DRAWING TITLE: **SERVICE VEHICLE SWEPT PATH ANALYSIS**
10.2m REAR LIFT REFUSE COLLECTION VEHICLE (RCV)

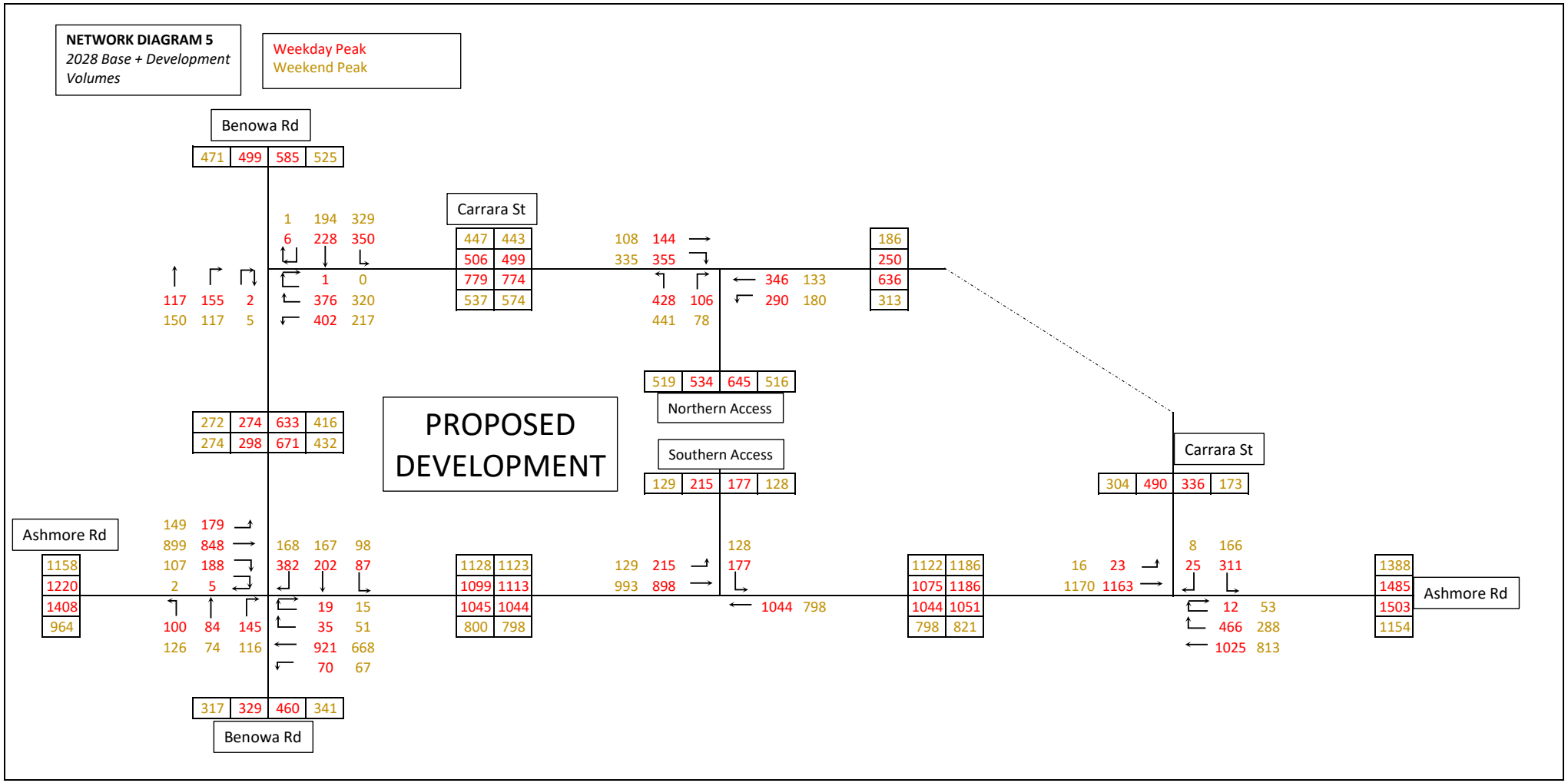
PROJECT NUMBER	ORIGINAL SIZE
24BRT0224	A3
DRAWING NUMBER	REVISION
24BRT0224-04	A
DATE	SHEET
5 Feb 2025	1 OF 1

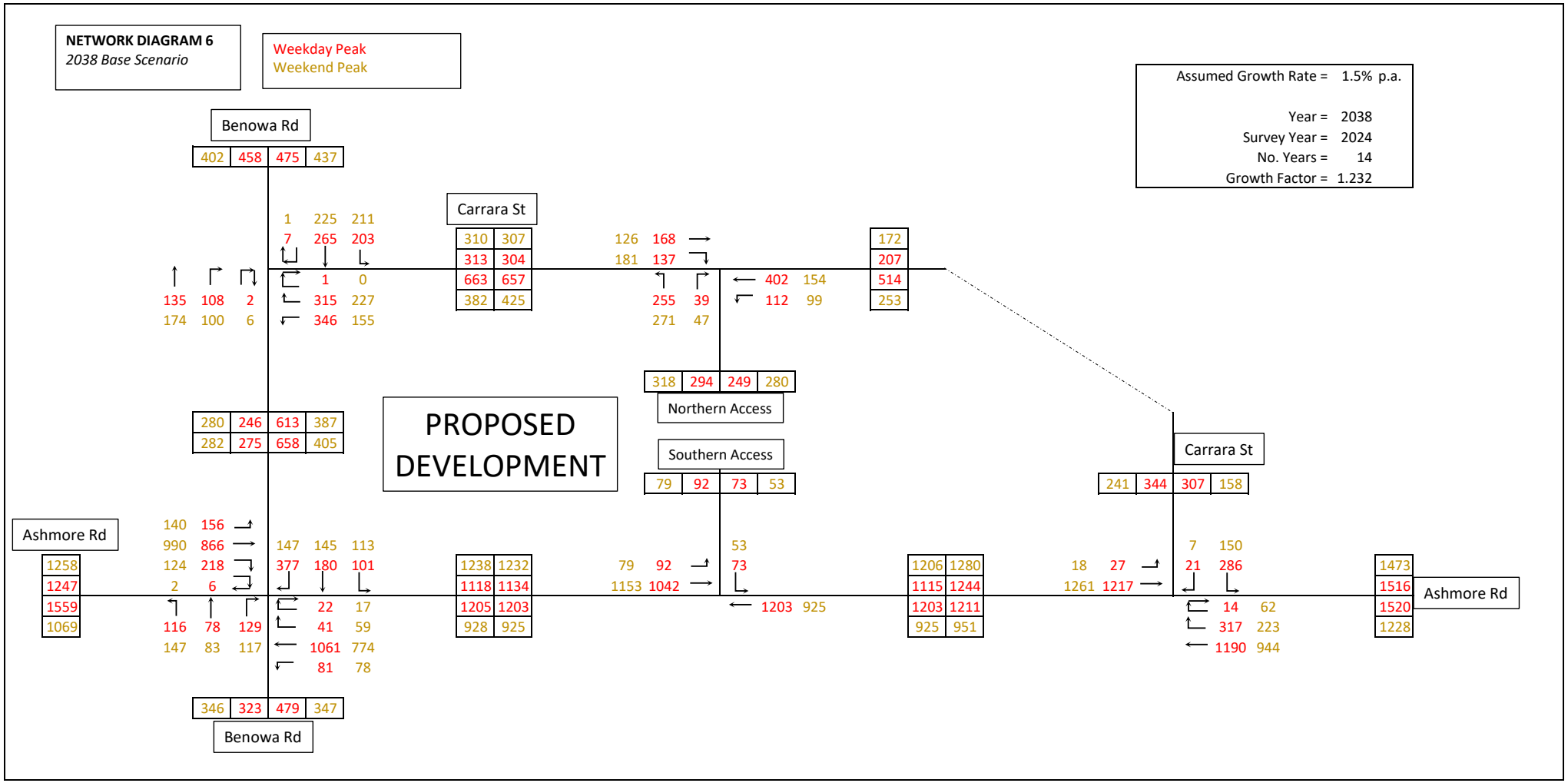
Appendix C Traffic Network Diagrams

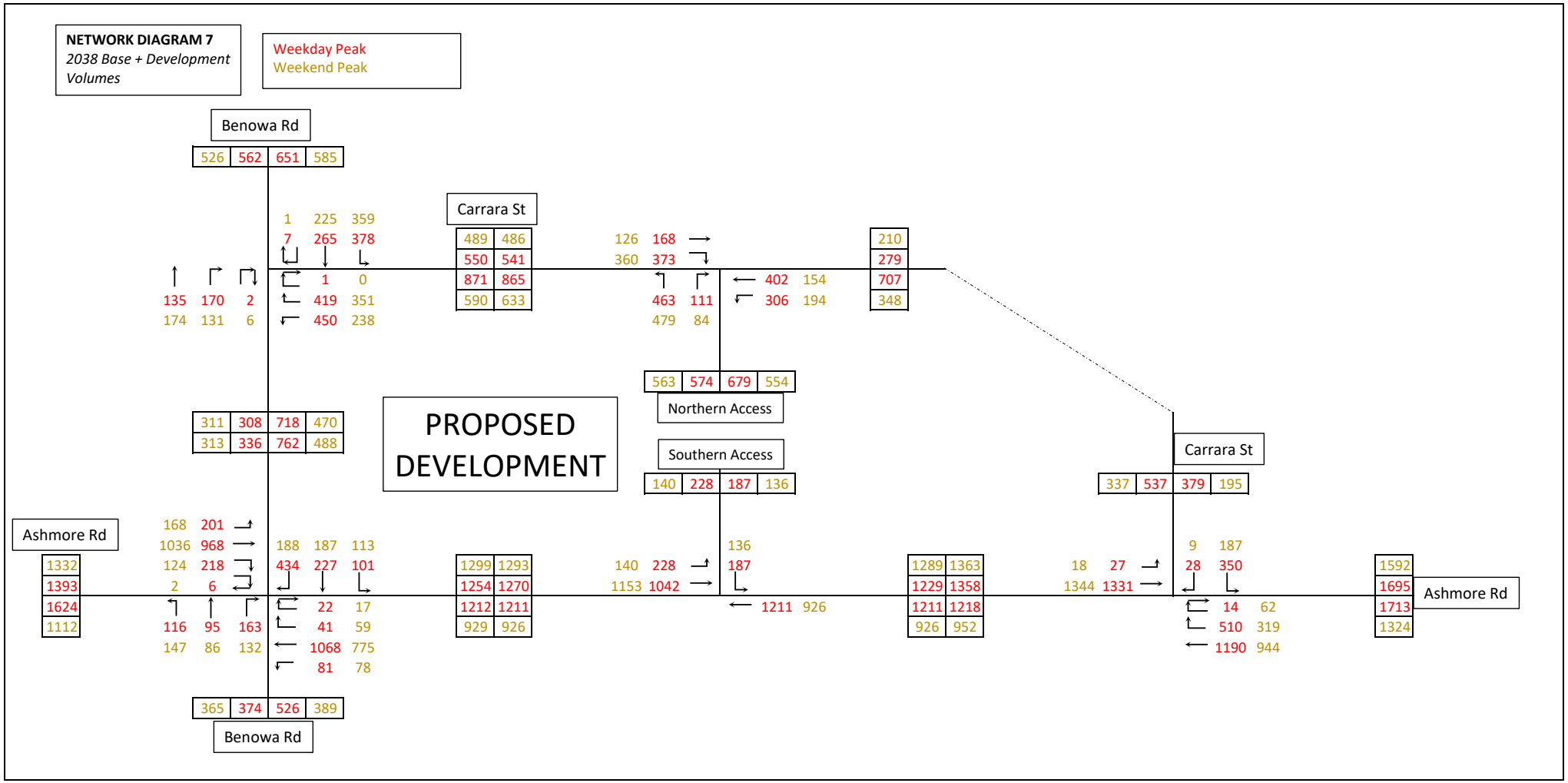

NETWORK DIAGRAM 1
Surveyed Traffic Volumes
Weekday Peak
Weekend Peak
Benowa Rd
326 372 386 355
16:30 - 17:30 Peak Hour
Carrara St
252 249
254 247
538 533
310 345
1 183 171
6 215 165
1 0
256 184
281 126
110 88 2
141 81 5
102 136
147 111
207 32
220 38
326 125
91 80
140
168
417
205
16:30 - 17:30 Peak Hour
258 239 202 227
Northern Access
Southern Access
64 75 59 43
227 200 498 314
229 223 534 329
Existing Shopping Centre
Carrara St
196 279 249 128
Ashmore Rd
1021
1012
1266
868
114 127
804 703
101 177
2 5
94 63 105
119 67 95
119 118 92
306 146 82
18 14
33 48
861 628
66 63
1005 1000
908 921
978 977
753 751
64 75
936 846
43
59
977 751
979 1039
905 1010
977 983
751 772
15 22
1024 988
6 122
17 232
11 50
257 181
966 766
1196
1231
1234
997
Ashmore Rd
281 262 389 282
Benowa Rd


NETWORK DIAGRAM 4
Devlopment Traffic
Weekday Peak
Weekend Peak
Benowa Rd
257 208 253 251
Carrara St
326 326
348 348
415 415
428 428
75
104
285
176
503 519 632 502
Northern Access
Southern Access
125 211 173 126
176 285 104 75
PROPOSED DEVELOPMENT
Ashmore Rd
149
228
125
91
125 125
211 211
10 10
5 5
126 126
173 173
10 10
5 5
196
266
285
176
Ashmore Rd
75 95 208 171
75 95 208 171
51 78 93 86
Benowa Rd


NETWORK DIAGRAM 4
2028 Base Scenario
Weekday Peak
Weekend Peak
Assumed Growth Rate = 1.5% p.a.
Year = 2028
Survey Year = 2024
No. Years = 4
Growth Factor = 1.061
Growth not applied
Benowa Rd
346 395 410 377
Carrara St
267 264
270 262
571 566
329 366
149
178
443
218
Northern Access
274 254 214 241
Southern Access
68 80 63 46
Carrara St
208 296 264 136
241 212 529 333
243 237 567 349
PROPOSED DEVELOPMENT
Ashmore Rd
1084
1074
1344
921
1067 1061
964 978
1038 1037
799 797
1039 1103
961 1072
1037 1043
797 819
1269
1307
1310
1058
Ashmore Rd
298 278 413 299
Benowa Rd


NETWORK DIAGRAM 5
2028 Base + Development Volumes
Weekday Peak
Weekend Peak
Benowa Rd
471 499 585 525
Carrara St
1 194 329
6 228 350
1 0
376 320
402 217
117 155 2
150 117 5
447 443
506 499
779 774
537 574
108 144
335 355
428 106
441 78
346 133
290 180
186
250
636
313
519 534 645 516
Northern Access
272 274 633 416
274 298 671 432
PROPOSED DEVELOPMENT
Southern Access
129 215 177 128
Carrara St
304 490 336 173
Ashmore Rd
149 179
899 848
107 188
2 5
168 167 98
382 202 87
19 15
35 51
921 668
70 67
100 84 145
126 74 116
1158
1220
1408
964
1128 1123
1099 1113
1045 1044
800 798
129 215
993 898
128
177
1044 798
1122 1186
1075 1186
1044 1051
798 821
16 23
1170 1163
8 166
25 311
12 53
466 288
1025 813
1388
1485
1503
1154
Ashmore Rd
317 329 460 341
Benowa Rd


NETWORK DIAGRAM 6
2038 Base Scenario
Weekday Peak
Weekend Peak
Assumed Growth Rate = 1.5% p.a.
Year = 2038
Survey Year = 2024
No. Years = 14
Growth Factor = 1.232
Benowa Rd
Carrara St
Northern Access
Southern Access
Carrara St
Ashmore Rd
Ashmore Rd
Benowa Rd
PROPOSED DEVELOPMENT


NETWORK DIAGRAM 7
2038 Base + Development Volumes
Weekday Peak
Weekend Peak
Benowa Rd
526 562 651 585
Carrara St
489 486
550 541
871 865
590 633
210
279
707
348
1 225 359
7 265 378
1 0
419 351
450 238
135 170 2
174 131 6
126 168
360 373
463 111
479 84
402 154
306 194
563 574 679 554
Northern Access
311 308 718 470
313 336 762 488
PROPOSED DEVELOPMENT
Southern Access
140 228 187 136
Carrara St
337 537 379 195
Ashmore Rd
168 201
1036 968
124 218
2 6
116 95 163
147 86 132
188 187 113
434 227 101
22 17
41 59
1068 775
81 78
1332
1393
1624
1112
1299 1293
1254 1270
1212 1211
929 926
140 228
1153 1042
136
187
1211 926
1289 1363
1229 1358
1211 1218
926 952
18 27
1344 1331
9 187
28 350
14 62
510 319
1190 944
1592
1695
1713
1324
Ashmore Rd
365 374 526 389
Benowa Rd

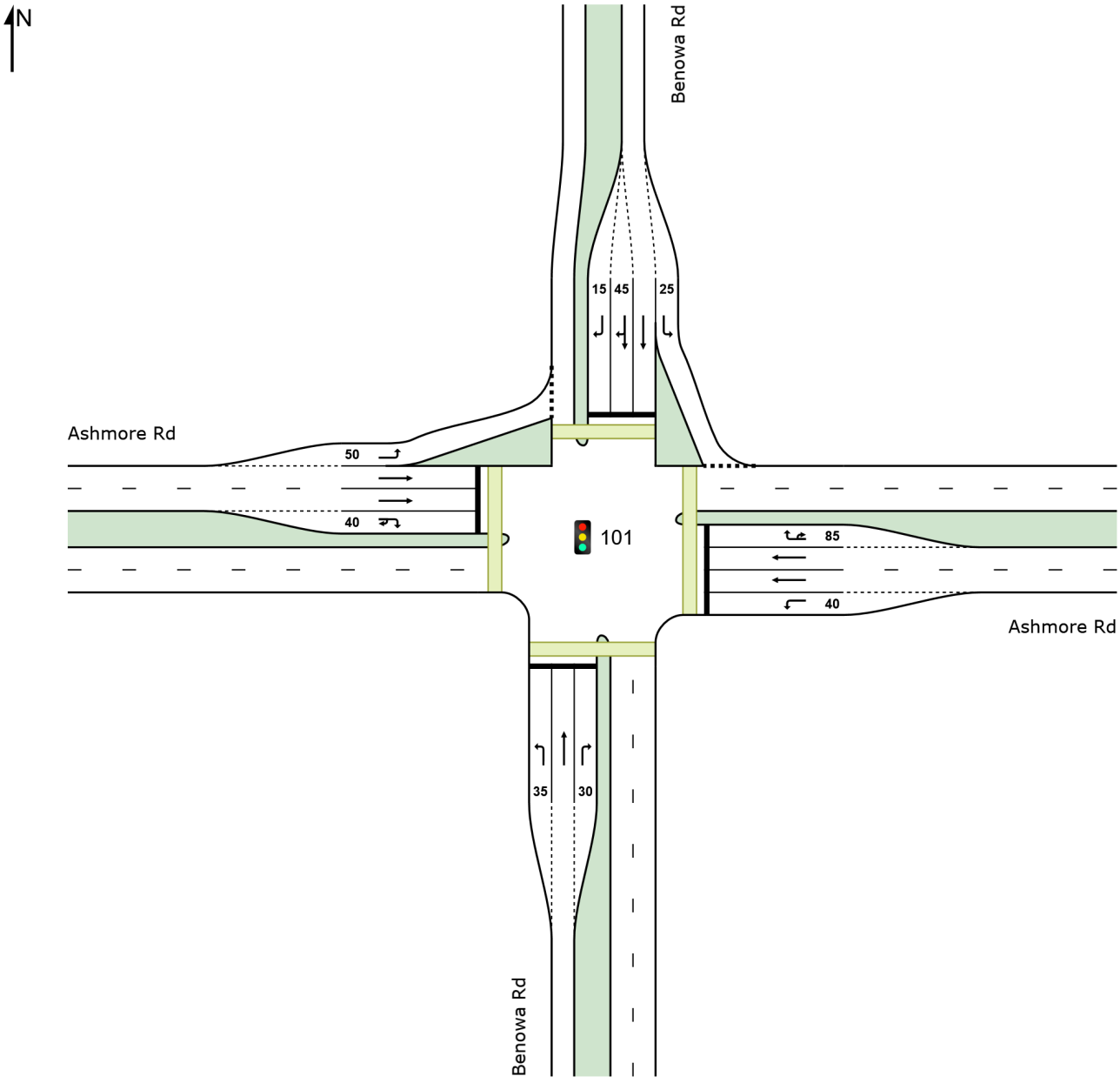
Appendix D SIDRA Output Reports

SITE LAYOUT

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	94	2.1	99	2.1	0.414	62.1	LOS E	5.9	42.1	0.96	0.78	0.96	21.4
2	T1	63	0.0	66	0.0	0.260	55.6	LOS E	3.8	26.9	0.94	0.72	0.94	11.8
3	R2	105	0.0	111	0.0	* 0.455	62.5	LOS E	6.6	46.4	0.97	0.79	0.97	19.1
Approach		262	0.8	276	0.8	0.455	60.7	LOS E	6.6	46.4	0.96	0.77	0.96	18.7
East: Ashmore Rd														
4	L2	66	0.0	69	0.0	0.084	16.7	LOS B	1.3	9.0	0.60	0.70	0.60	36.2
5	T1	861	2.0	906	2.0	* 0.805	46.0	LOS D	27.6	196.4	0.96	0.89	1.02	32.7
6	R2	33	6.1	35	6.1	0.538	73.8	LOS E	3.5	25.6	1.00	0.76	1.02	18.2
6u	U	18	0.0	19	0.0	0.538	74.9	LOS E	3.5	25.6	1.00	0.76	1.02	23.5
Approach		978	1.9	1029	1.9	0.805	45.5	LOS D	27.6	196.4	0.94	0.87	0.99	32.1
North: Benowa Rd														
7	L2	82	1.2	86	1.2	0.091	10.6	LOS B	1.5	10.5	0.34	0.64	0.34	44.5
8	T1	146	0.0	154	0.0	0.522	52.0	LOS D	8.8	61.6	0.94	0.76	0.94	12.5
9	R2	306	1.0	322	1.0	* 0.799	64.3	LOS E	10.1	71.1	0.95	0.89	1.16	22.4
Approach		534	0.7	562	0.7	0.799	52.7	LOS D	10.1	71.1	0.85	0.82	0.97	22.1
West: Ashmore Rd														
10	L2	127	0.0	134	0.0	0.085	6.4	LOS A	0.9	6.0	0.16	0.59	0.16	50.5
11	T1	703	1.1	740	1.1	0.515	26.2	LOS C	17.4	122.7	0.73	0.64	0.73	40.7
12	R2	177	1.1	186	1.1	* 0.785	62.0	LOS E	11.8	83.5	0.95	0.88	1.11	21.3
12u	U	5	0.0	5	0.0	0.785	63.1	LOS E	11.8	83.5	0.95	0.88	1.11	29.2
Approach		1012	1.0	1065	1.0	0.785	30.1	LOS C	17.4	122.7	0.70	0.68	0.73	37.1
All Vehicles		2786	1.3	2933	1.3	0.805	42.7	LOS D	27.6	196.4	0.84	0.78	0.89	30.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2024_Survey_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	119	2.1	125	2.1	*0.524	63.2	LOS E	7.6	54.2	0.98	0.80	0.98	21.2
2	T1	67	0.0	71	0.0	0.277	55.8	LOS E	4.1	28.7	0.94	0.73	0.94	11.8
3	R2	95	0.0	100	0.0	0.412	62.1	LOS E	6.0	41.7	0.96	0.78	0.96	19.2
Approach		281	0.9	296	0.9	0.524	61.0	LOS E	7.6	54.2	0.97	0.77	0.97	18.8
East: Ashmore Rd														
4	L2	63	0.0	66	0.0	0.067	13.5	LOS B	1.1	7.4	0.51	0.68	0.51	38.7
5	T1	628	2.0	661	2.0	0.444	30.1	LOS C	15.6	111.3	0.77	0.67	0.77	38.8
6	R2	48	6.1	51	6.1	*0.563	72.7	LOS E	4.3	31.0	1.00	0.77	1.02	18.4
6u	U	14	0.0	15	0.0	0.563	73.7	LOS E	4.3	31.0	1.00	0.77	1.02	23.7
Approach		753	2.0	793	2.0	0.563	32.2	LOS C	15.6	111.3	0.77	0.68	0.77	36.8
North: Benowa Rd														
7	L2	92	1.2	97	1.2	0.108	11.0	LOS B	1.7	12.3	0.35	0.64	0.35	44.2
8	T1	118	0.0	124	0.0	*0.330	54.3	LOS D	5.4	38.0	0.94	0.74	0.94	11.9
9	R2	119	1.0	125	1.0	0.330	59.6	LOS E	4.5	31.6	0.93	0.76	0.93	23.6
Approach		329	0.7	346	0.7	0.330	44.1	LOS D	5.4	38.0	0.77	0.72	0.77	23.2
West: Ashmore Rd														
10	L2	114	0.0	120	0.0	0.077	6.5	LOS A	0.8	5.8	0.17	0.59	0.17	50.4
11	T1	804	1.1	846	1.1	*0.542	24.9	LOS C	19.1	135.0	0.73	0.64	0.73	41.4
12	R2	101	1.1	106	1.1	0.428	62.0	LOS E	6.4	45.5	0.96	0.79	0.96	21.3
12u	U	2	0.0	2	0.0	0.428	63.1	LOS E	6.4	45.5	0.96	0.79	0.96	29.2
Approach		1021	1.0	1075	1.0	0.542	26.6	LOS C	19.1	135.0	0.69	0.65	0.69	39.4
All Vehicles		2384	1.3	2509	1.3	0.563	34.8	LOS C	19.1	135.0	0.76	0.68	0.76	33.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	100	2.1	105	2.1	0.440	62.4	LOS E	6.3	45.0	0.97	0.78	0.97	21.3
2	T1	67	0.0	71	0.0	0.277	55.8	LOS E	4.1	28.7	0.94	0.73	0.94	11.8
3	R2	111	0.0	117	0.0	* 0.481	62.8	LOS E	7.0	49.3	0.97	0.79	0.97	19.1
Approach		278	0.8	293	0.8	0.481	60.9	LOS E	7.0	49.3	0.96	0.77	0.96	18.6
East: Ashmore Rd														
4	L2	70	0.0	74	0.0	0.090	17.1	LOS B	1.4	9.8	0.61	0.70	0.61	36.0
5	T1	914	2.0	962	2.0	* 0.877	54.9	LOS D	32.8	233.8	0.99	1.00	1.16	30.1
6	R2	35	6.1	37	6.1	0.570	74.2	LOS E	3.8	27.2	1.00	0.77	1.04	18.2
6u	U	19	0.0	20	0.0	0.570	75.2	LOS E	3.8	27.2	1.00	0.77	1.04	23.4
Approach		1038	1.9	1093	1.9	0.877	53.4	LOS D	32.8	233.8	0.96	0.97	1.11	29.7
North: Benowa Rd														
7	L2	87	1.2	92	1.2	0.099	11.2	LOS B	1.7	11.9	0.36	0.65	0.36	43.9
8	T1	155	0.0	163	0.0	0.568	52.3	LOS D	9.4	65.8	0.95	0.77	0.95	12.4
9	R2	325	1.0	342	1.0	* 0.863	70.6	LOS E	11.4	80.4	0.96	0.95	1.29	21.1
Approach		567	0.7	597	0.7	0.863	56.5	LOS E	11.4	80.4	0.86	0.85	1.05	21.1
West: Ashmore Rd														
10	L2	135	0.0	142	0.0	0.091	6.4	LOS A	0.9	6.4	0.16	0.59	0.16	50.5
11	T1	746	1.1	785	1.1	0.556	26.6	LOS C	18.7	132.5	0.75	0.65	0.75	40.5
12	R2	188	1.1	198	1.1	* 0.864	68.6	LOS E	13.5	95.1	0.95	0.94	1.25	20.0
12u	U	5	0.0	5	0.0	0.864	69.8	LOS E	13.5	95.1	0.95	0.94	1.25	27.8
Approach		1074	1.0	1131	1.0	0.864	31.6	LOS C	18.7	132.5	0.71	0.70	0.76	36.4
All Vehicles		2957	1.3	3113	1.3	0.877	46.8	LOS D	32.8	233.8	0.85	0.83	0.96	29.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	126	2.1	133	2.1	*0.554	63.4	LOS E	8.1	57.7	0.99	0.80	0.99	21.1
2	T1	71	0.0	75	0.0	0.293	55.9	LOS E	4.4	30.5	0.95	0.73	0.95	11.8
3	R2	101	0.0	106	0.0	0.438	62.4	LOS E	6.4	44.5	0.97	0.78	0.97	19.2
Approach		298	0.9	314	0.9	0.554	61.3	LOS E	8.1	57.7	0.97	0.78	0.97	18.7
East: Ashmore Rd														
4	L2	67	0.0	71	0.0	0.071	13.3	LOS B	1.1	7.9	0.50	0.68	0.50	38.9
5	T1	667	2.0	702	2.0	0.464	29.7	LOS C	16.7	118.8	0.78	0.67	0.78	39.0
6	R2	51	6.1	54	6.1	*0.599	73.1	LOS E	4.6	33.2	1.00	0.79	1.05	18.4
6u	U	15	0.0	16	0.0	0.599	74.2	LOS E	4.6	33.2	1.00	0.79	1.05	23.7
Approach		800	2.0	842	2.0	0.599	31.9	LOS C	16.7	118.8	0.77	0.68	0.77	36.9
North: Benowa Rd														
7	L2	98	1.2	103	1.2	0.118	11.6	LOS B	2.0	14.0	0.37	0.65	0.37	43.5
8	T1	125	0.0	132	0.0	*0.357	54.5	LOS D	5.9	41.3	0.94	0.75	0.94	11.9
9	R2	126	1.0	133	1.0	0.357	59.8	LOS E	4.7	33.1	0.93	0.76	0.93	23.6
Approach		349	0.7	367	0.7	0.357	44.4	LOS D	5.9	41.3	0.78	0.72	0.78	23.1
West: Ashmore Rd														
10	L2	121	0.0	127	0.0	0.082	6.6	LOS A	1.0	6.7	0.17	0.60	0.17	50.3
11	T1	853	1.1	898	1.1	*0.579	25.3	LOS C	20.5	144.7	0.74	0.65	0.74	41.1
12	R2	107	1.1	113	1.1	0.479	63.4	LOS E	6.9	48.9	0.97	0.79	0.97	21.0
12u	U	2	0.0	2	0.0	0.479	64.5	LOS E	6.9	48.9	0.97	0.79	0.97	28.9
Approach		1083	1.0	1140	1.0	0.579	27.0	LOS C	20.5	144.7	0.70	0.66	0.70	39.2
All Vehicles		2530	1.3	2663	1.3	0.599	35.0	LOS D	20.5	144.7	0.77	0.69	0.77	33.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	100	2.1	105	2.1	0.440	62.4	LOS E	6.3	45.0	0.97	0.78	0.97	21.3
2	T1	83	0.0	87	0.0	0.343	56.4	LOS E	5.1	36.0	0.95	0.74	0.95	11.7
3	R2	144	0.0	152	0.0	* 0.686	65.0	LOS E	9.5	66.3	1.00	0.83	1.06	18.6
Approach		327	0.7	344	0.7	0.686	62.0	LOS E	9.5	66.3	0.98	0.80	1.00	18.2
East: Ashmore Rd														
4	L2	70	0.0	74	0.0	0.092	17.4	LOS B	1.4	9.8	0.62	0.70	0.62	35.7
5	T1	921	2.0	969	2.0	* 0.906	61.1	LOS E	35.1	250.1	1.00	1.06	1.23	28.5
6	R2	35	6.1	37	6.1	0.651	76.5	LOS E	3.9	27.9	1.00	0.80	1.12	17.8
6u	U	19	0.0	20	0.0	0.651	77.5	LOS E	3.9	27.9	1.00	0.80	1.12	23.0
Approach		1045	1.9	1100	1.9	0.906	59.0	LOS E	35.1	250.1	0.97	1.02	1.18	28.2
North: Benowa Rd														
7	L2	87	1.2	92	1.2	0.106	13.0	LOS B	1.9	13.7	0.40	0.66	0.40	42.3
8	T1	199	0.0	209	0.0	0.641	52.7	LOS D	12.3	85.9	0.97	0.80	0.97	12.4
9	R2	379	1.0	399	1.0	* 0.882	72.8	LOS E	17.1	120.9	0.98	0.97	1.31	20.7
Approach		665	0.7	700	0.7	0.882	59.0	LOS E	17.1	120.9	0.90	0.88	1.09	20.3
West: Ashmore Rd														
10	L2	178	0.0	187	0.0	0.120	6.6	LOS A	1.4	9.5	0.17	0.60	0.17	50.4
11	T1	844	1.1	888	1.1	0.651	27.5	LOS C	21.4	151.4	0.77	0.68	0.77	40.0
12	R2	188	1.1	198	1.1	* 0.893	73.5	LOS E	14.0	99.1	0.95	0.97	1.33	19.1
12u	U	5	0.0	5	0.0	0.893	74.7	LOS E	14.0	99.1	0.95	0.97	1.33	26.8
Approach		1215	1.0	1279	1.0	0.893	31.8	LOS C	21.4	151.4	0.71	0.71	0.77	36.4
All Vehicles		3252	1.2	3423	1.2	0.906	49.1	LOS D	35.1	250.1	0.86	0.85	0.99	28.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	126	2.1	133	2.1	*0.554	63.4	LOS E	8.1	57.7	0.99	0.80	0.99	21.1
2	T1	73	0.0	77	0.0	0.301	56.0	LOS E	4.5	31.4	0.95	0.73	0.95	11.8
3	R2	115	0.0	121	0.0	0.498	62.9	LOS E	7.3	51.2	0.98	0.79	0.98	19.1
Approach		314	0.9	331	0.9	0.554	61.5	LOS E	8.1	57.7	0.97	0.78	0.97	18.7
East: Ashmore Rd														
4	L2	67	0.0	71	0.0	0.071	13.3	LOS B	1.1	7.9	0.50	0.68	0.50	38.9
5	T1	668	2.0	703	2.0	0.465	29.7	LOS C	16.7	119.1	0.78	0.67	0.78	39.0
6	R2	51	6.1	54	6.1	*0.599	73.1	LOS E	4.6	33.2	1.00	0.79	1.05	18.4
6u	U	15	0.0	16	0.0	0.599	74.2	LOS E	4.6	33.2	1.00	0.79	1.05	23.7
Approach		801	2.0	843	2.0	0.599	31.9	LOS C	16.7	119.1	0.77	0.68	0.78	36.9
North: Benowa Rd														
7	L2	98	1.2	103	1.2	0.122	12.0	LOS B	2.0	14.4	0.38	0.65	0.38	43.2
8	T1	164	0.0	173	0.0	*0.547	55.6	LOS E	7.9	55.6	0.96	0.77	0.96	11.7
9	R2	165	1.0	174	1.0	0.547	60.7	LOS E	6.2	43.9	0.95	0.77	0.95	23.4
Approach		427	0.7	449	0.7	0.547	47.5	LOS D	7.9	55.6	0.82	0.75	0.82	22.0
West: Ashmore Rd														
10	L2	147	0.0	155	0.0	0.100	6.7	LOS A	1.2	8.3	0.18	0.60	0.18	50.3
11	T1	896	1.1	943	1.1	*0.613	25.7	LOS C	21.3	150.5	0.75	0.67	0.75	40.9
12	R2	107	1.1	113	1.1	0.479	63.4	LOS E	6.9	48.9	0.97	0.79	0.97	21.0
12u	U	2	0.0	2	0.0	0.479	64.5	LOS E	6.9	48.9	0.97	0.79	0.97	28.9
Approach		1152	1.0	1213	1.0	0.613	26.8	LOS C	21.3	150.5	0.70	0.67	0.70	39.2
All Vehicles		2694	1.2	2836	1.2	0.613	35.7	LOS D	21.3	150.5	0.77	0.70	0.77	33.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	116	2.1	122	2.1	0.510	63.0	LOS E	7.4	52.7	0.98	0.79	0.98	21.2
2	T1	78	0.0	82	0.0	0.322	56.2	LOS E	4.8	33.7	0.95	0.74	0.95	11.8
3	R2	129	0.0	136	0.0	* 0.582	63.5	LOS E	8.3	58.0	0.99	0.80	0.99	18.9
Approach		323	0.8	340	0.8	0.582	61.6	LOS E	8.3	58.0	0.97	0.78	0.97	18.5
East: Ashmore Rd														
4	L2	81	0.0	85	0.0	0.101	16.6	LOS B	1.6	11.5	0.60	0.70	0.60	36.3
5	T1	1061	2.0	1117	2.0	* 0.976	83.5	LOS F	48.2	343.3	1.00	1.22	1.42	23.9
6	R2	41	6.1	43	6.1	0.664	75.4	LOS E	4.5	32.3	1.00	0.81	1.12	18.0
6u	U	22	0.0	23	0.0	0.664	76.4	LOS E	4.5	32.3	1.00	0.81	1.12	23.2
Approach		1205	1.9	1268	1.9	0.976	78.6	LOS E	48.2	343.3	0.97	1.17	1.35	24.0
North: Benowa Rd														
7	L2	101	1.2	106	1.2	0.127	13.1	LOS B	2.3	16.1	0.41	0.66	0.41	42.2
8	T1	180	0.0	189	0.0	0.764	58.4	LOS E	11.8	82.7	0.98	0.87	1.10	11.4
9	R2	377	1.0	397	1.0	* 1.003	117.3	LOS F	22.5	159.2	1.00	1.14	1.74	14.8
Approach		658	0.7	693	0.7	1.003	85.2	LOS F	22.5	159.2	0.90	1.00	1.36	15.9
West: Ashmore Rd														
10	L2	156	0.0	164	0.0	0.106	6.7	LOS A	1.3	8.8	0.18	0.60	0.18	50.3
11	T1	866	1.1	912	1.1	0.651	26.2	LOS C	22.5	158.8	0.76	0.67	0.76	40.7
12	R2	218	1.1	229	1.1	* 1.003	117.7	LOS F	22.1	156.0	1.00	1.13	1.71	13.7
12u	U	6	0.0	6	0.0	1.003	118.8	LOS F	22.1	156.0	1.00	1.13	1.71	20.2
Approach		1246	1.0	1312	1.0	1.003	40.2	LOS D	22.5	158.8	0.73	0.74	0.86	33.0
All Vehicles		3432	1.3	3613	1.3	1.003	64.3	LOS E	48.2	343.3	0.87	0.94	1.14	24.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	147	2.1	155	2.1	*0.674	65.0	LOS E	9.7	69.0	1.00	0.83	1.04	20.8
2	T1	83	0.0	87	0.0	0.343	56.4	LOS E	5.1	36.0	0.95	0.74	0.95	11.7
3	R2	117	0.0	123	0.0	0.507	63.0	LOS E	7.5	52.2	0.98	0.79	0.98	19.0
Approach		347	0.9	365	0.9	0.674	62.3	LOS E	9.7	69.0	0.98	0.80	1.00	18.5
East: Ashmore Rd														
4	L2	78	0.0	82	0.0	0.082	13.4	LOS B	1.3	9.3	0.51	0.68	0.51	38.9
5	T1	774	2.0	815	2.0	0.545	30.8	LOS C	20.4	145.4	0.81	0.71	0.81	38.5
6	R2	59	6.1	62	6.1	*0.689	74.5	LOS E	5.4	39.0	1.00	0.83	1.13	18.1
6u	U	17	0.0	18	0.0	0.689	75.6	LOS E	5.4	39.0	1.00	0.83	1.13	23.4
Approach		928	2.0	977	2.0	0.689	32.9	LOS C	20.4	145.4	0.80	0.71	0.81	36.4
North: Benowa Rd														
7	L2	113	1.2	119	1.2	0.147	13.6	LOS B	2.7	18.8	0.43	0.67	0.43	41.7
8	T1	145	0.0	153	0.0	*0.455	55.1	LOS E	7.0	49.2	0.95	0.76	0.95	11.8
9	R2	147	1.0	155	1.0	0.455	60.2	LOS E	5.5	38.5	0.94	0.77	0.94	23.5
Approach		405	0.7	426	0.7	0.455	45.4	LOS D	7.0	49.2	0.80	0.74	0.80	22.8
West: Ashmore Rd														
10	L2	140	0.0	147	0.0	0.096	6.8	LOS A	1.2	8.4	0.19	0.60	0.19	50.1
11	T1	990	1.1	1042	1.1	*0.680	26.6	LOS C	24.5	173.5	0.78	0.70	0.78	40.5
12	R2	124	1.1	131	1.1	0.553	64.1	LOS E	8.1	57.2	0.99	0.80	0.99	20.9
12u	U	2	0.0	2	0.0	0.553	65.2	LOS E	8.1	57.2	0.99	0.80	0.99	28.8
Approach		1256	1.0	1322	1.0	0.680	28.2	LOS C	24.5	173.5	0.74	0.70	0.74	38.6
All Vehicles		2936	1.3	3091	1.3	0.689	36.1	LOS D	24.5	173.5	0.79	0.72	0.80	33.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	116	2.1	122	2.1	0.510	63.0	LOS E	7.4	52.7	0.98	0.79	0.98	21.2
2	T1	93	0.0	98	0.0	0.384	56.8	LOS E	5.8	40.6	0.96	0.75	0.96	11.7
3	R2	159	0.0	167	0.0	* 0.792	68.7	LOS E	10.9	76.6	1.00	0.89	1.18	17.9
Approach		368	0.7	387	0.7	0.792	63.9	LOS E	10.9	76.6	0.98	0.83	1.06	17.8
East: Ashmore Rd														
4	L2	81	0.0	85	0.0	0.105	17.2	LOS B	1.6	11.2	0.62	0.71	0.62	35.9
5	T1	1067	2.0	1123	2.0	* 1.028	115.1	LOS F	57.1	406.6	1.00	1.39	1.64	19.3
6	R2	41	6.1	43	6.1	0.759	78.6	LOS E	4.6	33.2	1.00	0.86	1.25	17.5
6u	U	22	0.0	23	0.0	0.759	79.6	LOS E	4.6	33.2	1.00	0.86	1.25	22.6
Approach		1211	1.9	1275	1.9	1.028	106.7	LOS F	57.1	406.6	0.97	1.32	1.55	19.6
North: Benowa Rd														
7	L2	101	1.2	106	1.2	0.132	15.5	LOS B	2.6	18.7	0.47	0.68	0.47	40.1
8	T1	216	0.0	227	0.0	0.774	56.5	LOS E	14.1	98.6	0.98	0.88	1.09	11.7
9	R2	421	1.0	443	1.0	* 1.019	125.8	LOS F	26.2	184.6	1.00	1.17	1.78	14.0
Approach		738	0.7	777	0.7	1.019	90.4	LOS F	26.2	184.6	0.92	1.02	1.40	15.1
West: Ashmore Rd														
10	L2	195	0.0	205	0.0	0.133	6.8	LOS A	1.7	12.1	0.19	0.60	0.19	50.1
11	T1	955	1.1	1005	1.1	0.762	29.0	LOS C	25.6	180.9	0.81	0.72	0.81	39.3
12	R2	218	1.1	229	1.1	* 1.052	146.4	LOS F	24.9	175.8	1.00	1.22	1.91	11.4
12u	U	6	0.0	6	0.0	1.052	147.5	LOS F	24.9	175.8	1.00	1.22	1.91	17.2
Approach		1374	1.0	1446	1.0	1.052	45.0	LOS D	25.6	180.9	0.75	0.78	0.90	31.2
All Vehicles		3691	1.2	3885	1.2	1.052	76.2	LOS E	57.1	406.6	0.88	1.01	1.23	22.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	147	2.1	155	2.1	*0.673	65.0	LOS E	9.7	69.0	1.00	0.83	1.04	20.8
2	T1	82	0.0	86	0.0	0.338	56.3	LOS E	5.1	35.5	0.95	0.74	0.95	11.7
3	R2	129	0.0	136	0.0	0.583	63.5	LOS E	8.3	58.0	0.99	0.80	0.99	18.9
Approach		358	0.9	377	0.9	0.673	62.5	LOS E	9.7	69.0	0.98	0.80	1.00	18.5
East: Ashmore Rd														
4	L2	78	0.0	82	0.0	0.082	13.4	LOS B	1.3	9.3	0.51	0.68	0.51	38.9
5	T1	774	2.0	815	2.0	0.545	30.8	LOS C	20.4	145.4	0.81	0.71	0.81	38.5
6	R2	59	6.1	62	6.1	*0.689	74.5	LOS E	5.4	39.0	1.00	0.83	1.13	18.1
6u	U	17	0.0	18	0.0	0.689	75.6	LOS E	5.4	39.0	1.00	0.83	1.13	23.4
Approach		928	2.0	977	2.0	0.689	32.9	LOS C	20.4	145.4	0.80	0.71	0.81	36.4
North: Benowa Rd														
7	L2	113	1.2	119	1.2	0.151	14.4	LOS B	2.8	19.8	0.45	0.67	0.45	41.1
8	T1	177	0.0	186	0.0	*0.617	56.0	LOS E	8.5	59.6	0.97	0.78	0.97	11.6
9	R2	178	1.0	187	1.0	0.617	61.3	LOS E	6.9	48.2	0.96	0.79	0.98	23.2
Approach		468	0.7	493	0.7	0.617	48.0	LOS D	8.5	59.6	0.84	0.76	0.85	21.9
West: Ashmore Rd														
10	L2	162	0.0	171	0.0	0.111	6.8	LOS A	1.4	9.9	0.19	0.60	0.19	50.1
11	T1	1025	1.1	1079	1.1	*0.710	26.9	LOS C	25.2	178.2	0.79	0.71	0.79	40.3
12	R2	124	1.1	131	1.1	0.553	64.1	LOS E	8.1	57.2	0.99	0.80	0.99	20.9
12u	U	2	0.0	2	0.0	0.553	65.2	LOS E	8.1	57.2	0.99	0.80	0.99	28.8
Approach		1313	1.0	1382	1.0	0.710	28.0	LOS C	25.2	178.2	0.74	0.70	0.74	38.6
All Vehicles		3067	1.2	3228	1.2	0.710	36.6	LOS D	25.2	178.2	0.80	0.73	0.81	33.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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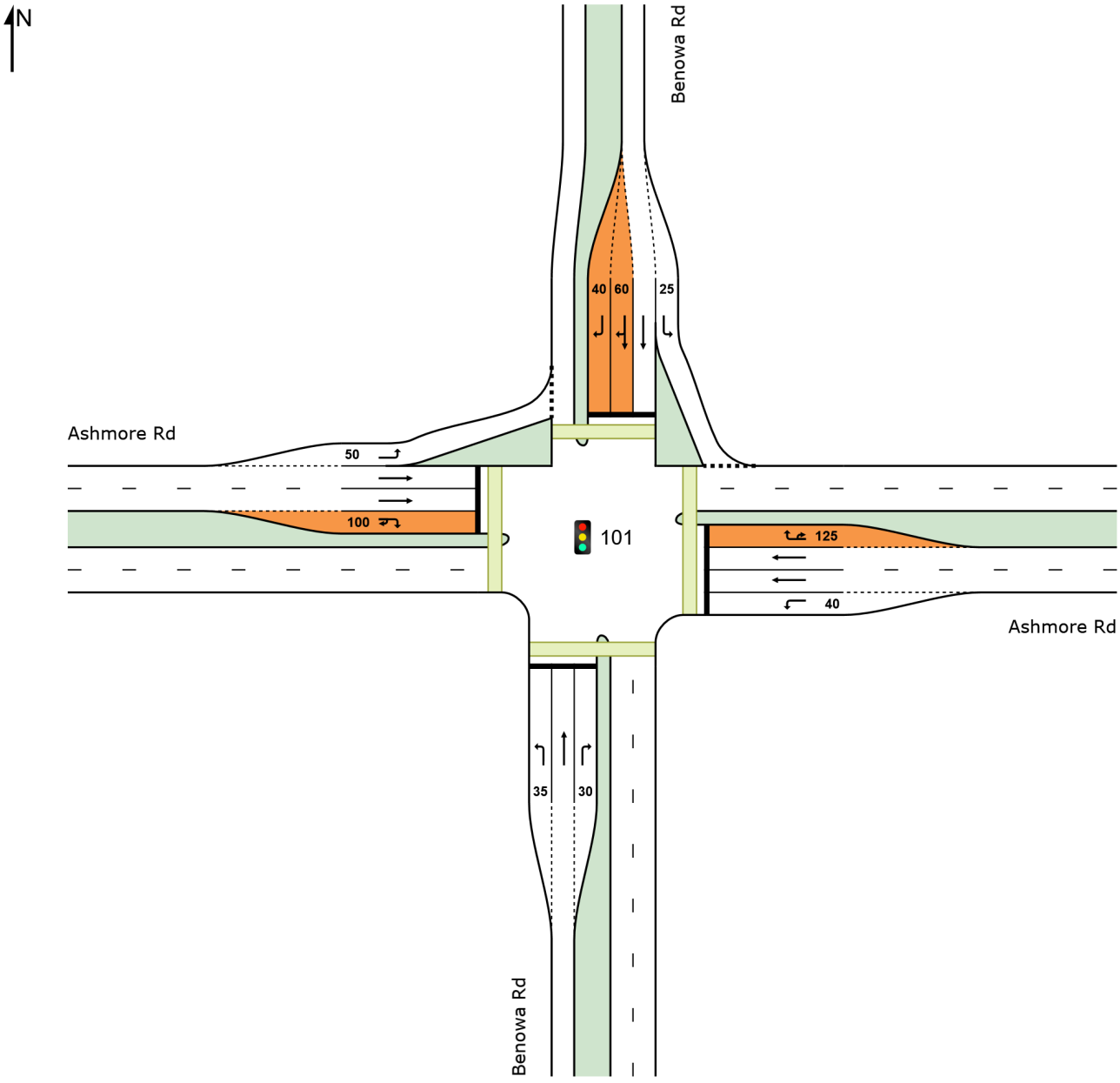
SITE LAYOUT

Site: 101 [2028_BG+DEV_THU_PM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	100	2.1	105	2.1	0.440	62.4	LOS E	6.3	45.0	0.97	0.78	0.97	21.3
2	T1	83	0.0	87	0.0	0.343	56.4	LOS E	5.1	36.0	0.95	0.74	0.95	11.7
3	R2	144	0.0	152	0.0	* 0.686	65.0	LOS E	9.5	66.3	1.00	0.83	1.06	18.6
Approach		327	0.7	344	0.7	0.686	62.0	LOS E	9.5	66.3	0.98	0.80	1.00	18.2
East: Ashmore Rd														
4	L2	70	0.0	74	0.0	0.082	15.3	LOS B	1.3	9.4	0.56	0.69	0.56	37.3
5	T1	921	2.0	969	2.0	* 0.746	38.9	LOS D	28.2	200.4	0.93	0.82	0.93	35.2
6	R2	35	6.1	37	6.1	0.570	74.2	LOS E	3.8	27.2	1.00	0.77	1.04	18.2
6u	U	19	0.0	20	0.0	0.570	75.2	LOS E	3.8	27.2	1.00	0.77	1.04	23.4
Approach		1045	1.9	1100	1.9	0.746	39.1	LOS D	28.2	200.4	0.91	0.81	0.91	34.3
North: Benowa Rd														
7	L2	87	1.2	92	1.2	0.107	13.3	LOS B	2.0	14.0	0.41	0.66	0.41	42.0
8	T1	199	0.0	209	0.0	* 0.729	55.4	LOS E	12.4	86.7	0.97	0.84	1.05	11.9
9	R2	379	1.0	399	1.0	0.729	61.5	LOS E	12.4	87.2	0.98	0.85	1.05	23.0
Approach		665	0.7	700	0.7	0.729	53.4	LOS D	12.4	87.2	0.90	0.82	0.97	21.7
West: Ashmore Rd														
10	L2	178	0.0	187	0.0	0.120	6.6	LOS A	1.4	9.5	0.17	0.60	0.17	50.4
11	T1	844	1.1	888	1.1	0.556	27.5	LOS C	22.2	156.6	0.77	0.68	0.77	40.0
12	R2	188	1.1	198	1.1	* 0.723	64.6	LOS E	12.8	90.4	1.00	0.85	1.06	20.8
12u	U	5	0.0	5	0.0	0.723	65.7	LOS E	12.8	90.4	1.00	0.85	1.06	28.6
Approach		1215	1.0	1279	1.0	0.723	30.4	LOS C	22.2	156.6	0.72	0.70	0.73	37.0
All Vehicles		3252	1.2	3423	1.2	0.746	41.1	LOS D	28.2	200.4	0.84	0.77	0.86	31.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	126	2.1	133	2.1	* 0.554	63.4	LOS E	8.1	57.7	0.99	0.80	0.99	21.1
2	T1	73	0.0	77	0.0	0.301	56.0	LOS E	4.5	31.4	0.95	0.73	0.95	11.8
3	R2	115	0.0	121	0.0	0.498	62.9	LOS E	7.3	51.2	0.98	0.79	0.98	19.1
Approach		314	0.9	331	0.9	0.554	61.5	LOS E	8.1	57.7	0.97	0.78	0.97	18.7
East: Ashmore Rd														
4	L2	67	0.0	71	0.0	0.071	13.3	LOS B	1.1	7.9	0.50	0.68	0.50	38.9
5	T1	668	2.0	703	2.0	0.465	29.7	LOS C	16.7	119.1	0.78	0.67	0.78	39.0
6	R2	51	6.1	54	6.1	* 0.539	71.2	LOS E	4.5	32.6	1.00	0.77	1.00	18.7
6u	U	15	0.0	16	0.0	0.539	72.3	LOS E	4.5	32.6	1.00	0.77	1.00	24.0
Approach		801	2.0	843	2.0	0.539	31.8	LOS C	16.7	119.1	0.77	0.68	0.77	37.0
North: Benowa Rd														
7	L2	98	1.2	103	1.2	0.122	12.7	LOS B	2.1	15.2	0.40	0.66	0.40	42.5
8	T1	164	0.0	173	0.0	* 0.423	55.2	LOS E	6.9	48.4	0.95	0.76	0.95	11.7
9	R2	165	1.0	174	1.0	0.423	61.0	LOS E	6.9	48.4	0.96	0.78	0.96	23.3
Approach		427	0.7	449	0.7	0.423	47.7	LOS D	6.9	48.4	0.83	0.75	0.83	22.0
West: Ashmore Rd														
10	L2	147	0.0	155	0.0	0.100	6.7	LOS A	1.2	8.2	0.18	0.60	0.18	50.3
11	T1	896	1.1	943	1.1	* 0.564	26.5	LOS C	22.9	162.2	0.77	0.68	0.77	40.5
12	R2	107	1.1	113	1.1	0.479	63.4	LOS E	6.9	48.9	0.97	0.79	0.97	21.0
12u	U	2	0.0	2	0.0	0.479	64.5	LOS E	6.9	48.9	0.97	0.79	0.97	28.9
Approach		1152	1.0	1213	1.0	0.564	27.5	LOS C	22.9	162.2	0.71	0.68	0.71	38.9
All Vehicles		2694	1.2	2836	1.2	0.564	35.9	LOS D	22.9	162.2	0.78	0.70	0.78	33.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	116	2.1	122	2.1	0.510	63.0	LOS E	7.4	52.7	0.98	0.79	0.98	21.2
2	T1	93	0.0	98	0.0	0.384	56.8	LOS E	5.8	40.6	0.96	0.75	0.96	11.7
3	R2	159	0.0	167	0.0	* 0.792	68.7	LOS E	10.9	76.6	1.00	0.89	1.18	17.9
Approach		368	0.7	387	0.7	0.792	63.9	LOS E	10.9	76.6	0.98	0.83	1.06	17.8
East: Ashmore Rd														
4	L2	81	0.0	85	0.0	0.093	15.1	LOS B	1.6	10.9	0.56	0.69	0.56	37.5
5	T1	1067	2.0	1123	2.0	* 0.866	48.2	LOS D	37.2	265.0	0.97	0.96	1.09	32.0
6	R2	41	6.1	43	6.1	0.664	75.4	LOS E	4.5	32.3	1.00	0.81	1.12	18.0
6u	U	22	0.0	23	0.0	0.664	76.4	LOS E	4.5	32.3	1.00	0.81	1.12	23.2
Approach		1211	1.9	1275	1.9	0.866	47.5	LOS D	37.2	265.0	0.94	0.93	1.06	31.5
North: Benowa Rd														
7	L2	101	1.2	106	1.2	0.132	15.0	LOS B	2.6	18.2	0.46	0.67	0.46	40.5
8	T1	216	0.0	227	0.0	0.839	61.7	LOS E	14.9	104.1	0.99	0.95	1.20	10.9
9	R2	421	1.0	443	1.0	* 0.863	70.4	LOS E	15.0	105.6	0.99	0.95	1.26	21.1
Approach		738	0.7	777	0.7	0.863	60.3	LOS E	15.0	105.6	0.92	0.91	1.14	20.1
West: Ashmore Rd														
10	L2	195	0.0	205	0.0	0.133	6.8	LOS A	1.7	12.1	0.19	0.60	0.19	50.1
11	T1	955	1.1	1005	1.1	0.683	28.6	LOS C	24.9	176.1	0.81	0.71	0.81	39.5
12	R2	218	1.1	229	1.1	* 0.883	76.1	LOS E	16.8	118.4	1.00	0.96	1.30	18.7
12u	U	6	0.0	6	0.0	0.883	77.2	LOS E	16.8	118.4	1.00	0.96	1.30	26.3
Approach		1374	1.0	1446	1.0	0.883	33.3	LOS C	24.9	176.1	0.75	0.74	0.80	35.7
All Vehicles		3691	1.2	3885	1.2	0.883	46.4	LOS D	37.2	265.0	0.87	0.85	0.98	29.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM - Upgrade (Site Folder: Ashmore Road - Benowa Road)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 130 seconds (Site User-Given Cycle Time)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1	L2	147	2.1	155	2.1	*0.673	65.0	LOS E	9.7	69.0	1.00	0.83	1.04	20.8
2	T1	82	0.0	86	0.0	0.338	56.3	LOS E	5.1	35.5	0.95	0.74	0.95	11.7
3	R2	129	0.0	136	0.0	0.583	63.5	LOS E	8.3	58.0	0.99	0.80	0.99	18.9
Approach		358	0.9	377	0.9	0.673	62.5	LOS E	9.7	69.0	0.98	0.80	1.00	18.5
East: Ashmore Rd														
4	L2	78	0.0	82	0.0	0.082	13.4	LOS B	1.3	9.3	0.51	0.68	0.51	38.9
5	T1	774	2.0	815	2.0	0.545	30.8	LOS C	20.4	145.4	0.81	0.71	0.81	38.5
6	R2	59	6.1	62	6.1	*0.689	74.5	LOS E	5.4	39.0	1.00	0.83	1.13	18.1
6u	U	17	0.0	18	0.0	0.689	75.6	LOS E	5.4	39.0	1.00	0.83	1.13	23.4
Approach		928	2.0	977	2.0	0.689	32.9	LOS C	20.4	145.4	0.80	0.71	0.81	36.4
North: Benowa Rd														
7	L2	113	1.2	119	1.2	0.151	14.4	LOS B	2.8	19.8	0.45	0.67	0.45	41.1
8	T1	177	0.0	186	0.0	*0.465	55.4	LOS E	7.6	53.7	0.96	0.77	0.96	11.7
9	R2	178	1.0	187	1.0	0.465	61.4	LOS E	7.6	53.7	0.96	0.79	0.96	23.2
Approach		468	0.7	493	0.7	0.465	47.8	LOS D	7.6	53.7	0.84	0.75	0.84	22.0
West: Ashmore Rd														
10	L2	162	0.0	171	0.0	0.111	6.8	LOS A	1.4	9.9	0.19	0.60	0.19	50.1
11	T1	1025	1.1	1079	1.1	*0.686	27.0	LOS C	25.6	180.9	0.79	0.71	0.79	40.3
12	R2	124	1.1	131	1.1	0.553	64.1	LOS E	8.1	57.2	0.99	0.80	0.99	20.9
12u	U	2	0.0	2	0.0	0.553	65.2	LOS E	8.1	57.2	0.99	0.80	0.99	28.8
Approach		1313	1.0	1382	1.0	0.686	28.0	LOS C	25.6	180.9	0.74	0.70	0.74	38.6
All Vehicles		3067	1.2	3228	1.2	0.689	36.6	LOS D	25.6	180.9	0.80	0.72	0.80	33.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
South: Benowa Rd												
P1	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
East: Ashmore Rd												

P2	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	231.4	223.8	0.97
North: Benowa Rd												
P3	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	226.3	217.2	0.96
West: Ashmore Rd												
P4	Full	50	53	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96
All Pedestrians		200	211	59.3	LOS E	0.2	0.2	0.96	0.96	228.9	220.5	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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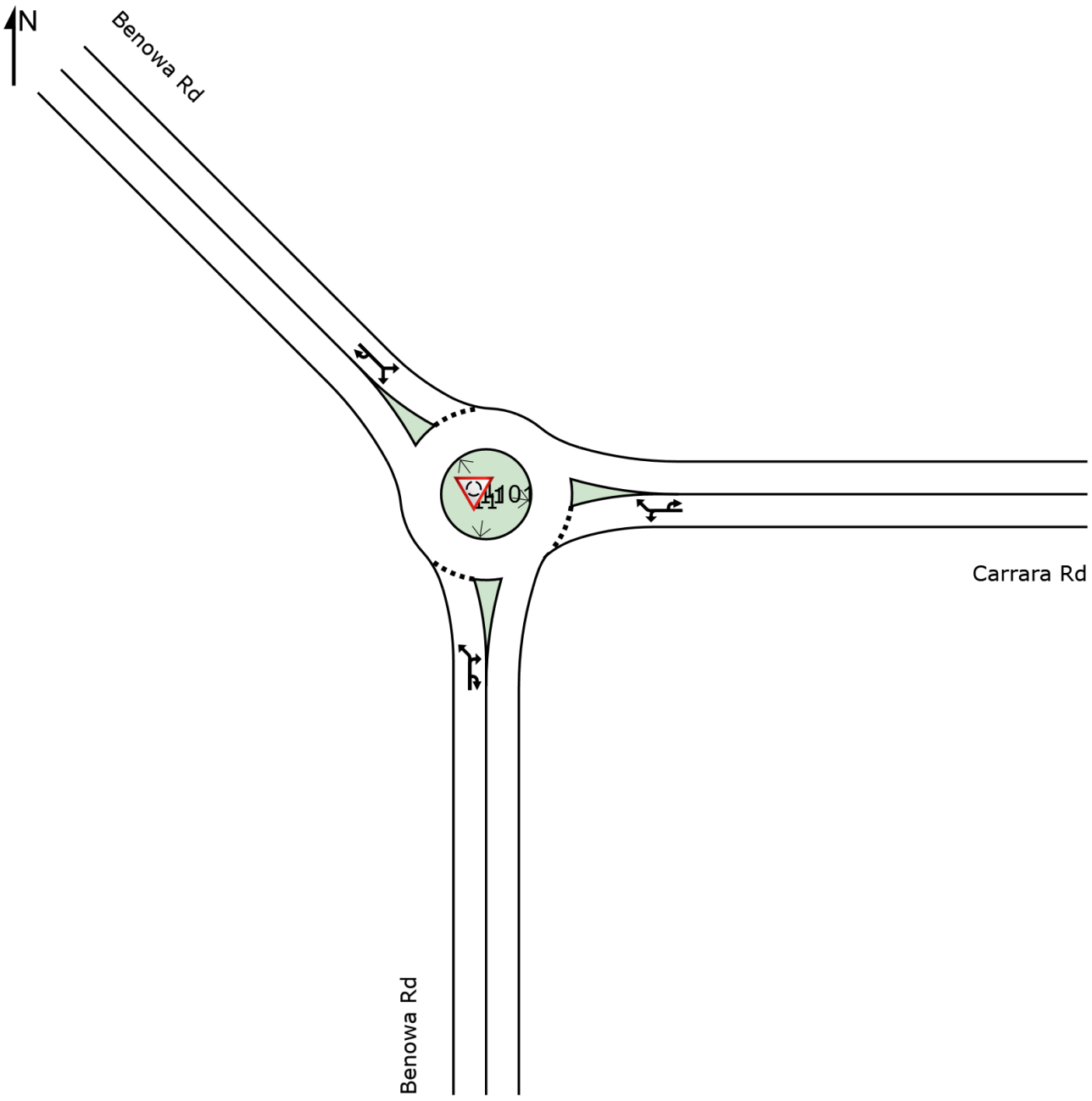
SITE LAYOUT

Site: 101 [2024_Survey_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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MOVEMENT SUMMARY

Site: 101 [2024_Survey_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	110	2.3	116	2.3	0.209	5.9	LOS A	1.1	7.9	0.40	0.63	0.40	45.4
3	R2	88	1.9	93	1.9	0.209	9.6	LOS A	1.1	7.9	0.40	0.63	0.40	46.4
3u	U	2	0.0	2	0.0	0.209	11.2	LOS B	1.1	7.9	0.40	0.63	0.40	37.3
Approach		200	2.1	211	2.1	0.209	7.6	LOS A	1.1	7.9	0.40	0.63	0.40	45.8
East: Carrara Rd														
4	L2	281	0.9	296	0.9	0.538	6.8	LOS A	4.1	28.7	0.52	0.66	0.52	45.1
6a	R1	256	0.4	269	0.4	0.538	9.3	LOS A	4.1	28.7	0.52	0.66	0.52	48.4
6u	U	1	0.0	1	0.0	0.538	11.8	LOS B	4.1	28.7	0.52	0.66	0.52	50.2
Approach		538	0.7	566	0.7	0.538	8.0	LOS A	4.1	28.7	0.52	0.66	0.52	46.9
NorthWest: Benowa Rd														
27a	L1	165	0.8	174	0.8	0.321	4.8	LOS A	2.0	14.4	0.28	0.57	0.28	50.1
29a	R1	215	0.8	226	0.8	0.321	7.7	LOS A	2.0	14.4	0.28	0.57	0.28	45.7
29u	U	6	0.0	6	0.0	0.321	10.2	LOS B	2.0	14.4	0.28	0.57	0.28	50.1
Approach		386	0.8	406	0.8	0.321	6.5	LOS A	2.0	14.4	0.28	0.57	0.28	48.0
All Vehicles		1124	1.0	1183	1.0	0.538	7.4	LOS A	4.1	28.7	0.42	0.62	0.42	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2024_Survey_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	141	2.3	148	2.3	0.219	5.4	LOS A	1.2	8.3	0.34	0.59	0.34	46.2
3	R2	81	1.9	85	1.9	0.219	9.1	LOS A	1.2	8.3	0.34	0.59	0.34	47.1
3u	U	5	0.0	5	0.0	0.219	10.7	LOS B	1.2	8.3	0.34	0.59	0.34	38.1
Approach		227	2.1	239	2.1	0.219	6.9	LOS A	1.2	8.3	0.34	0.59	0.34	46.4
East: Carrara Rd														
4	L2	126	0.9	133	0.9	0.310	6.0	LOS A	1.8	12.7	0.39	0.63	0.39	45.6
6a	R1	184	0.4	194	0.4	0.310	8.6	LOS A	1.8	12.7	0.39	0.63	0.39	48.9
6u	U	1	0.0	1	0.0	0.310	11.0	LOS B	1.8	12.7	0.39	0.63	0.39	50.7
Approach		311	0.6	327	0.6	0.310	7.5	LOS A	1.8	12.7	0.39	0.63	0.39	47.8
NorthWest: Benowa Rd														
27a	L1	171	0.8	180	0.8	0.294	4.8	LOS A	1.8	12.7	0.26	0.56	0.26	50.3
29a	R1	183	0.8	193	0.8	0.294	7.7	LOS A	1.8	12.7	0.26	0.56	0.26	46.0
29u	U	1	0.0	1	0.0	0.294	10.1	LOS B	1.8	12.7	0.26	0.56	0.26	50.4
Approach		355	0.8	374	0.8	0.294	6.3	LOS A	1.8	12.7	0.26	0.56	0.26	48.4
All Vehicles		893	1.1	940	1.1	0.310	6.9	LOS A	1.8	12.7	0.32	0.59	0.32	47.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	117	2.3	123	2.3	0.188	6.0	LOS A	1.0	7.0	0.41	0.62	0.41	45.8
3	R2	58	1.9	61	1.9	0.188	9.7	LOS A	1.0	7.0	0.41	0.62	0.41	46.8
3u	U	2	0.0	2	0.0	0.188	11.3	LOS B	1.0	7.0	0.41	0.62	0.41	37.7
Approach		177	2.1	186	2.1	0.188	7.3	LOS A	1.0	7.0	0.41	0.62	0.41	46.1
East: Carrara Rd														
4	L2	298	0.9	314	0.9	0.575	7.0	LOS A	4.6	32.0	0.55	0.67	0.55	44.8
6a	R1	272	0.4	286	0.4	0.575	9.6	LOS A	4.6	32.0	0.55	0.67	0.55	48.2
6u	U	1	0.0	1	0.0	0.575	12.0	LOS B	4.6	32.0	0.55	0.67	0.55	49.9
Approach		571	0.7	601	0.7	0.575	8.2	LOS A	4.6	32.0	0.55	0.67	0.55	46.6
NorthWest: Benowa Rd														
27a	L1	175	0.8	184	0.8	0.321	4.6	LOS A	2.1	14.6	0.22	0.56	0.22	50.3
29a	R1	228	0.8	240	0.8	0.321	7.5	LOS A	2.1	14.6	0.22	0.56	0.22	45.9
29u	U	6	0.0	6	0.0	0.321	10.0	LOS A	2.1	14.6	0.22	0.56	0.22	50.3
Approach		409	0.8	431	0.8	0.321	6.3	LOS A	2.1	14.6	0.22	0.56	0.22	48.2
All Vehicles		1157	0.9	1218	0.9	0.575	7.4	LOS A	4.6	32.0	0.41	0.62	0.41	47.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	150	2.3	158	2.3	0.235	5.5	LOS A	1.3	9.0	0.35	0.60	0.35	46.1
3	R2	86	1.9	91	1.9	0.235	9.2	LOS A	1.3	9.0	0.35	0.60	0.35	47.0
3u	U	5	0.0	5	0.0	0.235	10.8	LOS B	1.3	9.0	0.35	0.60	0.35	38.0
Approach		241	2.1	254	2.1	0.235	6.9	LOS A	1.3	9.0	0.35	0.60	0.35	46.3
East: Carrara Rd														
4	L2	134	0.9	141	0.9	0.333	6.1	LOS A	2.0	13.9	0.41	0.63	0.41	45.5
6a	R1	195	0.4	205	0.4	0.333	8.7	LOS A	2.0	13.9	0.41	0.63	0.41	48.8
6u	U	1	0.0	1	0.0	0.333	11.1	LOS B	2.0	13.9	0.41	0.63	0.41	50.5
Approach		330	0.6	347	0.6	0.333	7.7	LOS A	2.0	13.9	0.41	0.63	0.41	47.6
NorthWest: Benowa Rd														
27a	L1	181	0.8	191	0.8	0.313	4.8	LOS A	2.0	13.8	0.27	0.56	0.27	50.3
29a	R1	194	0.8	204	0.8	0.313	7.7	LOS A	2.0	13.8	0.27	0.56	0.27	45.9
29u	U	1	0.0	1	0.0	0.313	10.2	LOS B	2.0	13.8	0.27	0.56	0.27	50.3
Approach		376	0.8	396	0.8	0.313	6.3	LOS A	2.0	13.8	0.27	0.56	0.27	48.4
All Vehicles		947	1.1	997	1.1	0.333	7.0	LOS A	2.0	13.9	0.34	0.60	0.34	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	117	2.3	123	2.3	0.323	6.9	LOS A	1.9	13.6	0.53	0.71	0.53	43.7
3	R2	153	1.9	161	1.9	0.323	10.6	LOS B	1.9	13.6	0.53	0.71	0.53	44.8
3u	U	2	0.0	2	0.0	0.323	12.2	LOS B	1.9	13.6	0.53	0.71	0.53	35.5
Approach		272	2.0	286	2.0	0.323	9.1	LOS A	1.9	13.6	0.53	0.71	0.53	44.3
East: Carrara Rd														
4	L2	396	0.9	417	0.9	0.770	9.6	LOS A	10.5	74.1	0.74	0.75	0.84	42.0
6a	R1	369	0.4	388	0.4	0.770	12.2	LOS B	10.5	74.1	0.74	0.75	0.84	45.8
6u	U	1	0.0	1	0.0	0.770	14.6	LOS B	10.5	74.1	0.74	0.75	0.84	47.5
Approach		766	0.7	806	0.7	0.770	10.9	LOS B	10.5	74.1	0.74	0.75	0.84	44.1
NorthWest: Benowa Rd														
27a	L1	346	0.8	364	0.8	0.521	5.6	LOS A	4.2	29.7	0.46	0.59	0.46	49.8
29a	R1	228	0.8	240	0.8	0.521	8.5	LOS A	4.2	29.7	0.46	0.59	0.46	45.4
29u	U	6	0.0	6	0.0	0.521	11.0	LOS B	4.2	29.7	0.46	0.59	0.46	49.8
Approach		580	0.8	611	0.8	0.521	6.8	LOS A	4.2	29.7	0.46	0.59	0.46	48.4
All Vehicles		1618	1.0	1703	1.0	0.770	9.1	LOS A	10.5	74.1	0.60	0.69	0.65	45.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	150	2.3	158	2.3	0.293	6.4	LOS A	1.7	12.0	0.46	0.66	0.46	44.8
3	R2	114	1.9	120	1.9	0.293	10.2	LOS B	1.7	12.0	0.46	0.66	0.46	45.8
3u	U	5	0.0	5	0.0	0.293	11.7	LOS B	1.7	12.0	0.46	0.66	0.46	36.6
Approach		269	2.1	283	2.1	0.293	8.1	LOS A	1.7	12.0	0.46	0.66	0.46	45.1
East: Carrara Rd														
4	L2	211	0.9	222	0.9	0.514	6.5	LOS A	3.8	26.9	0.49	0.65	0.49	45.1
6a	R1	312	0.4	328	0.4	0.514	9.0	LOS A	3.8	26.9	0.49	0.65	0.49	48.5
6u	U	1	0.0	1	0.0	0.514	11.5	LOS B	3.8	26.9	0.49	0.65	0.49	50.2
Approach		524	0.6	552	0.6	0.514	8.0	LOS A	3.8	26.9	0.49	0.65	0.49	47.3
NorthWest: Benowa Rd														
27a	L1	323	0.8	340	0.8	0.444	5.2	LOS A	3.3	23.1	0.37	0.56	0.37	50.3
29a	R1	194	0.8	204	0.8	0.444	8.1	LOS A	3.3	23.1	0.37	0.56	0.37	45.9
29u	U	1	0.0	1	0.0	0.444	10.5	LOS B	3.3	23.1	0.37	0.56	0.37	50.3
Approach		518	0.8	545	0.8	0.444	6.3	LOS A	3.3	23.1	0.37	0.56	0.37	49.0
All Vehicles		1311	1.0	1380	1.0	0.514	7.3	LOS A	3.8	26.9	0.44	0.62	0.44	47.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2038_BG_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	135	2.3	142	2.3	0.275	6.4	LOS A	1.6	11.1	0.48	0.67	0.48	44.8
3	R2	108	1.9	114	1.9	0.275	10.2	LOS B	1.6	11.1	0.48	0.67	0.48	45.8
3u	U	2	0.0	2	0.0	0.275	11.7	LOS B	1.6	11.1	0.48	0.67	0.48	36.6
Approach		245	2.1	258	2.1	0.275	8.1	LOS A	1.6	11.1	0.48	0.67	0.48	45.2
East: Carrara Rd														
4	L2	346	0.9	364	0.9	0.696	9.1	LOS A	7.6	53.7	0.68	0.75	0.76	42.6
6a	R1	315	0.4	332	0.4	0.696	11.6	LOS B	7.6	53.7	0.68	0.75	0.76	46.3
6u	U	1	0.0	1	0.0	0.696	14.1	LOS B	7.6	53.7	0.68	0.75	0.76	48.0
Approach		662	0.7	697	0.7	0.696	10.3	LOS B	7.6	53.7	0.68	0.75	0.76	44.5
NorthWest: Benowa Rd														
27a	L1	203	0.8	214	0.8	0.404	5.0	LOS A	2.8	20.0	0.34	0.58	0.34	49.8
29a	R1	265	0.8	279	0.8	0.404	8.0	LOS A	2.8	20.0	0.34	0.58	0.34	45.4
29u	U	7	0.0	7	0.0	0.404	10.4	LOS B	2.8	20.0	0.34	0.58	0.34	49.9
Approach		475	0.8	500	0.8	0.404	6.8	LOS A	2.8	20.0	0.34	0.58	0.34	47.7
All Vehicles		1382	1.0	1455	1.0	0.696	8.7	LOS A	7.6	53.7	0.53	0.68	0.57	45.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

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MOVEMENT SUMMARY

Site: 101 [2038_BG_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	174	2.3	183	2.3	0.282	5.8	LOS A	1.6	11.4	0.40	0.62	0.40	45.8
3	R2	100	1.9	105	1.9	0.282	9.5	LOS A	1.6	11.4	0.40	0.62	0.40	46.7
3u	U	6	0.0	6	0.0	0.282	11.1	LOS B	1.6	11.4	0.40	0.62	0.40	37.7
Approach		280	2.1	295	2.1	0.282	7.2	LOS A	1.6	11.4	0.40	0.62	0.40	46.0
East: Carrara Rd														
4	L2	155	0.9	163	0.9	0.398	6.5	LOS A	2.5	17.7	0.46	0.65	0.46	45.0
6a	R1	227	0.4	239	0.4	0.398	9.1	LOS A	2.5	17.7	0.46	0.65	0.46	48.4
6u	U	1	0.0	1	0.0	0.398	11.5	LOS B	2.5	17.7	0.46	0.65	0.46	50.1
Approach		383	0.6	403	0.6	0.398	8.1	LOS A	2.5	17.7	0.46	0.65	0.46	47.2
NorthWest: Benowa Rd														
27a	L1	211	0.8	222	0.8	0.370	5.0	LOS A	2.5	17.4	0.32	0.57	0.32	50.1
29a	R1	225	0.8	237	0.8	0.370	7.9	LOS A	2.5	17.4	0.32	0.57	0.32	45.7
29u	U	1	0.0	1	0.0	0.370	10.3	LOS B	2.5	17.4	0.32	0.57	0.32	50.1
Approach		437	0.8	460	0.8	0.370	6.5	LOS A	2.5	17.4	0.32	0.57	0.32	48.2
All Vehicles		1100	1.1	1158	1.1	0.398	7.2	LOS A	2.5	17.7	0.39	0.61	0.39	47.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	174	2.3	183	2.3	0.333	6.6	LOS A	2.0	14.2	0.49	0.67	0.49	44.7
3	R2	121	1.9	127	1.9	0.333	10.3	LOS B	2.0	14.2	0.49	0.67	0.49	45.7
3u	U	6	0.0	6	0.0	0.333	11.9	LOS B	2.0	14.2	0.49	0.67	0.49	36.5
Approach		301	2.1	317	2.1	0.333	8.2	LOS A	2.0	14.2	0.49	0.67	0.49	45.0
East: Carrara Rd														
4	L2	218	0.9	229	0.9	0.551	6.9	LOS A	4.2	29.7	0.55	0.67	0.55	44.7
6a	R1	321	0.4	338	0.4	0.551	9.4	LOS A	4.2	29.7	0.55	0.67	0.55	48.1
6u	U	1	0.0	1	0.0	0.551	11.9	LOS B	4.2	29.7	0.55	0.67	0.55	49.8
Approach		540	0.6	568	0.6	0.551	8.4	LOS A	4.2	29.7	0.55	0.67	0.55	46.9
NorthWest: Benowa Rd														
27a	L1	335	0.8	353	0.8	0.484	5.3	LOS A	3.8	26.7	0.40	0.57	0.40	50.1
29a	R1	225	0.8	237	0.8	0.484	8.2	LOS A	3.8	26.7	0.40	0.57	0.40	45.7
29u	U	1	0.0	1	0.0	0.484	10.7	LOS B	3.8	26.7	0.40	0.57	0.40	50.1
Approach		561	0.8	591	0.8	0.484	6.5	LOS A	3.8	26.7	0.40	0.57	0.40	48.6
All Vehicles		1402	1.0	1476	1.0	0.551	7.6	LOS A	4.2	29.7	0.47	0.63	0.47	47.2

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM (Site Folder: Benowa Road - Carrara Street)]

New Site
Site Category: (None)
Roundabout

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Benowa Rd														
1a	L1	135	2.3	142	2.3	0.372	7.2	LOS A	2.3	16.3	0.57	0.74	0.57	43.5
3	R2	162	1.9	171	1.9	0.372	10.9	LOS B	2.3	16.3	0.57	0.74	0.57	44.5
3u	U	2	0.0	2	0.0	0.372	12.5	LOS B	2.3	16.3	0.57	0.74	0.57	35.2
Approach		299	2.1	315	2.1	0.372	9.3	LOS A	2.3	16.3	0.57	0.74	0.57	44.0
East: Carrara Rd														
4	L2	426	0.9	448	0.9	0.864	14.2	LOS B	16.7	117.9	0.88	0.89	1.19	38.0
6a	R1	395	0.4	416	0.4	0.864	16.7	LOS B	16.7	117.9	0.88	0.89	1.19	42.1
6u	U	1	0.0	1	0.0	0.864	19.2	LOS B	16.7	117.9	0.88	0.89	1.19	43.8
Approach		822	0.7	865	0.7	0.864	15.4	LOS B	16.7	117.9	0.88	0.89	1.19	40.2
NorthWest: Benowa Rd														
27a	L1	360	0.8	379	0.8	0.573	5.8	LOS A	5.0	35.1	0.50	0.61	0.50	49.6
29a	R1	265	0.8	279	0.8	0.573	8.7	LOS A	5.0	35.1	0.50	0.61	0.50	45.1
29u	U	7	0.0	7	0.0	0.573	11.2	LOS B	5.0	35.1	0.50	0.61	0.50	49.6
Approach		632	0.8	665	0.8	0.573	7.1	LOS A	5.0	35.1	0.50	0.61	0.50	48.0
All Vehicles		1753	1.0	1845	1.0	0.864	11.4	LOS B	16.7	117.9	0.69	0.76	0.84	43.3

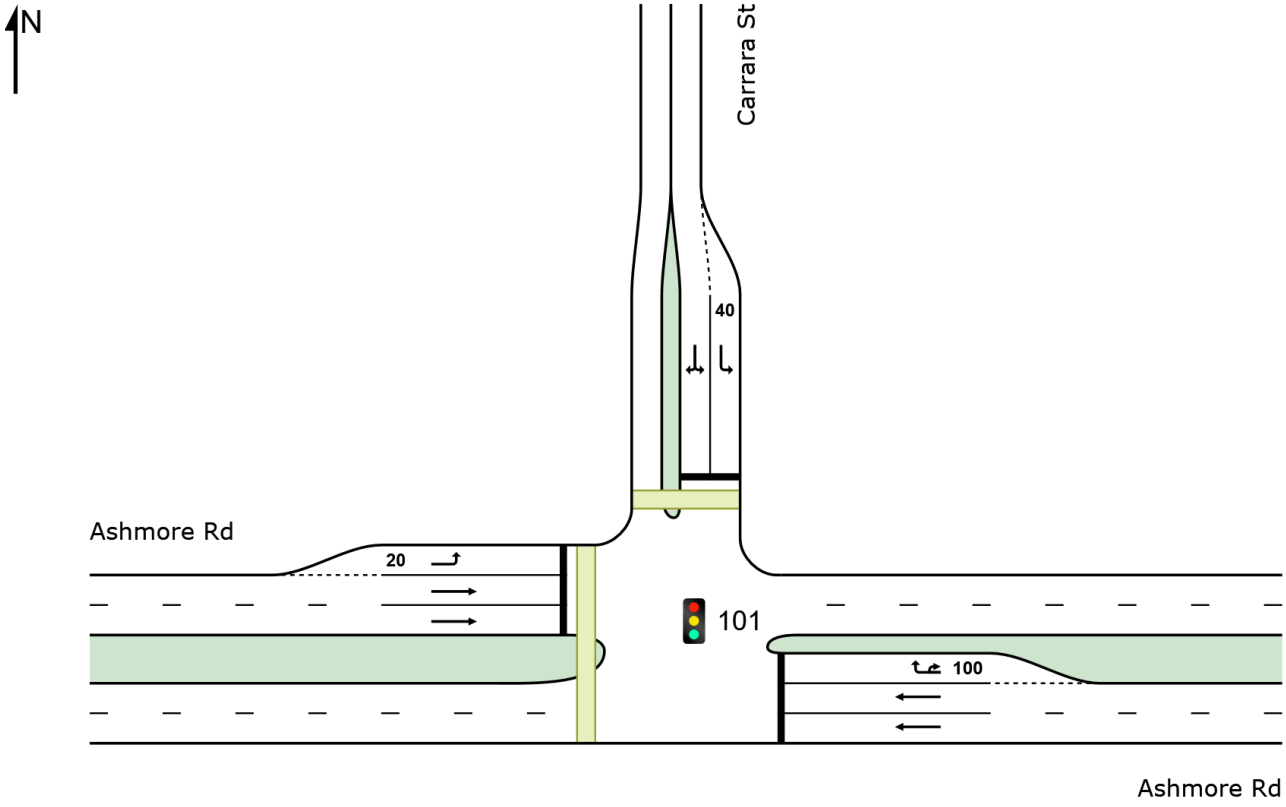
Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

SITE LAYOUT

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated

Layout pictures are schematic functional drawings reflecting input data. They are not design drawings.



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Project: C:\Users\MGrierson\TTM\2024 Synergy Projects - Documents\TotalSynergy\24BRT0224 Benowa Gardens - 203 Ashmore Road Benowa\6 - Analysis\241125 - Update\24BRT0224 SA01 E.sip9

MOVEMENT SUMMARY

Site: 101 [2024_Survey_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	966	1.3	1017	1.3	0.390	7.3	LOS A	10.3	72.7	0.48	0.42	0.48	50.7
6	R2	257	0.0	271	0.0	*0.504	24.8	LOS C	8.2	57.3	0.87	0.81	0.87	34.9
6u	U	11	0.0	12	0.0	0.504	26.0	LOS C	8.2	57.3	0.87	0.81	0.87	32.0
Approach		1234	1.1	1299	1.1	0.504	11.1	LOS B	10.3	72.7	0.56	0.51	0.56	46.4
North: Carrara St														
7	L2	232	0.0	244	0.0	0.559	49.4	LOS D	6.0	41.7	0.99	0.79	0.99	25.2
9	R2	17	0.0	18	0.0	*0.559	49.4	LOS D	6.0	41.7	0.99	0.79	0.99	28.4
Approach		249	0.0	262	0.0	0.559	49.4	LOS D	6.0	41.7	0.99	0.79	0.99	25.4
West: Ashmore Rd														
10	L2	22	0.0	23	0.0	0.024	12.3	LOS B	0.3	2.4	0.51	0.65	0.51	46.0
11	T1	988	1.0	1040	1.0	*0.701	26.1	LOS C	20.6	145.8	0.90	0.79	0.90	36.2
Approach		1010	1.0	1063	1.0	0.701	25.8	LOS C	20.6	145.8	0.89	0.79	0.89	36.4
All Vehicles		2493	0.9	2624	0.9	0.701	20.9	LOS C	20.6	145.8	0.74	0.65	0.74	38.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2024_Survey_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	766	1.3	806	1.3	0.310	6.8	LOS A	7.6	53.6	0.44	0.39	0.44	51.3
6	R2	181	0.0	191	0.0	*0.460	23.8	LOS C	7.0	49.3	0.85	0.79	0.85	35.4
6u	U	50	0.0	53	0.0	0.460	24.9	LOS C	7.0	49.3	0.85	0.79	0.85	32.4
Approach		997	1.0	1049	1.0	0.460	10.8	LOS B	7.6	53.6	0.54	0.48	0.54	46.6
North: Carrara St														
7	L2	122	0.0	128	0.0	0.287	47.5	LOS D	2.9	20.5	0.95	0.75	0.95	25.7
9	R2	6	0.0	6	0.0	*0.287	47.5	LOS D	2.9	20.5	0.95	0.75	0.95	29.0
Approach		128	0.0	135	0.0	0.287	47.5	LOS D	2.9	20.5	0.95	0.75	0.95	25.9
West: Ashmore Rd														
10	L2	15	0.0	16	0.0	0.016	12.2	LOS B	0.2	1.7	0.51	0.64	0.51	46.0
11	T1	1024	1.0	1078	1.0	*0.723	26.5	LOS C	21.5	152.0	0.91	0.80	0.91	36.0
Approach		1039	1.0	1094	1.0	0.723	26.3	LOS C	21.5	152.0	0.90	0.80	0.90	36.2
All Vehicles		2164	1.0	2278	1.0	0.723	20.4	LOS C	21.5	152.0	0.74	0.65	0.74	39.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1025	1.3	1079	1.3	0.414	7.4	LOS A	11.1	78.9	0.49	0.44	0.49	50.6
6	R2	273	0.0	287	0.0	*0.537	25.9	LOS C	8.7	61.0	0.88	0.83	0.88	34.3
6u	U	12	0.0	13	0.0	0.537	27.0	LOS C	8.7	61.0	0.88	0.83	0.88	31.4
Approach		1310	1.1	1379	1.1	0.537	11.5	LOS B	11.1	78.9	0.57	0.52	0.57	46.1
North: Carrara St														
7	L2	246	0.0	259	0.0	0.592	49.7	LOS D	6.4	44.6	0.99	0.80	1.00	25.1
9	R2	18	0.0	19	0.0	*0.592	49.7	LOS D	6.4	44.6	0.99	0.80	1.00	28.3
Approach		264	0.0	278	0.0	0.592	49.7	LOS D	6.4	44.6	0.99	0.80	1.00	25.3
West: Ashmore Rd														
10	L2	23	0.0	24	0.0	0.025	12.3	LOS B	0.4	2.6	0.51	0.65	0.51	46.0
11	T1	986	1.0	1038	1.0	*0.700	26.1	LOS C	20.6	145.5	0.89	0.79	0.89	36.2
Approach		1009	1.0	1062	1.0	0.700	25.8	LOS C	20.6	145.5	0.89	0.79	0.89	36.4
All Vehicles		2583	0.9	2719	0.9	0.700	21.0	LOS C	20.6	145.5	0.74	0.65	0.74	38.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	813	1.3	856	1.3	0.329	6.9	LOS A	8.2	57.9	0.45	0.40	0.45	51.2
6	R2	192	0.0	202	0.0	*0.488	24.3	LOS C	7.5	52.6	0.86	0.80	0.86	35.1
6u	U	53	0.0	56	0.0	0.488	25.5	LOS C	7.5	52.6	0.86	0.80	0.86	32.1
Approach		1058	1.0	1114	1.0	0.488	11.0	LOS B	8.2	57.9	0.55	0.49	0.55	46.4
North: Carrara St														
7	L2	129	0.0	136	0.0	0.303	47.6	LOS D	3.1	21.7	0.95	0.76	0.95	25.7
9	R2	6	0.0	6	0.0	*0.303	47.6	LOS D	3.1	21.7	0.95	0.76	0.95	29.0
Approach		135	0.0	142	0.0	0.303	47.6	LOS D	3.1	21.7	0.95	0.76	0.95	25.9
West: Ashmore Rd														
10	L2	16	0.0	17	0.0	0.018	12.3	LOS B	0.3	1.8	0.51	0.65	0.51	46.0
11	T1	1087	1.0	1144	1.0	*0.767	28.4	LOS C	24.1	170.2	0.93	0.85	0.96	35.0
Approach		1103	1.0	1161	1.0	0.767	28.2	LOS C	24.1	170.2	0.92	0.85	0.96	35.1
All Vehicles		2296	1.0	2417	1.0	0.767	21.4	LOS C	24.1	170.2	0.75	0.68	0.77	38.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1025	1.3	1079	1.3	0.414	7.4	LOS A	11.1	78.9	0.49	0.44	0.49	50.6
6	R2	461	0.0	485	0.0	*0.886	46.1	LOS D	19.4	135.5	1.00	1.08	1.26	26.1
6u	U	12	0.0	13	0.0	0.886	47.2	LOS D	19.4	135.5	1.00	1.08	1.26	23.4
Approach		1498	0.9	1577	0.9	0.886	19.6	LOS B	19.4	135.5	0.65	0.64	0.73	39.5
North: Carrara St														
7	L2	309	0.0	325	0.0	0.749	52.8	LOS D	8.5	59.7	1.00	0.88	1.16	24.2
9	R2	25	0.0	26	0.0	*0.749	52.8	LOS D	8.5	59.7	1.00	0.88	1.16	27.5
Approach		334	0.0	352	0.0	0.749	52.8	LOS D	8.5	59.7	1.00	0.88	1.16	24.5
West: Ashmore Rd														
10	L2	23	0.0	24	0.0	0.025	12.3	LOS B	0.4	2.6	0.51	0.65	0.51	46.0
11	T1	1159	1.0	1220	1.0	*0.822	32.1	LOS C	28.1	198.1	0.96	0.93	1.05	33.2
Approach		1182	1.0	1244	1.0	0.822	31.7	LOS C	28.1	198.1	0.95	0.92	1.04	33.4
All Vehicles		3014	0.8	3173	0.8	0.886	28.1	LOS C	28.1	198.1	0.81	0.78	0.90	34.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2028_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	813	1.3	856	1.3	0.329	6.9	LOS A	8.2	57.9	0.45	0.40	0.45	51.2
6	R2	283	0.0	298	0.0	*0.657	29.4	LOS C	10.3	72.3	0.92	0.89	0.92	32.5
6u	U	53	0.0	56	0.0	0.657	30.5	LOS C	10.3	72.3	0.92	0.89	0.92	29.6
Approach		1149	1.0	1209	1.0	0.657	13.5	LOS B	10.3	72.3	0.59	0.54	0.59	44.0
North: Carrara St														
7	L2	164	0.0	173	0.0	0.384	48.2	LOS D	4.0	27.9	0.96	0.77	0.96	25.5
9	R2	7	0.0	7	0.0	*0.384	48.2	LOS D	4.0	27.9	0.96	0.77	0.96	28.8
Approach		171	0.0	180	0.0	0.384	48.2	LOS D	4.0	27.9	0.96	0.77	0.96	25.7
West: Ashmore Rd														
10	L2	16	0.0	17	0.0	0.018	12.3	LOS B	0.3	1.8	0.51	0.65	0.51	46.0
11	T1	1167	1.0	1228	1.0	*0.823	32.3	LOS C	28.2	199.0	0.96	0.93	1.05	33.1
Approach		1183	1.0	1245	1.0	0.823	32.0	LOS C	28.2	199.0	0.95	0.93	1.05	33.3
All Vehicles		2503	0.9	2635	0.9	0.823	24.6	LOS C	28.2	199.0	0.79	0.74	0.83	36.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2038_BG_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1190	1.3	1253	1.3	0.481	7.9	LOS A	13.8	97.8	0.52	0.47	0.52	50.0
6	R2	317	0.0	334	0.0	*0.623	28.4	LOS C	10.1	71.0	0.91	0.88	0.91	33.0
6u	U	14	0.0	15	0.0	0.623	29.6	LOS C	10.1	71.0	0.91	0.88	0.91	30.1
Approach		1521	1.1	1601	1.1	0.623	12.4	LOS B	13.8	97.8	0.61	0.56	0.61	45.2
North: Carrara St														
7	L2	286	0.0	301	0.0	0.689	51.3	LOS D	7.6	53.5	1.00	0.84	1.09	24.6
9	R2	21	0.0	22	0.0	*0.689	51.3	LOS D	7.6	53.5	1.00	0.84	1.09	27.9
Approach		307	0.0	323	0.0	0.689	51.3	LOS D	7.6	53.5	1.00	0.84	1.09	24.9
West: Ashmore Rd														
10	L2	27	0.0	28	0.0	0.030	12.3	LOS B	0.4	3.0	0.51	0.66	0.51	46.0
11	T1	1217	1.0	1281	1.0	*0.865	36.7	LOS D	32.1	226.5	0.98	1.00	1.14	31.2
Approach		1244	1.0	1309	1.0	0.865	36.2	LOS D	32.1	226.5	0.97	1.00	1.13	31.5
All Vehicles		3072	0.9	3234	0.9	0.865	25.9	LOS C	32.1	226.5	0.79	0.76	0.87	35.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	944	1.3	994	1.3	0.382	7.2	LOS A	10.0	70.5	0.47	0.42	0.47	50.8
6	R2	223	0.0	235	0.0	*0.568	26.9	LOS C	8.8	61.3	0.89	0.85	0.89	33.7
6u	U	62	0.0	65	0.0	0.568	28.1	LOS C	8.8	61.3	0.89	0.85	0.89	30.7
Approach		1229	1.0	1294	1.0	0.568	11.8	LOS B	10.0	70.5	0.57	0.52	0.57	45.6
North: Carrara St														
7	L2	150	0.0	158	0.0	0.352	48.0	LOS D	3.6	25.5	0.96	0.77	0.96	25.6
9	R2	7	0.0	7	0.0	*0.352	48.0	LOS D	3.6	25.5	0.96	0.77	0.96	28.9
Approach		157	0.0	165	0.0	0.352	48.0	LOS D	3.6	25.5	0.96	0.77	0.96	25.8
West: Ashmore Rd														
10	L2	18	0.0	19	0.0	0.020	12.3	LOS B	0.3	2.0	0.51	0.65	0.51	46.0
11	T1	1261	1.0	1327	1.0	*0.890	40.7	LOS D	35.0	247.5	1.00	1.06	1.21	29.7
Approach		1279	1.0	1346	1.0	0.890	40.3	LOS D	35.0	247.5	0.99	1.05	1.20	29.8
All Vehicles		2665	1.0	2805	1.0	0.890	27.6	LOS C	35.0	247.5	0.79	0.79	0.89	35.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_THU_PM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	1190	1.3	1253	1.3	0.481	7.9	LOS A	13.8	97.8	0.52	0.47	0.52	50.0
6	R2	489	0.0	515	0.0	*0.943	59.6	LOS E	25.3	177.4	1.00	1.16	1.43	22.6
6u	U	14	0.0	15	0.0	0.943	60.7	LOS E	25.3	177.4	1.00	1.16	1.43	20.0
Approach		1693	0.9	1782	0.9	0.943	23.3	LOS C	25.3	177.4	0.66	0.68	0.79	37.2
North: Carrara St														
7	L2	344	0.0	362	0.0	0.832	56.4	LOS E	10.0	69.8	1.00	0.94	1.29	23.3
9	R2	27	0.0	28	0.0	*0.832	56.4	LOS E	10.0	69.8	1.00	0.94	1.29	26.5
Approach		371	0.0	391	0.0	0.832	56.4	LOS E	10.0	69.8	1.00	0.94	1.29	23.6
West: Ashmore Rd														
10	L2	27	0.0	28	0.0	0.030	12.3	LOS B	0.4	3.0	0.51	0.66	0.51	46.0
11	T1	1317	1.0	1386	1.0	*0.935	51.2	LOS D	41.8	294.8	1.00	1.17	1.34	26.2
Approach		1344	1.0	1415	1.0	0.935	50.5	LOS D	41.8	294.8	0.99	1.16	1.32	26.5
All Vehicles		3408	0.9	3587	0.9	0.943	37.6	LOS D	41.8	294.8	0.83	0.89	1.06	30.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101 [2038_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Carrara Street)]

New Site
Site Category: (None)
Signals - EQUISAT (Fixed-Time/SCATS) Isolated Cycle Time = 95 seconds (Site User-Given Phase Times)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
East: Ashmore Rd														
5	T1	944	1.3	994	1.3	0.382	7.2	LOS A	10.0	70.5	0.47	0.42	0.47	50.8
6	R2	300	0.0	316	0.0	*0.711	31.4	LOS C	11.4	79.6	0.94	0.92	0.97	31.6
6u	U	62	0.0	65	0.0	0.711	32.5	LOS C	11.4	79.6	0.94	0.92	0.97	28.7
Approach		1306	1.0	1375	1.0	0.711	14.0	LOS B	11.4	79.6	0.60	0.56	0.61	43.7
North: Carrara St														
7	L2	179	0.0	188	0.0	0.420	48.4	LOS D	4.4	30.7	0.97	0.78	0.97	25.5
9	R2	8	0.0	8	0.0	*0.420	48.4	LOS D	4.4	30.7	0.97	0.78	0.97	28.7
Approach		187	0.0	197	0.0	0.420	48.4	LOS D	4.4	30.7	0.97	0.78	0.97	25.6
West: Ashmore Rd														
10	L2	18	0.0	19	0.0	0.020	12.3	LOS B	0.3	2.0	0.51	0.65	0.51	46.0
11	T1	1334	1.0	1404	1.0	*0.942	53.3	LOS D	42.9	303.0	1.00	1.19	1.36	25.6
Approach		1352	1.0	1423	1.0	0.942	52.7	LOS D	42.9	303.0	0.99	1.18	1.35	25.8
All Vehicles		2845	0.9	2995	0.9	0.942	34.7	LOS C	42.9	303.0	0.81	0.87	0.98	31.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

* Critical Movement (Signal Timing)

Pedestrian Movement Performance

Mov ID	Crossing	Input Vol. ped/h	Dem. Flow ped/h	Aver. Delay sec	Level of Service	AVERAGE BACK OF QUEUE [Ped ped	Dist] m	Prop. Que	Effective Stop Rate	Travel Time sec	Travel Dist. m	Aver. Speed m/sec
North: Carrara St												
P3	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	206.3	213.9	1.04
West: Ashmore Rd												
P4	Full	50	53	41.8	LOS E	0.1	0.1	0.94	0.94	213.9	223.8	1.05
All Pedestrians		100	105	41.8	LOS E	0.1	0.1	0.94	0.94	210.1	218.9	1.04

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)
Pedestrian movement LOS values are based on average delay per pedestrian movement.
Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

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MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_THU_PM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	173	3.4	182	3.4	0.182	6.9	LOS A	0.7	5.4	0.50	0.71	0.50	41.0
Approach		173	3.4	182	3.4	0.182	6.9	LOS A	0.7	5.4	0.50	0.71	0.50	41.0
West: Ashmore Rd														
10	L2	211	2.7	222	2.7	0.122	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	898	3.0	945	3.0	0.247	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1109	2.9	1167	2.9	0.247	1.1	NA	0.0	0.0	0.00	0.11	0.00	55.6
All Vehicles		1282	3.0	1349	3.0	0.247	1.9	NA	0.7	5.4	0.07	0.19	0.07	53.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	126	1.0	133	1.0	0.137	7.0	LOS A	0.5	3.8	0.51	0.72	0.51	41.3
Approach		126	1.0	133	1.0	0.137	7.0	LOS A	0.5	3.8	0.51	0.72	0.51	41.3
West: Ashmore Rd														
10	L2	125	1.0	132	1.0	0.071	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	993	1.0	1045	1.0	0.270	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.9
Approach		1118	1.0	1177	1.0	0.270	0.6	NA	0.0	0.0	0.00	0.06	0.00	57.4
All Vehicles		1244	1.0	1309	1.0	0.270	1.3	NA	0.5	3.8	0.05	0.13	0.05	55.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_THU_PM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	173	3.4	182	3.4	0.200	7.4	LOS A	0.8	5.8	0.54	0.76	0.54	40.2
Approach		173	3.4	182	3.4	0.200	7.4	LOS A	0.8	5.8	0.54	0.76	0.54	40.2
West: Ashmore Rd														
10	L2	211	2.7	222	2.7	0.122	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	1042	3.0	1097	3.0	0.287	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1253	3.0	1319	3.0	0.287	1.0	NA	0.0	0.0	0.00	0.10	0.00	56.1
All Vehicles		1426	3.0	1501	3.0	0.287	1.7	NA	0.8	5.8	0.07	0.18	0.07	53.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_SAT_AM (Site Folder: Ashmore Road - Southern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
North: South Access														
7	L2	126	1.0	133	1.0	0.153	7.6	LOS A	0.6	4.2	0.55	0.77	0.55	40.5
Approach		126	1.0	133	1.0	0.153	7.6	LOS A	0.6	4.2	0.55	0.77	0.55	40.5
West: Ashmore Rd														
10	L2	125	1.0	132	1.0	0.071	5.6	LOS A	0.0	0.0	0.00	0.58	0.00	36.1
11	T1	1153	1.0	1214	1.0	0.313	0.0	LOS A	0.0	0.0	0.00	0.00	0.00	59.8
Approach		1278	1.0	1345	1.0	0.313	0.6	NA	0.0	0.0	0.00	0.06	0.00	57.7
All Vehicles		1404	1.0	1478	1.0	0.313	1.2	NA	0.6	4.2	0.05	0.12	0.05	55.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_THU_PM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	415	0.5	437	0.5	0.637	8.8	LOS A	5.5	38.7	0.62	0.96	1.13	17.4
3	R2	104	0.0	109	0.0	0.637	17.7	LOS C	5.5	38.7	0.62	0.96	1.13	36.5
Approach		519	0.4	546	0.4	0.637	10.6	LOS B	5.5	38.7	0.62	0.96	1.13	21.3
East: Carrara St														
4	L2	285	1.2	300	1.2	0.350	5.6	LOS A	0.0	0.0	0.00	0.27	0.00	47.9
5	T1	346	0.4	364	0.4	0.350	0.1	LOS A	0.0	0.0	0.00	0.27	0.00	53.5
Approach		631	0.7	664	0.7	0.350	2.6	NA	0.0	0.0	0.00	0.27	0.00	50.9
West: Carrara St														
11	T1	144	0.4	152	0.4	0.505	5.6	LOS A	4.2	29.5	0.72	0.73	1.12	41.6
12	R2	348	0.0	366	0.0	0.505	10.9	LOS B	4.2	29.5	0.72	0.73	1.12	25.6
Approach		492	0.1	518	0.1	0.505	9.3	NA	4.2	29.5	0.72	0.73	1.12	31.5
All Vehicles		1642	0.5	1728	0.5	0.637	7.1	NA	5.5	38.7	0.41	0.62	0.69	34.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2028_BG+DEV_SAT_AM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	428	0.5	451	0.5	0.434	5.1	LOS A	2.5	17.6	0.31	0.59	0.33	20.4
3	R2	75	0.0	79	0.0	0.434	9.9	LOS A	2.5	17.6	0.31	0.59	0.33	42.6
Approach		503	0.4	529	0.4	0.434	5.8	LOS A	2.5	17.6	0.31	0.59	0.33	23.8
East: Carrara St														
4	L2	176	1.0	185	1.0	0.173	5.6	LOS A	0.0	0.0	0.00	0.34	0.00	46.7
5	T1	133	1.0	140	1.0	0.173	0.0	LOS A	0.0	0.0	0.00	0.34	0.00	52.2
Approach		309	1.0	325	1.0	0.173	3.2	NA	0.0	0.0	0.00	0.34	0.00	49.0
West: Carrara St														
11	T1	108	0.4	114	0.4	0.320	1.4	LOS A	1.8	12.8	0.48	0.51	0.48	47.5
12	R2	326	0.0	343	0.0	0.320	6.6	LOS A	1.8	12.8	0.48	0.51	0.48	31.1
Approach		434	0.1	457	0.1	0.320	5.3	NA	1.8	12.8	0.48	0.51	0.48	36.6
All Vehicles		1246	0.5	1312	0.5	0.434	5.0	NA	2.5	17.6	0.30	0.50	0.30	33.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_THU_PM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	415	0.5	437	0.5	0.699	10.4	LOS B	6.4	45.2	0.67	1.11	1.43	16.4
3	R2	104	0.0	109	0.0	0.699	21.0	LOS C	6.4	45.2	0.67	1.11	1.43	34.4
Approach		519	0.4	546	0.4	0.699	12.5	LOS B	6.4	45.2	0.67	1.11	1.43	20.1
East: Carrara St														
4	L2	285	1.2	300	1.2	0.380	5.6	LOS A	0.0	0.0	0.00	0.25	0.00	48.2
5	T1	402	0.4	423	0.4	0.380	0.1	LOS A	0.0	0.0	0.00	0.25	0.00	54.0
Approach		687	0.7	723	0.7	0.380	2.4	NA	0.0	0.0	0.00	0.25	0.00	51.5
West: Carrara St														
11	T1	168	0.4	177	0.4	0.559	6.8	LOS A	5.0	35.1	0.79	0.74	1.32	40.1
12	R2	348	0.0	366	0.0	0.559	12.2	LOS B	5.0	35.1	0.79	0.74	1.32	24.3
Approach		516	0.1	543	0.1	0.559	10.4	NA	5.0	35.1	0.79	0.74	1.32	30.7
All Vehicles		1722	0.5	1813	0.5	0.699	7.8	NA	6.4	45.2	0.44	0.65	0.83	34.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 101v [2038_BG+DEV_SAT_AM (Site Folder: Carrara Street - Northern Access)]

New Site
Site Category: (None)
Give-Way (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: North Access														
1	L2	428	0.5	451	0.5	0.447	5.4	LOS A	2.8	19.6	0.35	0.61	0.39	20.2
3	R2	75	0.0	79	0.0	0.447	10.6	LOS B	2.8	19.6	0.35	0.61	0.39	42.1
Approach		503	0.4	529	0.4	0.447	6.2	LOS A	2.8	19.6	0.35	0.61	0.39	23.5
East: Carrara St														
4	L2	176	1.0	185	1.0	0.184	5.6	LOS A	0.0	0.0	0.00	0.31	0.00	47.1
5	T1	154	1.0	162	1.0	0.184	0.0	LOS A	0.0	0.0	0.00	0.31	0.00	52.6
Approach		330	1.0	347	1.0	0.184	3.0	NA	0.0	0.0	0.00	0.31	0.00	49.6
West: Carrara St														
11	T1	126	0.4	133	0.4	0.336	1.6	LOS A	2.0	13.7	0.51	0.50	0.51	47.6
12	R2	326	0.0	343	0.0	0.336	6.8	LOS A	2.0	13.7	0.51	0.50	0.51	31.2
Approach		452	0.1	476	0.1	0.336	5.3	NA	2.0	13.7	0.51	0.50	0.51	37.3
All Vehicles		1285	0.5	1353	0.5	0.447	5.0	NA	2.8	19.6	0.31	0.50	0.33	34.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Vehicle movement LOS values are based on average delay per movement.
Minor Road Approach LOS values are based on average delay for all vehicle movements.
NA: Intersection LOS and Major Road Approach LOS values are Not Applicable for two-way sign control since the average delay is not a good LOS measure due to zero delays associated with major road movements.
Delay Model: SIDRA Standard (Geometric Delay is included).
Queue Model: SIDRA Standard.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Environmental Noise Assessment Report

Benowa Gardens Master Plan

At 203 Ashmore Road, Benowa

On behalf of Benowa Gardens Holdings PTY LTD ATF

24GCA0185 R01_1

Revision Record

No.	Author	Reviewed/Approved	Description	Date
C.	D. Prostamo-Brown	J. Fox	Internal draft	17/02/2025
0.	D. Prostamo-Brown	J. Fox	Issued to client	18/02/2025
1.	D. Prostamo-Brown	J. Fox	Issued to client	21/02/2025

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Suite 701 Seabank Building, 12-14 Marine Parade, Southport QLD 4215

Executive Summary

Colliers conducted an environmental noise assessment for the proposed Benowa Gardens mixed use development located at 203 Ashmore Road, Benowa.

Noise measurements were undertaken to establish the existing road traffic and ambient noise levels.

Road traffic noise from Council-controlled roads was predicted at the development with a worst-case impact of QDC MP4.4 Noise Category 3 for the southern façade of the 'Ashmore Tower'. Balconies on noise affected facades will require solid balustrades to reduce transport noise where possible.

Noise generated by the proposed development was assessed and recommendations were made for compliance with the applicable noise criteria.

Noise generated at offsite premises was assessed onto the proposed development and was found to comply without the need for further acoustic treatment.

Compliance with the criteria outlined in Section 5 is predicted to be achieved based on the implementation of the recommendations outlined in Section 9 of this report.

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1 Introduction

1.1 Background

Colliers (formally TTM) was engaged by Benowa Gardens Holdings PTY LTD ATF to undertake an environmental noise assessment of the proposed Benowa Gardens mixed use development located at 203 Ashmore Road, Benowa. This report will form part of the application for consideration by the City of Gold Coast Council.

1.2 References

The assessment is based on the following:

- City of Gold Coast *City Plan, Version 11*.
- Queensland Development Code *MP4.4 Buildings in a Transport Noise Corridor* (August, 2015).
- Environmental *Protection (Noise) Policy*.
- Development plans by *Neylan Architecture*, Samples shown in Appendix A.
- Site inspection, noise measurements, analysis and calculations conducted by Colliers.

1.3 Scope

The assessment includes the following:

- Description of the site and proposal;
- Measurement of existing road traffic, and ambient noise levels;
- Statement of assessment criteria relating to road traffic intrusion and environmental noise emissions;
- Prediction of road traffic impacts on the development;
- Assessment of noise generated by the development onto noise sensitive receivers;
- Assessment of noise generated by offsite premises onto the residential component of the development;
- Analysis of predicted noise levels;
- Details of noise control recommendations to be incorporated to achieve predicted compliance.

2 Site Description

2.1 Site Location

The site is described by the following:

- Lot 822 on RP839746
- 203 Ashmore Road, Benowa

The site locality is shown in Figure 1.

Figure 1: Site Locality

2.2 Description of Surrounding Area

The site is bound by Ashmore Road and residential to the south, Benowa Road to the west, Carrara Street to the north and commercial uses to the east. The current acoustic environment at the site is primarily comprised of road traffic noise from Ashmore Road, Benowa Road and Carrara Street.

3 Proposed Development

3.1 Development Description

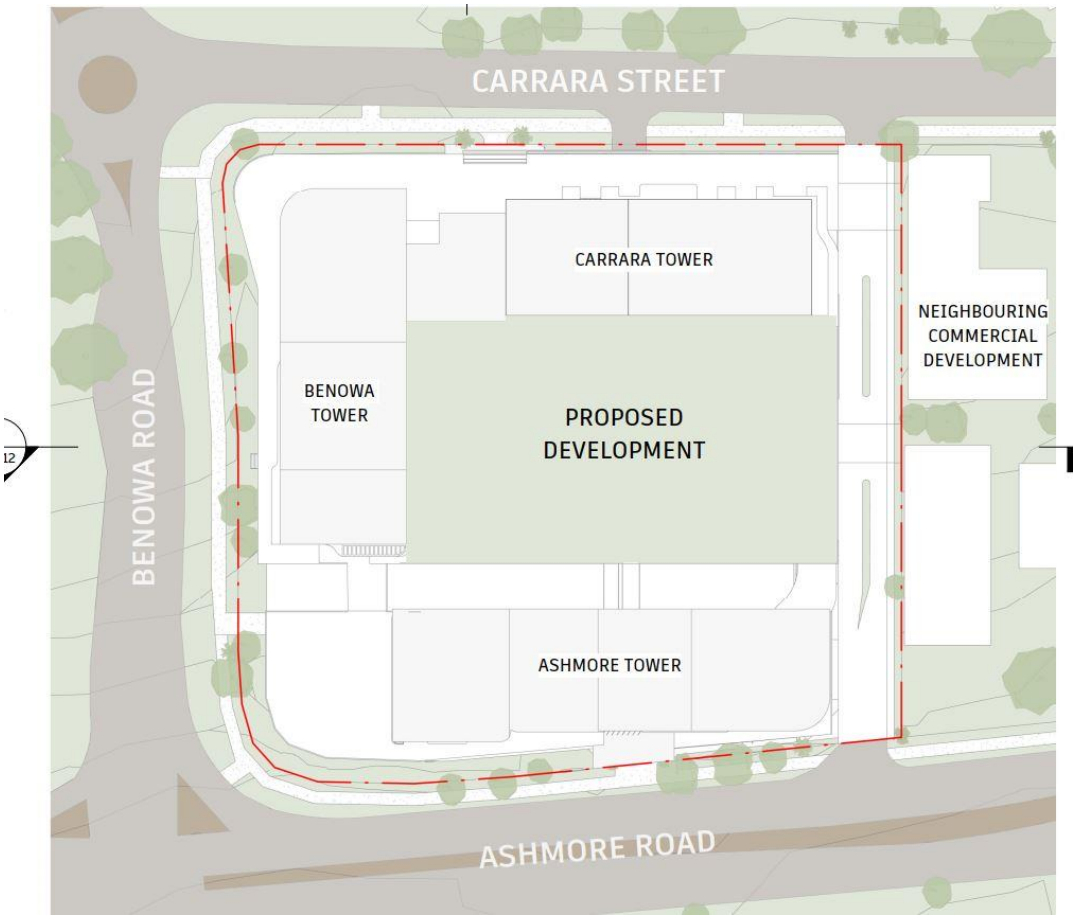
The proposal is for a mixed-use development comprising of the following:

- 397 apartments from level 4 to 13
- 700 retail and 270 perimeter car parking spaces from B3 to B1
- 490 residential car parking spaces from level 2 to 3
- 10000m^2 total retail area
- 8400m^2 total perimeter use area (short term accommodation or health care suites)
- 3000m^2 total commercial area

The assessment is based on the development plans shown in Appendix A.

A site plan of the proposed development is shown in Figure 2.

Figure 2: Development Site Plan



4 Noise Measurements

Noise surveys were undertaken on the Benowa Gardens site to establish the existing ambient and road traffic noise conditions.

4.1 Equipment

The following equipment was used to measure existing noise levels:

Table 1: Summary of Noise Monitoring Equipment

Purpose	Equipment	Serial Number	Location
Unattended noise monitoring	ARL EL316 environmental noise monitor	16-707-039	Location A – 7m from Ashmore Road
	ARL EL316 environmental noise monitor	16-707-040	Location B –12m from Benowa Road
	ARL Ngara environmental noise monitor	878244	Location C – 7m from Carrara Road
	SV31 Acoustical Calibrator	38174	n/a

All equipment was calibrated by a National Association of Testing Authorities (NATA) accredited laboratory. The equipment was calibrated before and after the measurement session. No significant drift from the reference signal was recorded.

4.2 Unattended Noise Monitoring

Unattended noise monitoring was conducted to establish the existing road traffic noise and ambient levels between Monday 3rd February and Tuesday 11th February 2025. The noise monitoring locations are shown in Figure 3 below.

The road traffic noise monitors were located in shrubbery with a relatively unobstructed line of sight to each road. The ambient noise monitoring data was drawn from the most representative noise monitor.

The microphones were in free-field locations and 1.5m above ground level. The road traffic noise monitors were set to measure statistical noise levels in 'A'-weighting, 'Fast' response, over 60-minute intervals. Road traffic noise levels were measured in accordance with Australian Standard AS2702[1]. The ambient noise monitor was set to measure statistical noise levels in 'A'-weighting, 'Fast' response, over 15-minute intervals. Ambient noise levels were measured in accordance with Australian Standard *AS1055*[2].

[1] Australian Standard *AS2702:1984 Acoustics – Methods for the Measurement of Road Traffic Noise*

[2] Australian Standard *AS1055:2018 Acoustics – Description and Measurement of Environmental Noise*

Weather during the noise monitoring period was generally fine. The temperature range was between 20-29°C (source: Bureau of Meteorology, Gold Coast Seaway weather station).

Figure 3: Noise Monitoring Locations

4.4 Results of Measurements

4.4.1 Road Traffic Noise Levels

Table 2 presents the measured road traffic noise levels from each of the three (3) noise monitoring locations.

Table 2: Measured Road Traffic Noise Levels

Location, Day and Date	Road Traffic Noise Descriptor	Time Period	Measured Level, dB(A)
Benowa Road Average of measurement days 3rd to 11th February	$L_{A10,18\ hour}$	6am to midnight	65.1
	Noisiest daytime $L_{Aeq,1\ hour}$	10am to 11am	66.4
	Noisiest night time $L_{Aeq,1\ hour}$	10pm to 11pm	58.4
	$L_{Aeq,24\ hour}$	Midnight to midnight	60.0
	$L_{A90,8\ hour}$	10pm to 6am	43.6
	$L_{A90,18\ hour}$	6am to midnight	54.7
Ashmore Road Average of measurement days 3rd to 8th February	$L_{A10,18\ hour}$	6am to midnight	65.2
	Noisiest daytime $L_{Aeq,1\ hour}$	11am to 12pm	65.6
	Noisiest night time $L_{Aeq,1\ hour}$	5am to 6am	57.9
	$L_{Aeq,24\ hour}$	Midnight to midnight	59.6
	$L_{A90,8\ hour}$	10pm to 6am	43.1
	$L_{A90,18\ hour}$	6am to midnight	51.4
Carrara Street Average of measurement days 4th to 11th February	$L_{A10,18\ hour}$	6am to midnight	62.8
	Noisiest daytime $L_{Aeq,1\ hour}$	8am to 9am	62.7
	Noisiest night time $L_{Aeq,1\ hour}$	5am to 6am	60.4
	$L_{Aeq,24\ hour}$	Midnight to midnight	59.9
	$L_{A90,8\ hour}$	10pm to 6am	47.4
	$L_{A90,18\ hour}$	6am to midnight	52.0

Graphical presentation of the measured levels is shown in Appendix B.

4.4.2 Ambient Noise Levels

Table 3 presents the measured ambient noise levels. The Rating Background Level (RBL) was determined in accordance with the requirements of Council. Graphical presentation of the measured levels is shown in Appendix B.

Table 3: Measured Ambient Noise Levels

Time Period	Measured Noise Levels, dB(A)					
	RBL L_{90}			L_{eq}		
Location	Benowa Road	Ashmore Road	Carrara Street	Benowa Road	Ashmore Road	Carrara Street
Daytime (7am – 6pm)	55	**51**	52	63	63	61
Evening (6pm – 10pm)	51	49	**47**	62	61	59
Night-time (10pm – 7am)	**39**	41	45	56	57	58

The lowest RBL from each time period was chosen for the purposes of establishing the noise emission criteria in accordance with the *Environmental Protection (Noise) Policy*.

5 Noise Criteria

5.1 Road Traffic Noise

The development site is situated adjacent to Ashmore Road, Benowa Road and Carrara Street, which are local Council controlled roads, and therefore the City of Gold Coast Council *Regional Infrastructure Overlay Code* is applied.

5.1.1 City of Gold Coast Council

Table 8.2.14-3: Design level – road and rail noise criteria of the City of Gold Coast Council *Regional Infrastructure Overlay Code* outlines the external and internal noise criteria for residential uses. The noise assessment requirements are summarised in Table 4.

Table 4: The City of Gold Coast Council *Regional Infrastructure Overlay Code* – Road Traffic Noise Criteria

Development Type	Measurement Location	Design Level Road Noise Criteria
Accommodation Activities	External (1m in front of the most exposed part of a proposed sensitive land use)	≤60 dB(A) L_{10} (18h) façade corrected (where the measured L_{90} (8h) free field between 10pm and 6am ≤40dB(A))
		≤63 dB(A) L_{10} (18h) façade corrected (where the measured L_{90} (8h) free field between 10pm and 6am >40dB(A))
		Where the above criteria cannot be met, internal maximum design criterion levels specified in Table 1 of AS2107 apply, particularly for buildings greater than 1 storey high.
	External (Balconies and formal external open space)	≤57 dB(A) L_{10} (18h) free field (where the measured L_{90} (18h) free field between 6am and 12 midnight ≤45dB(A))
		≤60 dB(A) L_{10} (18h) free field (where the measured L_{90} (18h) free field between 6am and midnight >45dB(A))

5.1.2 Queensland Development Code MP4.4

The Queensland Development Code Part MP 4.4 - 'Buildings in a Transport Noise Corridor' August 2015 (QDC) specifies Noise Categories to ensure that habitable rooms of residential buildings are adequately protected from transport noise.

The Noise Categories list the minimum acoustic R_W ratings for each building component to comply with the indoor sound levels of AS2107[3]. Internal noise levels specified in Table 1 of AS2107 are expressed as L_{Aeq} levels and are reproduced in Table 5 below.

[3] Australian Standard *AS2107:2016 Acoustics – Recommended Design Sound Levels and Reverberation Times for Building Interiors*

Table 5: Indoor Design Sound Levels for Residential Buildings from AS2107

Type of Occupancy	Recommended Design Sound Level $L_{Aeq,t}$, dB(A)
7. Residential Buildings	
Living areas	35 - 45
Sleeping areas (night time)	35 - 40

It is expected that compliance with AS2107 would be achieved through implementation of the Noise Category building treatment recommendations specified by QDC MP4.4.

The triggers for each noise category are summarised in Table 6. Details regarding the noise categories and acceptable forms of construction can be found within Schedule 1 and 2 of the QDC document.

Table 6: Road Traffic Noise Category Levels - QDC MP4.4 (Schedule 3)

Noise Category	Level of Transport Noise* $L_{A10,\ 18Hour}$ for State-Controlled Roads and Designated Local Government Roads
Category 4	≥ 73 dB(A)
Category 3	68 – 72 dB(A)
Category 2	63 – 67 dB(A)
Category 1	58 – 62 dB(A)
Category 0	≤ 57 dB(A)

*Measured at 1m from the façade of the proposed or existing building.

5.1.3 Australian Standard AS2107 – Commercial Uses

Potential uses within the development are exposed to road traffic noise from the surrounding road network. The recommended indoor sound levels for different types of occupancies are summarised in Table 7.

Table 7: Indoor Design Sound Levels for Different Areas of Occupancy from AS2107

Type of Occupancy	Recommended Design Sound Level $L_{Aeq,t}$, dB(A)
2. Health Buildings	
Consulting Rooms, Dental Clinics, Nurses stations	40 - 45
Office Areas	35 - 45
8. Shop Buildings	
Small Retail Stores (general)	< 55
Supermarkets	< 55
Enclosed Carparks	< 65

5.2 Environmental Noise

PO2 of the *General Development Provisions Code* (City Plan) requires that the proposed development prevents loss of amenity and threats to health and safety, having regard to noise. No specific noise criteria is stated. Therefore, assessment of noise emissions from onsite noise sources is considered to be pursuant to the *Environmental Protection (Noise) Policy* (EPP). Council requires the 2008 version of the Noise Policy to be used to include an assessment using the Background Creep criteria which was removed from the 2019 version. The Acoustic Quality Objectives criteria remains the same in both 2008 and 2019 versions. Details of the criteria and established noise limits are presented below.

5.2.1 Acoustic Quality Objectives (EPP 2008 and 2019)

Table 8 presents the acoustic quality objectives at noise sensitive receivers as detailed in Schedule 1 of the *Environmental Protection (Noise) Policy*.

Table 8: Acoustic Quality Objectives at Noise Sensitive Receivers

Sensitive Receiver	Time of Day	Acoustic Quality Objectives, dB(A)		
		$L_{Aeq,adj,1hr}$	$L_{A10,adj,1hr}$	$L_{A1,adj,1hr}$
Dwelling (Outdoors)	Day and Evening (7am – 10pm)	50	55	65
Dwelling (Indoors)	Day and Evening (7am – 10pm)	35	40	45
	Night (10pm – 7am)	30	35	40
Hospital, surgery or other medical institution	Visiting hours	35	-	-

5.2.2 Background Creep (EPP 2008)

The Background Creep criteria forms part of the *Environmental Protection (Noise) Policy 2008* and is included in this report for completeness. This criterion is to prevent background noise progressively increasing or creeping higher over time with the establishment of new developments in a locality. EPP2008 states that:

2. *To the extent that it is reasonable to do so, noise from an activity must not be—*
   - *for noise that is continuous noise measured by $L_{A90,T}$—more than nil dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$; or*
   - *for noise that varies over time measured by $L_{Aeq,adj,T}$—more than 5dB(A) greater than the existing acoustic environment measured by $L_{A90,T}$.*

In accordance with the Environmental Protection Regulation 2008, the time period (T) is considered to be a time interval of at least 15 minutes, or if the noise continues for less than 15 minutes, the duration of the noise source.

The Background Creep criteria for steady-state and transient noise sources are stated in Table 9.

Table 9: Background Creep Noise Limits at Noise Sensitive Properties (EPP2008)

Time Period	Steady-State Noise Emission Criteria, dB(A)	Time Varying Noise Emission Criteria, dB(A)
	$L_{A90,T}$	$L_{Aeq,T}$
Day (7am – 6pm)	51	56
Evening (6pm – 10pm)	47	52
Night (10pm – 7am)	39	44

The above steady-state criterion levels are quoted as a measured level, not a component level; hence, for mechanical plant, all plant proposed must be included in the assessment. By designing plant noise to a measured level rather than a component level, the additive effect of multiple plant is taken into account.

6 Road Traffic Noise Assessment

An assessment of road traffic noise from Ashmore Road, Benowa Road and Carrara Street was conducted to determine the extent of acoustic treatments necessary for compliance with the assessment criteria.

6.1 Assessment Criteria

Based on the measured background noise levels detailed in Table 2 and the criteria outlined in Section 5.1, the following external road traffic noise limits apply to the development:

- Façades: An external noise level of 63 dB(A) $L_{A10\,(18\,hour)}$ façade corrected.
- Private Open Space: An external noise level of 60 dB(A) $L_{A10\,(18\,hour)}$ free-field.

6.2 Traffic Volumes

Table 10 presents the existing traffic volumes for Ashmore Road and Benowa Road which were obtained from the City of Gold Coast Council (Open Data website). Traffic volumes for Carrara Street were unavailable and therefore the traffic volume was estimated for the purposes of verifying the unattended noise monitoring result.

Heavy vehicle percentages were unavailable from the City of Gold Coast Council Open Data website and were therefore estimated for the purposes of noise modelling. A conservative compound growth rate of 2% per annum was applied to determine future traffic volumes in 2036 to reflect a 10-year planning horizon from completion of the development.

Table 10: Traffic Volumes used in the Noise Model

Road	Traffic Volumes (AADT)					Heavy Vehicles (%)	Avg. Growth Rate (%)
	2020	2021	2023	2024	2036		
Ashmore Road	-	-	21,655	22,088	28,013	4.0	2.0
Benowa Road	8,999	-	-	9,741	12,111	2.0	2.0
Carrara Street	-	-	-	6,000	7,460	2.0	2.0

The 18-hour traffic volumes used in the noise model are taken to be 95% of the AADT (Annual Average Daily Traffic).

6.3 Road Traffic Noise Model

6.3.1 Noise Modelling Parameters

Road traffic noise predictions were conducted using 'SoundPLAN v9.0', a CoRTN based modelling program. The basis of the 'SoundPLAN' model is as follows:

Table 11: Road Traffic Noise Modelling Parameters

Description	Value
Noise modelling standard	CoRTN
Angle increment	1 ^{O}
Grid spacing (noise maps)	2m squares
Road surface type	Impervious (+0dB(A))
Ground contours	Obtained from Elvis - Elevation and Depth - Foundation Spatial Data. Segments: • GoldCoast_2014_LGA_SW_538000_6901000_1K_DEM_1m
Ashmore Road speed limit	60km/h
Benowa Road speed limit	60km/h
Carrara Street speed limit	40km/h
Noise source height above grade	0.5m
Development floor heights	As per development plans
Receiver heights	1.8m above finished floor level
Free-field calibration factor	-0.7 dB(A) adjustment as per Table 4.3.2.1 of TMR Code of Practice
Receiver (façade corrected) calibration factor	-1.7 dB(A) adjustment as per Table 4.3.2.1 of TMR Code of Practice
Façade correction	+2.5dB(A)

6.3.2 Noise Model Verification

To verify the road traffic noise model, the $L_{A10,\ 18\ Hour}$ noise levels were modelled and compared to the measured levels presented in Table 2. As the noise monitors were in a free-field location, the predicted noise levels are also shown as free-field. Details of the noise model verification are shown in Table 12. The SoundPLAN prediction is shown in Appendix C.

Table 12: Comparison between measured and modelled road traffic noise level

Logger Locations	Measured $L_{A10,\ 18\ Hour}$	Predicted $L_{A10,\ 18\ Hour}$	Model Adjustment
7m from Ashmore Road	65.2	66.3	0
12m from Benowa Road	65.1	65.2	0
7m from Carrara Street	62.8	63.2	0

The modelled levels are within the allowable tolerance of 2dB(A) of the measured level and no correction is required.

6.4 Predicted Road Traffic Noise Levels

Modelling was conducted to determine the road traffic noise levels at the development in the 10-year planning horizon. A summary of the predicted noise impacts at the façade and outdoor areas of the development are provided below. Detailed receiver point modelling results are shown in Appendix C.

6.4.1 Building Façade

The road traffic noise contours at the residential facades of Level 4 and Level 10 are presented in the figures below. The predicted noise levels at these floor levels are representative of the impacts on the whole development.

Figure 4: Predicted Road Traffic Noise Levels at Facades – Level 4

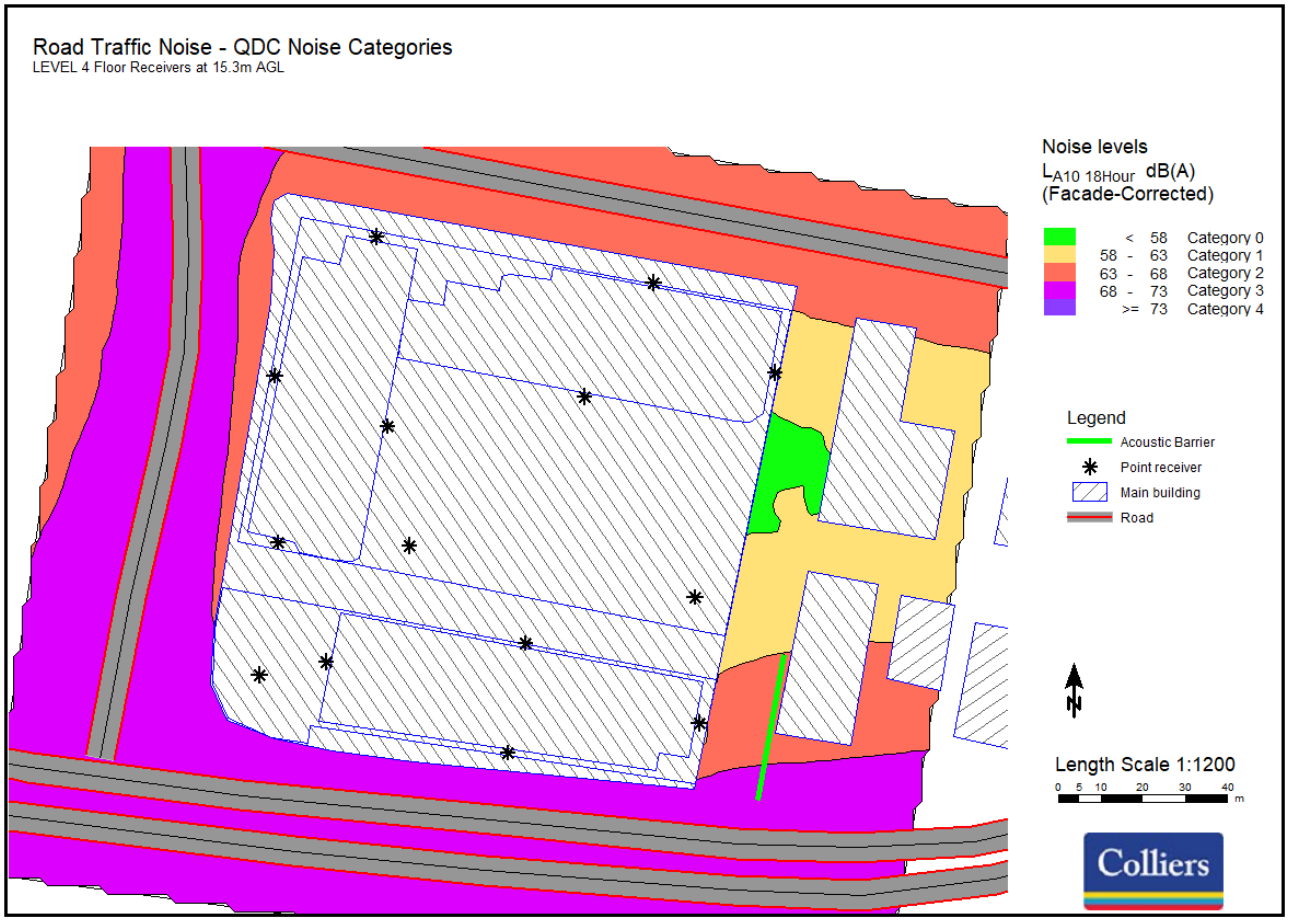
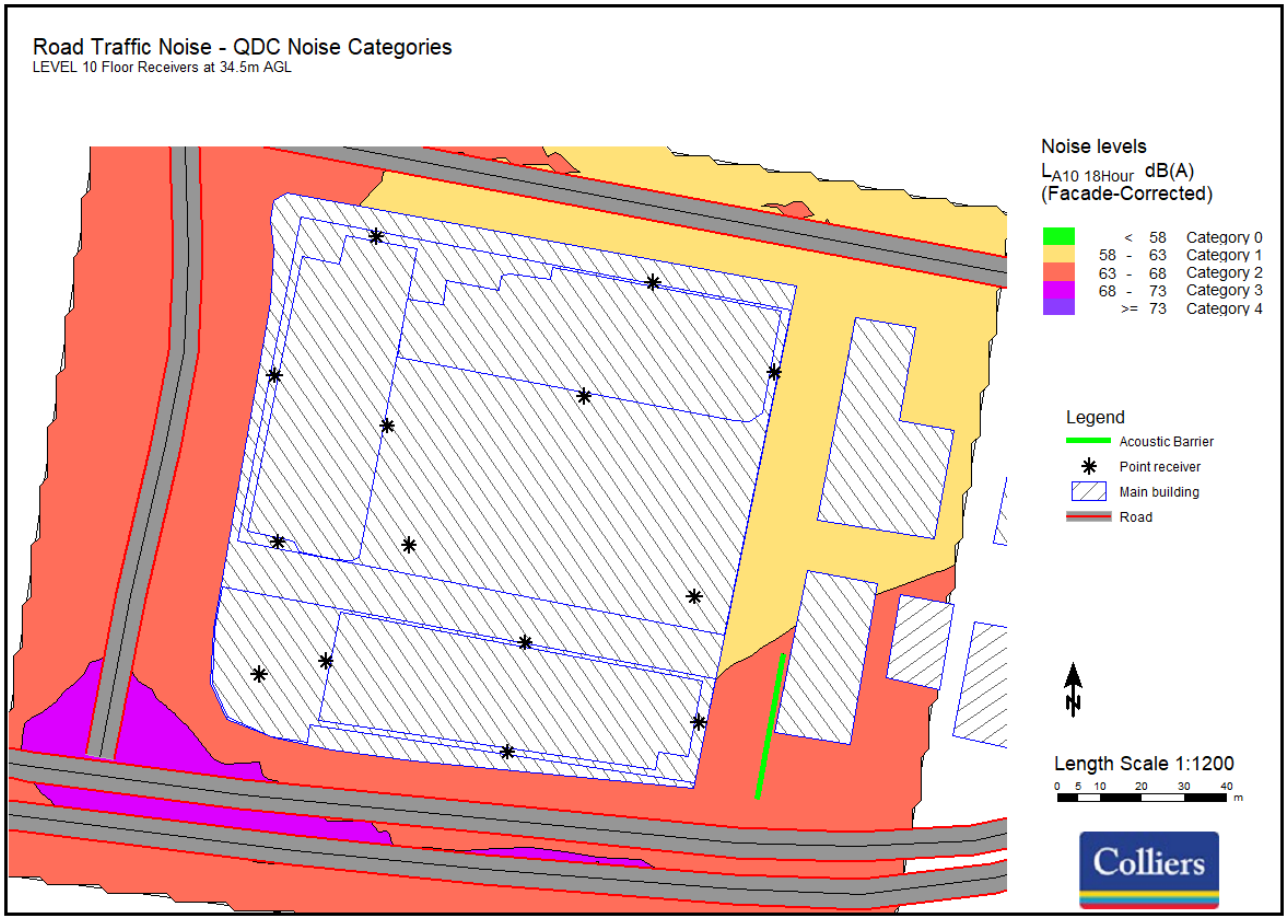


Figure 5: Predicted Road Traffic Noise Levels at Facades – Level 10



Road traffic noise levels at the residential component of the development range from QDC MP4.4 Noise Category 0 to Noise Category 3. Acoustic building treatments will therefore be required to achieve compliance with recommended internal sound levels.

Details of future construction requirements in accordance with QDC MP4.4 are outlined in Section 9.

6.4.2 Outdoor Space (Balconies)

The road traffic noise contours at Level 4 and Level 10 of the development compared to the outdoor space (balcony) criteria of 60dB(A) are presented in Figure 6 and Figure 7 below.

Figure 6: Predicted Road Traffic Noise Levels Compared to Outdoor Criteria – Level 4

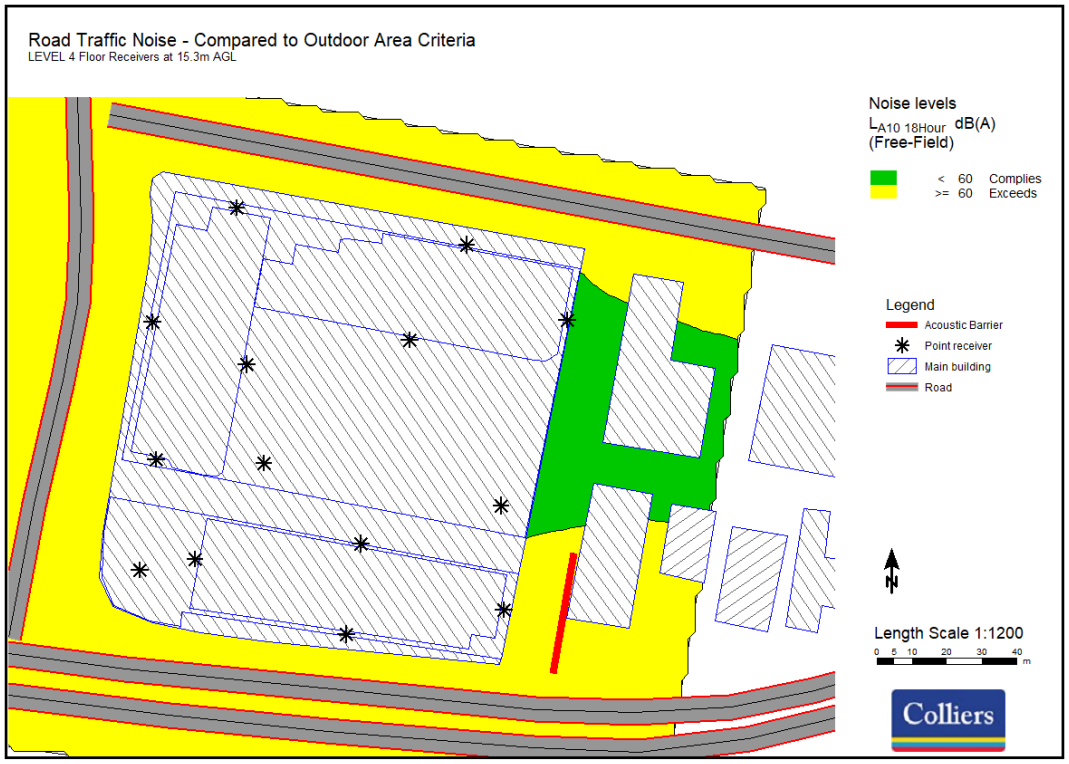
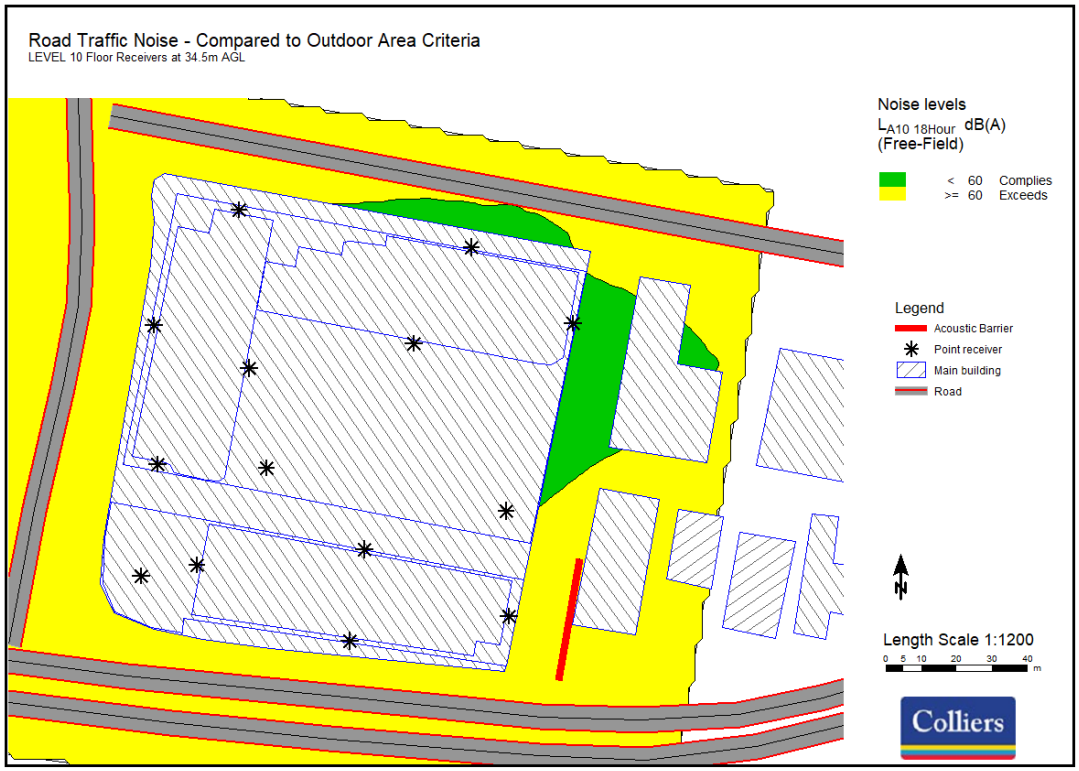


Figure 7: Predicted Road Traffic Noise Levels Compared to Outdoor Criteria – Level 10



Road traffic noise levels are generally predicted to exceed the outdoor criteria at balconies facing the surrounding road network. Therefore, it will be recommended that solid balcony upstands are used for balconies in these locations to reduce noise levels where possible.

6.4.3 Outdoor Space (Communal Recreation Areas)

The predicted road traffic noise levels at the outdoor recreation areas on Level 7 are presented in Table 13.

Table 13: Predicted Road Traffic Noise Levels at Communal Outdoor Areas

Communal Recreation Area	Predicted $L_{A10,\ 18\ Hour}$ (Free-field)	Complies with Criteria?
Ashmore Tower	54	✓
Benowa / Carrara Tower	53	✓

Road traffic noise levels at the communal recreation areas are predicted to comply with the criteria of $L_{10\ (18\ hour)}$ 60dB(A) in all instances. Therefore, no further acoustic treatment is required.

7 Assessment of Onsite Noise Impacting Noise Sensitive Receivers

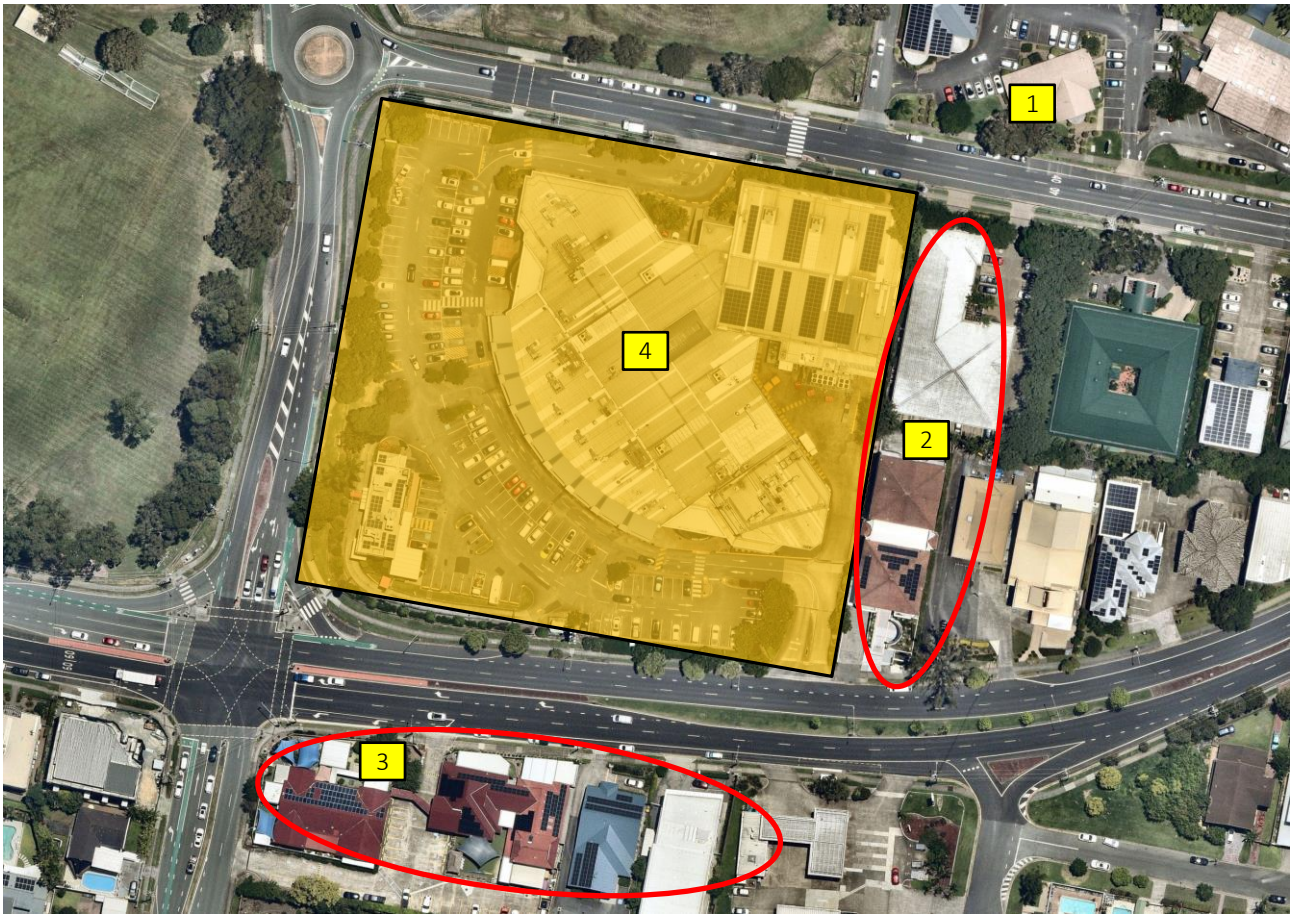
An assessment of activities associated with the proposed development was conducted to determine potential impacts at the nearest noise sensitive receivers. Details of the analysis is presented below.

7.1 Noise Sensitive Receivers

This assessment will focus on the nearest noise sensitive receivers as outlined below and shown in Figure 8. If compliance can be achieved at these nearest receivers, then all remaining noise sensitive locations are expected to comply due to additional separation distance or intervening screening features.

- Receiver 1: Pindara Physiotherapy
- Receiver 2: Health centre sites (Medlands Orthodontics, GP suites)
- Receiver 3: Medical suites, Childcare centre
- Receiver 4: Most affected apartments of proposed development

Figure 8: Noise Sensitive Receivers



7.2 Noise Source Levels

Table 14 presents the typical noise sources generated by the development and the respective measured noise levels in $L_{Aeq,T}$, $L_{A10,T}$, and $L_{A1,T}$. The noise source levels were calculated to one metre and include corrections for tonality and impulsiveness as per *AS1055*.

Table 14: Typical Onsite Transient Noise Source Levels

Noise Source Description	Noise Level at 1m, dB(A)			Measured Duration (sec)
	$L_{Aeq,T}$	$L_{A10,T}$	$L_{A1,T}$	
Car door closure	75*	77*	83*	2
Car bypass @ 5km/h	69	75	75	6
Car engine ignition	72	74	74	3
Conversations	65	68	70	Long term
Crowd Noise	74	77	82	Long term
Unloading a delivery vehicle	80	83	85	60
Waste collection	93*	94*	105*	40

*Includes 2dB(A) adjustment to account for impulsiveness characteristics in accordance with AS1055.

Includes 5dB(A) adjustment to account for tonal noise characteristics in accordance with AS1055. Not applicable.

7.3 Calculation Assumptions

Noise predictive calculations in accordance with *Environmental Protection (Noise) Policy* are based on the number of events occurring within a typical or worst-case period. The following assumptions have been made for noise calculations:

- Site traffic generation rates are based on an estimated traffic generation rate of 0.5 vph/carpark spot. Car park noise is predicted from the retail car park levels (basement), residential car park levels and internal street ramp.
- Noise levels for voice are based on published data contained in Harris, C.M., *Handbook of Acoustical Measurements and Noise Control* – 3rd ed. Ch 16.3, Mc Graw-Hill Inc. The voice level at 1m (long term average) used for the assessment of conversations was taken from the 'Raised' category with an associated noise level of 65 dB(A) for an individual male. Conversation is predicted from the nearest relevant location (i.e. café, congregation area, loading dock, etc.).
- Deliveries and waste collection are predicted from the loading dock.
- Noise attenuation provided by intervening building structures where applicable.
- Cumulative noise totals are provided for the commonly occurring sources such as car parking and voices.

Table 15 presents the expected proportion of time / number of noise events for the basis of the calculations. These have then been assumed to be the same across all time periods (day, evening and night).

Table 15: Assumptions used for Onsite Noise Calculations

Noise Source Description	Prediction Location	Day/Evening/Night Period
		Events per hour or % of Assessment Period
Car door closure	Retail car park	700 events (based on 2 events per vehicle)
Car bypass @ 5km/h	Access road to car park	350 events
Car engine ignition	Retail car park	350 events
Car door closure	Residential car park	490 events (based on 2 events per vehicle)
Car bypass @ 5km/h	Access road to car park	245 events
Car engine ignition	Residential car park	245 events
Conversations	Retail areas	80% of the time
Crowd Noise	Residential communal area	80% of the time
Unloading a delivery vehicle	Loading dock	2 events per hour
Waste collection	Loading dock	2 events per hour

7.4 Predicted Onsite Noise Levels at Receivers

Predicted noise levels are based on the noise source levels presented in Table 14, calculation assumptions listed in Section 7.3 and Table 15, distance loss to the nearest receiver, and noise reduction from intervening structures where applicable. Sample calculations are shown in Appendix D.

7.4.1 Acoustic Quality Objective Predictions

Table 17 presents the predicted acoustic quality objective noise levels nearby commercial receivers with windows/doors closed. Any noise level exceedances are shown in bold and underline.

Table 16: Acoustic Quality Objective Onsite Noise Predictions - Commercial Receivers

Receiver	Noise Source	Predicted Internal Noise Level, $L_{Aeq,\ 1hr}$ dB(A)	Complies with 35dB internally:
1	Car door closure (retail car park)	<10	✓
	Car bypass (retail car park)	12	✓
	Car engine ignition (retail car park)	<10	✓
	Car door closure (residential car park)	<10	✓
	Car bypass (residential car park)	10	✓
	Car engine ignition (residential car park)	<10	✓
	Conversations	<10	✓
	Crowd noise (communal recreation areas)	<10	✓
	Unloading deliveries	10	✓
	Waste collection	22	✓
	Cumulative total noise	*14*	✓
2	Car door closure (retail car park)	<10	✓
	Car bypass (retail car park)	29	✓

Receiver	Noise Source	Predicted Internal Noise Level, $L_{Aeq,\ 1hr}$ dB(A)	Complies with 35dB internally:
	Car engine ignition (retail car park)	<10	✓
	Car door closure (residential car park)	<10	✓
	Car bypass (residential car park)	28	✓
	Car engine ignition (residential car park)	<10	✓
	Conversations	14	✓
	Crowd noise (communal recreation areas)	18	✓
	Unloading deliveries	19	✓
	Waste collection	30	✓
	Cumulative total noise	*32*	✓
3	Car door closure (retail car park)	<10	✓
	Car bypass (retail car park)	<10	✓
	Car engine ignition (retail car park)	<10	✓
	Car door closure (residential car park)	<10	✓
	Car bypass (residential car park)	12	✓
	Car engine ignition (residential car park)	<10	✓
	Conversations	<10	✓
	Crowd noise (communal recreation areas)	<10	✓
	Unloading deliveries	<10	✓
	Waste collection	<10	✓
	Cumulative total noise	*12*	✓

Noise levels associated with the development are predicted to comply at the surrounding commercial receivers without the need for acoustic treatment.

Table 17 presents the predicted acoustic quality objective noise levels at the nearest residential receivers (onsite apartments within the development). The criteria for day/evening periods is specified in the table heading, with the night time indoor criteria shown in brackets. Noise level exceedances are shown in bold and underline.

Table 17: Acoustic Quality Objective Onsite Noise Predictions – Residential Receivers

Receiver	Noise Source	Predicted Noise Level, dB(A)					
		$L_{Aeq,\ 1hr}$		$L_{A10,\ 1\ hr}$		$L_{A1,\ 1hr}$	
		Outdoors	Indoors	Outdoors	Indoors	Outdoors	Indoors
	Criteria	50	35 (30)	55	40 (35)	65	45 (40)
4	Car door closure (retail car park)	21	11	23	13	29	19
	Car bypass (retail car park)	42	**32**	48	**38**	48	38
	Car engine ignition (retail car park)	17	<10	19	<10	19	<10
	Car door closure (residential car park)	38	28	40	30	46	36
	Car bypass (residential car park)	41	**31**	47	**37**	47	37
	Car engine ignition (residential car park)	34	24	36	26	36	26

Receiver	Noise Source	Predicted Noise Level, dB(A)					
		$L_{Aeq, 1hr}$		$L_{A10, 1 hr}$		$L_{A1, 1hr}$	
		Outdoors	Indoors	Outdoors	Indoors	Outdoors	Indoors
	Criteria	50	35 (30)	55	40 (35)	65	45 (40)
	Conversations	22	12	25	15	27	17
	Crowd noise (communal recreation areas)	49	**39**	52	**42**	57	**47**
	Unloading deliveries	39	29	42	32	44	34
	Waste collection	50	**40**	51	**41**	62	**52**
	Cumulative total noise	*50*	***40***	*54*	***44***	*58*	***48***

Noise levels generated onsite are predicted, in some instances, to exceed the Acoustic Quality Objectives at the most exposed apartments of the development. Internal compliance is predicted to be achieved with standard building construction and windows/doors closed. Therefore, no further acoustic treatment is required.

7.4.2 Background Creep Predictions (15-minute Duration)

Table 18 presents the background creep predictions averaged over a 15-minute duration.

Table 18: Background Creep Onsite Noise Predictions (15-minute Duration)

Receiver	Noise Source	Predicted External Noise Level, $L_{eq\ (15min)}$ dB(A)	Complies with Criteria: (Yes/No)		
			Day 56 dB(A)	Evening 52 dB(A)	Night 44 dB(A)
1 North	Car door closure (retail car park)	<10	✓	✓	✓
	Car bypass (retail car park)	32	✓	✓	✓
	Car engine ignition (retail car park)	<10	✓	✓	✓
	Car door closure (residential car park)	11	✓	✓	✓
	Car bypass (residential car park)	30	✓	✓	✓
	Car engine ignition (residential car park)	<10	✓	✓	✓
	Conversations	<10	✓	✓	✓
	Crowd noise (recreation area)	<10	✓	✓	✓
	Unloading deliveries	33	✓	✓	✓
	Waste collection	45	✓	✓	× (+1dB)
	Cumulative total noise	34	✓	✓	✓
2 East	Car door closure (retail car park)	16	✓	✓	✓
	Car bypass (retail car park)	49	✓	✓	× (+5dB)
	Car engine ignition (retail car park)	12	✓	✓	✓
	Car door closure (residential car park)	20	✓	✓	✓
	Car bypass (residential car park)	48	✓	✓	× (+4dB)
	Car engine ignition (residential car park)	16	✓	✓	✓
	Conversations	34	✓	✓	✓

Receiver	Noise Source	Predicted External Noise Level, $L_{eq\ (15min)}$ dB(A)	Complies with Criteria: (Yes/No)		
			Day 56 dB(A)	Evening 52 dB(A)	Night 44 dB(A)
	Crowd noise (recreation area)	38	✓	✓	✓
	Unloading deliveries	42	✓	✓	✓
	Waste collection	53	✓	× (+1dB)	× (+9dB)
	Cumulative total noise	52	✓	✓	× (+8dB)
3 South	Car door closure (retail car park)	11	✓	✓	✓
	Car bypass (retail car park)	<10	✓	✓	✓
	Car engine ignition (retail car park)	<10	✓	✓	✓
	Car door closure (residential car park)	15	✓	✓	✓
	Car bypass (residential car park)	32	✓	✓	✓
	Car engine ignition (residential car park)	10	✓	✓	✓
	Conversations	<10	✓	✓	✓
	Crowd noise (recreation area)	11	✓	✓	✓
	Unloading deliveries	19	✓	✓	✓
	Waste collection	31	✓	✓	✓
	Cumulative total noise	32	✓	✓	✓
4 Onsite	Car door closure (retail car park)	21	✓	✓	✓
	Car bypass (retail car park)	42	✓	✓	✓
	Car engine ignition (retail car park)	17	✓	✓	✓
	Car door closure (residential car park)	38	✓	✓	✓
	Car bypass (residential car park)	41	✓	✓	✓
	Car engine ignition (residential car park)	34	✓	✓	✓
	Conversations	22	✓	✓	✓
	Crowd noise (recreation area)	49	✓	✓	× (+5dB)
	Unloading deliveries	42	✓	✓	✓
	Waste collection	53	✓	× (+1dB)	× (+9dB)
	Cumulative total noise	50	✓	✓	× (+6dB)

The summary of the background creep ($L_{eq\ 15min}$) predictions is as follows:

- Noise levels are generally predicted to comply with the background creep criteria during day and evening periods.
- Car bypass, waste collection, and cumulative total noise is predicted to exceed the night-time criteria at Receiver 2 (commercial premises to the east). These premises do not operate during the night-time hours of 10pm to 7am and therefore no further acoustic treatment is required. Further, compliance with the internal acoustic quality objectives is achieved to provide satisfactory acoustic amenity for these locations.
- Some noise sources are predicted to exceed the night-time criteria at the nearest onsite apartments of the development. Standard building construction with windows/doors closed is predicted to achieve

compliance with the internal AQO criteria which will provide satisfactory acoustic amenity for these locations.

- Based on the predicted exceedances for waste collection, it will be recommended that waste collection activities are conducted during the daytime hours of 7am to 6pm where possible.

7.4.3 Background Creep Predictions (Duration of Noise Source)

Table 19 presents the background creep predictions assessed against the duration of each noise source. The noise levels are provided as a source of additional information showing the maximum expected noise levels at noise sensitive receivers during an onsite noise event. Waste collection is excluded from evening and night predictions based on the results and recommendations from the previous sections.

Table 19: Background Creep Onsite Noise Predictions (Duration of Noise Source)

Receiver	Noise Source	Predicted External Noise Level, $L_{eq\ (period)}$ dB(A)	Complies with Criteria: (Yes/No)		
			Day 56 dB(A)	Evening 52 dB(A)	Night 44 dB(A)
1 North	Car door closure (retail car park)	12	✓	✓	✓
	Car bypass (retail car park)	34	✓	✓	✓
	Car engine ignition (retail car park)	<10	✓	✓	✓
	Car door closure (residential car park)	17	✓	✓	✓
	Car bypass (residential car park)	34	✓	✓	✓
	Car engine ignition (residential car park)	14	✓	✓	✓
	Conversations	<10	✓	✓	✓
	Crowd noise (recreation area)	10	✓	✓	✓
	Unloading deliveries	45	✓	✓	×
	Waste collection	58	×	n/a	n/a
2 East	Car door closure (retail car park)	20	✓	✓	✓
	Car bypass (retail car park)	52	✓	✓	×
	Car engine ignition (retail car park)	17	✓	✓	✓
	Car door closure (residential car park)	25	✓	✓	✓
	Car bypass (residential car park)	52	✓	✓	×
	Car engine ignition (residential car park)	22	✓	✓	✓
	Conversations	35	✓	✓	✓
	Crowd noise (recreation area)	39	✓	✓	✓
	Unloading deliveries	54	✓	×	×
	Waste collection	67	×	n/a	n/a
3 South	Car door closure (retail car park)	15	✓	✓	✓
	Car bypass (retail car park)	11	✓	✓	✓
	Car engine ignition (retail car park)	12	✓	✓	✓
	Car door closure (residential car park)	20	✓	✓	✓

Receiver	Noise Source	Predicted External Noise Level, $L_{eq\ (period)}$ dB(A)	Complies with Criteria: (Yes/No)		
			Day 56 dB(A)	Evening 52 dB(A)	Night 44 dB(A)
	Car bypass (residential car park)	36	✓	✓	✓
	Car engine ignition (residential car park)	17	✓	✓	✓
	Conversations	<10	✓	✓	✓
	Crowd noise (recreation area)	12	✓	✓	✓
	Unloading deliveries	31	✓	✓	✓
	Waste collection	44	✓	n/a	n/a
4 Onsite	Car door closure (retail car park)	25	✓	✓	✓
	Car bypass (retail car park)	44	✓	✓	✓
	Car engine ignition (retail car park)	22	✓	✓	✓
	Car door closure (residential car park)	44	✓	✓	✓
	Car bypass (residential car park)	44	✓	✓	✓
	Car engine ignition (residential car park)	41	✓	✓	✓
	Conversations	23	✓	✓	✓
	Crowd noise (recreation area)	49	✓	✓	×
	Unloading deliveries	54	✓	×	×
	Waste collection	67	×	n/a	n/a

All noise sources (except waste collection) comply with the daytime background creep criteria when assessed over the duration of the noise source.

Car movements and deliveries are predicted to exceed evening and night-time criteria in some cases at the nearby commercial uses. These premises generally do not operate outside of the daytime period and therefore the noise impact is considered acceptable.

Crowd noise, deliveries and waste collection is predicted to exceed the criteria in some cases at the most exposed apartments of the development. Standard building construction with windows/doors closed is predicted to achieve compliance with the internal AQO criteria which will provide satisfactory acoustic amenity for these locations. Therefore, no further acoustic treatment is required.

7.5 Preliminary Mechanical Plant Advice

A reverse calculation was conducted to determine the allowable noise source level of onsite mechanical equipment prior to the inclusion of acoustic treatment. This type of assessment was conducted as plant has not been selected during DA stage and it provides guidance around the design of mechanical equipment.

Based on the steady-state Background Creep criteria and distance attenuation from the nearest potential locations to the nearest residential receiver, the allowable mechanical noise levels are presented in Table 20.

Table 20: Mechanical Plant Noise Limit for Compliance Without Acoustic Treatment

Plant location	Allowable noise level at 1m from the nearest piece of plant to receiver to achieve compliance, L_{eq} dB(A)		
	Day (7am – 6pm)	Evening (6pm – 10pm)	Night (10pm – 7am)
Northern facade	82	78	70
Eastern façade	72	68	60
Southern façade	82	78	70

Acoustic treatment or screening of the plant may allow a higher noise limit. Compliance with the noise limits and design criteria should be checked once plant selections and locations are finalised.

8 Assessment of Offsite Noise Impacting the Proposed Development

An assessment of activities associated with offsite premises was conducted to determine potential impacts at the proposed development. The surrounding offsite noise sources are generally comprised of Benowa State School car parking, Benowa State School sporting oval, Benowa High School sporting oval and Pindara Private Hospital Physiotherapy centre carpark. Details of the analysis is presented below.

8.1 Offsite Noise Source Locations

The offsite noise sources with the potential to impact the proposed development are shown in Figure 9.

Figure 9: Potential Offsite Noise Impacts

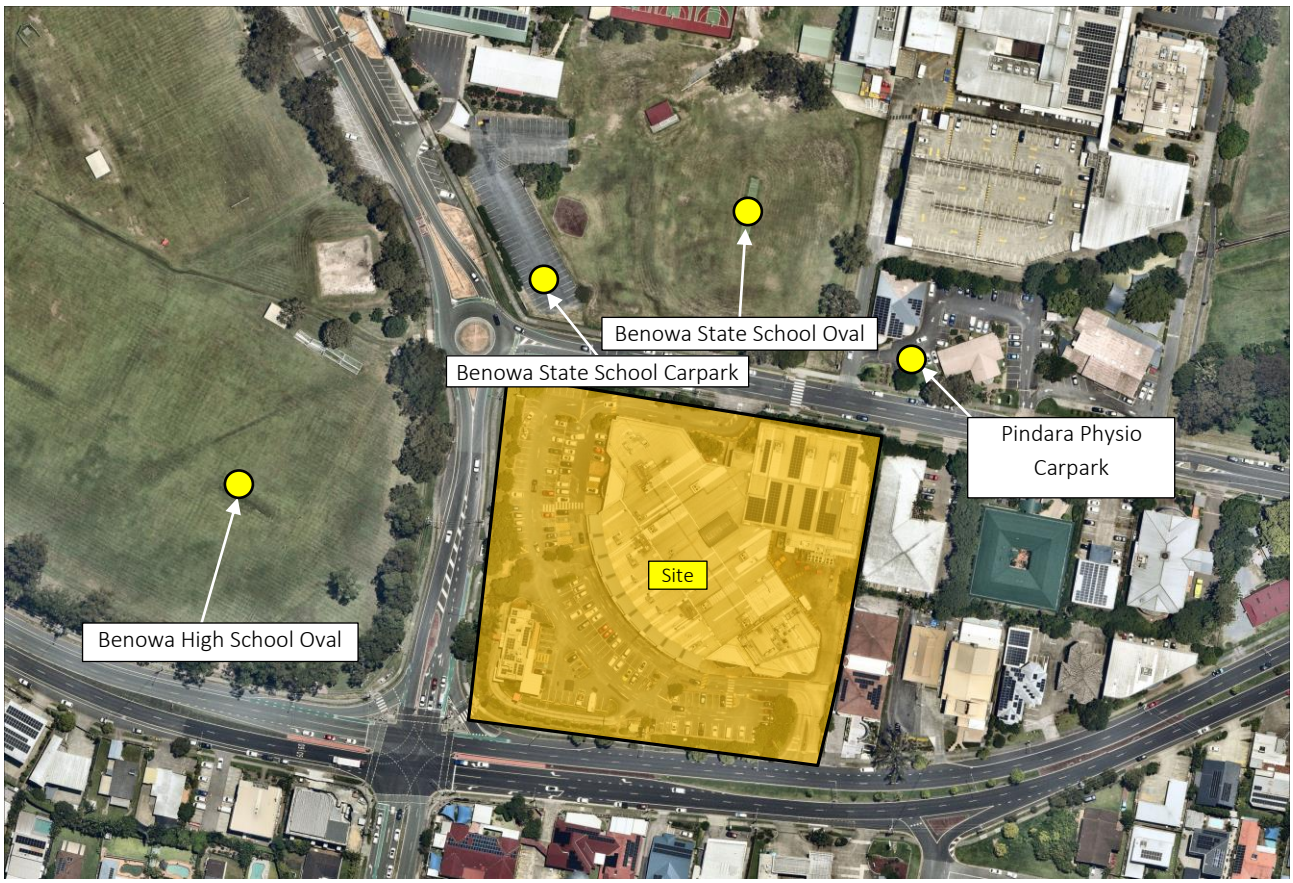


Table 21: Typical Offsite Transient Noise Source Levels

Noise Source Description	Noise Level at 1m, dB(A)			Measured Duration (sec)
	$L_{Aeq,T}$	$L_{A10,T}$	$L_{A1,T}$	
Car door closure	75*	77*	83*	2
Car bypass @ 5km/h	69	75	75	6
Car engine ignition	72	74	74	3
Carpark conversations	65	68	70	Long term
Crowd Noise (school oval)	78	81	85	60
Unloading a delivery vehicle	80*	83*	85*	60
Waste collection	93	94	105	40

*Includes 2dB(A) adjustment to account for impulsiveness characteristics in accordance with AS1055.

Includes 5dB(A) adjustment to account for tonal noise characteristics in accordance with AS1055. Not applicable.

8.3 Offsite Calculation Assumptions

The following assumptions have been made for offsite noise calculations:

- Noise predictions were made to the nearest residential façade of the development.
- Offsite car parking noise predictions were taken from the neighbouring School and Physio car parks and were based on an estimated traffic generation rate of 92 and 69 events per hour respectively.
- Conversations predicted from the neighbouring car parks.
- School children crowd noise predicted from the School Ovals.
- Delivery vehicle predicted from the Pindara Physio car park.
- Waste collection predicted from the Pindara Physio car park.

Table 22 presents the expected proportion of time / number of noise events for the basis of the calculations. These have then been assumed to be the same across all time periods (day, evening and night).

Table 22: Assumptions Used for Offsite Noise Calculations

Noise Source Description	Prediction Location	Day/Evening/Night Period
		Events per hour or % of Assessment Period
Car door closure	Neighbouring Pindara Physio carpark	184 events (based on 2 events per vehicle)
Car bypass @ 5km/h	Neighbouring Pindara Physio carpark	92 events (based on 2 cars per parking spot per hour)
Car engine ignition	Neighbouring Pindara Physio carpark	92 events (based on 2 cars per parking spot per hour)
Conversations	Neighbouring Pindara Physio carpark	80% of the time
Unloading a delivery vehicle	Neighbouring Pindara Physio carpark	2 events
Waste Collection	Neighbouring Pindara Physio carpark	2 events
Car door closure	Neighbouring Benowa School carpark	138 events (based on 2 events per vehicle)

Noise Source Description	Prediction Location	Day/Evening/Night Period
		Events per hour or % of Assessment Period
Car bypass @ 5km/h	Neighbouring Benowa School carpark	69 events (based on 2 events per vehicle)
Car engine ignition	Neighbouring Benowa School carpark	69 events (based on 2 events per vehicle)
Conversations	Neighbouring Benowa School carpark	69 events (based on 2 events per vehicle)
School noise	Benowa school ovals	100% of the time

8.4 Predicted Offsite Noise Levels at the Development

Predicted noise levels are based on the noise source levels presented in Table 21, calculation assumptions listed in Section 8.3 and distance loss to the nearest receiver. Sample calculations are shown in Appendix D.

8.4.1 Acoustic Quality Objective Predictions

Table 23 presents the predicted acoustic quality objective noise levels. The criteria for day/evening periods are specified in the table heading, with the night time indoor criteria shown in brackets. Noise level exceedances are shown in bold and underline.

Table 23: Acoustic Quality Objective Offsite Noise Predictions

Receiver	Noise Source	Location	Predicted Noise Level, dB(A)					
			$L_{Aeq, 1hr}$		$L_{A10, 1 hr}$		$L_{A1, 1hr}$	
			Outdoors	Indoors	Outdoors	Indoors	Outdoors	Indoors
	Criteria		50	35 (30)	55	40 (35)	65	45(40)
Nearest façade of the Development	Car door closure	Pindara	30	20	32	22	38	28
	Car bypass @ 5km/h	Pindara	25	15	31	21	31	21
	Car engine ignition	Pindara	25	15	27	17	27	17
	Conversations	Pindara	28	18	32	22	39	29
	Unloading delivery vehicle	Pindara	30	20	33	23	35	25
	Waste Collection	Pindara	41	**31**	42	32	53	43
	Car door closure	School	28	18	30	20	36	26
	Car bypass @ 5km/h	School	24	14	30	30	30	20
	Car engine ignition	School	24	14	26	16	26	16
	Conversations	School	28	18	32	22	39	29
	Crowd (Primary Oval)	School	40	30	44	34	51	**41**
	Crowd (High Oval)	School	38	28	42	32	49	39
	Cumulative Noise	ALL	*45*	***35***	*48*	***38***	*57*	***47***

Noise levels from offsite activities are generally predicted to comply, with a minor exceedance predicted with the internal night-time criteria. Standard building construction with windows/doors closed would be sufficient to achieve compliance internally. Therefore, no further acoustic treatment is required.

8.4.2 Background Creep Predictions

The background creep criteria is designed to prevent the background noise from creeping higher over time with the establishment of new developments in a locality. This is not applicable when considering existing noise from offsite premises. Therefore, background creep predictions are not provided for offsite noise. Compliance with the Acoustic Quality Objectives criteria is predicted to provide an acceptable amenity for the development.

9 Colliers Recommendations

The recommended acoustic treatments are presented in the sections below to achieve predicted compliance with the relevant assessment criteria.

9.1 Road Traffic Noise

9.1.1 Residential Building Facades

The QDC MP4.4 requires that habitable rooms in residential buildings located in a transport noise corridor are adequately protected from transport noise to safeguard occupant's health and amenity.

In order to achieve the performance requirements of the QDC MP4.4, the external building envelope of habitable rooms must comply with the minimum R_W for each building component specified in Schedule 1 to achieve a minimum transport noise reduction level for the relevant noise category by either one of the following:

a. Using materials specified in Schedule 2 of the QDC MP4.4;

   OR

b. Using materials with manufacturer's specifications that, in combination, achieve the minimum R_W value for the relevant building component and applicable noise category.

For application of Point (b), possible alternative constructions can be determined by the glazier (for glazing) and construction manuals such as 'The Red Book' by CSR (for walls and roof/ceiling).

Noise Categories applicable to residential locations of the development are listed in Table 24 to Table 26. The reference system used for describing the building treatment requirements is shown in Figure 10 below.

Facades or floors not shown in the tables are predicted to be QDC Noise Category 0 and do not require further acoustic treatment.

Table 24: Recommended QDC Noise Categories – Building 1 Ashmore Tower

Floor Level	QDC MP4.4 Noise Category			
	N	S	E	W
Level 4	0	3	2	0
Level 5	0	3	2	0
Level 6	0	3	2	1
Level 7	0	3	2	1
Level 8	0	3	2	2
Level 9	0	3	2	2
Level 10	0	2	2	2
Level 11	0	2	2	2

Table 25: Recommended QDC Noise Categories – Building 2 Benowa Tower

Floor Level	QDC MP4.4 Noise Category			
	N	S	E	W
Level 4	1	1	0	2
Level 5	2	1	0	2
Level 6	2	2	0	2
Level 7	2	2	0	2
Level 8	2	2	0	2
Level 9	1	2	0	2
Level 10	1	2	0	2
Level 11	1	2	0	2
Level 12	1	2	0	2

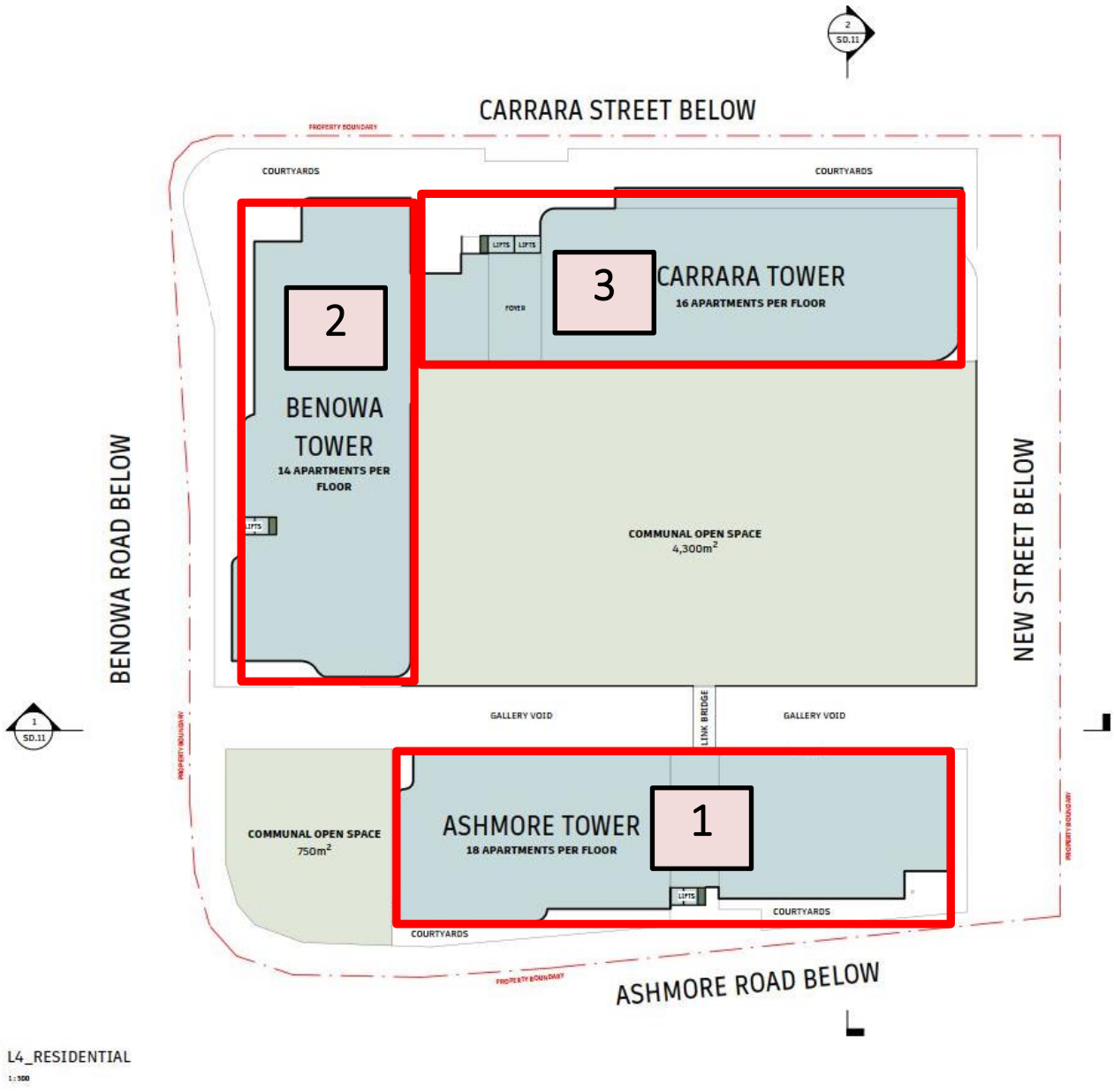
Table 26: Recommended QDC Noise Categories – Building 3 Carrara Tower

Floor Level	QDC MP4.4 Noise Category			
	N	S	E	W
Level 4	2	0	1	-
Level 5	2	0	1	-
Level 6	2	0	1	-
Level 7	1	0	1	-
Level 8	1	0	1	-
Level 9	1	0	1	-
Level 10	1	0	1	-
Level 11	1	0	1	-
Level 12	1	0	1	-
Level 13	1	0	1	-

The construction requirements for each noise category are outlined in QDC MP4.4. An extract of Schedule 1 and Schedule 2 of the QDC is provided in Appendix E.

Noise affected apartments may be constructed in accordance with the QDC Noise Category construction requirements for the nominated floor/facade, or alternatively a glazing design assessment can be conducted by a suitably qualified acoustic consultant to optimise cost savings.

Figure 10: QDC Noise Category Building Reference System



9.1.2 Balcony Treatment

Road traffic noise levels are predicted to exceed the outdoor area criteria in certain locations. The noise affected locations are summarised in Table 27 below.

Table 27: Locations Requiring Balcony Treatment

Building	Noise Affected Facades
Ashmore Tower	SOUTH (all floors) WEST (Level 8 up) EAST (all floors)
Benowa Tower	SOUTH (Level 6 up) WEST (all floors)
Carrara Tower	Nil

Therefore, it is recommended that:

> *Balconies on noise affected facades must have a continuous solid gap-free balustrade (other than gaps required for drainage purposes to comply with the Building Code of Australia).*

9.2 Onsite Noise

9.2.1 Noise Management Strategies

The following management strategies are recommended to minimise noise annoyance:

a. Waste collection should be limited to the day time period of 7am to 6pm, where possible.

b. Any grates or other protective covers in the handstand and access driveway must be rigidly fixed in position to eliminate clanging and be maintained.

9.2.2 Mechanical Plant Noise

As detailed plant selections are not available at this stage, it is not possible to carry out a detailed examination of the noise control measures that may be required to achieve the noise targets for mechanical plant.

Plant may need to be acoustically treated to achieve the criteria detailed in Section 5.2.2 to prevent noise emissions from adversely impacting the surrounding properties. This may include selecting the quietest plant possible, or treating the plant equipment with enclosures, barriers, duct lining and silencers, etc.

A preliminary assessment of allowable plant noise limits to achieve compliance is conducted in Section 7.4.3.

A mechanical plant noise assessment should be conducted by a suitably qualified acoustic consultant once plant selections are finalised.

10 Conclusion

An environmental noise assessment was undertaken of the proposed Benowa Gardens mixed use development located at 203 Ashmore Road, Benowa.

Compliance with the criteria outlined in Section 5 is predicted to be achieved based on the implementation of the recommendations outlined in Section 9 of this report.

Appendix A Sample of Development Plans

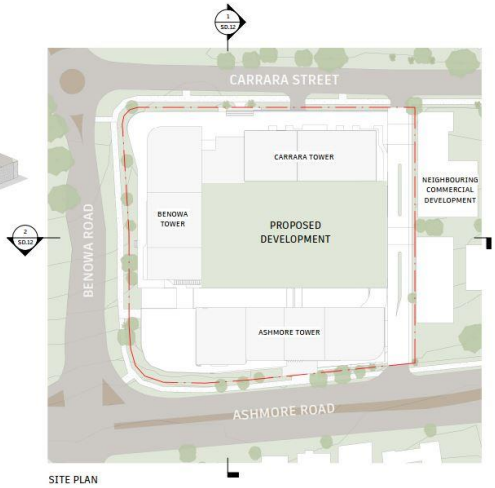
BENOWA GARDENS MASTER PLANNING

SITE INFORMATION

ADDRESS	203 ASHMORE ROAD BENOWA QLD 4217
RPD	LOT/DP: RP839746
SITE AREA	17,658m²

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE



SITE PLAN

APARTMENT TYPES

	LEVELS	2 x BED	3 x BED	TOTAL
CARRARA TOWER	PER LEVEL (x 9)	12	3	15
	TOTAL PER TOWER	108	27	135
BENOWA TOWER	PER LEVEL (x 8)	12	4	16
	TOTAL PER TOWER	96	32	128
ASHMORE TOWER	PER LEVEL (x 7)	14	4	18
	PER HALF LEVEL (x 1)	4	4	8
	TOTAL PER TOWER	102	32	134
TOTAL APARTMENTS		306	91	397

PERIMETER USE: 8,400m²

	SHORT STAY ACCOMMODATION	RESIDENTIAL 1 BED		HEALTH CARE
BASEMENT 2	130m² TUA (LOBBY)	-		-
BASEMENT 1	11	-		1,400m² TUA
GROUND (SHOPPING CENTRE)	15	-		1,300m² TUA
CARRARA LEVEL 1	15	-	OR	1,300m² TUA
CARRARA LEVEL 2	-	22		2,400m² TUA
CARRARA LEVEL 3	-	22		2,400m² TUA
TOTAL	41	44		8,800m²

CARPARKING

RETAIL

BASEMENT 3	190 CARS
BASEMENT 2	260 CARS
BASEMENT 1	250 CARS
TOTAL RETAIL CARPARKS	700 CARS

RESIDENTIAL

LEVEL 2	220 CARS
LEVEL 3	270 CARS
TOTAL RESIDENTIAL CARPARKS	490 CARS

PERIMETER USE

BASEMENT 3	270 CARS
TOTAL PERIMETER USE CARPARKS	270 CARS

TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF

BASEMENT 2	100 SPACES
TOTAL STAFF SPACES	100 SPACES

VISITOR

BASEMENT 2	86 SPACES
BASEMENT 1	114 SPACES
TOTAL STAFF SPACES	200 SPACES

TOTAL BICYCLE SPACES	300

AREA CALCULATIONS

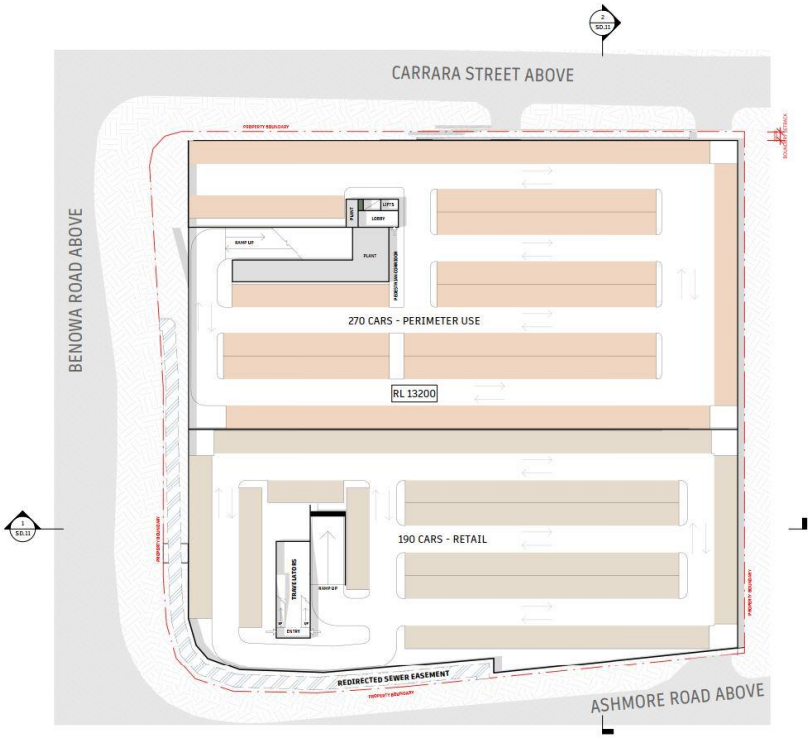
RETAIL AREA

SUPERMARKET	4,000m²
SPECIALTY SHOPS:	6,000m²
RETAIL BASEMENT 2 LEVEL:	700m²
RETAIL BASEMENT 1 LEVEL:	300 m²
SHOPPING CENTRE LEVEL:	5,000m²
TOTAL RETAIL	10,000m²

COMMERCIAL AREA

LEVEL 1:	3,000m²
TOTAL COMMERCIAL	3,000m²

FLOOR PLAN-BASEMENT 3 (RETAIL)



B3_CARPARK RETAIL / HOTEL

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL

BASEMENT 3	190 CARS
BASEMENT 2	260 CARS
BASEMENT 1	250 CARS
TOTAL RETAIL CARPARKS	700 CARS

RESIDENTIAL

LEVEL 2	220 CARS
LEVEL 3	270 CARS
TOTAL RESIDENTIAL CARPARKS	490 CARS

PERIMETER USE

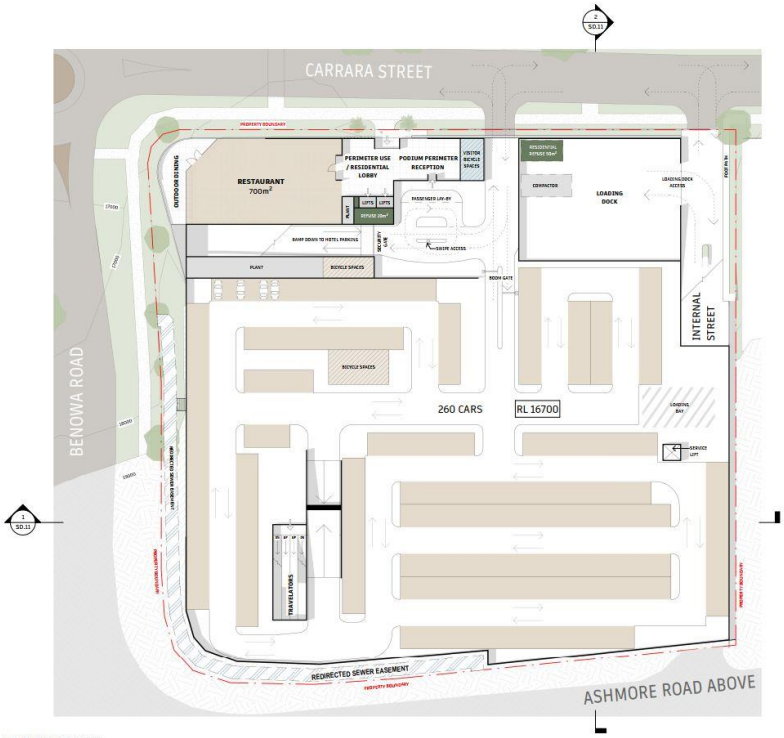
BASEMENT 3	270 CARS
TOTAL PERIMETER USE CARPARKS	270 CARS

TOTAL CARPARKS	1,460

Site: 203 Ashmore Road, Benowa

Reference: 24GCA0185 R01_1

FLOOR PLAN-BASEMENT 2 (RETAIL)



B2_CARPARK RETAIL

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL	
BASEMENT 3	190 CARS
BASEMENT 2	260 CARS
BASEMENT 1	250 CARS
TOTAL RETAIL CARPARKS	700 CARS
RESIDENTIAL	
LEVEL 2	220 CARS
LEVEL 3	270 CARS
TOTAL RESIDENTIAL CARPARKS	490 CARS
PERIMETER USE	
BASEMENT 3	270 CARS
TOTAL PERIMETER USE CARPARKS	270 CARS
TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF	
BASEMENT 2	100 SPACES
TOTAL STAFF SPACES	100 SPACES
VISITOR	
BASEMENT 2	86 SPACES
BASEMENT 1	114 SPACES
TOTAL STAFF SPACES	200 SPACES
TOTAL BICYCLE SPACES	300

0 5 10 25 45m

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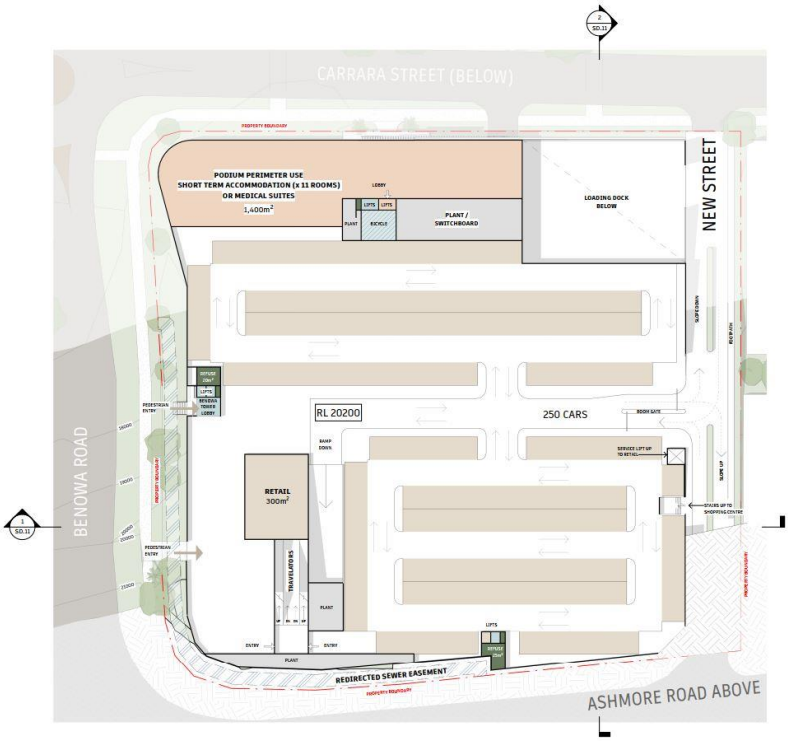
FLOOR PLAN-BASEMENT 1 (RETAIL)



B1_CARPARK RETAIL

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL	
BASEMENT 3	190 CARS
BASEMENT 2	260 CARS
BASEMENT 1	250 CARS
TOTAL RETAIL CARPARKS	700 CARS
RESIDENTIAL	
LEVEL 2	220 CARS
LEVEL 3	270 CARS
TOTAL RESIDENTIAL CARPARKS	490 CARS
PERIMETER USE	
BASEMENT 3	270 CARS
TOTAL PERIMETER USE CARPARKS	270 CARS
TOTAL CARPARKS	1,460

BICYCLE PARKING

STAFF	
BASEMENT 2	100 SPACES
TOTAL STAFF SPACES	100 SPACES
VISITOR	
BASEMENT 2	86 SPACES
BASEMENT 1	114 SPACES
TOTAL STAFF SPACES	200 SPACES
TOTAL BICYCLE SPACES	300

0 5 10 25 45m

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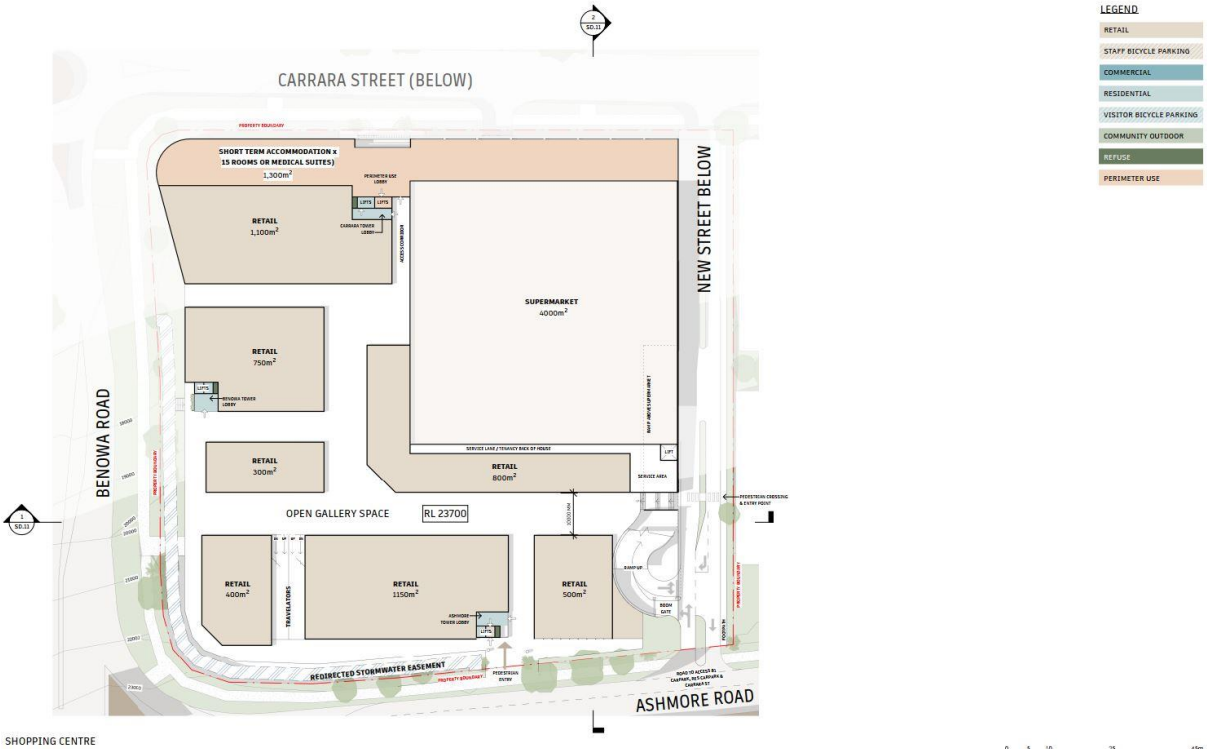
FLOOR PLAN-SHOPPING CENTRE



SHOPPING CENTRE

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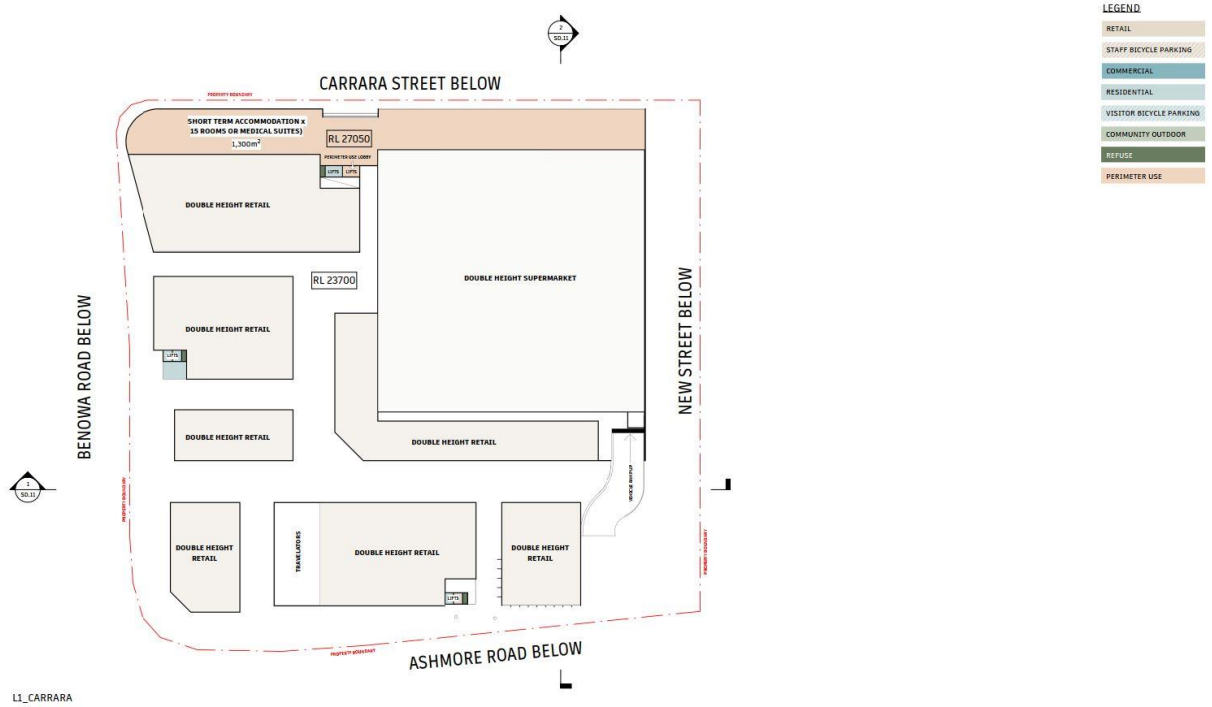
FLOOR PLAN LEVEL 1 - PERIMETER USE MEZZANINE



L1_CARRARA

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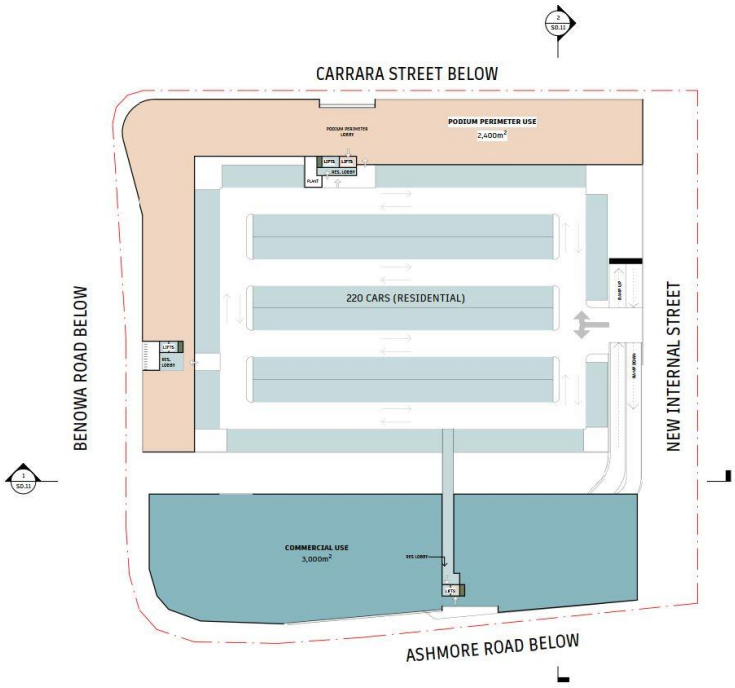
FLOOR PLAN-LEVEL 2 (RESIDENTIAL CARPARK)



LEVEL 2

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

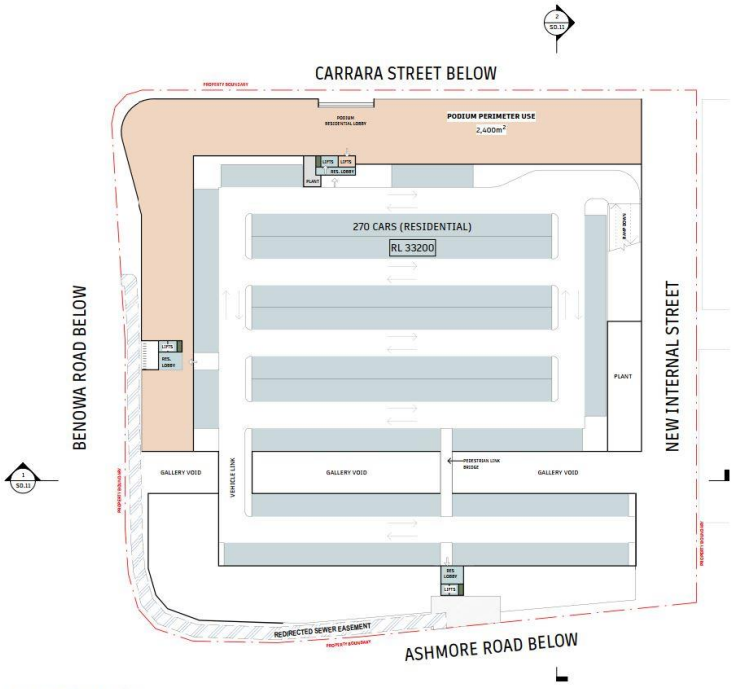
CARPARKING

RETAIL	
BASEMENT 3	190 CARS
BASEMENT 2	260 CARS
BASEMENT 1	250 CARS
TOTAL RETAIL CARPARKS	700 CARS
RESIDENTIAL	
LEVEL 2	220 CARS
LEVEL 3	270 CARS
TOTAL RESIDENTIAL CARPARKS	490 CARS
PERIMETER USE	
BASEMENT 3	270 CARS
TOTAL PERIMETER USE CARPARKS	270 CARS
TOTAL CARPARKS	1,460

0 5 10 25 45m

neylan | BENOWA HOLDING | BENOWA GARDENS TOWERS | SEPTEMBER 2024 | SD.07

FLOOR PLAN-LEVEL 3 (RESIDENTIAL CARPARK)



L3_RESIDENTIAL + CARPARK

LEGEND

- RETAIL
- STAFF BICYCLE PARKING
- COMMERCIAL
- RESIDENTIAL
- VISITOR BICYCLE PARKING
- COMMUNITY OUTDOOR
- REFUSE
- PERIMETER USE

CARPARKING

RETAIL	
BASEMENT 3	190 CARS
BASEMENT 2	260 CARS
BASEMENT 1	250 CARS
TOTAL RETAIL CARPARKS	700 CARS
RESIDENTIAL	
LEVEL 2	220 CARS
LEVEL 3	270 CARS
TOTAL RESIDENTIAL CARPARKS	490 CARS
PERIMETER USE	
BASEMENT 3	270 CARS
TOTAL PERIMETER USE CARPARKS	270 CARS
TOTAL CARPARKS	1,460

0 5 10 25 45m

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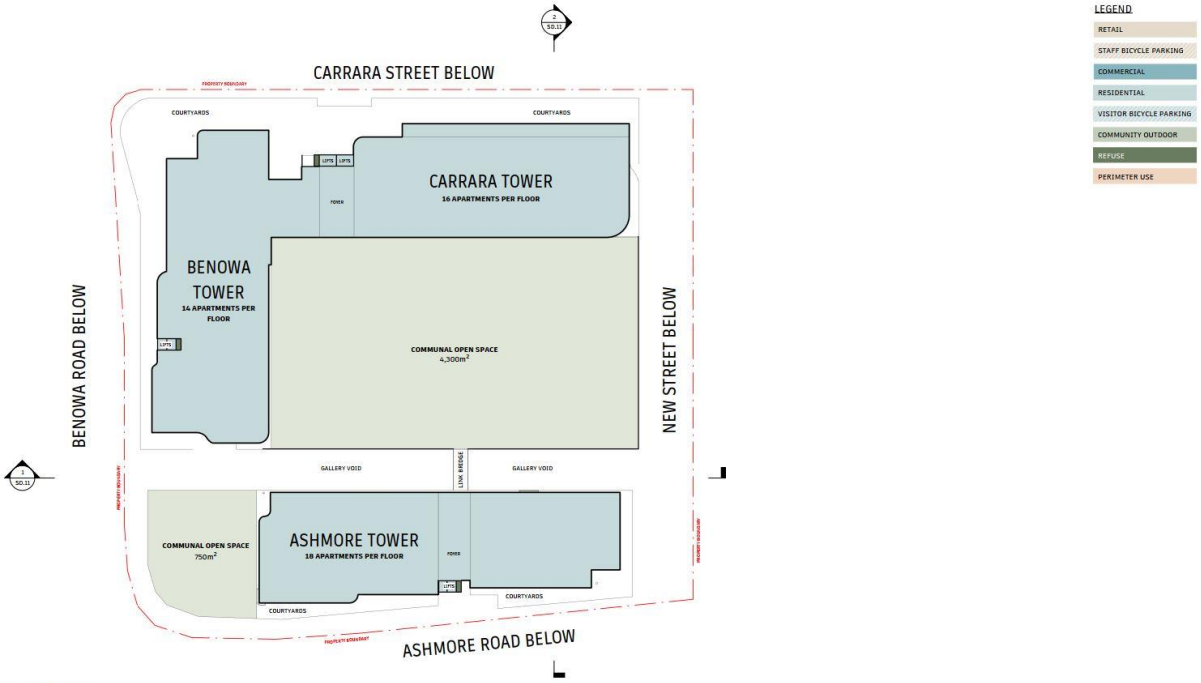
FLOOR PLAN-LEVEL 4 - TOWERS+COMMUNAL SPACE



L4_RESIDENTIAL

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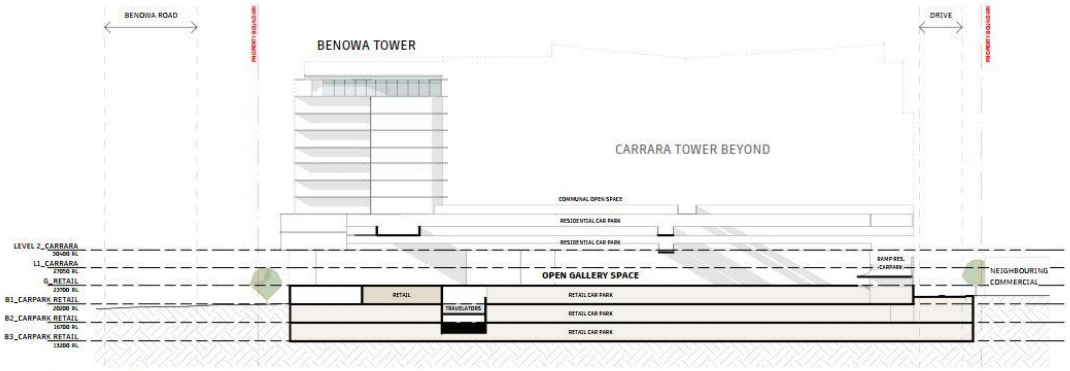
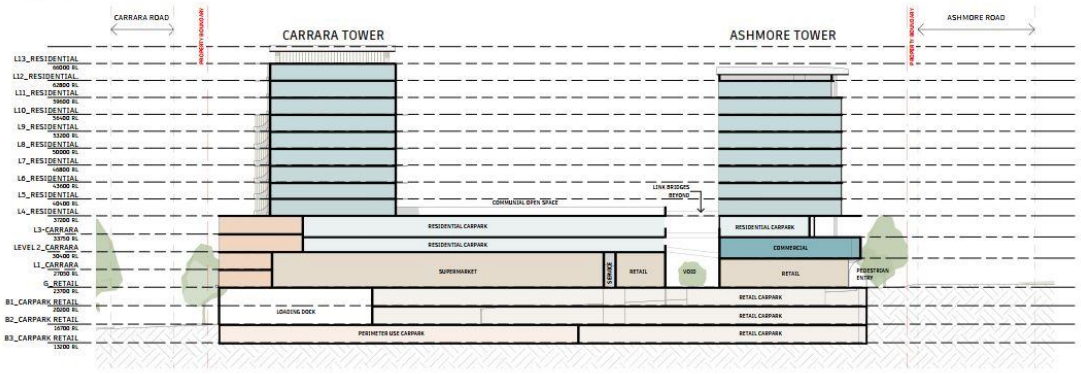
SECTION



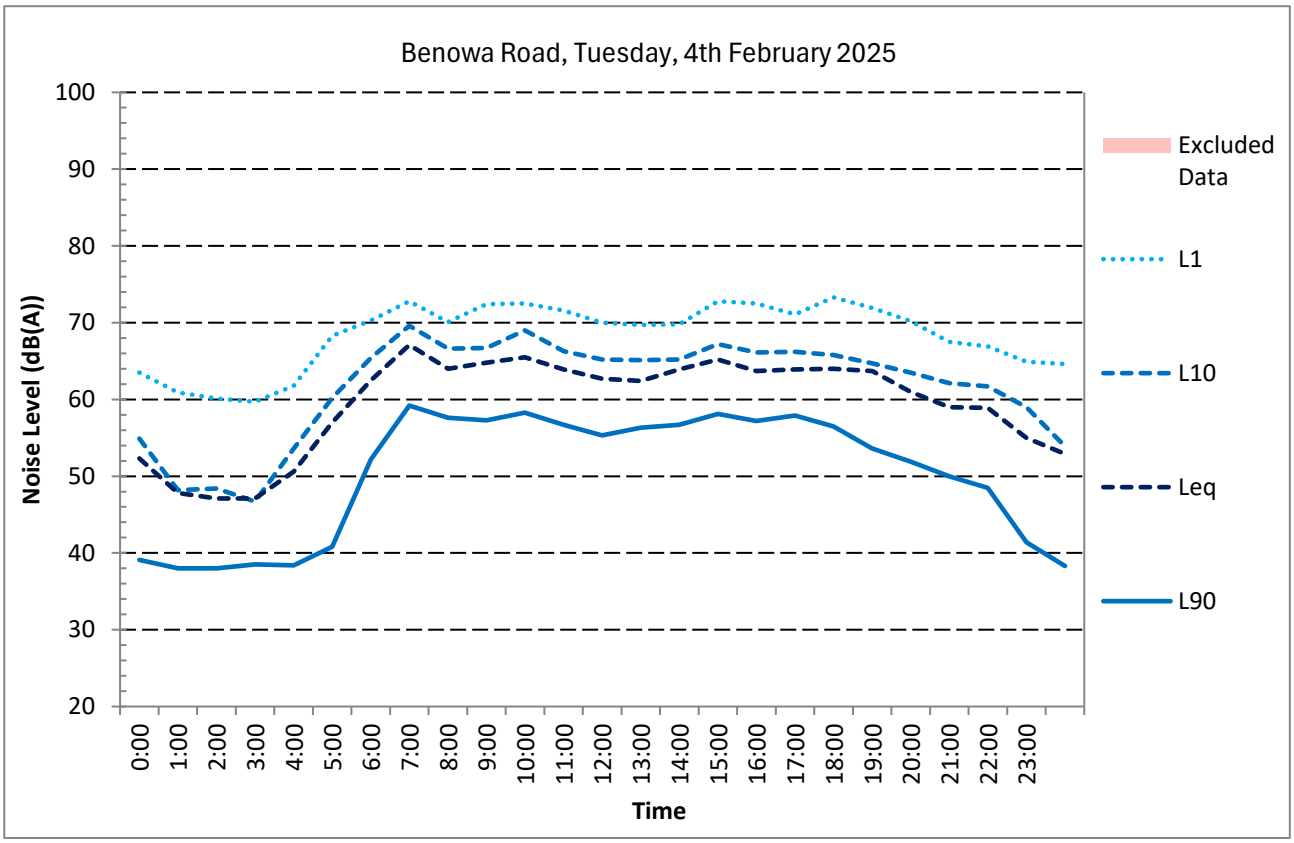
EAST - WEST SECTION

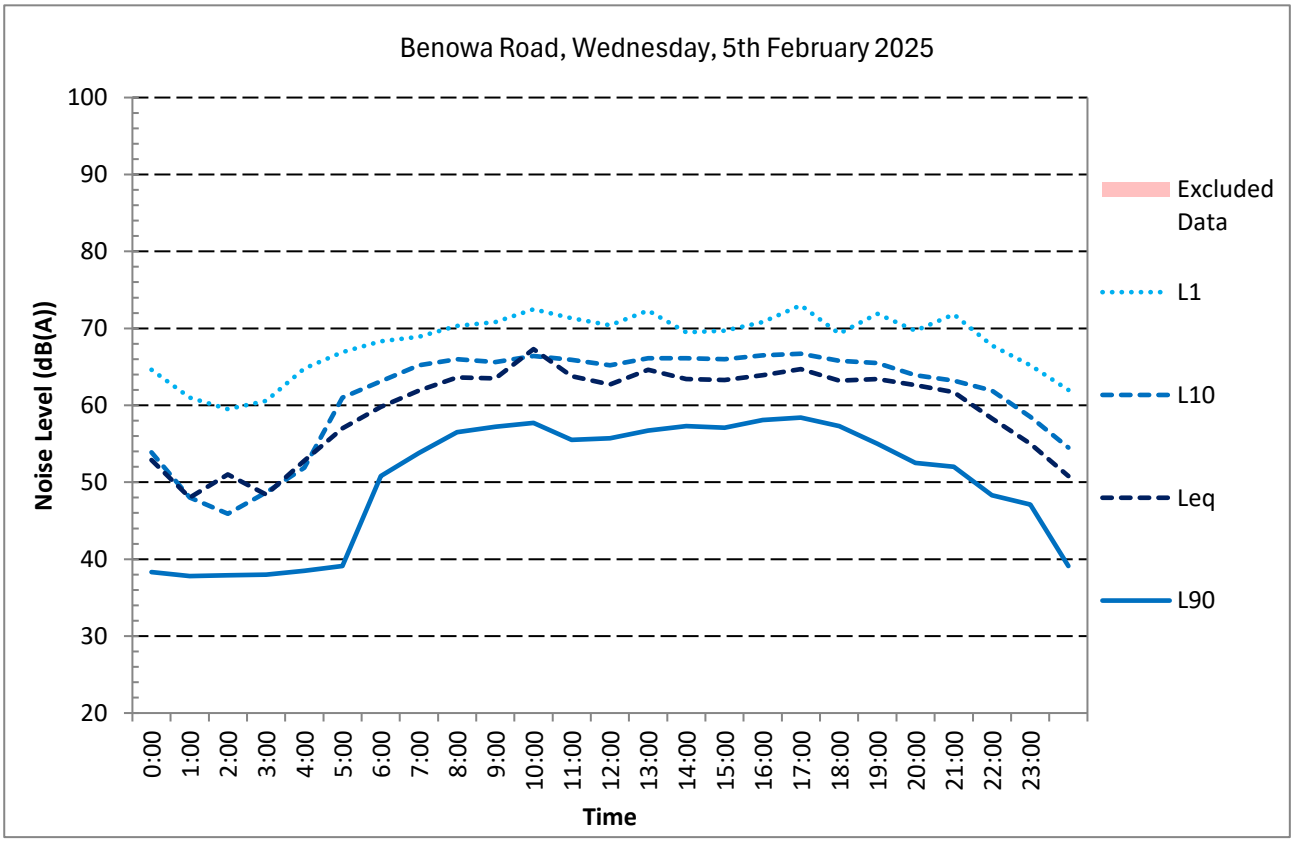


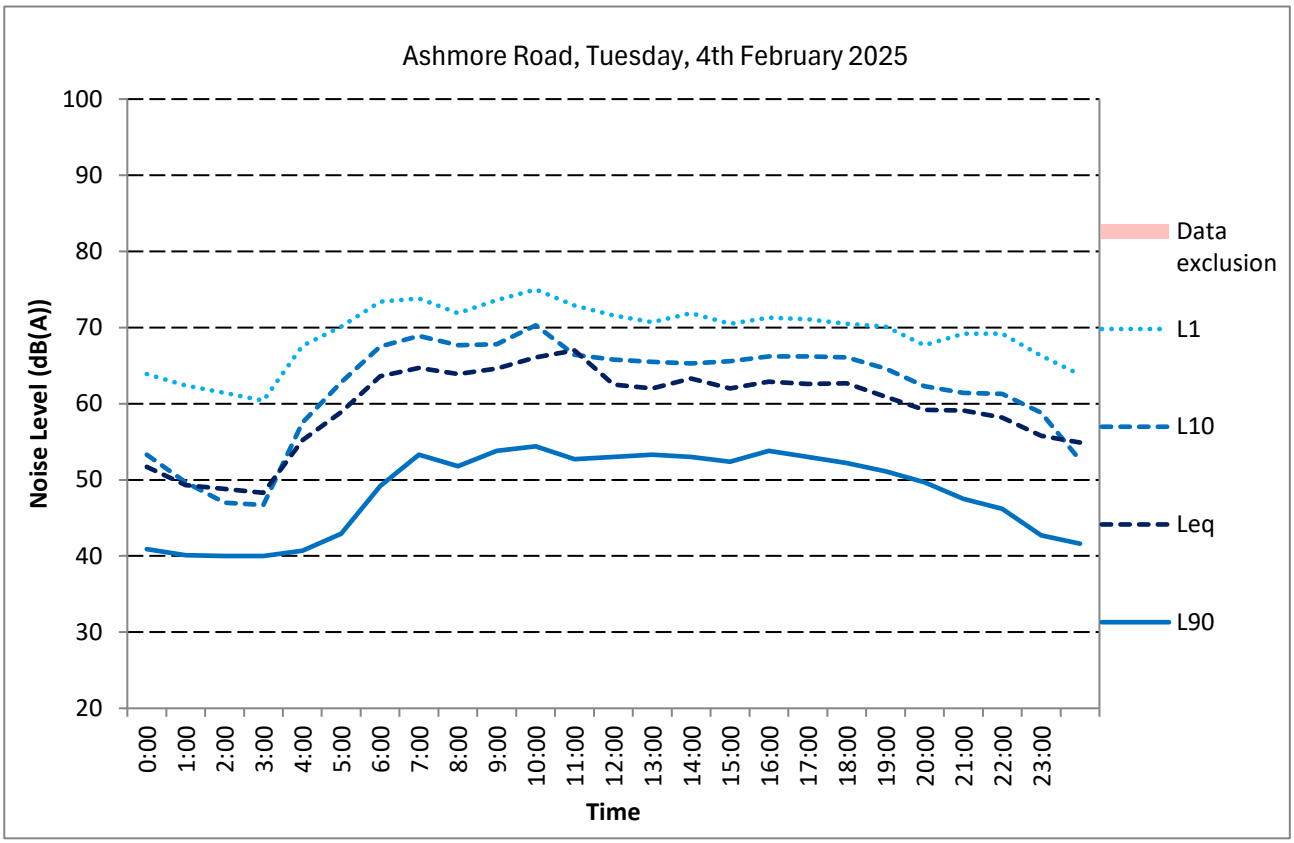
NORTH - SOUTH SECTION

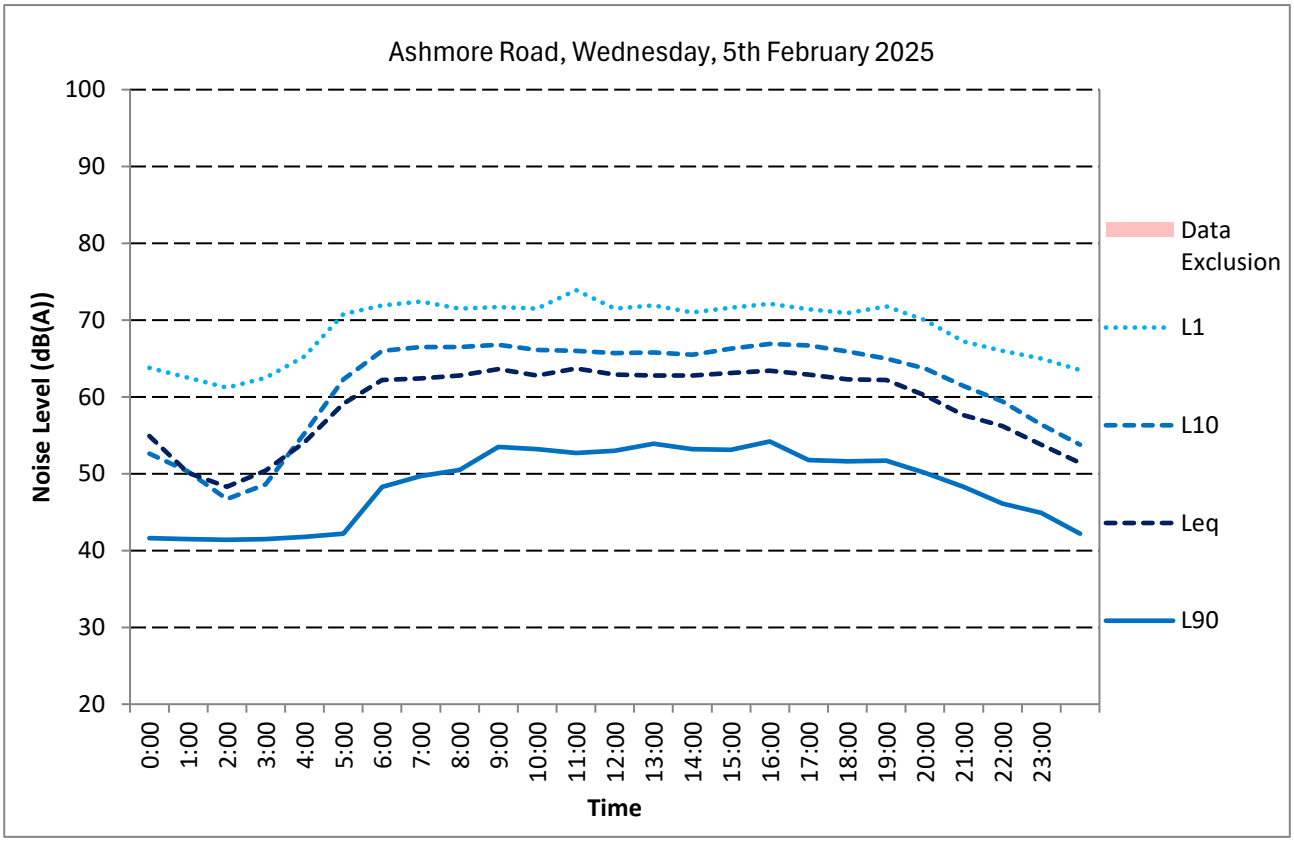
Appendix B Unattended Noise Monitoring Graphs

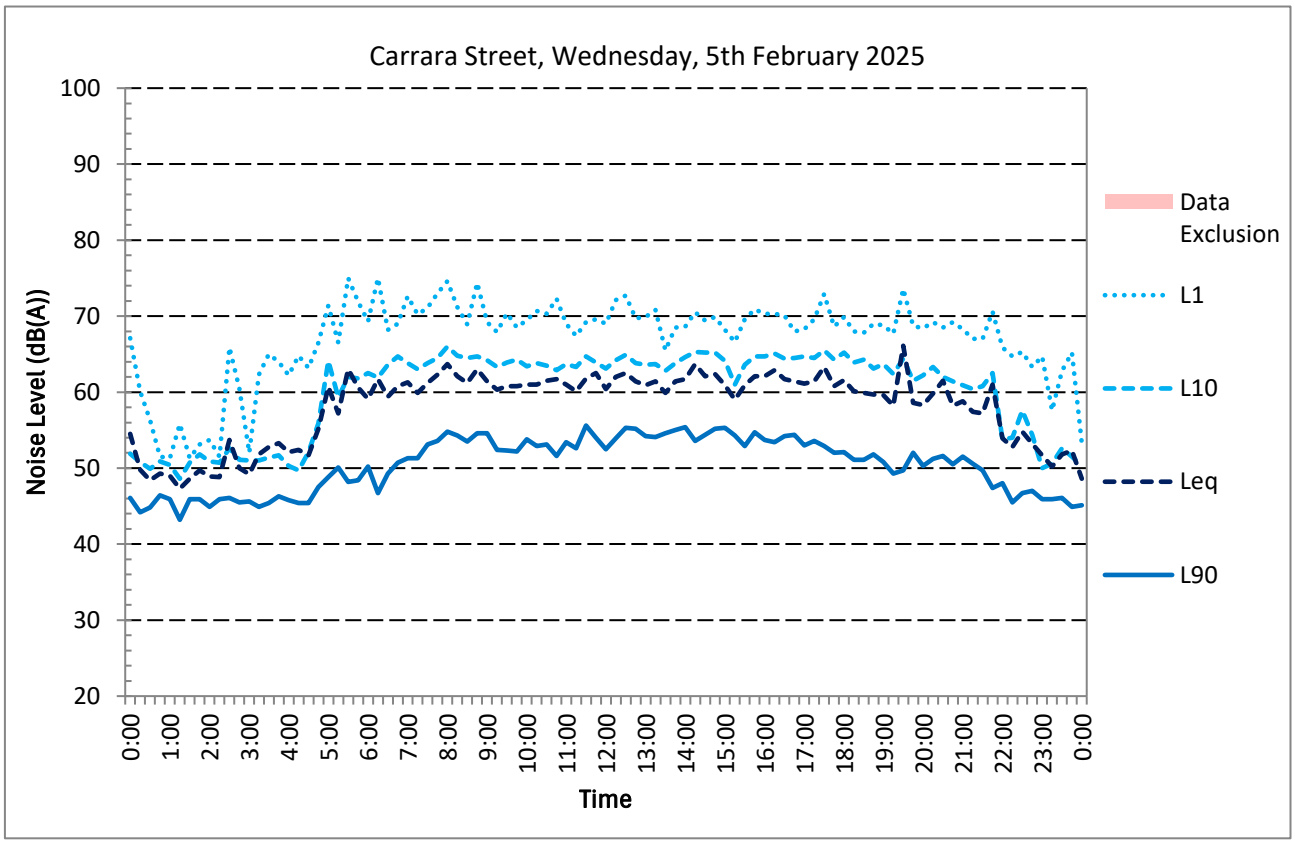
ROAD TRAFFIC NOISE

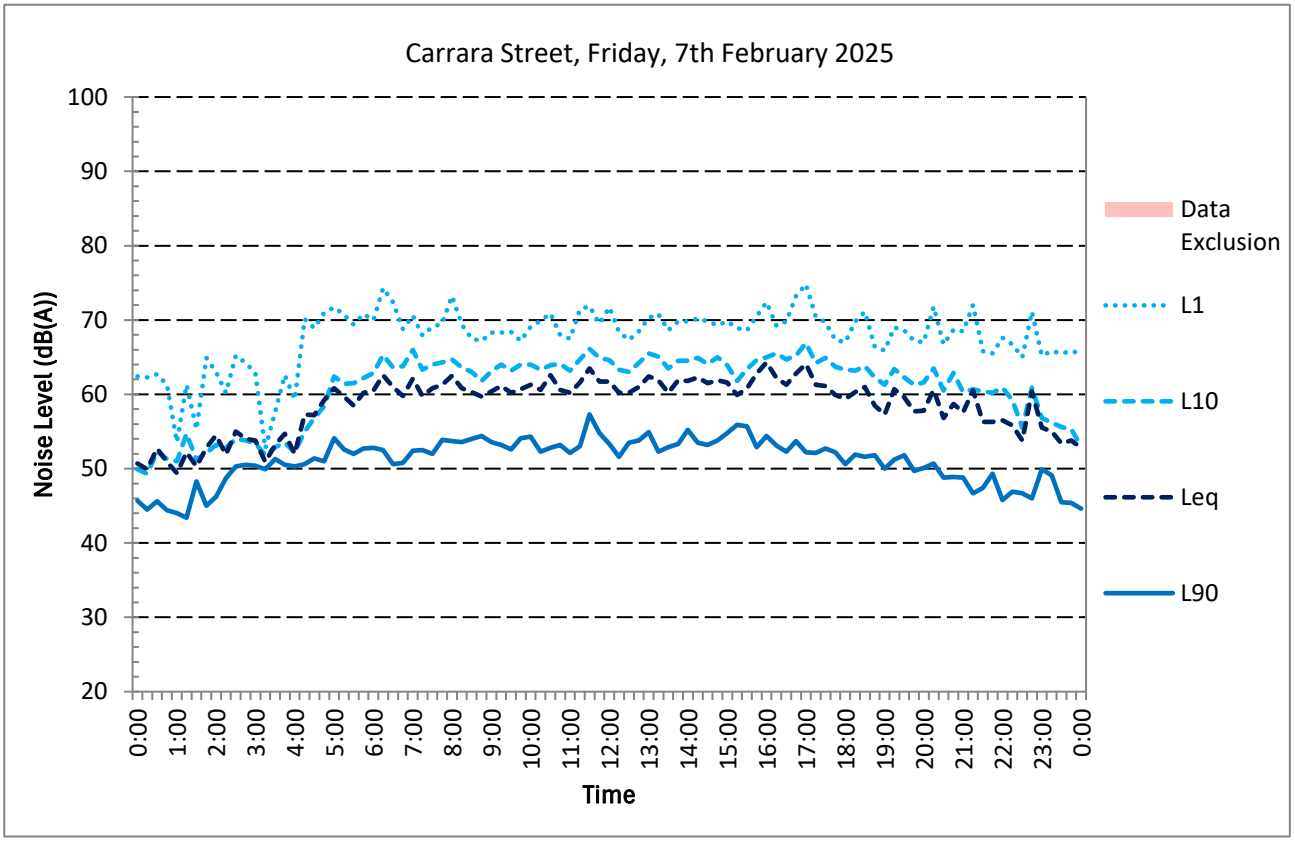




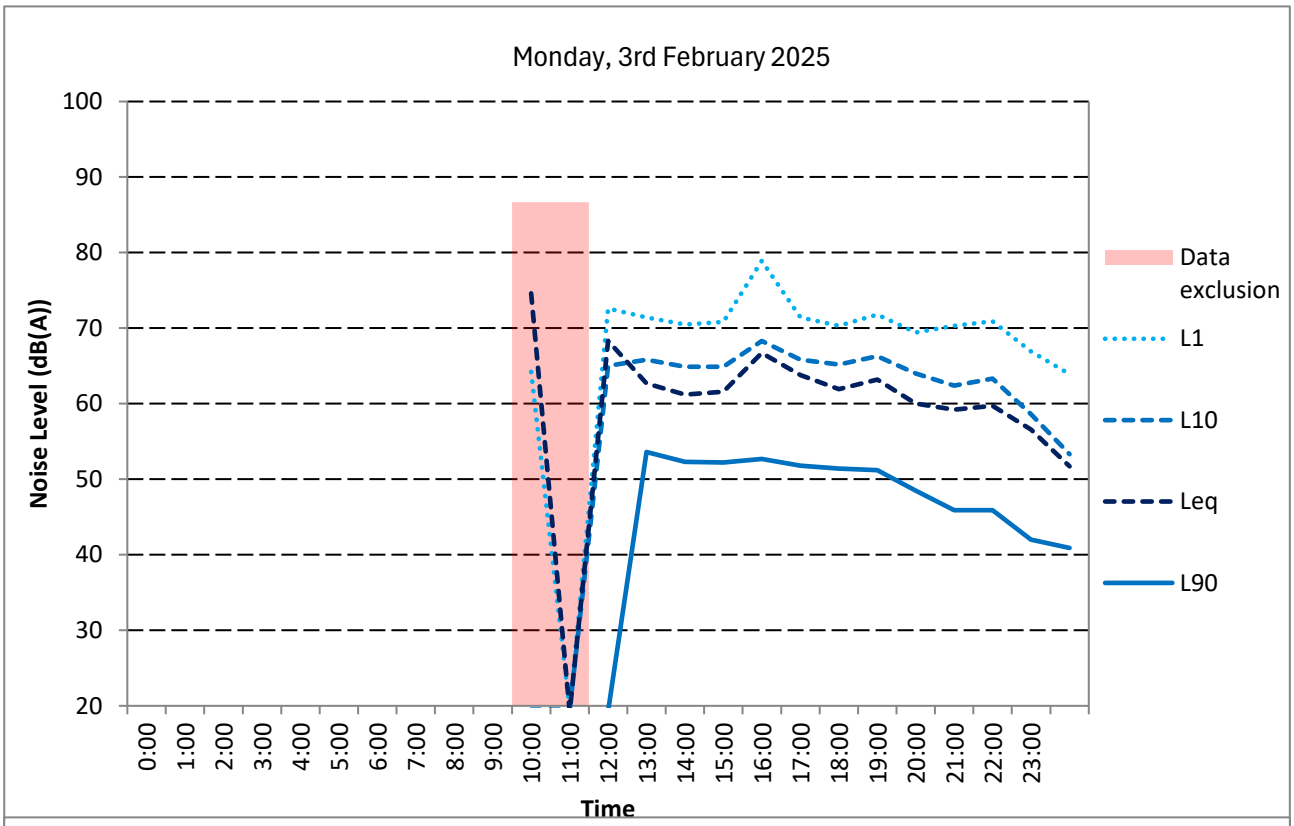

Ashmore Road, Tuesday, 4th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time
Data exclusion
L1
L10
Leq
L90

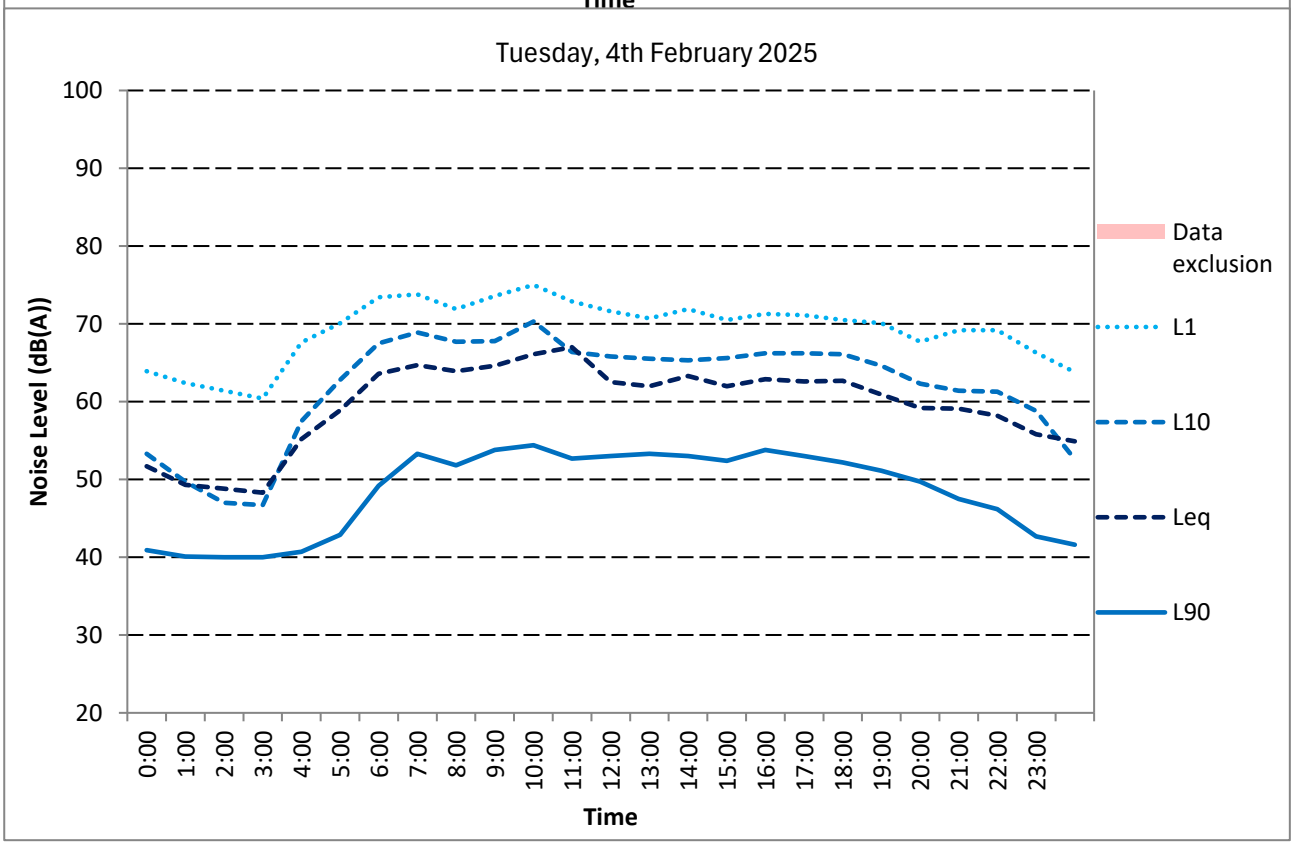

Ashmore Road, Wednesday, 5th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time
Data Exclusion
L1
L10
Leq
L90

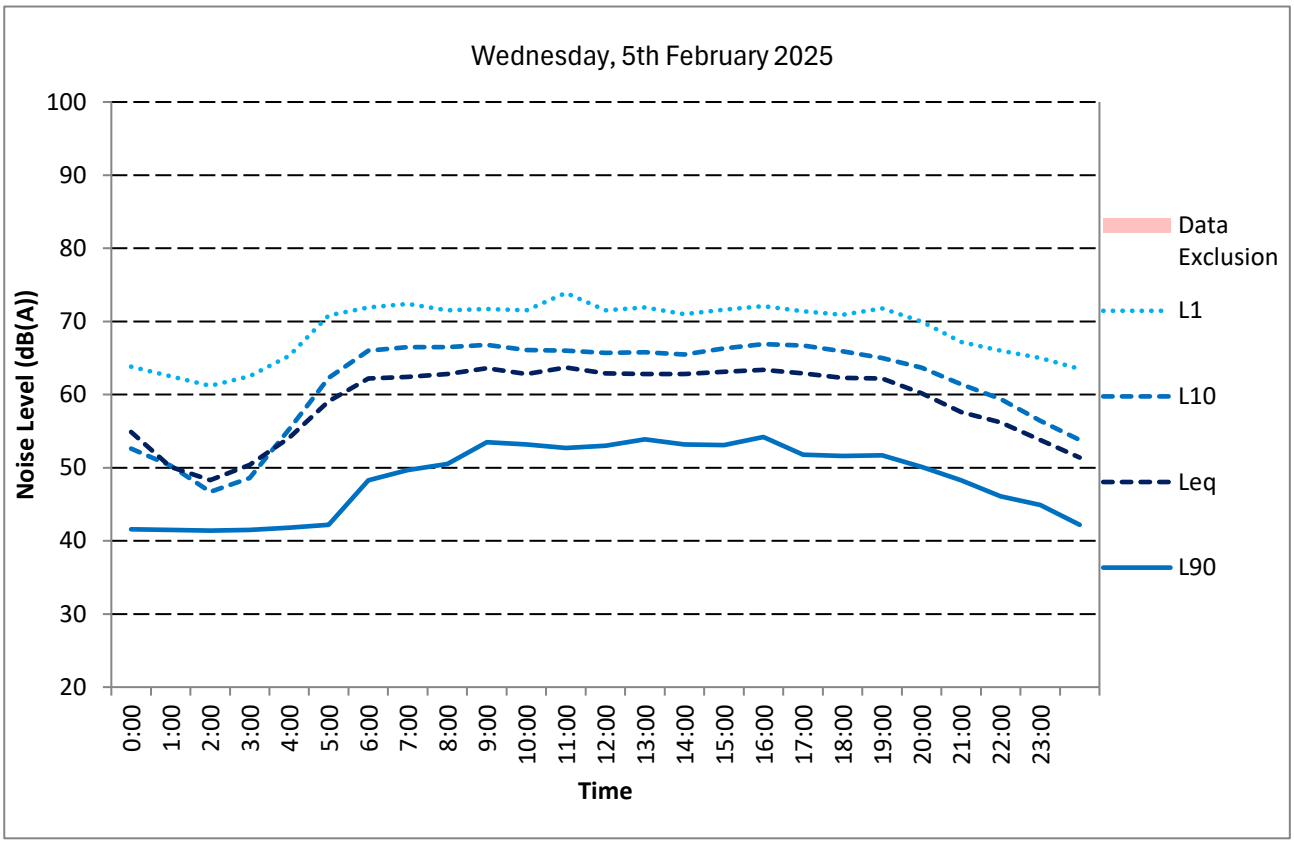

Carrara Street, Wednesday, 5th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
Data Exclusion
L1
L10
Leq
L90

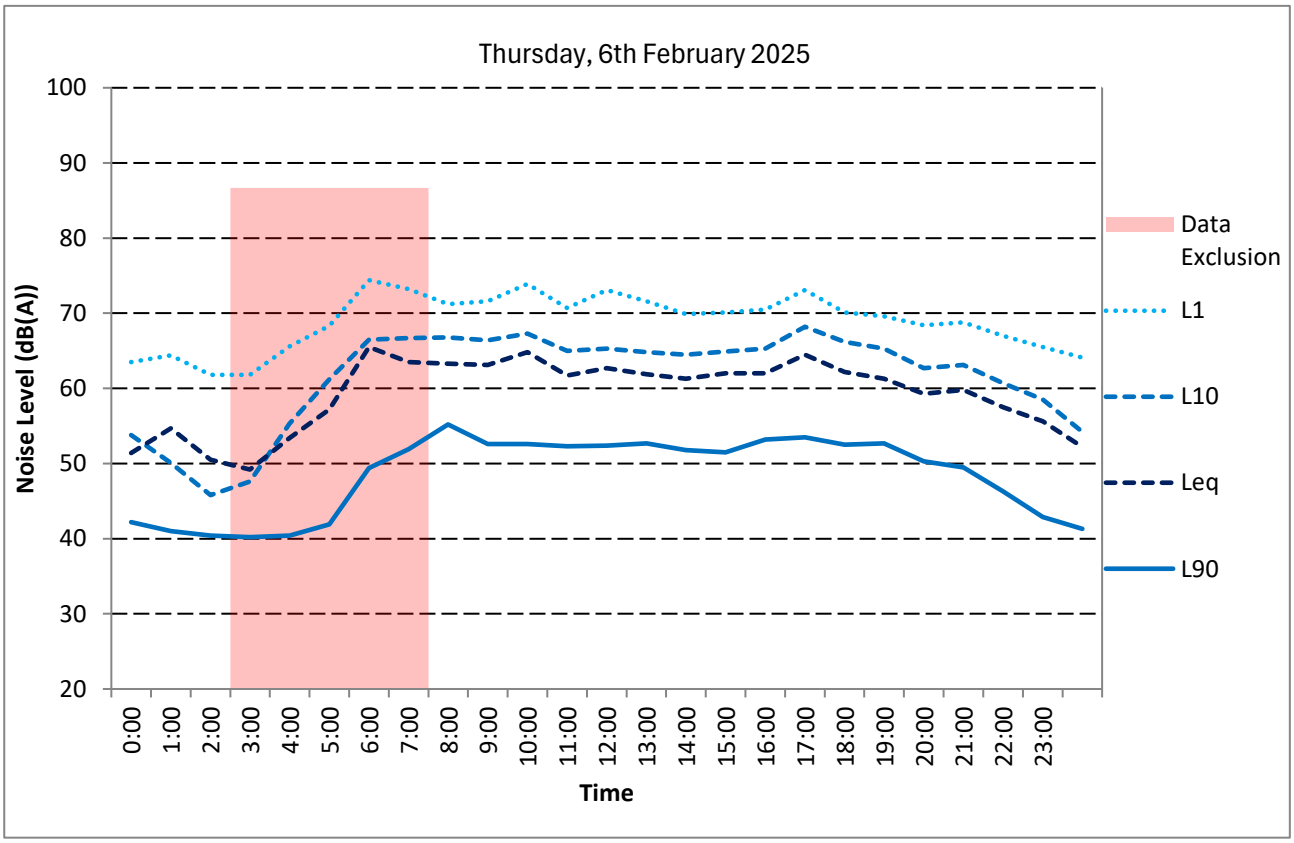

Carrara Street, Friday, 7th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
0:00
Time
Data Exclusion
L1
L10
Leq
L90

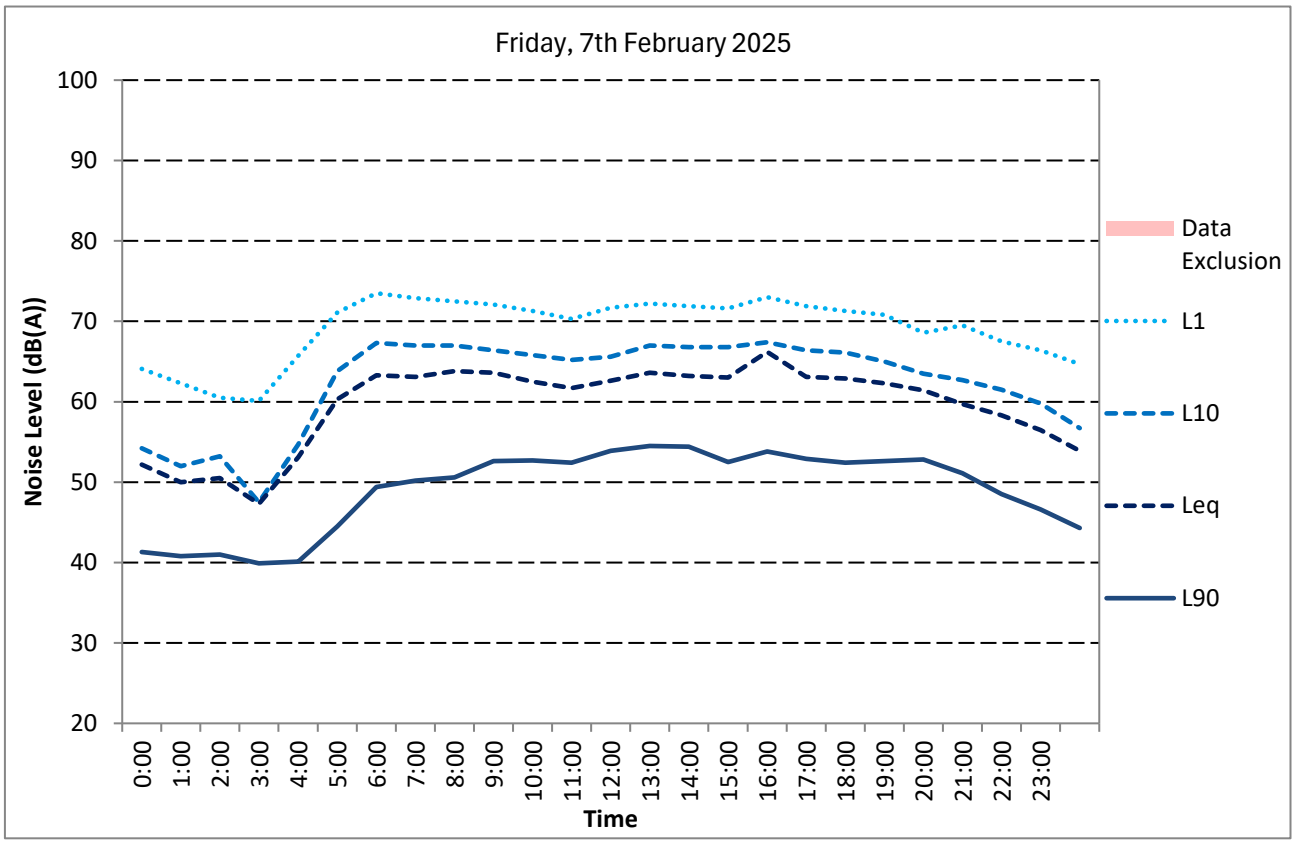
AMBIENT NOISE (Ashmore Road)

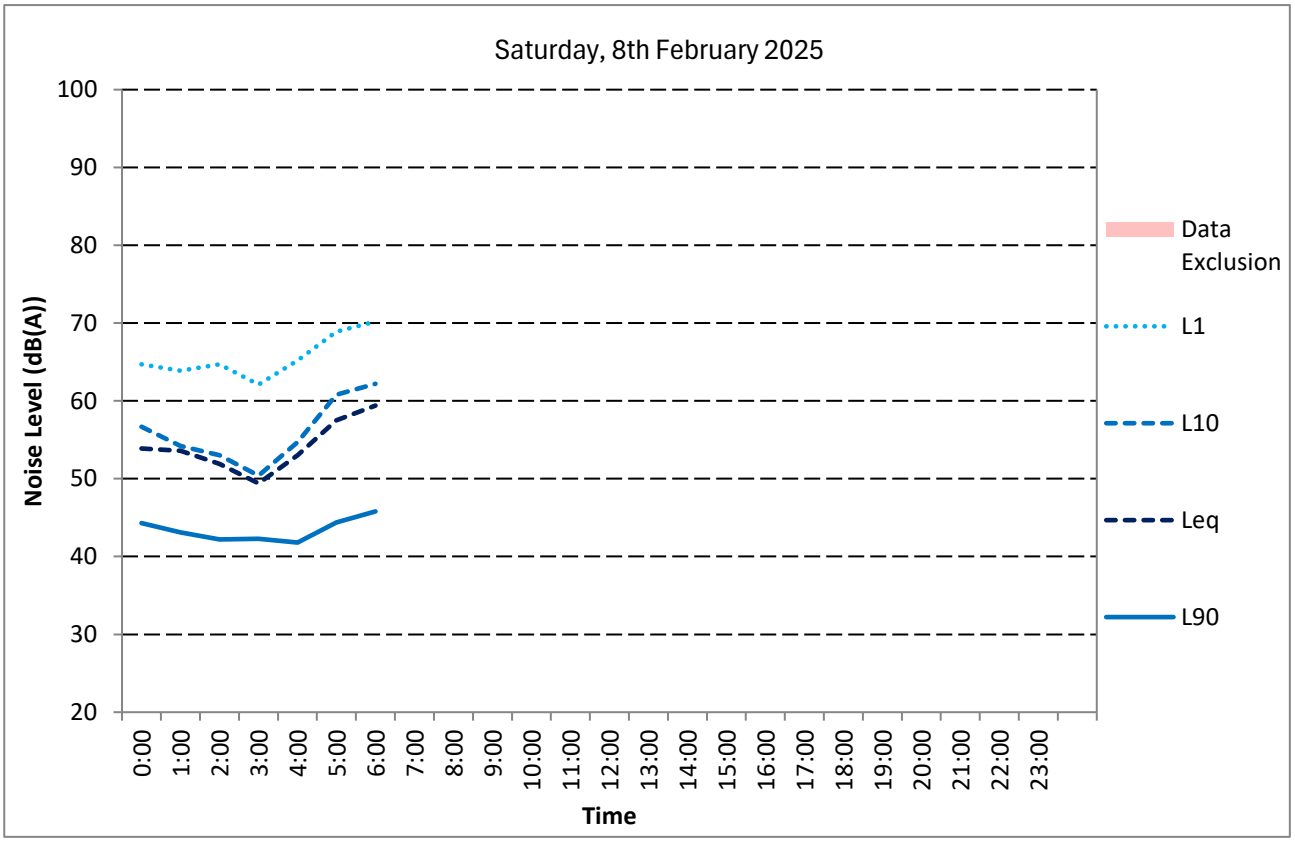





Wednesday, 5th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time
Data Exclusion
L1
L10
Leq
L90


Thursday, 6th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time
Data Exclusion
L1
L10
Leq
L90


Friday, 7th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time
Data Exclusion
L1
L10
Leq
L90


Saturday, 8th February 2025
Noise Level (dB(A))
100
90
80
70
60
50
40
30
20
0:00
1:00
2:00
3:00
4:00
5:00
6:00
7:00
8:00
9:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00
Time
Data Exclusion
L1
L10
Leq
L90

Appendix C SoundPLAN Noise Model Outputs – Road Traffic Noise

Benowa Gardens
M02 - Logger Verifications

Receiver	Fl	L10(18h) Free Field dB(A)
Ashmore Rd - 65.2dB	GF	66.3
Benowa Rd - 65.1dB	GF	65.2
Carrara St - 62.8dB	GF	63.2

Benowa Gardens
Assessed receiver levels
M03 - Future Prediction - Receivers

Receiver	Floor	Dir	L10(18h) Facade Corrected dB(A)
Communal - Ashmore Tower L4	F 4		54.3
Communal - Benowa/Carrara Tower L4 East	F 4		53.4
Communal - Benowa/Carrara Tower L4 West	F 4		44.2
Development - Ashmore Tower	F 4	S	69.2
	F 5		69.1
	F 6		68.8
	F 7		68.4
	F 8		68.0
	F 9		67.7
	F 10		67.3
	F 11		67.0
Development - Ashmore Tower	F 4	W	51.3
	F 5		56.0
	F 6		59.7
	F 7		61.9
	F 8		63.0
	F 9		63.7
	F 10		64.1
	F 11		64.3
Development - Ashmore Tower	F 4	N	47.7
	F 5		49.6
	F 6		51.1
	F 7		52.3
	F 8		53.1
	F 9		53.6
	F 10		54.0
	F 11		54.3
Development - Ashmore Tower	F 4	E	63.6
	F 5		64.8
	F 6		64.9
	F 7		64.9
	F 8		64.8
	F 9		64.7
	F 10		64.5
	F 11		64.3
Development - Benowa Tower	F 4	S	59.9
	F 5		62.0
	F 6		63.0
	F 7		63.6
	F 8		63.7
	F 9		63.6
	F 10		63.5
	F 11		63.5

Benowa Gardens
Assessed receiver levels
M03 - Future Prediction - Receivers

Receiver	Floor	Dir	L10(18h) Facade Corrected dB(A)
	F 12		63.4
Development - Benowa Tower	F 4	E	42.4
	F 5		43.8
	F 6		45.9
	F 7		48.1
	F 8		50.1
	F 9		51.2
	F 10		51.9
	F 11		52.4
	F 12		52.8
Development - Benowa Tower	F 4	N	61.4
	F 5		63.3
	F 6		63.1
	F 7		62.8
	F 8		62.6
	F 9		62.4
	F 10		62.1
	F 11		61.9
	F 12		61.6
Development - Benowa Tower	F 4	W	65.9
	F 5		66.6
	F 6		66.3
	F 7		66.0
	F 8		65.7
	F 9		65.4
	F 10		65.1
	F 11		64.8
	F 12		64.5
Development - Carrara Tower	F 4	N	63.3
	F 5		62.9
	F 6		62.5
	F 7		62.2
	F 8		61.8
	F 9		61.5
	F 10		61.2
	F 11		60.9
	F 12		60.7
Development - Carrara Tower	F 4	E	59.2
	F 5		59.9
	F 6		60.1
	F 7		60.2
	F 8		60.4
	F 9		60.5

Benowa Gardens
Assessed receiver levels
M03 - Future Prediction - Receivers

Receiver	Floor	Dir	L10(18h) Facade Corrected dB(A)
Development - Carrara Tower	F 10	S	60.6
	F 11		60.6
	F 12		60.6
	F 4		46.0
	F 5		48.6
	F 6		51.0
	F 7		53.1
	F 8		54.4
	F 9		55.2
	F 10		55.7
	F 11		56.1
	F 12		56.3

Appendix D Onsite and Offsite Noise Calculations

Onsite AQO Noise Predictions

Noise Source	Duration	Leq	Leq 1 hour	Distance from Noise Source to Receivers R1	R2	R3	R4
				North East	East	South	Onsite
Car door closure (basement retail carpark)	2	75	42	80	30	55	17
Car bypass (basement retail carpark ramp)	6	69	41	55	7	45	17
Car engine (basement retail carpark)	3	72	41	80	30	55	17
Car door closure (residential carpark)	2	75	42	80	30	55	4
Car bypass (residential carpark ramp)	6	69	41	55	7	45	17
Car engine (residential carpark)	3	72	41	80	30	55	4
Conversations	720	65	58	160	30	55	10
Crowd Noise (communal area)	720	74	67	125	58	100	16
Unloading a delivery vehicle	60	80	62	55	20	155	20
waste collection	40	93	73	55	20	155	20
Noise level after Distance loss							
Car door closure (basement retail carpark)				4	13	8	18
Car bypass (basement retail carpark ramp)				6	24	8	17
Car engine (basement retail carpark)				3	12	6	17
Car door closure (residential carpark)				4	13	8	32
Car bypass (residential carpark ramp)				6	24	8	17
Car engine (residential carpark)				3	12	6	30
Conversations				14	28	23	38
Crowd Noise (communal area)				25	32	27	43
Unloading a delivery vehicle				27	36	18	36
waste collection				39	47	30	47
Shielding Losses							
Car door closure (basement retail carpark)			*fixed values	25	25	25	25
Car bypass (basement retail carpark ramp)			*fixed values	0	0	25	0
Car engine (basement retail carpark)			*fixed values	25	25	25	25
Car door closure (residential carpark)			*fixed values	20	20	20	20
Car bypass (residential carpark ramp)			*fixed values	0	0	0	0
Car engine (residential carpark)			*fixed values	20	20	20	20
Conversations				22	0	22	22
Crowd Noise (communal area)				22	0	22	0
Unloading a delivery vehicle				0	0	5	0
waste collection				0	0	5	0
Sub Total - at Receiver				**R1**	**R2**	**R3**	**R4**
Car door closure (basement retail carpark)				-21	-12	-17	-7
Car bypass (basement retail carpark ramp)				6	24	-17	17
Car engine (basement retail carpark)				-22	-13	-19	-8
Car door closure (residential carpark)				-16	-7	-12	12
Car bypass (residential carpark ramp)				6	24	8	17
Car engine (residential carpark)				-17	-8	-14	10
Conversations				-8	28	1	16
Crowd Noise (communal area)				3	32	5	42
Unloading a delivery vehicle				27	36	13	36
waste collection				39	47	25	47

CALC Activity	Events	Duration	R1	R2	R3	R4
Car door closure (basement retail carpark)	700	2	6	43	13	135
Car bypass (basement retail carpark ramp)	350	6	1532	83709	7	16033
Car engine (basement retail carpark)	350	3	2	16	5	51
Car door closure (residential carpark)	490	2	13	96	28	7027
Car bypass (residential carpark ramp)	245	6	1072	58596	1602	11223
Car engine (residential carpark)	245	3	5	36	11	2641
Conversations	4	720	1	2811	5	160
Crowd Noise (communal area)	4	720	8	5974	13	70933
Unloading a delivery vehicle	2	60	1102	8333	44	8333
waste collection	2	40	14658	110848	584	110848
Noise Level at Receiver			**R1**	**R2**	**R3**	**R4**
Car door closure (basement retail carpark)			8	16	11	21
Car bypass (basement retail carpark ramp)			32	49	9	42
Car engine (basement retail carpark)			4	12	7	17
Car door closure (residential carpark)			11	20	15	38
Car bypass (residential carpark ramp)			30	48	32	41
Car engine (residential carpark)			7	16	10	34
Conversations			-2	34	7	22
Crowd Noise (communal area)			9	38	11	49
Unloading a delivery vehicle			30	39	16	39
waste collection			42	50	28	50
TOTAL NOISE			**34**	**52**	**32**	**50**

Offsite AQO Noise Predictions

Conversations (pindara)				22	#NUM!	#NUM!	#NUM!
unloading delivery vehicle				27	#NUM!	#NUM!	#NUM!
Waste Collection				38	#NUM!	#NUM!	#NUM!
Car door closure (benowa primary)				7	#NUM!	#NUM!	#NUM!
Car bypass (benowa primary)				6	#NUM!	#NUM!	#NUM!
Car engine (benowa primary)				6	#NUM!	#NUM!	#NUM!
Conversations (benowa primary)				22	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa primary				34	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa high)				32	#NUM!	#NUM!	#NUM!
Shielding Losses							
Car door closure (pindara)				0	#DIV/0!	#DIV/0!	#DIV/0!
Car bypass (pindara)				0	#DIV/0!	#DIV/0!	#DIV/0!
Car engine (pindara)				0	#DIV/0!	#DIV/0!	#DIV/0!
Conversations (pindara)				0	#DIV/0!	#DIV/0!	#DIV/0!
unloading delivery vehicle				0	#DIV/0!	#DIV/0!	#DIV/0!
Waste Collection				0	#DIV/0!	#DIV/0!	#DIV/0!
Car door closure (benowa primary)				0	#DIV/0!	#DIV/0!	#DIV/0!
Car bypass (benowa primary)				0	#DIV/0!	#DIV/0!	#DIV/0!
Car engine (benowa primary)				0	#DIV/0!	#DIV/0!	#DIV/0!
Conversations (benowa primary)				0	#DIV/0!	#DIV/0!	#DIV/0!
Crowd Noise (benowa primary				0	#DIV/0!	#DIV/0!	#DIV/0!
Crowd Noise (benowa high)				0	#DIV/0!	#DIV/0!	#DIV/0!
Sub Total - at Receiver				**R1**	**R2**	**R3**	**R4**
Car door closure (pindara)				7	#NUM!	#NUM!	#NUM!
Car bypass (pindara)				6	#NUM!	#NUM!	#NUM!
Car engine (pindara)				6	#NUM!	#NUM!	#NUM!
Conversations (pindara)				22	#NUM!	#NUM!	#NUM!
unloading delivery vehicle				27	#NUM!	#NUM!	#NUM!
Waste Collection				38	#NUM!	#NUM!	#NUM!
Car door closure (benowa primary)				7	#NUM!	#NUM!	#NUM!
Car bypass (benowa primary)				6	#NUM!	#NUM!	#NUM!
Car engine (benowa primary)				6	#NUM!	#NUM!	#NUM!
Conversations (benowa primary)				22	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa primary				34	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa high)				32	#NUM!	#NUM!	#NUM!
0							

CALC

Activity	**Events**	**Duration**	**R1**	**R2**	**R3**	**R4**
Car door closure (pindara)	184	2	898	#NUM!	#NUM!	#NUM!
Car bypass (pindara)	92	6	338	#NUM!	#NUM!	#NUM!
Car engine (pindara)	92	3	338	#NUM!	#NUM!	#NUM!
Conversations (pindara)	4	720	703	#NUM!	#NUM!	#NUM!
unloading delivery vehicle	2	60	926	#NUM!	#NUM!	#NUM!
Waste Collection	2	40	12316	#NUM!	#NUM!	#NUM!
Car door closure (benowa primary)	138	2	673	#NUM!	#NUM!	#NUM!
Car bypass (benowa primary)	69	6	254	#NUM!	#NUM!	#NUM!
Car engine (benowa primary)	69	3	253	#NUM!	#NUM!	#NUM!
Conversations (benowa primary)	4	720	703	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa primary	4	900	11217	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa high)	4	900	6310	#NUM!	#NUM!	#NUM!

Noise Level at Receiver	**R1**	**R2**	**R3**	**R4**
Car door closure (pindara)	30	#NUM!	#NUM!	#NUM!
Car bypass (pindara)	25	#NUM!	#NUM!	#NUM!
Car engine (pindara)	25	#NUM!	#NUM!	#NUM!
Conversations (pindara)	28	#NUM!	#NUM!	#NUM!
unloading delivery vehicle	30	#NUM!	#NUM!	#NUM!
Waste Collection	41	#NUM!	#NUM!	#NUM!
Car door closure (benowa primary)	28	#NUM!	#NUM!	#NUM!
Car bypass (benowa primary)	24	#NUM!	#NUM!	#NUM!
Car engine (benowa primary)	24	#NUM!	#NUM!	#NUM!
Conversations (benowa primary)	28	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa primary	40	#NUM!	#NUM!	#NUM!
Crowd Noise (benowa high)	38	#NUM!	#NUM!	#NUM!
	#NUM!	#NUM!	#NUM!	#NUM!
	#NUM!	#NUM!	#NUM!	#NUM!
TOTAL NOISE	**45**	**#NUM!**	**#NUM!**	**#NUM!**

Appendix E Schedule 1 & 2 of QDC MP4.4

Schedule 1

Noise category	Minimum *transport noise reduction* (*dB (A)*) required for *habitable rooms*	Component of building's *external envelope*	Minimum R_w required for each component
Category 4	40	Glazing	43
		External walls	52
		Roof	45
		Floors	51
		Entry doors	35
Category 3	35	Glazing	38 (where total area of glazing for a *habitable room* is greater than 1.8m²)
			35 (where total area of glazing for a *habitable room* is less than or equal to 1.8m²)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33

Noise category	Minimum *transport noise reduction* (*dB (A)*) required for *habitable rooms*	Component of building's *external envelope*	Minimum R_w required for each component
Category 2	30	Glazing	35 (where total area of glazing for a *habitable room* is greater than 1.8m²)
			32 (where total area of glazing for a *habitable room* is less than or equal to 1.8m²)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25	Glazing	27 (where total area of glazing for a *habitable room* is greater than 1.8m²)
			24 (where total area of glazing for a *habitable room* is less than or equal to 1.8m²)
		External walls	35
		Roof	35
		Entry Doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

Schedule 2

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter *acoustically rated seals*.
	38	Minimum 14.38mm thick laminated glass, with full perimeter *acoustically rated seals*; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter *acoustically rated seals*
	35	Minimum 10.38mm thick laminated glass, with full perimeter *acoustically rated seals*.
	32	Minimum 6.38mm thick laminated glass with full perimeter *acoustically rated seals*.
	27	Minimum 4mm thick glass with full perimeter *acoustically rated seals*
	24	Minimum 4mm thick glass with standard weather seals

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators.
	47	Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m³ or 50mm thick polyester insulation with a density of 20kg/m³ in the cavity. OR Two leaves of clay brick masonry at last 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) at least 13mm thick cement render on each face OR Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. OR Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	41	Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves OR Single leaf of clay brick masonry at last 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face OR Concrete brickwork at least 110mm thick OR In-situ concrete at least 100mm thick OR Precast concrete at least 100mm thick and without joints.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	35	Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.
Roof	45	Concrete or terracotta tile or sheet metal roof with sarking, *acoustically rated plasterboard* ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m³ in the cavity. OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of *acoustically rated plasterboard* at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity.
	41	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity. OR Concrete suspended slab at least 100mm thick.
	38	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity.
Floors	51	Concrete slab at least 150mm thick.
	45	Concrete slab at least 100mm thick OR Tongued and grooved boards at least 19mm thick with: (i) timber joists not less than 175mm x 50mm; and (ii) mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m³ positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and (iii) mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m³ laid over entire floor, including tops of joists before flooring is laid; and (iv) secured to battens at least 75mm x 50mm; and (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
Entry Doors	35	Solid core timber not less than 45mm thick, fixed so as to overlap the frame or rebate of the frame by not less than 10mm, with full perimeter *acoustically rated seals*.
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter *acoustically rated seals* and constructed of - (i) solid core, wood, particleboard or blockboard not less than 45mm thick; and/or (ii) acoustically laminated glass not less than 10.38mm thick.

Component of building's *external envelope*	Minimum R_w	Acceptable forms of construction
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of - (i) Wood, particleboard or blockboard not less than 33mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4kg/m²; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter *acoustically rated seals*.

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

6.2.5 Neighbourhood centre zone code

6.2.5.1 Application

This code applies to assessing all development in the Neighbourhood centre zone.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

Where development is identified in the **West Burleigh historic township precinct,** additional outcomes will apply to assessment.

Note: To the extent there is any inconsistency with the outcomes applying to the whole of the zone, the precinct outcomes will prevail.

6.2.5.2 Purpose

(1) The purpose of the Neighbourhood centre zone code is to provide for a small mix of land uses to service residential neighbourhoods.

It includes small scale convenience shopping, professional offices, community services and other uses that directly support the immediate community.

(2) The purpose of the code will be achieved through the following overall outcomes:

(a) Land uses:

(i) provide day-to-day goods and services and diverse business opportunities without exceeding the needs of the immediate neighbourhood, detracting from the residential amenity of the area or undermining the viability of mixed use or specialist centres;

(ii) include retail facilities such as neighbourhood stores and newsagents, cultural uses, medical and community facilities, small scale entertainment premises, educational establishments, indoor sport and recreation, service stations and local services such as post offices;

(iii) may include Food and drink outlets (without drive-through facilities) and Bars (with a total use area up to 100m^2);

(iv) involving commercial activities cease by 10pm to limit potential social and amenity impacts arising from these uses to nearby residents;

Note: It is acknowledged that on an individual basis it may be appropriate to review and adjust these operating hours based on the specific circumstances, roles and function of some centres.

(v) involving external patron areas, particularly where alcohol is consumed, are designed and orientated to mitigate any potential residential amenity impacts;

(vi) do not detract from the amenity of nearby sensitive land uses or land zoned for sensitive land uses;

(vii) include multiple dwelling residential development where integrated with business activities;

(viii) operate in a manner that do not cause nuisance to sensitive land uses; and

(ix) may include a Shop, providing the GFA of any single shop does not exceed 1,500m^2.

(b) Housing is provided at a form, scale and intensity that is appropriate for the zone and each particular locality it is in where the following outcomes are satisfied:

Orderly and economically efficient settlement pattern

(i) degree of public transport service within a 400 metre walking distance, being the most desirable distance for pedestrian access, and the ease and safety of pedestrian access to that service;

(ii) proximity to major employment concentrations, centres, social and community infrastructure facilities and important amenity features, including the coast, recreational waterways and parkland;

(iii) capacity of available infrastructure to support the development, including water, sewer, transport and social and community facilities;

Housing needs

(iv) delivery of a generous mix of housing form, sizes and affordability outcomes that meet housing needs (including housing needs of the future) for the locality;

Design and amenity

(v) whether intended outcomes for building form/city form and desirable building height patterns are negatively impacted, including the likelihood of undesirable local development patterns to arise if the cumulative effects of the development are considered;

(vi) retention of important elements of neighbourhood character and amenity, and cultural heritage;

(vii) whether adjoining residential amenity is unreasonably impacted;

(viii) achievement of a high quality urban design through highly functional, accessible, attractive, memorable and sustainable buildings and public spaces;

Environment

(ix) the impacts of any site constraints, including natural hazard and environmental-based constraints; and

Community Benefit

(x) where the development:

(A) is appropriate having regard to overall outcome (b) (i) to (ix);

(B) meets all other overall outcomes for the zone; and

(C) incorporates community benefits in addition to those that could be lawfully conditioned to be provided (i.e. that are required to be provided by this City Plan or reasonably required in relation to the development or use of premises as a consequence of the development), development bonuses are applied in accordance with the **SC6.5 City Plan policy – Community benefit bonus elements**.

Note: SC6.5 City Plan policy – Community benefit bonus elements provides guidance on what might constitute additional community benefits and the supporting material that may be required to demonstrate the degree of benefit.

Note: Development is not required to incorporate community benefits in order to demonstrate that housing has been provided at a form, scale and intensity that is appropriate having regard to overall outcome (b) (i) to (ix).

(c) Character consists of:

(i) a variety of mixed use neighbourhood centre sizes which are determined by the needs of the immediate neighbourhood within a 1000m walking distance;

(ii) distinctive ground floor businesses that provide a convenient and diverse shopping experience, complemented by discrete office or residential units above;

(iii) a streetscape that is pedestrian friendly, with ample parking and framed by awning covered, attractive shop frontages;

(iv) a high level of accessibility by walking and cycling; and

(v) integration with existing neighbourhood focal points such as public transport services, parks and other community facilities, wherever possible.

(d) Built form:

(i) is of a height and density that complements its surrounding neighbourhood;

(ii) on the ground floor allows for activation with the street, a flexible range of commercial opportunities and flexible re-use of non-residential space;

(iii) is setback from road frontages to complement the streetscape character and allow for activation of the street;

(iv) is setback from side and rear boundaries to protect the amenity of adjoining properties;

(v) has a site cover to maximise the use of the land while providing adequate space for facilities and landscaping;

(vi) creates strongly defined building edges and an attractive, safe and pedestrian-focused environment; and

(vii) is not dominated by supermarkets or bulky and large built form.

(e) Lot design:

(i) lots are of a size and configuration that support viable neighbourhood centre activities.

(f) Variations in the zone are:

(i) **West Burleigh historic township precinct**.

(3) The purpose of the **West Burleigh historic township precinct** will be achieved through the following additional overall outcome:

(a) The historical character of the area is conserved by ensuring development incorporates design features, materials, colours, detailing and landscaping that is in keeping with the colonial style and existing historical buildings.

6.2.5.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 6.2.5-2: Neighbourhood centre zone code – for assessable development

<table>
<tr><th>Performance outcomes</th><th>Acceptable outcomes</th><th>Does the proposal meet the acceptable outcome?
If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome</th><th>Internal use</th></tr>
<tr><td colspan="4">Setbacks</td></tr>
<tr><td>PO1
Setbacks:
(a) allow buildings to address and actively interface with streets and public spaces;
(b) provide additional width to the public realm and additional space for road side dining opportunities; and
(c) assist in the protection of adjacent amenity.</td><td>AO1
Setbacks are as follows:<table><tr><th rowspan="2">Setback</th><th colspan="2">Minimum distances measured in metres (m)</th></tr><tr><th>Building height</th><th>Setback</th></tr><tr><td rowspan="2">Frontage</td><td>up to 9.5m and not more than 2 storeys</td><td>0m (maximum 2m)</td></tr><tr><td>for that part exceeding 9.5m or 2 storeys</td><td>2m</td></tr><tr><td>Side</td><td>up to 9.5m and not more than 2 storeys</td><td>0m where the site abuts the Centre zone, Neighbourhood centre</td></tr></table></td><td>NOT APPLICABLE
No built form is proposed as part of this Preliminary Approval (Variation Request) application.

The Benowa Gardens Plan of Development will apply the setbacks of the Neighbourhood centre zone for non-residential development and High density residential zone code setbacks for residential development.
This has been detailed further in the Planning Report.
The conceptual Architectural Drawings illustrate the potential future built form that can be facilitated by applying the proposed Benowa Gardens Plan of Development and have been formed through the application of the Neighbourhood centre zone setbacks.
Future built form will be subject to code assessable</td><td></td></tr>
</table>

Performance outcomes	Acceptable outcomes			Does the proposal meet the acceptable outcome? If not, justify how the proposal meets **either** the performance outcome or overall outcome	Internal use
			zone or Mixed use zone 2m otherwise	development applications, at such time the setbacks can be addressed.	
		for that part exceeding 9.5m or 2 storeys	2m plus an extra 0.5m for every 3m in height or part thereof over 9.5m		
	Rear	up to 9.5m and not more than 2 storeys	2m		
		for that part exceeding 9.5m or 2 storeys	6m		

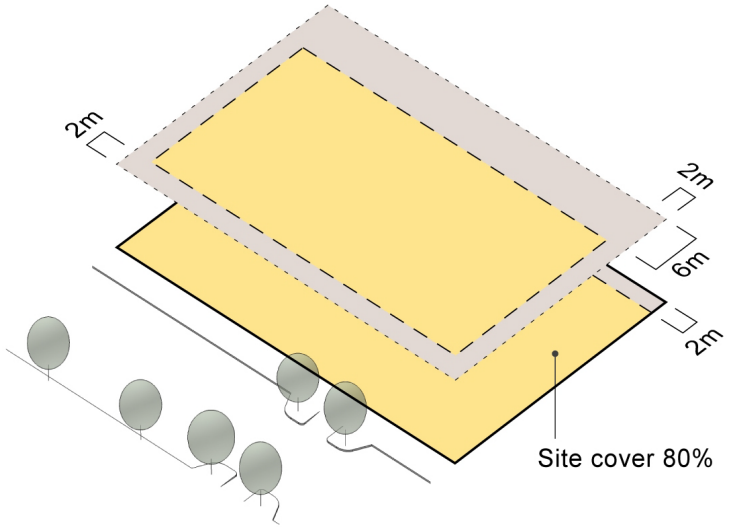
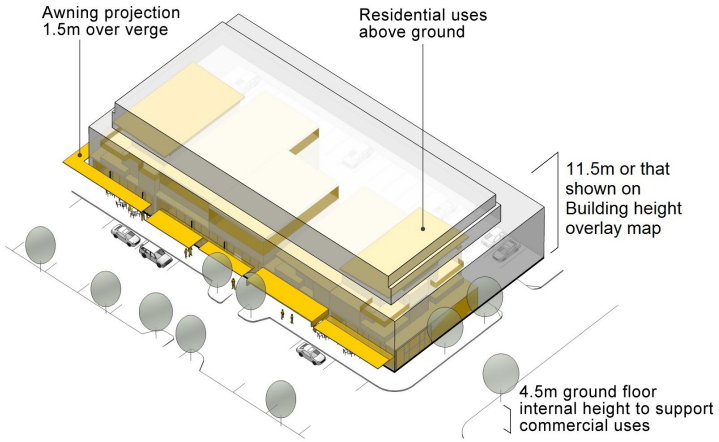


Figure 6.2.5-1
Illustration showing Neighbourhood centre zone setback and site cover outcomes

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Site cover			
PO2 Site cover: (a) ensures adequate space for storage and other necessary facilities required to support the land use; (b) allows for areas of high quality landscaping and streetscaping treatments; and (c) contributes to neighbourhood character.	**AO2** Site cover does not exceed 80%.	**NOT APPLICABLE** While the proposal does not involve any built form, the Benowa Gardens Development Code reflects the maximum site cover requirement of 80%. Future development is therefore able to comply with the maximum site cover prescribed under AO2. Notwithstanding, should any variations to site cover be sought, this can be addressed at the time of the code assessable application.	
Height			
PO3 Development is of a height that: (a) promotes the intended character of the zone; and (b) does not impact on the amenity of adjoining uses.	**AO3** Building height does not exceed 2 storeys with a maximum height of 14m or that shown on the **Building height overlay map.** AND Structures do not exceed a height of 14m or that shown on the **Building height overlay map.**	**DOES NOT COMPLY** The proposed Benowa Gardens Development code seeks to apply a new building height overlay on site. A detailed assessment has been undertaken within the Planning Report.	
Density			
PO4 Density does not exceed that shown on **Residential density overlay map**. OR Where not identified on the overlay map, density does not exceed one dwelling per 400m^2. OR For Rooming accommodation, accommodating more than four unrelated people, density does not exceed one	**AO4** No acceptable outcome provided.	**DOES NOT COMPLY** The proposed Benowa Gardens Development code seeks to apply a new building height overlay on site. A detailed assessment has been undertaken within the planning report.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
bedroom per 133m^2.			
Design and appearance			
PO5 Commercial buildings present well to the street and provide awnings for the comfort of pedestrians.	**AO5.1** Development provides awnings which are a minimum width of 1.5m over the pedestrian access/footpath.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO5.2 Footpath awnings are designed to complement and integrate with the façade and the streetscape.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable mcu development applications.	
PO6 **West Burleigh historic township precinct** Development incorporates design features, materials, colours detailing and landscaping to complement the colonial style and historical characteristics of the area.	**AO6.1** **West Burleigh historic township precinct** The roof form and pitch, façade articulation and detailing, window and door proportions and features such as verandas, eaves and parapets reflect or incorporate existing design elements from other buildings within the township.	**NOT APPLICABLE**	
	AO6.2 **West Burleigh historic township precinct** Building design features, patterns, textures and colours used are complementary to those of nearby buildings.	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets **either** the performance outcome or overall outcome	Internal use



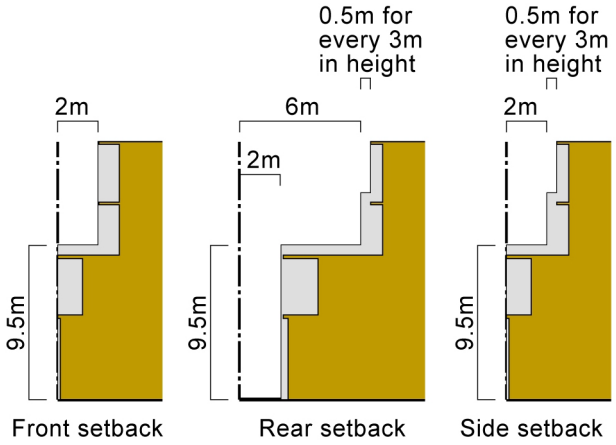


Figure 6.2.5-2
Illustration showing Neighbourhood centre zone outcomes

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Amenity			
PO7 Non-residential activities operate within appropriate hours to minimise nuisance to nearby, existing or intended sensitive land uses.	**AO7** Business hours of non-residential activities are between 6am to 10pm.		
Land uses			
PO8 Residential land uses do not compromise the activation of ground floor storeys.	**AO8** Residential uses are located above ground floor.	**WILL COMPLY** The Benowa Gardens Development Code envisages residential development to be located above ground floor and atop the podium. This has been reflected in the proposed provisions of the development code.	
PO9 Ground floor spaces are designed to enable the flexible reuse of non-residential floor area to support changing community and business needs.	**AO9** The design of the ground floor services and utilities allow for easy reconfiguration of commercial tenancies. **Note: To facilitate the flexible re-use of the ground floor, Council recommends an internal floor to ceiling height of 4.5m.**	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
PO10 Non-residential development: (a) serves the needs of the immediate neighbourhood catchment – generally calculated as the planned population and jobs within a 1,000 metre walk from the centre; (b) supports a range of neighbourhood centre uses and enterprise opportunities; and (c) provides a range of goods and services to satisfy the day to day convenience needs of the immediate	**AO10** No acceptable outcome provided.	**COMPLIES WITH PO** The proposed development and associated uses are considered to serve the need of the immediate neighbourhood. A detailed assessment has been undertaken in the Planning Report and supporting Economic Impact Assessment.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
neighbourhood catchment.			
PO11 A single tenancy does not dominate the retail GFA of the neighbourhood centre area and does not exceed 1,500m^2.	**AO11** The GFA of a single shop does not exceed 1,500m^2.	**DOES NOT COMPLY** The proposed Benowa Gardens Development code seeks to apply facilitate the establishment of a single anchor Shop tenancy of 4,000m^2. A detailed assessment has been undertaken within the planning report.	
Lot design (for subdivision only)			
PO12 Lots are of a size and configuration that support viable neighbourhood centre activities.	**AO12.1** Minimum lot size is 1,000m^2.	**NOT APPLICABLE**	
	AO12.2 Minimum road frontage for lots is 18m.	**NOT APPLICABLE**	

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.3.9 High-rise accommodation design code

9.3.9.1 Application

This code applies to assessing material change of use for development for Multiple dwellings, Residential care facilities, Resort complexes, Retirement facilities, Rooming accommodation and Short-term accommodation uses over 32m in height where indicated within **Part 5 Tables of Assessment**.

Note: Where a development involves commercial uses, that component of the development shall be assessed against the Commercial design code.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3** in **Part 5**.

9.3.9.2 Purpose

The purpose of the High-rise accommodation design code is to responsibly encourage diverse, innovative and engaging sub-tropical high-rise forms that enhance the city skyline.

The purpose of the code will be achieved through the following overall outcomes:

(a) Development is designed to create attractive, high-quality visually appealing buildings and protect the privacy and amenity of neighbouring residential premises.

(b) Slender towers relate to existing high-rises and enhance views of the city skyline.

(c) Tower development mitigates negative visual and physical impacts through appropriate setbacks and design.

(d) Where they occur (in accordance with zone intentions), podiums are designed to engage with the street and be of a scale that is complementary to adjoining and nearby buildings.

(e) Development provides a high-standard of amenity and visual interest for users and neighbours, including a high-standard of communal and private open space.

(f) Development is designed and orientated to promote a safe environment within the site, adjoining streets and public realm.

(g) Development is complemented by high-quality landscaping that contributes to the desired character of the area.

(h) Development is designed to promote safe and convenient pedestrian and vehicle access to and from the site.

(i) Development supports the provision of diversity of housing for various types of households within the city to meet the needs of existing and future residents.

(j) Residential care facilities and retirement facilities are provided with self contained services and recreational facilities to meet the needs of residents.

(k) Development provides private and communal open spaces that respond to the subtropical climate, maximise outdoor living opportunities, enhance amenity for residents and provide engagement with streets and public open spaces.

9.3.9.3 Specific benchmarks for assessment

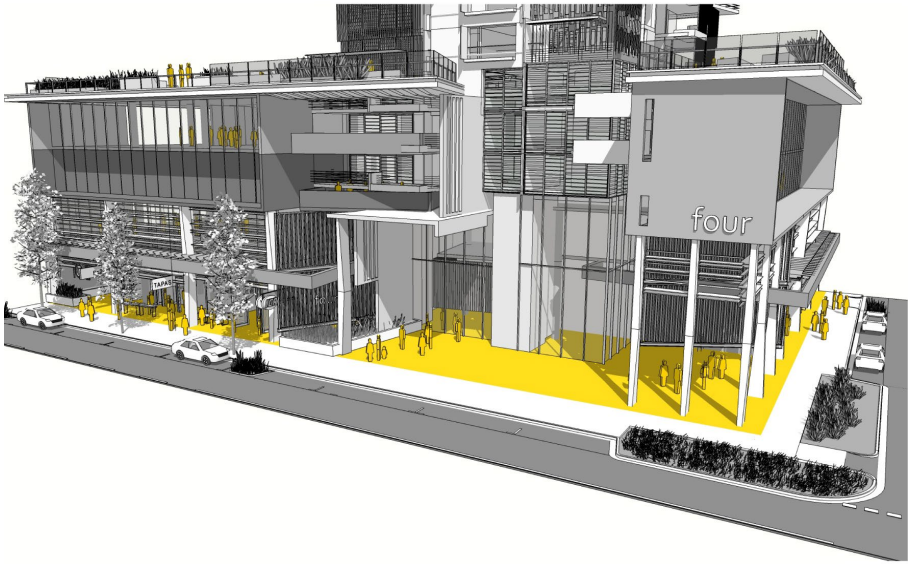
PART B– ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.3.9-1: High-rise accommodation design code – for assessable development

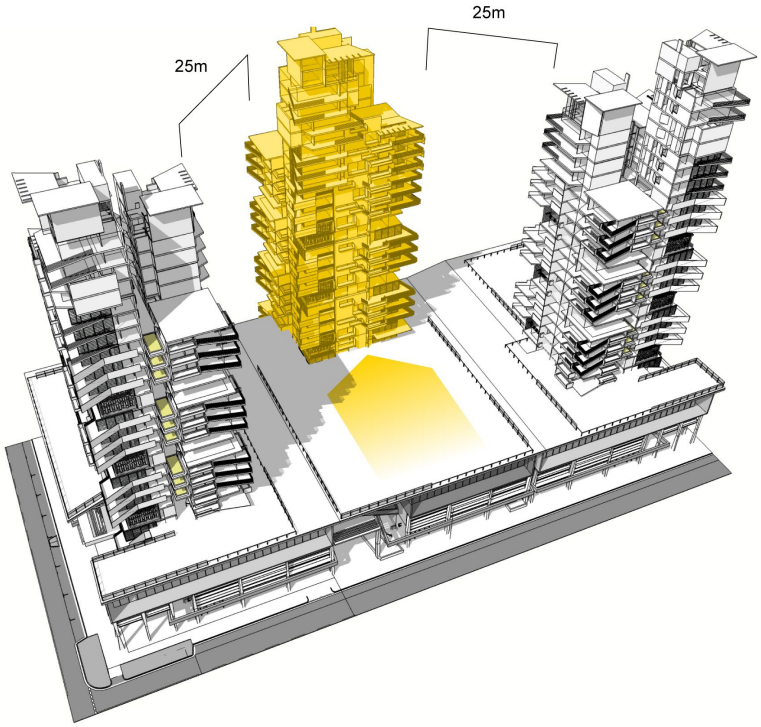
Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Tower base (podium)			
PO1 Where podiums are envisaged by the zone, tower base form respects the framework of established built form, adjacent streets, parks and public or private open spaces.	**AO1.1** Tower base heights: (a) are well-proportioned to frame adjacent park land and on-site open space; (b) match neighbouring low-set built form; or (c) are no greater than 10.5 metres in height where no neighbouring low-set built form exists.	**COMPLIES WITH PO** The Master Plan and associated Benowa Gardens Master Plan aims to introduce a new building height overlay which will afford a maximum podium height of 22 metres. This is considered to maintain the framework of established built form and surrounding development character. This has been outlined in detail in the Planning Report.	

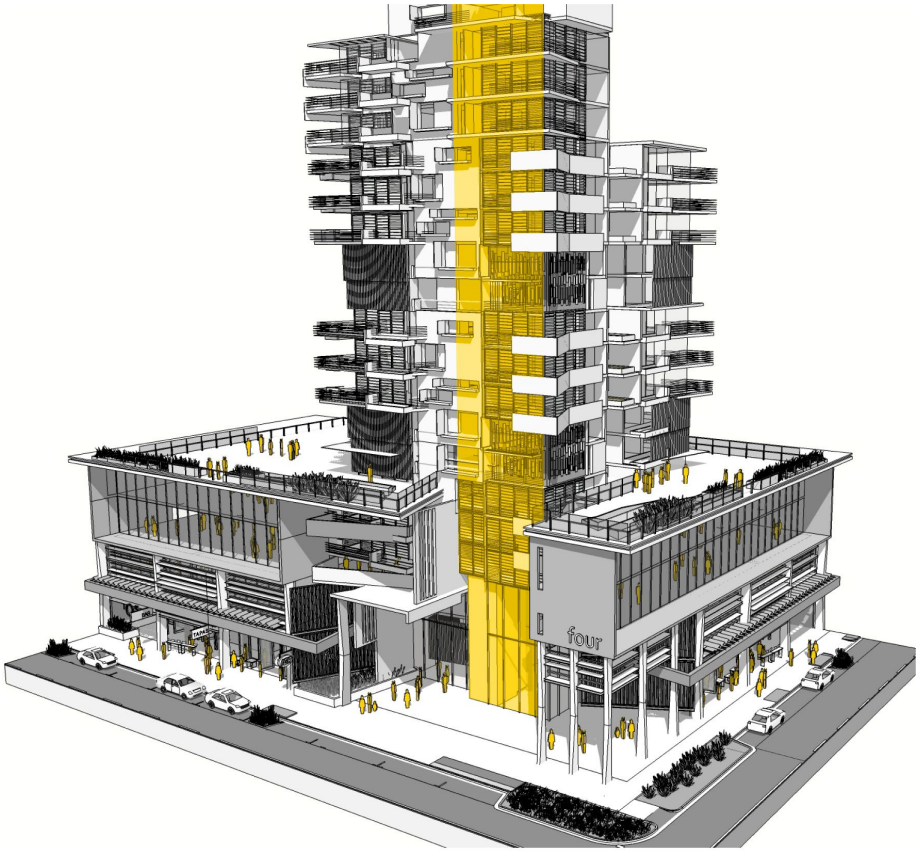
Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	AO1.2 Tower base setbacks: (a) match adjacent established setbacks; and (b) continue public open space areas provided along street frontages.	**NOT APPLICABLE** No public open space nor established towers are present on surrounding sites.	
 Figure 9.3.9-1 Illustration showing High-rise accommodation design outcome where the tower base (podium) height matches neighbouring low-set built form and match adjacent established setbacks			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO2 Tower base façades reinforce the intended neighbourhood character and enhance the pedestrian experience.	**AO2** Tower base façades avoid blank, featureless walls by patterning high-quality architectural elements, like window bays, canopies, and fenestration.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
 Figure 9.3.9-2 Illustration showing High-rise accommodation design outcomes where the tower base facades reinforce the intended neighbourhood character and enhance the pedestrian experience with high quality architectural elements and windows			
PO3 Tower base form animates the street level by engaging primary and secondary street frontages appropriately.	**AO3.1** Where entirely residential development is proposed: (a) along the primary street frontages ground floor units are grade-separated (up to 600mm high) with soft screening landscaping and direct individual	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	entrances; and (b) private and communal open space areas provide casual surveillance to all street frontages.		
	AO3.2 Short-term accommodation uses locate grand lobbies or other signature features along primary street frontages and prominent street corners.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
 **Figure 9.3.9-3** Illustration showing High-rise accommodation design outcomes where the tower base form animates the street by engaging primary and secondary street frontages through the use of grand lobbies or other signature features			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Tower form design			
PO4 Slender tower form promotes: (a) open, attractive and distinct skyline; (b) small, fast moving shadows; (c) view corridors between nearby towers; (d) efficient interior climate control; and (e) balconies as an extension of indoor living space.	**AO4.1** Tower floor plate is limited to 750m^2 per tower (includes all services, lift and stairwell annex, etc.). **Note**: **Balconies are excluded from calculations to encourage larger private outdoor space areas.**	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO4.2 Tower form provides a unique profile when compared to nearby existing and proposed towers of similar height.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
PO5 Tower form mitigates negative visual and physical impacts, including impacts on privacy, by setting back from streets, parks, open space and adjacent properties and tower forms.	**AO5.1** Tower form (including balconies) along: (a) single frontages step in at least 3m from the base (podium); or (b) corner frontages can have up to 1/3 tower width extend straight down at the corner point to reinforce the intersection if negative ground level wind effects are mitigated.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO5.2 New towers are separated a minimum distance of 25m from any existing or approved adjacent and on-site tower(s).	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	

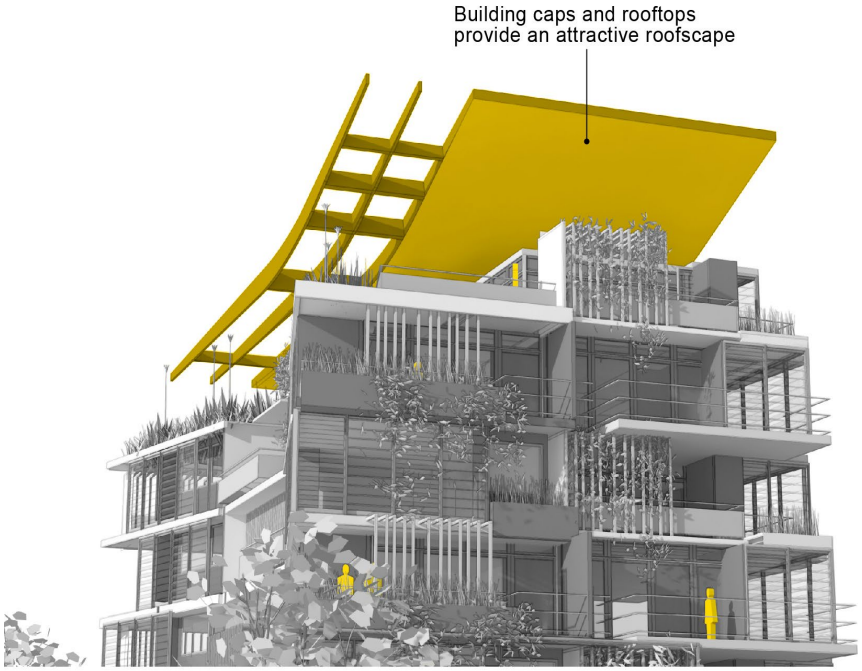
Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	AO5.3 Tower form is coordinated to off-set with adjacent existing and proposed towers to ensure: (a) prominent tower views to natural features like the beach and rivers are not obstructed; and (b) views of the sky and access to sunlight from the public realm and private open space areas are maximised.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
 **Figure 9.3.9-4**			

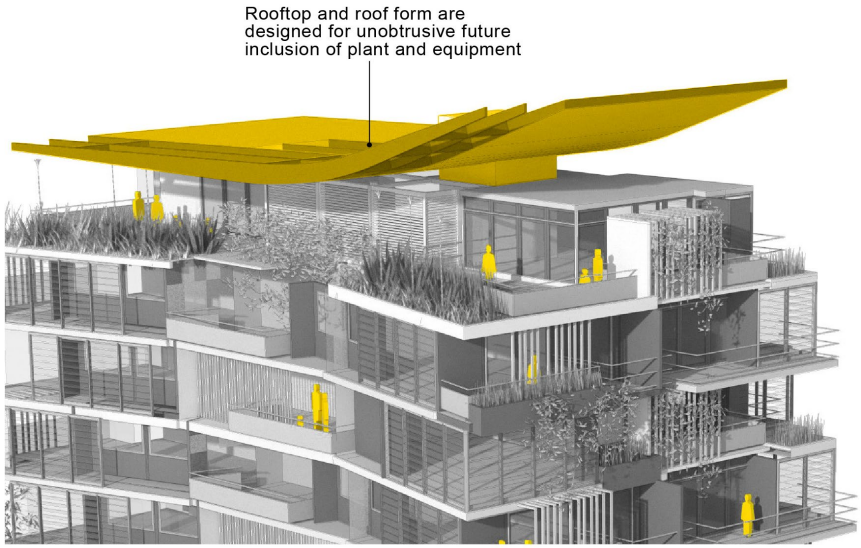
Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Illustration showing High-rise accommodation outcomes for separation between towers.			
 **Figure 9.3.9-5** Illustration showing High-rise accommodation design outcomes where the tower form mitigates			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets <u>either</u> the performance outcome or overall outcome	Internal use
negative visual and physical impacts by setting back from streets			
PO6 Tower form orientation and articulation promotes sub-tropical design excellence and innovation.	**AO6.1** Tower form is orientated to: (a) reduce the perceived mass of the building; and (b) provide privacy for both communal and private open space amenity areas.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO6.2 Tower façades are: (a) articulated to manage passive solar gain in summer; (b) well-glazed with functional windows where possible to reduce reliance on artificial cooling; (c) designed with high-quality sustainable materials and finishes that promote building longevity; and (d) varied in design and articulation to promote visual interest.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
 Figure 9.3.9-6 Illustration showing High-rise accommodation design outcome where tower facades are articulated to manage passive solar gain in summer and varied in design and articulated to promote visual interest			
PO7 Balconies maximise building performance while minimising negative impacts on the building mass and public realm.	**AO7** Balconies: (a) are not made with materials susceptible to solar gain; (b) are not made with transparent materials that spill light from the dwellings; and (c) integrate into the building profile.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
Tower cap design			

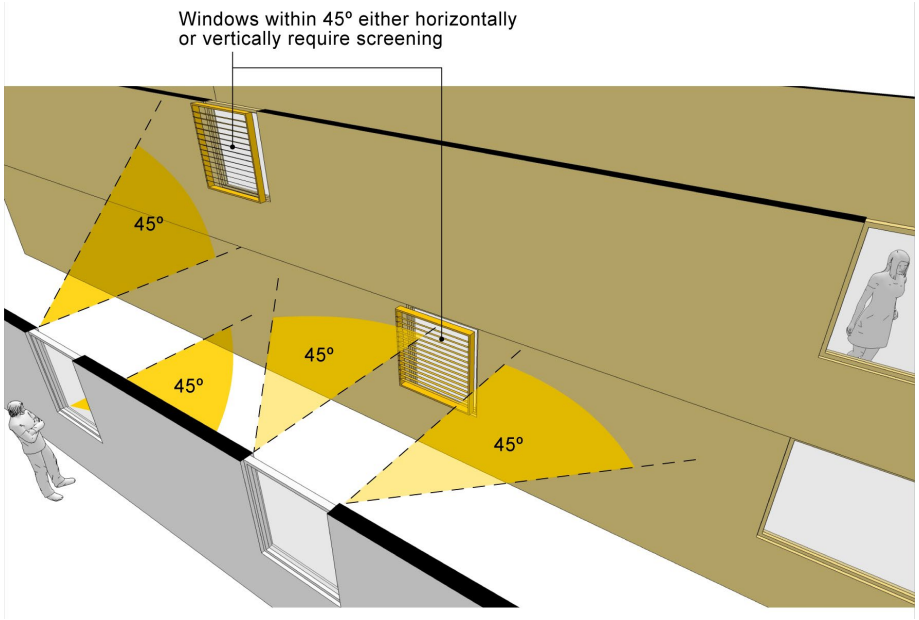
Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO8 Tower caps reinforce the Gold Coast skyline. **Note: building height incorporates allowance for plant and equipment, attractive building caps and rooftop features.**	**AO8** Where building height creates an identifiable protrusion in the skyline or the site terminates a viewpoint, the following are provided: (a) a signature cap strengthening the identity as a landmark; and (b) decorative lighting that highlights key architectural features. OR Where lower building height forms part of the urban backdrop a subtle cap that integrates with the overall design is provided.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
PO9 Tower cap design attractively integrates all signage, telecommunications, service structures, lift motor rooms and mechanical plants.	**AO9** No acceptable outcome provided.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	

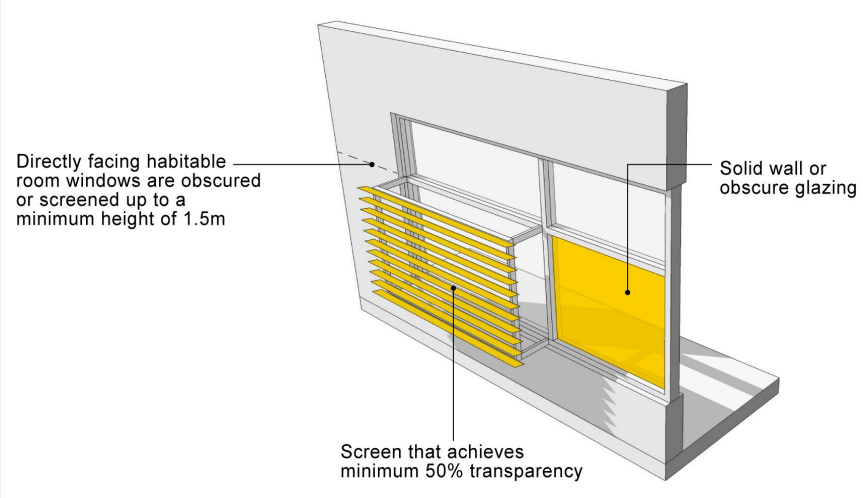
Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
 **Figure 9.3.9-7** Illustration showing High-rise accommodation outcomes for building caps and rooftops			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
 **Figure 9.3.9-8** Illustration showing High-rise accommodation outcomes for roof top and roof form			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Housing need and choice			
PO10 Development provides a mix of housing sizes and affordability outcomes to meet housing needs.	**AO10** No acceptable outcome provided.	**WILL COMPLY** The conceptual Master Plan envisages the delivery of 397 residential dwellings, comprising a mix of 2-bed and 3-bed apartments. By virtue of this, future development on site will provide a mix of housing sizes.	
Communal and private space areas			
PO11 Communal space areas: (a) are accessible, useable and safe; (b) are designed for the subtropical climate, maximising outdoor living opportunities and enhancing amenity for residents; (c) enhance the attractiveness of the development; (d) provide opportunities for social interaction; and (e) create pleasantly shaded outdoor areas.	**AO11.1** Communal space is provided at a rate of 6.5m^2 per dwelling and is designed for simultaneous use by individuals and groups.	**NOT APPLICABLE** The proposed development does not involve built form. Open space provisions will be addressed through subsequent code assessable MCU development applications.	
	AO11.2 Landscaping in open communal space areas: (a) have minimum and average widths of 1.5m and 3m; (b) are at-grade with adjacent footpaths; (c) comprises 50% deep planting; and (d) do not screen views to the street or entries.	**NOT APPLICABLE** The proposed development does not involve built form. Detailed landscape design will be addressed through subsequent code assessable MCU development applications.	
	AO11.3 Where the communal open space is for a residential care facility or retirement facility, the open space is provided with outdoor facilities for the health and wellbeing of residents such as sheltered gardens, circuit walkways, gardening beds and a space of sufficient size for a resident to take a visiting family with young children.	**NOT APPLICABLE** The proposed development does not involve built form. Detailed landscape design will be addressed through subsequent code assessable MCU development applications.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO12 Development provides attractive, accessible and functional private open space for residents, which are designed for the subtropical climate to maximise outdoor living opportunities and enhance amenity for residents.	**AO12.1** Above ground private open space for each dwelling: (a) mitigates negative wind effects on intended users; (b) has a minimum area of 3m x 3m; (c) is accessible from the living room; and (d) has a maximum gradient not exceeding one in ten.	**NOT APPLICABLE** The proposed development does not involve built form. Open space provisions will be addressed through subsequent code assessable MCU development applications.	
	AO12.2 Ground floor private open space for each dwelling: (a) has a minimum area of 25m²; (b) has a minimum width of 5m; (c) is accessible from the living room; and (d) has a maximum gradient not exceeding one in ten.	**NOT APPLICABLE** The proposed development does not involve built form. Open space provisions will be addressed through subsequent code assessable MCU development applications.	
Privacy			
PO13 Privacy for users and neighbouring properties is accomplished by windows that are appropriately obscured by glazing, shuttering, location or other similar treatments.	**AO13** Habitable room windows do not 'directly face': (a) private open space of adjoining dwellings; (b) another habitable room window within 10m; and (c) an at-grade access way, footpath or communal open space area within 3m. OR Where habitable room windows must face, the privacy is achieved through windows that: (a) have fixed obscure glazing in any part of the window below 1.5m above floor level; and (b) have privacy screens that cover a	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	minimum of 50% window view. **Note: 'directly facing' means an angle within 45° either horizontally or vertically.**		
 **Figure 9.3.9-9** Illustration showing High-rise accommodation design privacy outcomes where windows and doors are appropriately obscured by screening			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
 **Figure 9.3.9-10** Illustration showing High-rise accommodation outcomes for privacy.			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Safety and security			
PO14 Building design enhances safety and security for intended users.	**AO14.1** Above ground floor windows and balconies overlook all on-site pedestrian paths and communal open spaces.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO14.2 Lighting at 4m intervals is provided along all on-site pedestrian paths and communal open spaces.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO14.3 Entrances and exits to the street are directly accessible, illuminated and highly visible.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO14.4 Dead-end corridors, alleyways, pathways and refuse areas are signed and secured to prevent unauthorised access.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
Services			
PO15 Servicing, utilities, loading and other 'back of house' activities are either located underground, screened or hidden away from public view.	**AO15** No acceptable outcome provided.	**WILL COMPLY** The supporting conceptual master plan documents envisage servicing and utility areas to be located within ground and basement parking levels.	
Services and recreational facilities for residential care facilities and retirement facilities			
PO16 A range of self-contained services and	**AO16** Developments that have between 11 and 25	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
recreational facilities are provided.	units include a community meeting room. OR Developments that have 26 units or more include a community meeting room and one or more of the following: (a) community vehicle; (b) on-site personal care; (c) on-site meal service; and (d) recreational facilities, in addition to the open space requirements in **PO11**.		

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.4.12 Solid waste management code

9.4.12.1 Application

This code applies to assessing material change of use for development requiring waste management where indicated within **Part 5 Tables of assessment,** unless the use is Caretaker's accommodation, Car wash, Community residence, Dwelling house, Dual occupancy, Environmental facility, Home based business, Landing, Major electrical infrastructure, Park, Parking station, Permanent plantation, Roadside stall, Sales office, Substation or Telecommunications facility.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

9.4.12.2 Purpose

(1) The purpose of the Solid waste management code is to ensure development provides appropriate solid waste and recycling storage and servicing facilities.

(2) The purpose of the code will be achieved through the following overall outcomes:

- (a) Development provides waste and recycling storage and servicing points that are safe, convenient, efficient, appropriately sized, and minimise disruption to traffic.
- (b) Waste and recycling storage and servicing facilities minimise risk to public health and the environment.
- (c) The location and design of waste and recycling storage and waste servicing points protect the amenity of occupants and adjoining properties.
- (d) Development provides suitable waste management measures in non-serviced areas.

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.4.4 General development provisions code

9.4.4.1 Application

The code applies to assessing material change of use, building work, reconfiguring a lot or operational work where indicated within **Part 5 Tables of assessment**.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

9.4.4.2 Purpose

(1) The purpose of the General development provisions code is to provide a consistent approach to city wide issues and avoid duplication of regulation throughout the City Plan.

(2) The purpose of the code will be achieved through the following overall outcomes:

- (a) Development is designed to maintain the expected level of amenity for the area.
- (b) Development promotes a safe environment and reduces the potential for crime.
- (c) Development is designed to respect the natural values of the land, including vegetation, natural topography and development on steep slopes to minimise impacts on the landscape character of the city's rural, urban and hinterland areas.
- (d) Development does not result in unsightly retaining walls.
- (e) Building services and storage areas are designed and located to avoid nuisance to adjoining premises and avoid an unattractive appearance when viewed from the street.
- (f) Development does not cause adverse stormwater drainage impacts on or off the site.

(g) Development is connected to essential services and public utilities in accordance with infrastructure provider requirements.

(h) Development is designed and located to ensure it does not adversely impact on Council infrastructure.

9.4.4.3 Specific benchmarks for assessment

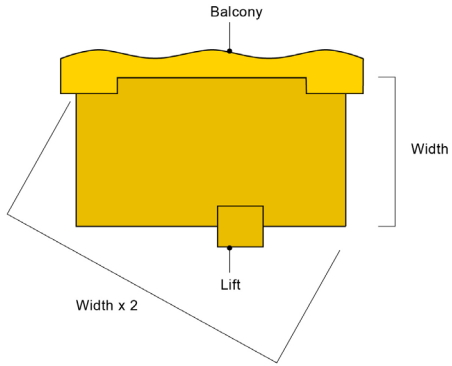
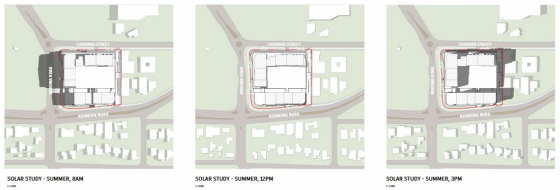
PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

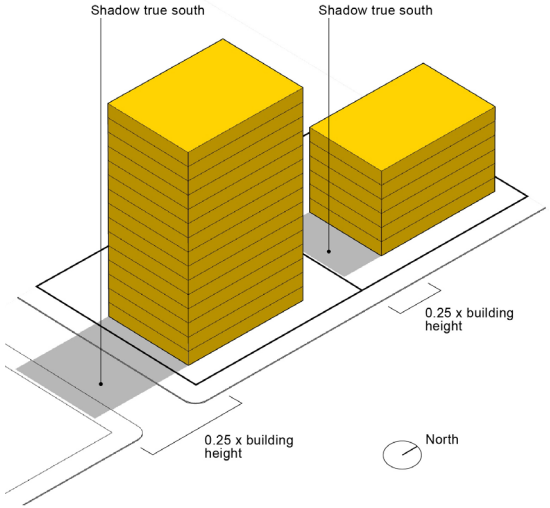
Table 9.4.4-2: General development provisions code – for assessable development

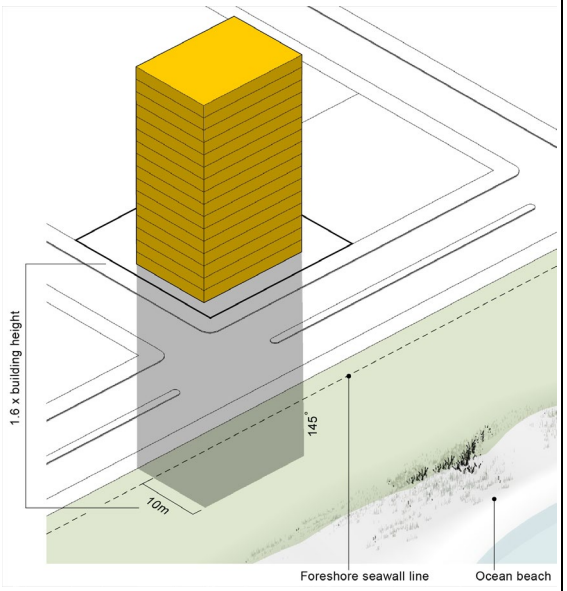
Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Amenity protection			
PO1 Development mitigates any negative effects to amenity, health and safety from existing surrounding activities having regard to: (a) noise; (b) hours of operation; (c) traffic; (d) signage; (e) visual amenity; (f) wind effects; (g) privacy; (h) vibration; (i) contaminated substances; (j) hazardous chemicals; (k) odour and emissions; and (l) safety.	**AO1** No acceptable outcome provided.	**WILL COMPLY** The proposal is for a Preliminary approval (Variation Request) to vary the effect of the Planning Scheme and does not involve any built form at this time. As such, development impacts to amenity, health and safety with regards to hours of operation, signage, wind effects and privacy will be assessed during subsequent code assessable development applications. With regards to noise, traffic and visual amenity, in-depth analysis has been undertaken as part of the preliminary Traffic Impact Assessment, Visual Impact Assessment and Acoustic Assessment provided in support of the application. Each of these reports provides recommendations for future development to ensure adverse impacts will be mitigated. Given the nature of the development, there are no anticipated impacts associated with contaminated substances, hazardous materials nor odour and emissions.	
PO2 The proposed development prevents loss of amenity and threats to health and safety, having regard to:	**AO2** No acceptable outcome provided.	**WILL COMPLY** The proposal is for a Preliminary approval (Variation Request) to vary the effect of the Planning Scheme and does not involve any built form at this time.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
(a) noise; (b) hours of operation; (c) traffic; (d) signage; (e) visual amenity; (f) wind effects; (g) privacy; (h) vibration; (i) contaminating substances; (j) hazardous chemicals; (k) odour and emissions; and (l) safety.		As such, development impacts to amenity, health and safety with regards to hours of operation, signage, wind effects and privacy will be assessed during subsequent code assessable development applications. With regards to noise, traffic and visual amenity, in-depth analysis has been undertaken as part of the preliminary Traffic Impact Assessment, Visual Impact Assessment and Acoustic Assessment provided in support of the application. Each of these reports provides recommendations for future development to ensure adverse impacts will be mitigated. **GIVEN THE NATURE OF THE DEVELOPMENT, THERE ARE NO ANTICIPATED IMPACTS ASSOCIATED WITH CONTAMINATED SUBSTANCES, HAZARDOUS MATERIALS NOR ODOUR AND EMISSIONS.**	
Development along the Pacific Motorway and heavy railway line			
PO3 Development adjacent to the Pacific Motorway and heavy railway line minimises views of the storage of outdoor plant and equipment, including service areas to provide an attractive outlook for persons using the transport network.	**AO3** Where the site is adjacent to the Pacific Motorway or a heavy rail line, areas used for outdoor storage, including service areas are screened from view from users of the motorway or heavy rail line by buildings, solid fencing or vegetation.	**NOT APPLICABLE**	
Landscaping			
PO4 The proposal provides landscape work that protects and enhances the character of the local area.	**AO4.1** For all development except dwelling houses, dual occupancies, caretaker's accommodation and community residences a Statement of Landscape Intent prepared in accordance with **SC6.13 City Plan policy – Landscape work** demonstrating that the landscaping will provide amenity for site users and will protect and enhance the character of	**COMPLIES** A preliminary Landscape Analysis has been prepared by O2 Landscape Architects and outlines the landscape strategy for future development. As no built form is proposed as part of this application, detailed landscape design will be undertaken as part of subsequent code assessable MCUs.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	the local area. **AO4.2** An Open Space Management Statement is prepared in accordance with **SC6.13 City Plan policy – Landscape work** where landscape works are proposed to be undertaken on land that is or is intended to be, public open space.		
Building services			
PO5 All mechanical equipment is located and housed so as not to cause disturbance to residents within or adjoining the development.	**AO5** **For all development except dwelling houses, dual occupancies, caretaker's accommodation and community residences:** The mechanical equipment, including air-conditioning plant and swimming pool pumps, is incorporated within the building. OR The mechanical equipment, including air-conditioning plant and swimming pool pumps, is housed external to the principal building and: (a) is contained within a solid structure; and (b) located no closer than 1.5m to any site boundary.	**WILL COMPLY** No built form is proposed as part of this development application. However, proof of concept works has demonstrated that mechanical equipment can be located and housed so as not to cause disturbance to surrounding residents.	
Casual surveillance and lighting			
PO6 Development facilitates casual surveillance of public areas and incorporates lighting to reduce opportunities for crime.	**AO6** No acceptable outcome provided.	**WILL COMPLY** The proposed design outcomes of the Benowa Gardens Development Code will facilitate casual surveillance of public areas.	
Lighting			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO7 Lighting associated with any development does not cause a nuisance.	**AO7** Direct or reflected light emissions from the premises must be positioned and shielded to prevent light spillage outside the boundaries of the site.	**NOT APPLICABLE**	
Shadow impacts – for all development 3 or more storeys			
PO8 The building is designed and located to ensure that the shadow cast by the building does not detract from a comfortable living and ground level environment and the access of adequate sunlight to private and public spaces having regard to: (a) the degree of containment of the shadow on the subject site at different times of the day on the summer and winter solstice and spring and autumn equinox; (b) the cumulative impact of the shadow and existing shadows; (c) the effect of the shadow on the ocean beach, Broadwater foreshore, or riverside or beachside public open space; (d) the location of the shadow on non-residential areas external to the site; and (e) the effect of the shadow on any other site or other building.	**AO8.1** The width of the shadow cast in any direction by each level of the building, excluding balconies and lift wells, does not exceed twice the width of the shadow cast in any other direction.  **Figure 9.4.4-1** Illustration showing width ratio shadow outcome **AO8.2** The shadow cast by the building in a true south direction has a length 0.25 times the height of the building, as measured from ground level adjacent to the southern side of the subject building to the top of the topmost storey, and does not intrude onto any other site, or does not cast shadow onto any other building on the same site.	**COMPLIES WITH PO8** The proposal does not involve any built form, with the future envisaged podium and towers requiring subsequent code assessable development applications. At such time, the exact shadow impacts will be known. Notwithstanding, shadow impacts of the conceptual master plan prepared in accordance with the built form provisions of the Benowa Gardens Plan of Development include shadow diagrams. An analysis of these shadow diagrams illustrates that the proposed building height will not detract from a comfortable living a ground level environment to surrounding properties. During the summer months, shadows are predominantly confined to the surrounding road reserve area. In the morning, minor sections of the school ovals are shaded, while in the afternoon, the adjoining commercial properties to the west experience some shadowing.  As noted within the Planning Report, development	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	 **Figure 9.4.4-2** Illustration showing southern shadow outcome	fronting Ashmore Road to the south, while located within residential dwellings of the Low density residential zone, it primarily comprised of commercial uses. Considering this, shadow impacts to surrounding residential devleopment is limited to the morning period during summer months, with access to sunlight maintained throughout the rest of the day. Overall, the site benefits from it's unique siting, being largely surrounded by sporting fields and commercial developments. For this reason, shadow impacts are mnimal.	
	AO8.3 **Bermuda Point precinct** The shadow cast by the building in a true south direction has a length 0.25 times the height of the building, as measured from the top of the podium adjacent to the southern side of the subject building to the top of the topmost storey, and does not intrude onto any other site, or does not cast shadow onto any other building on the same site. **Note: The podium is excluded from any southern shadow calculations.**	**NOT APPLICABLE**	
	AO8.4 The shadow cast by any building does not cover any part of the ocean beach or Broadwater foreshore when the shadow has a bearing of 145° east of true north and the length of the shadow is	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	1.6 times the height of the building as measured from the ground level to the top of the topmost storey. **Note: For the purpose of this acceptable outcome, the ocean beach is defined as that area east of a line 10m east of and parallel to the foreshore seawall line and the Broadwater foreshore is defined as that area east of the leading edge of the revetment wall.**  **Figure 9.4.4-3** Illustration showing ocean beach and Broadwater foreshore shadow outcome		
	AO8.5 The shadow cast by the building in the direction of true south does not intrude more than 10m into a riverside public open space reserve.	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Earthworks and treatment of retaining walls			
PO9 Earthworks and retaining walls associated with the development do not create a negative visual impact upon neighbouring properties or the streetscape.	**AO9** Retaining walls and batters comply with the requirements of **SC6.12 City Plan policy – Land development guidelines, Section 3 – Change to ground level standards**.	**WILL COMPLY**	
Stormwater drainage			
PO10 Development does not cause adverse stormwater drainage impacts on or off the site.	**AO10** All development incorporates stormwater drainage works to comply with the requirements of **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.	**WILL COMPLY**	
Infrastructure			
PO11 All development ensures connection to public utilities to meet the needs of the development, including sewer, water, electricity and communications services.	**AO11** All development is provided with services, as follows: (a) electricity supply and communication services (b) reticulated water supply, when within the mapped 'water supply service area' identified in the Local government infrastructure plan, and not located in the Conservation, Extractive industry, Major tourism (Island resorts precinct), Open space or Rural zones (c) reticulated sewer network, when within the mapped 'wastewater service area' identified in the Local government infrastructure plan, and not located in the Conservation, Extractive industry, Major tourism (Island resorts precinct), Open space, Rural or Rural residential zones.	**WILL COMPLY**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO12 Development is undertaken in accordance with the Performance Criteria specified in the *Queensland Development Code MP1.4 – Building over or near relevant infrastructure*.	**AO12** Development is undertaken in accordance with the Acceptable Solutions specified in the *Queensland Development Code MP1.4 – Building over or near relevant infrastructure*.	**WILL COMPLY**	
Site analysis			
PO13 Development is designed to: (a) complement the character and address any impacts on the amenity and environment of the local area; (b) avoid any risk to life or property arising from natural hazards; and (c) protect significant natural habitat areas, wildlife corridors, wetlands and waterway corridors.	**AO13** A site analysis plan is prepared in accordance with **SC6.14 City Plan policy – Site analysis**.	**COMPLIES**	

9.4.12.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.12-1: Solid waste management code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Waste and recycling storage and bin wash-down facilities			
PO1 Development provides waste and recycling storage and servicing facilities that are safe, convenient, efficient, appropriately sized for the type and volume of waste generated.	**AO1.1** Development includes waste storage points of sufficient size to accommodate the required number of waste and recyclable bins consistent with **SC6.16 City Plan policy – Solid waste management**.	**AO1.1** COMPLIES – SEE SECTION 2.2 AND 2.3.	
	AO1.2 Waste and recycling storage points are located, designed and sized consistent with **SC6.16 City Plan policy – Solid waste management**.	**AO1.2** COMPLIES	
	AO1.3 Development with a dwelling above the third storey include appropriate waste removal systems which incorporate: (a) waste chutes; (b) hoppers; and (c) separate waste storage rooms. **Note: Waste removal system design is to be consistent with SC6.16 City Plan policy – Solid waste management.**	**AO1.3** COMPLIES – WASTE CHUTES PROVIDED.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	AO1.4 Development that includes a commercial kitchen or generates clinical or related waste incorporate additional waste facilities consistent with **SC6.16 City Plan policy –Solid waste management**.	**AO1.4** COMPLIES – MEDICAL TENANCIES NOT CURRENTLY FINALIZED. FURTHER INFORMATION ON CLINICAL WASTE TO BE PROVIDED ONCE COMMERCIAL USES ARE CONFIRMED.	
PO2 Development provides a bin wash-down facility that maintains appropriate environmental health and amenity standards.	**AO2** Development includes appropriately sized and located bin wash-down facilities consistent with **SC6.16 City Plan policy –Solid waste management**.	**AO2** LOADING DOCK AND REFUSE STORAGE AREAS TO CONTAIN APPROPRIATE WASHDOWN FACILITIES. COMPLIES.	
Amenity			
PO3 Waste and recycling storage and servicing points are appropriately located and designed for convenient and safe access by all users and to minimise the potential for nuisance to occupants of the development or adjoining properties.	**AO3.1** Direct unobstructed paths exist between waste and recycling storage and servicing points and road frontages.	**AO3.1** COMPLIES – DESIGN SUBJECT TO CHANGE.	
	AO3.2 Waste and recycling storage points are screened by solid fencing or vegetation to ensure they are not visible from a public place or sensitive land use.	**AO3.2** COMPLIES.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Waste servicing			
PO4 Waste and recycling servicing points are appropriately located and designed to facilitate safe, unobstructed and efficient servicing of waste containers.	**AO4** Waste and recycling servicing points are located, designed and sufficiently sized consistent with **SC6.16 City Plan policy –Solid waste management**. **Note: Regulation of the access, stopping and manoeuvring of refuse collection vehicles are subject to meeting, Part 9.4.13 Transport code and associated City Plan guidelines.**	**AO4** COMPLIES.	
Non-serviced areas			
PO5 Developments in non-serviced areas have appropriate solid waste management measures to adequately service the development. **Note: For Commercial developments a Waste management plan, prepared in accordance with SC6.16 City Plan policy – Solid waste management, is Council's preferred method of addressing the above outcome.**	**AO5** No acceptable outcome provided.	**PO5** COMPLIES.	

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.4.13 Transport code

9.4.13.1 Application

This code applies to assessing a material change of use where indicated within **Part 5 Tables of assessment** unless the development is listed as accepted subject to requirements and is:

(a) establishing in an existing lawful non-residential premises; and

(b) involving:

  (i) no building work (other than an internal fit-out); or

  (ii) only minor building work; and

(c) the development results in no loss of car parking spaces.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5.**

9.4.13.2 Purpose

(1) The purpose of the Transport code is to ensure transport needs associated with the development of land are met.

(2) The purpose of the code will be achieved through the following overall outcomes:

  (a) Development ensures that:

    (i) on-site access, parking and facilities, manoeuvring and servicing areas are designed to:

      (A) meet the needs of the development;

(B) result in a functional and efficient site layout that minimises impacts on surrounding areas and traffic movement;

(C) create a safe pedestrian and cyclist focussed environment; and

(D) promote a high quality public realm.

(ii) the function and capacity of the road network is not compromised and impacts on amenity, safety and operation of existing and planned roads are appropriately mitigated.

(b) An integrated transport system is provided that:

(i) is convenient, efficient and flexible, being able to accommodate major events and provide a high level of connectivity between all activity centres, urban neighbourhoods, mixed use and industrial areas, inclusive of all modes, including active transport networks;

(ii) supports well designed urban development, which is concentrated within activity centres and urban neighbourhoods, that is easy to access via frequent public transport, walking and cycling, thereby reducing the need to travel by car;

(iii) supports community and privately operated transport services as viable alternatives to the private car;

(iv) reduces congestion and car dependency and significantly increases levels of walking, cycling and public transport use; and

(v) ensures existing and future transport corridors are protected.

(c) Active transport networks are provided that:

(i) are direct, safe, pleasant and comfortable to make walking and cycling an attractive alternative to the car;

(ii) ensure development within centres and urban neighbourhoods, including the light rail corridor have access to high quality active transport infrastructure including paths, bicycle parking and end of trip facilities;

(iii) are directly connected to local attractions and services;

(iv) are clear and easily accessed; and

(v) ensure the active transport infrastructure are completed in the early stages of development.

(d) Public transport networks are provided that:

(i) are of a standard and quality to provide an attractive alternative to the car;

(ii) ensure district and regional level community uses are within walking distance of public transport facilities; and

(iii) are clear and easily accessed.

(e) A road network is provided that:

(i) is developed and managed efficiently and meets the city's needs for the movement of people and goods, and can be safely shared by all users;

(ii) ensures development impacts on amenity caused by traffic and parking is consistent with the community's reasonable expectations for the intended use;

(iii) develops local road networks that are permeable and legible to facilitate a high level of connectivity, are safe and are shared with active and public transport;

(iv) ensures developments are designed for safe and efficient waste collection, carried out with minimal disruption or impact to the road network; and

(v) within the Coomera Town Centre area, provides an integrated network of predominantly public streets to ensure efficient movement of pedestrians, cyclists, vehicles and strong public transport connections that is guided by the indicative access and mobility outcomes in Figure 9.4.13-2 Coomera Town Centre Indicative Access and Mobility.

(f) Major freight corridors and haulage routes:

(i) are protected from incompatible uses and ensure their safe and efficient operation.

(g) Navigable waterways:

(i) support active and public transport facilities in waterfront locations for public water transport and enhance access to the city's waterways.

9.4.13.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.13-2: Transport code – for assessable development

Performance outcomes	Acceptable outcomes		Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Car parking and travel demand				
PO1 Development provides off-street car parking to accommodate the parking demand and allows for various modes of travel to reduce dependency on private vehicle usage. OR Where located in the Centre zone or the Southport Priority Development Area,	**AO1** Off- street car parking spaces are provided in accordance with the identified relevant table as follows:		**THE DEVELOPMENT IS EXPECTED TO COMPLY WITH THE AO, SUBJECT TO FURTHER DESIGN REVIEW.** **THE TRAFFIC REPORTING HAS OUTLINED THE REQUIRED COMPLIANT PARKING REQUIREMENTS.** The DA is expected to provide further detail and review of the carparking supply.	
	Location	**Off-street car**		

Performance outcomes	Acceptable outcomes		Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
development: (a) maximises the efficiency of car parking provided; (b) reduces congestion and car dependency; and (c) encourages alternative transport options such as walking, cycling and the use of public transport. **Note: For an increase in scale or intensity of an existing lawful use, this PO and AO applies to the extent of the increase, provided existing car parking areas are not reduced or disturbed.**		**parking rate**		
	Centre zone and High density residential zone where nominated in the Transport hub area in **Figure 9.4.13-1: Transport hub area**	**Table 9.4.13-4: Car parking rates – Centre zone and High density residential zone – Transport hub**		
	Centre zone not nominated in the Transport hub area in **Figure 9.4.13-1: Transport hub area**	**Table 9.4.13-5: Car parking rates – Centre zone – outside Transport hub area**		
	Special purposes zone – Special development area precinct – Southport Priority Development Area	**Table 9.4.13-6: Car parking rates – Southport Priority Development Area**		
	All other zones	**Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO2 Car parking spaces for employees and visitors to the development are maximised and allow for efficient functioning of the site and surrounding traffic network.	**AO2** Car parking spaces for employees and visitors to the development are accessible at all times and not restricted by allocation of spaces, gateways, doors or similar devices.	**COMPLIES WITH AO2** The development provides carparking set out for various user groups on site.	
Servicing			
PO3 Development accommodates the required design service vehicle (including waste collection) in accordance with: (a) **Table 9.4.13-8: Service vehicle requirements**; and (b) **Table 9.4.13-9: Minimum class of service vehicle**; and (c) *AS2890.2: Parking facilities Part 2: Off-street commercial vehicle facilities* to allow for: (i) loading and unloading of service vehicles wholly within the site; (ii) pathways from service areas to tenancies at a width and grade that allows for unimpeded manoeuvring of goods (i.e. clear of doors, gates or landscaping); (iii) waste collection vehicles to appropriately service the development; (iv) safe pickup and set-down of passengers on-site; (v) unobstructed access to off-street parking areas; and (vi) an efficient and safe traffic network.	**AO3** No acceptable outcome provided.	**COMPLIES WITH PO3** The preliminary development layout has allowed for the access and circulation of a 19m Articulated Vehicle (AV).	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO4 Development ensures that service vehicle routes to and from the development minimise impacts on residential safety and amenity.	**AO4** No acceptable outcome provided.	**COMPLIES WITH PO4** The development is to provide direct connections to higher order roads to minimise exposure for pedestrians and other road users.	
Public transport network			
PO5 Development that attracts large numbers of people, integrates the provision of on-site public transport facilities which are connected to: (a) adjoining uses; (b) the existing road network; (c) existing or future public transport facilities; and (d) public areas.	**AO5.1** On-site public transport facilities (including stops) are integrated with the following land uses: (a) Air services; (b) Educational establishment (new and existing); (c) Hospital; (d) Major sport, recreation and entertainment facility; (e) Shop (2,000m² or greater); and (f) Tourist attraction.	**COMPLIES WITH PO5.2** The site will provide direct connections to the Bus Stop on the Benowa Gardens frontage	
	AO5.2 Development provides safe, attractive and convenient pedestrian and cycle pathways connected to: (a) adjoining uses; (b) the existing road network; (c) existing or future public transport facilities; and (d) public areas.	**COMPLIESWITH AO5.2** The site will provide direct connections to the Bus Stop on the Benowa Gardens frontage	
PO6 Development within 400m walking distance of a high frequency public	**AO6** No acceptable outcome provided.	**COMPLIES WITH PO5.2** The site will provide direct connections to the Bus Stop on the Benowa Gardens frontage.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
transport stop or rail station provides attractive, safe and convenient linkages to this infrastructure.			
Active transport network			
PO7 Off-street bicycle parking and off-street end-of-trip facilities are provided to encourage active transport and are: (a) designed to meet the needs and volumes of pedestrians and cyclists; and (b) located in safe, convenient and highly accessible areas. **Note: This PO does not apply to the following uses:** • **Dwelling house;** • **Dual occupancy; or** • **Multiple dwelling (where there are 3 dwellings)**	**AO7.1** Development provides off-street bicycle parking and off-street end-of-trip facilities in accordance with **Table 9.4.13-10: Bicycle parking rates** and **Table 9.4.13-11: End-of-trip facilities for active travel users**.	**COMPLIES WITH PO7** The site will provide appropriate carparking and EOT facilities, which are to addressed further as part of the subsequent development applications.	
	AO7.2 Location of off-street, end-of-trip facilities are: (a) within 50m to off-street bicycle parking; and (b) clearly signed off-street bicycle parking areas.	**COMPLIES WITH PO7** The site will provide appropriate carparking and EOT facilities, which are to addressed further as part of the subsequent development applications.	
	AO7.3 Signage indicating location of off-street bicycle parking is: (a) clearly identifiable within the site; (b) at ground level, external to buildings; and (c) in accordance with *AS2890.3:Parking facilities Part 3: Bicycle parking*.	**COMPLIES WITH PO7** The site will provide appropriate carparking and EOT facilities, which are to addressed further as part of the subsequent development applications.	
	AO7.4 Off-street bicycle parking areas are: (a) clear of pedestrian movement paths;	**COMPLIES WITH PO7** The site will provide appropriate carparking and EOT facilities, which are to addressed further as part of the	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	(b) visible from the street to allow casual surveillance; (c) located clear of vehicle movement; (d) well lit; (e) protected from the weather; (f) connected from the road via direct pathways/ramps; and (g) in accordance with the cycling aspects of austroads and *AS2890.3:Parking facilities Part 3: Bicycle parking.*	subsequent development applications.	
PO8 Development provides pedestrian and cyclist pathways to all street frontages and set down areas, and: (a) allows for safe movement; (b) is convenient and direct; (c) is clearly identifiable; and (d) is clear of potential vehicle movements.	**AO8.1** Development provides a pathway from the primary street frontage and car parking set-down areas, to connect to the main entry of the building. OR For development with 21 dwellings or more, a pathway is provided for each road frontage and car parking set-down area(s) to the main entry of the building.	**COMPLIES WITH AO8.1** The site provides pedestrian connections to all of the sites road frontages.	
	AO8.2 Pathways are to be designed and constructed in accordance with *AS 1428.1: Design for access and mobility Part 1: General requirements for access – New building work*.	**COMPLIES WITH AO8.2** The pathways are expected to be appropriately constructed.	
	AO8.3 Pathways are separated from vehicle movements.	**COMPLIES WITH AO8.3** Major pathways are to be separate from vehicle movements.	
PO9	**AO9**	**COMPLIES WITH PO9**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Public pathways are provided: (a) within the road reserve, adjacent to, and for the full length of, the sites road frontage; and (b) in accordance with **SC6.12 City Plan policy – Land development guidelines**. **Note: This PO does not apply to the following uses:** • **Dwelling house;** • **Dual occupancy; or** • **Multiple dwelling (where there are 3 dwellings).**	No acceptable outcome provided.	Pathways are to be provided within the road reserve.	
PO10 Development contributes to the safe and efficient provision and operation of the bicycle and pedestrian network.	**AO10.1** Pathways and on-road cycle lanes are designed and constructed in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 2 – Transport network standards**.	**COMPLIES WITH AO10.1** Pathways and cycle lanes are expected to be designed appropriately.	
	AO10.2 Development does not remove or compromise existing on-road and off-road bicycle and pedestrian infrastructure and facilities.	**COMPLIES WITH AO10.2** The development is to retain or appropriately integrate with existing cycling infrastructure.	
Roads and freight			
PO11 Public roads including upgrades are designed to an appropriate standard and are designed to: (a) prevent the need for traffic calming devices to manage vehicle design speed; (b) deter through traffic if the roads function is primarily for access; and	**AO11** New roads and upgrades to roads are designed and constructed in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 2 – Transport network standards.**	**COMPLIES WITH AO11** Upgrades are expected to be designed appropriately.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
(c) create safe conditions for pedestrians and cyclists.			
PO12 Corner lots include truncations at each roadway intersection to ensure the intersection and sight lines are safe and functional.	**AO12.1** Corner lots are truncated at each roadway intersection by: (a) three equal chords of a 6m radius for non-industrial lots and are dedicated to Council as public road; or (b) three equal chords of a 8m radius for industrial lots and are dedicated to Council as public road.	**COMPLIES WITH AO12.1** Truncations are provided.	
	AO12.2 At roundabouts and intersections, corner truncations are wider to maintain verge widths and sight line requirements.	**COMPLIES WITH AO12.2** No changes to the existing roundabout are proposed.	
PO13 New intersections: (a) are safe and do not compromise the efficiency, function, convenience of use or capacity of the road network; (b) have verge areas that provide sufficient area for safe pedestrian and cycling movement; and (c) have sufficient area to provide essential services and infrastructure, including traffic management.	**AO13** New intersections are designed and constructed in accordance with *Austroads* and **SC6.12 City Plan policy – Land development guidelines, Section 2 – Transport network standards**.	**NA** No new intersections are proposed.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Ingress and egress			
PO14 All vehicles enter and exit the site in a forward gear (restricted manoeuvring is allowed for service vehicles identified in **Table 9.4.13-8: Service vehicle requirements**). **Note: This PO does not apply to the following uses:** • **Dwelling house;** • **Dual occupancy; or** • **Multiple dwelling (where there are 3 dwellings).** **Editor's note – Access to State controlled roads may require additional approvals in accordance with the *Transport Infrastructure Act 1994***	**AO14** No acceptable outcome provided.	**COMPLIES WITH PO14** All entry and exit movements will be forward in / forward out.	
PO15 Where identified on the functional road hierarchy (as shown on the zone maps in Schedule 2) and a lot has two or more road frontages, vehicle access is provided from the road with the least on-road traffic.	**AO15** No acceptable outcome provided.	**COMPLIES WITH PO15** Access is to be maintained similar to the existing on site arrangements. With passenger vehicles utilising the lower order roads.	
Integrated transport and land use			
PO16 Development: (a) does not compromise the function and capacity of the existing and planned road network; and (b) appropriately mitigates impacts on the safety and operation of the existing and planned road network. **Note: A Traffic Impact Assessment is Council's preferred method of addressing the above Performance**	**AO16** No acceptable outcome is provided.	**COMPLIES WITH PO16** The traffic impact assessment indicates that the proposed development impacts are mitigated by the proposed intersection upgrades (Ashmore Road / Benowa Road)	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
outcome particularly in the following instances: **(a) when the development is identified as "any other use not listed in this table" or "any other undefined use" in Part 5 – Tables of assessment;** **(b) freight dependent development; or** **(c) site access is to a road identified on the Functional road hierarchy (indicated on the Zone maps in Schedule 2);** **(d) site access is from a road identified on the Pacific motorway service road types overlay map;** **(e) site access is within 100m of a signalised intersection;** **(f) site access is within 50m of a roundabout; or** **(g) a new intersection is proposed;** **(h) density outcomes in a Zone code are exceeded; or** **(i) development has the potential to increase existing background traffic (peak period or daily traffic movements) ≥ 5 percent.**			
PO17 Development is not located in areas that compromise future transport corridors, including roads, public transport and active transport.	**AO17** Land shown on the zone maps for the purposes of existing or future road network infrastructure, is to be dedicated to Council as public road.	**COMPLIES AO17** The development I located within an existing site. It is understood that Council does not have any land requirements from the site.	
PO18 Development within the Coomera Town Centre area provides an integrated network of predominantly public streets to ensure efficient movement of pedestrians,	**AO18** No acceptable outcome provided.	**NA** The site is not within the Coomera Town Centre area.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
cyclists, vehicles and strong public transport connections. **Note: Indicative access and mobility outcomes for the Coomera Town Centre area are identified on Figure 9.4.13-2.**			
General			
PO19 Continuous circulation aisles are provided within carparking areas to avoid the use of the road network when accessing areas within the development.	**AO19.1** All off-street car parking modules and service areas are accessed by internal circulation aisles.	**COMPLIES WITH AO19.1** All parking is to be accessed internally.	
	AO19.2 Circulation aisles are not disconnected by car parking modules or service areas.	**COMPLIES WITH AO19.2** The circulation aisles are to be interconnected internally to allow for appropriate circulation.	
	AO19.3 All access driveways are linked by circulation aisles and free from parking manoeuvres.	**COMPLIES WITH AO19.3** The circulation aisles are to be interconnected internally to allow for appropriate circulation.	
	AO19.4 All vehicles can circulate throughout the site in a forward gear without performing reverse manoeuvres.	**COMPLIES WITH AO19.4** Vehicles will be able to circulate in a forward gear.	
PO20 Off street car parking areas: (a) provide a legible and efficient internal layout; (b) ensure the safety and security of users; (c) are clearly distinguishable from pedestrian paths and entry points; (d) are easily negotiated by vehicles and pedestrians including persons with a	**AO20.1** Off street car parking provided in accordance with *AS 2890.1: Parking facilities – Part 1: Off-street car parking*, *AS 2890.2: Parking facilities – Part 2: Off-street commercial vehicle facilities, AS/NZS 2890.6: Parking facilities Part 6: Off-street parking for people with disabilities* and *AS 1428.1: Design for access and mobility Part 1: General requirements for access – New building work*.	**COMPLIES WITH AO20.1** The development is expected to achieve compliance with AS2890.1.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
disability; (e) ensure that there are no disruptions to or queues onto the public road network; (f) provide sight distances from driveways to ensure visibility between vehicles on the driveway and pedestrians on the verge; (g) are designed, marked and maintained to the current relevant standard; and (h) promote driver expectations consistent with conventional road rules (e.g. keep to the left).			
	AO20.2 Development does not provide pavement humps or raised platforms in queuing areas.	**COMPLIES WITH AO20.2** The development design will position humps and platforms away from queuing areas.	
	AO20.3 Development is designed so that vehicles do not reverse across marked pedestrian crossings.	**COMPLIES WITH AO20.3** Carparking areas will be positioned to limit interaction with marked pedestrian crossings.	
PO21 Any proposed porte-cocheres are designed to enable safe manoeuvring and access of vehicles on-site.	**AO21** Any proposed porte-cocheres are designed to: (a) have a minimum vertical clearance of 4.5m; (b) accommodate vehicles entirely within the site, including the queuing of vehicles; and (c) allow vehicles to circulate in a forward direction at all times.	**COMPLIES WITH AO21** Porte-cochere on site is to allow for vehicles to be contained entirely on site and circulate in a forward direction.	
PO22 Staged development is planned, designed and constructed to ensure that for each stage: (a) sufficient car parking is provided; and (b) appropriate connections to active and public transport facilities are provided.	**AO22** No acceptable outcome is provided.	**COMPLIES WITH PO22** It is understood that any staging of the development will allow for stage appropriate parking and connections.	

Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area

This table sets out the minimum number of car parking spaces required according to the use applied for. Where the calculated number of car spaces is not a whole number, the number of car parking spaces required must be the next higher whole number.

Land use	Minimum number of off-street car parking spaces	
Adult store	5 per 100m² of TUA (total use area)	
Agricultural supplies store	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	
Animal husbandry	1 per staff in addition to parking provided for the primary dwelling	
Animal keeping	1 per staff in addition to parking provided for the primary dwelling	
Bar	5 per 100m² of TUA	
Brothel	1 per each room plus 1 per 2 staff	
Bulk landscape supplies	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	
Caretaker's accommodation	2	
Car wash	**DIY car wash**	0
	Hand-wash	1 per 2 staff
Child care centre	1 per 4 children, which may be provided as a passenger set-down/pick-up area	
Club	6 per 100m² of TUA	
Community care centre	14, plus 5 per 100m² of TUA	
Community use	6 per 100m² of TUA	
Crematorium	10 per 100m² of TUA	
Cropping	1 per staff in addition to parking provided for the primary dwelling	
Dual occupancy	2 per dwelling	
Dwelling house	**Dwelling house**	1 per 1 bedroom dwelling
		2 per dwelling with 2 or more bedrooms
	Secondary dwelling where 80m² or less	1
	Secondary dwelling where greater than 80m²	2

Land use	Minimum number of off-street car parking spaces	
Dwelling unit	2	
Educational establishment	**Preparatory**	1 per staff, plus 1 per 5 children enrolled which may be provided as a passenger set-down/pick-up area
	Primary	1 per staff
	Secondary	1 per staff plus 1 per 10 Year 12 students
	Before and after school care	1 per staff, plus 1 per 5 children enrolled which may be provided as a passenger set-down/pick-up area
	Tertiary and further education	To be determined upon submission of a Car Parking Assessment to Council
	In addition to the car parking requirements a set down/pick-up area is provided.	
Food and drink outlet	5 per 100m² of TUA, plus queuing area for 10 vehicles for any drive-thru facility from the collection point	
Function facility	10 per 100m² of TUA	
Funeral parlour	The greater of: (a) 1 per 10m² of TUA; or (b) 1 per 2.5 persons, based on maximum occupancy	
Garden centre	10, plus 1 space per 100m² of TUA in excess of 3,000m²	
Hardware and trade supplies	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	
Health care services	The greater of: (a) 1 per 20m² of TUA; or (b) 2 per consulting room, plus 1 space per staff	
High impact industry	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	
Home based business	**Bed and breakfast**	1 per guest room in addition to parking provided for the primary dwelling
	Home office	1, in addition to parking provided for the primary dwelling
	Home based child care	0
	Home based business n.e.i.	2, in addition to parking provided for the primary dwelling
Hospital	0.8 per staff plus 1 per 2 beds	

Land use	Minimum number of off-street car parking spaces	
Hotel	6 per 100m² of TUA and 1 space per short term/serviced apartment plus queuing area for 10 vehicles for any drive-through facility from the collection point	
Indoor sport and recreation	**Gymnasium (where 24hr and no classes)**	1 per 20m² of TUA
	Amusement parlour	5 per 100m² TUA
	Squash or enclosed tennis court	6 per court
	Indoor cricket or other court game	20 per court
	Swimming pool or skating rink	15, plus 1 per 100m² of TUA
	Any other operation	1 per 10m² of TUA
Intensive animal industry	1 per staff in addition to parking provided for primary dwelling	
Intensive horticulture	1 per staff in addition to parking provided for primary dwelling	
Low impact industry	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	
Marine industry	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	
Market	1 per 2 stalls	
Medium impact industry	**Medium impact industry**	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²
	Salvage Yard	0.7 per 100m² of TUA, with a minimum of 5 spaces
Multiple dwelling	(a) 1 per 1 bedroom unit or dwelling; (b) 1.25 per 2 bedroom unit or dwelling; (c) 1.5 per 3 bedroom unit or dwelling; (d) 2 per 4 bedroom unit or dwelling; Plus: (a) where 3 to 4 dwellings, 1 for visitor parking; or (b) where 5 to 6 dwellings, 2 for visitor parking; or (c) where 7 to 9 dwellings, 3 for visitor parking; or (d) where 10 or more dwellings, 3 plus 1 per 10 dwellings for visitor parking thereafter **Note: At least 50% of visitor parking to be provided in a single location**	

Land use	Minimum number of off-street car parking spaces	
Nightclub	5 per 100m² of TUA	
Office	**Office, if real estate agent**	To be determined upon submission of a Car Parking Assessment to Council
	Office, if call centre	To be determined upon submission of a Car Parking Assessment to Council
	Office n.e.i	3 per 100m² of TUA
Outdoor sales	**Vehicle hire**	3 per 100m² of TUA plus 1 per 1.5 vehicles in the vehicle hire fleet and 1 on-site wash bay
	Motor vehicles sale yard	3 per 100m² of TUA plus 0.5 per 100m² of display area
Outdoor sport and recreation	**Tennis court**	4 per court
	Lawn bowls (stand-alone)	20 per green
	Swimming pool	15, plus 1 per 100m² of TUA
	Golf course	The greater of: (a) 4 per hole, plus 3 per 100m² of TUA of clubhouse; or (b) 6 per 100m² of TUA of clubhouse
	Football ground	50 per field
	Any other court game	20 per court
Permanent plantation	1 per staff in addition to parking provided for the primary dwelling	
Place of worship	1 per 2.5 persons, based on maximum occupancy	
Port services	**Marina**	(a) 0.6 per wet berth designed for boats 10m and under; (b) 0.8 per wet berth designed for boats between 10m and 15m; (c) 1 per wet berth designed for boats greater than 15m; (d) 0.2 per dry berth or swing mooring; plus (e) 0.5 per staff; (f) 1 per 50m² TUA of ancillary activities associated with the marina.
Relocatable home park	**Relocatable home park**	1 per relocatable home plus 1 per 5 homes for visitors

Land use	Minimum number of off-street car parking spaces	
Research and technology industry	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	
Residential care facility	1 per 2 beds for visitor car parking, and 1 per staff based on maximum residential occupancy **Note: 50% of visitor parking to be provided in a single location**	
Resort complex	1 per 4 dwellings	
Retirement facility	(a) 1 per independent living, self contained dwelling; plus (b) 1 per 4 independent living, self contained dwellings for visitor car parking; plus (c) 1 per staff based on maximum residential occupancy **Note: 50% of visitor parking to be provided in a single location**	
Roadside stall	4	
Rooming accommodation	**Off-site Student accommodation**	1 per 2 students, based on maximum occupancy plus 1 for a manager residence
	Hostel	1 per room, excluding communal areas, plus 1 for a manager residence
	Other	To be determined upon submission of a Car Parking Assessment to Council
Rural industry	1 per staff in addition to parking provided for primary dwelling plus 1 visitor space	
Sales office	**Sales office**	5
	Display dwelling	0
Service industry	**Service industry**	5 per 100m² of TUA
	Laundromat	5 per 100m² of TUA
Service station	2, plus 5 per 100m² of TUA	
Shop	5 per 100m² of TUA	
Short-term accommodation	**Backpackers accommodation**	1 per 8 beds plus 1 for a shuttle bus
	Other	1 per room plus 1 per managers residence
Showroom	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²	

Land use	Minimum number of off-street car parking spaces	
Theatre	**Stand-alone**	To be determined upon submission of a Car Parking Assessment to Council
	Where part of a shopping centre	1 per 8 seats
Tourist attraction	**Existing**	To be determined upon submission of a Car Parking Assessment to Council
Tourist park	**Caravan park**	11 per 10 sites plus 1 per 10 sites for visitors
	Holiday cabins	1 per site or cabin plus 1 per 10 sites for visitors
Transport depot	To be determined upon submission of a Car Parking Assessment to Council	
Veterinary services	5 per 100m² of TUA	
Warehouse	**Warehouse**	2 per tenancy or lot plus 1 per 50m² of TUA up to and including 500m², and 1 per 100m² of TUA over 500m²
	Self storage sheds **0 – 3,000m² GLA**	(a) 3 plus 1 for trailer (b) This rate includes staff parking requirements (c) All spaces are located beside or adjacent to the office administration building (d) Where storage units are proposed to be located in a multi-storey building and access to the units is via stairs or lifts, an additional 2 parking spaces are to be provided behind a secured gate and at the entry to the building
	Self storage sheds **3,001m² - 6,000m² GLA**	(a) 4 plus 1 for trailer (b) This rate includes staff parking requirements (c) All spaces are located beside or adjacent to the office administration building (d) Where storage units are proposed to be located in a multi-storey building and access to the units is via stairs or lifts, an additional 5 parking spaces are to be provided behind a secured gate
	Self storage sheds **6,001m² - 9,500m² GLA**	(a) 5 plus 1 for trailer (b) This rate includes staff parking requirements (c) All spaces are located beside or adjacent to the office administration building (d) Where storage units are proposed to be located in a

Land use	Minimum number of off-street car parking spaces	
		multi-storey building and access to the units is via stairs or lifts, an additional 5 parking spaces are to be provided behind a secured gate
	Self storage sheds **≥ 9,501m² GLA**	To be determined upon submission of a Car Parking Assessment to Council
Wholesale nursery	10, plus 1 space per 100m² of TUA in excess of 3,000m²	
Winery	To be determined upon submission of a Car Parking Assessment to Council	
Any other land use or land use operation	To be determined upon submission of a Car Parking Assessment to Council	

Note: The Car sharing travel demand measure may be applied to reduce car parking requirements in accordance with Table 9.4.13-7: Travel demand measures.

Note: Tandem car parking spaces (limited to 2 vehicles parked one behind the other) can be counted as 2 spaces in the following instances:

(a) the spaces are designated and signed for the occupants of the same dwelling or the same non-residential tenancy;

(b) the minimum length of the tandem car space is 10.4m; and

(c) the minimum length of a tandem garage (if proposed) is 11m.

Table 9.4.13-4: Car parking rates – Centre zone and High density residential zone – Transport Hub Area

This table sets out the minimum number of car parking spaces required according to the use applied for. Where the calculated number of car spaces is not a whole number, the number of car parking spaces required must be the next higher whole number.

Zone	Site proximity to a light rail station	Land use	Minimum number of off-street car parking spaces
Centre zone	Where the property boundary of a development directly adjoins a Light rail station platform	Non-residential	0
Centre zone	Within 400m walking distance	Residential – permanent/long-term accommodation	0.75 per unit or dwelling and 1 per 10 units or dwelling for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled.
		Residential –Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers	1 per 8 beds plus 1 for a shuttle bus

Zone	Site proximity to a light rail station	Land use	Minimum number of off-street car parking spaces
		accommodation	
		Non-residential	1 per 100m² of TUA
Centre zone	Within 800m walking distance	Residential – permanent/long-term accommodation	0.9 per unit or dwelling and 1 per 10 units or dwelling for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled.
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers accommodation	1 per 8 beds plus 1 for a shuttle bus
		Non-residential	1 per 75m² of TUA
High density residential zone	Within mapped boundaries of the Transport hub area	Residential – permanent/long-term accommodation	1 per unit or dwelling and 1 per 10 units or dwelling for visitors
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers accommodation	1 per 8 beds plus 1 for a shuttle bus
High density residential zone	Within 400m walking distance	Non-residential	1 per 100m² of TUA
High density residential zone	Within 800m walking distance	Non-residential	1 per 75m² of TUA

Note: Where 1 space is provided per unit or dwelling, there is no requirement to unbundle car parking.

Note: The Car sharing travel demand measure may be applied to reduce car parking requirements in accordance with Table 9.4.13-7: Travel demand measures.

Note: Tandem car parking spaces (limited to 2 vehicles parked one behind the other) can be counted as 2 spaces in the following instances:

(a) the spaces are designated and signed for the occupants of the same dwelling or the same non-residential tenancy;

(b) the minimum length of the tandem car space is 10.4m; and

(c) the minimum length of a tandem garage (if proposed) is 11m.

Table 9.4.13-5: Car parking rates – Centre zone – outside Transport hub area

This table sets out the minimum number of car parking spaces required according to the use applied for. Where the calculated number of car spaces is not a whole number, the number of car parking spaces required must be the next higher whole number.

Centre zone	Land Use	Minimum number of off-street car parking spaces
Principal centre		
Coomera	Residential – permanent/long-term accommodation	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Residential – serviced and short-term accommodation	1 per 4 units
	Non-residential	1 per 100m² of TUA
Specialist centre		
Bundall	Office	2.5 per 100m² of TUA
	Food and drink outlet, shop, service industry	2.5 per 100m² of TUA
	Any other land use	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Varsity Central/ Bond University	Residential – permanent/long-term accommodation	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Residential – serviced and short-term accommodation	1 per 2 units, plus 1 for a manager residence
	Non-residential	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Bond University campus	Residential – serviced and short-term accommodation where on Lot 10 on SP148599	1 per 4 units, plus 1 for a manager residence
Varsity Station Village	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Non-residential	1 per 100m² of TUA
Biggera Waters (Harbour	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors

Centre zone	Land Use	Minimum number of off-street car parking spaces
Town)	Non-residential	3.3 per 100m² of TUA
Major centre		
Nerang	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Non-residential	3.3 per 100m² of TUA
Coolangatta	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Non-residential	3.3 per 100m² of TUA
Helensvale	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Non-residential	1 per 100m² of TUA
District centres		
Burleigh	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Non-residential	3.3 per 100m² of TUA
Oxenford	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Ormeau	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Non-residential	5 per 100m²
Pimpama Old Pacific Highway, Pimpama	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Coomera City Centre Days Rd and City Centre Drive	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Hope Island Marina Quays Dr	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Runaway Bay Shopping Centre Cnr Morala and Lae Dr	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Ashmore City	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special**

Centre zone	Land Use	Minimum number of off-street car parking spaces
Cnr Southport-Nerang Rd and Currumburra Rd		**purpose zone – Special development area precinct – Southport Priority Development Area**
Ashmore Plaza Cotlew St	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Southport Park Shopping Centre Cnr Drury Av, Ferry Rd and Benowa Rd	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Q-Superstore Cnr Bermuda and Markeri St	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Mudgeeraba Village	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Treetops (Urbia) Cnr Bermuda Street and Reedy Creek Rd	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
West Burleigh Shopping Centre Reedy Creek Rd, Burleigh Waters	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Palm Beach	Residential	1 per unit or dwelling and 1 per 10 units or dwellings for visitors
	Non-residential	3.3 per 100m² of TUA
The Pines Shopping Centre Cnr K P McGrath Dr and Guineas Creek	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**
Tugun	Residential	1 per unit or dwelling plus 1 per 10 for visitors
	Non-residential	3.3 per 100m² of TUA
All other centres	All	Refer to **Table 9.4.13-3: Car parking rates – all zones except Centre zone or Special purpose zone – Special development area precinct – Southport Priority Development Area**

Note: **The Car sharing travel demand measure may be applied to reduce car parking requirements in accordance with Table 9.4.13-7: Travel demand measures.**

Note: Tandem car parking spaces (limited to 2 vehicles parked one behind the other) can be counted as 2 spaces in the following instances:

(a) the spaces are designated and signed for the occupants of the same dwelling or the same non-residential tenancy;

(b) the minimum length of the tandem car space is 10.4m; and

(c) the minimum length of a tandem garage (if proposed) is 11m.

Table 9.4.13-6: Car parking rates – Southport Priority Development Area

This table sets out the minimum number of car parking spaces required according to the use applied for. Where the calculated number of car spaces is not a whole number, the number of car parking spaces required must be the next higher whole number.

Precinct	Site proximity to a light rail station	Land use	Minimum number of off-street car parking spaces
Precinct 1	Where the property boundary of a development directly adjoins a Light rail station platform	Residential – permanent/long term accommodation	0.75 per unit or dwelling and 1 per 10 units or dwelling for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled and provided in a pooled parking arrangement.
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers accommodation	1 per 8 beds plus 1 for a shuttle bus
		Non-residential	0
	Within 400m walking distance	Residential – permanent/long-term accommodation	0.75 per unit or dwelling and 1 per 10 units or dwelling for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled and provided in a pooled parking arrangement.
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers accommodation	1 per 8 beds plus 1 for a shuttle bus
		Non-residential	1 per 100m² of TUA
	Outside 400m walking distance and within the boundaries of the precinct	Residential – permanent/long term accommodation	0.9 per unit or dwelling and 1 per 10 units or dwellings for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled and provided in a pooled parking arrangement.
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers	1 per 8 beds plus 1 for a shuttle bus

Precinct	Site proximity to a light rail station	Land use	Minimum number of off-street car parking spaces
		accommodation	
		Non-residential	1 per 75m² TUA
Precinct 2	Within the boundaries of the precinct	Residential – permanent/long-term accommodation	0.9 per unit or dwelling and 1 per 10 units or dwellings for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled and provided in a pooled parking arrangement.
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers accommodation	1 per 8 beds plus 1 for a shuttle bus
		Non-residential	1 per 75m² TUA
Precinct 3	Within 400m walking distance	Residential – permanent/long term accommodation	0.75 per unit or dwelling and 1 per 10 units or dwellings for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled and provided in a pooled parking arrangement.
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers accommodation	1 per 8 beds plus 1 for a shuttle bus
		Non-residential	1 per 100m² TUA
	Outside 400m walking distance and within the boundaries of the precinct	Residential – permanent/long term accommodation	0.9 per unit or dwelling and 1 per 10 units or dwellings for visitors. A minimum of 17.5% residential parking, excluding visitor, is to be unbundled and provided in a pooled parking arrangement.
		Residential – Short-term accommodation (not including Backpackers accommodation) and Rooming accommodation	1 per 4 units or dwellings
		Residential – Short-term accommodation if Backpackers accommodation	1 per 8 beds plus 1 for a shuttle bus
		Non-residential	1 per 75m² TUA

Note: The Car sharing travel demand measure may be applied to reduce car parking requirements in accordance with Table 9.4.13-7: Travel demand measures.

Note: Tandem car parking spaces (limited to 2 vehicles parked one behind the other) can be counted as 2 spaces in the following instances:

(a) the spaces are designated and signed for the occupants of the same dwelling or the same non-residential tenancy;

(b) the minimum length of the tandem car space is 10.4m; and

(c) the minimum length of a tandem garage (if proposed) is 11m.

Table 9.4.13-7: Travel demand measures

This table sets out the travel demand measures that can be applied to development. The indicative reduction of each travel demand measure is to be subtracted from the car parking requirement indicated in the tables: Table 9.4.13-3 to Table 9.4.13-6.

Travel demand measure	Indicative reduction to car parking rates
Car sharing	Each car share vehicle off-sets 5 spaces (equates to a relaxation of 4 spaces)
Unbundled parking	20% to 50% unbundled – 30% reduction in minimum rate
Motorcycle/motor scooter parking	Every 2 motorcycles spaces can replace 1 car space, up to 15% of the minimum parking requirement
Bicycle parking (where provided in excess of the requirement under relevant section of this code)	Every 6 bicycles offsets 1 car space, up to 15% of the minimum parking requirement
Any other travel demand measure **Note: This travel demand measure only applies to assessable development**	To be approved by Council

Table 9.4.13-8: Service vehicle requirements

Site area (m²)	Service vehicle requirements
Less than 1,000m²	Demonstrate that the development can accommodate the design service vehicle – in accordance with **Table 9.4.13-9: Minimum class of service vehicle** – a separate service bay is not required and restricted manoeuvring areas from a public roadway are allowed.
1,000m² to < 2,000m²	(a) Service bay to accommodate the design service vehicle in accordance with **Table 9.4.13-9: Minimum class of service vehicle**. (b) Restricted manoeuvring from a public roadway is allowed for a heavy rigid vehicle (HRV) and/or articulated vehicle (AV) is the design service vehicle. (c) Full on-site manoeuvring is required for all other classes of service vehicle (Van, SRV & MRV).
2,000m² to <4,000m²	(a) Service bay to accommodate the design service vehicle in accordance with **Table 9.4.13-9: Minimum class of service vehicle**. (b) Restricted manoeuvring from a public roadway is allowed for an articulated vehicle. (c) Full on-site manoeuvring is required for all other classes of service vehicle (Van, SRV, MRV, LRV, RCV & HRV).
4,000m² and greater	(a) Service bay to accommodate the design service vehicle in accordance with **Table 9.4.13-9: Minimum class of service vehicle**. (b) Full on-site manoeuvring is required for all classes of service vehicle.

Editor's note – Restricted manoeuvring is designed as a single point reverse manoeuvre from the public roadway into the site to access a servicing area. This manoeuvre may be performed from the kerbside lane where it is clearly demonstrated that the design vehicle can achieve the manoeuvre to access the service area.

Table 9.4.13-9: Minimum class of service vehicle

Where waste collection is required to be provided for on-site, and the stated service vehicle in the table below is less than a Council refuse collection vehicle, then the development must be designed to cater for a waste collection vehicle in accordance with **SC6.15 City Plan policy – Solid waste management** (or as amended) and **SC6.12 City Plan policy – Land development guidelines, Section 2 – Transport network standards** (or as amended) as required.

Land use	Minimum class of service vehicle
Adult store	SRV
Agricultural supplies store	AV
Animal husbandry	AV
Animal keeping	Van
Brothel	Van

Land use	Minimum class of service vehicle
Bulk landscape supplies	AV
Caretaker's accommodation	Not applicable
Car wash	SRV
Child care centre	Van
Club	SRV
Community care centre	SRV
Community residence	Van
Community use	SRV
Crematorium	SRV
Cropping	Not applicable
Dual occupancy	Not applicable
Dwelling house	Not applicable
Dwelling unit	Not applicable
Educational establishment	SRV
Food and drink outlet	SRV
Food and drink outlet if: (a) a take away food premises; or (b) including a drive through facility	HRV
Function facility	MRV
Funeral parlour	SRV
Garden centre	HRV
Hardware and trade supplies	AV
Health care services	SRV
High impact industry	AV
Home based business	Not applicable
Hospital	AV

Land use	Minimum class of service vehicle
Hotel	HRV
Indoor sport and recreation	SRV
Intensive animal industry	AV
Intensive horticulture	AV
Low impact industry	AV
Marine Industry	AV
Market	Not applicable
Medium impact industry	AV
Multiple dwelling if: (a) 3 dwellings	Not applicable
Multiple dwelling if: (a) more than 3 dwellings	Standing area for an MRV on-site
Nightclub	SRV
Office	Van
Outdoor sales	AV
Outdoor sport and recreation	SRV
Permanent plantation	AV
Place of worship	SRV
Relocatable home park	Van
Research and technology industry	AV
Residential care facility	HRV
Resort complex	HRV
Retirement facility	HRV
Roadside stall	Not applicable
Rooming accommodation	SRV
Student accommodation	SRV

Land use	Minimum class of service vehicle
Hostel accommodation	SRV
Rural industry	AV
Sales office	Not applicable
Service industry	SRV
Service station	SRV and AV (fuel tanker)
Shop	SRV
Shop (GFA less than 400m²)	SRV
Shop (GFA 400m² - 1,500m²)	HRV
Shop (GFA greater than 1,500m²)	AV
Short-term accommodation	Coach
Showroom	AV
Tourist park	Coach
Tourist park if: (a) a caravan park	Van
Transport depot	AV
Veterinary services	Van
Veterinary hospital	MRV
Warehouse	AV
Warehouse if: (a) for self storage sheds	Not applicable
Wholesale nursery	AV
Any other land use	As determined upon submission of a Service vehicle assessment

Editor's note – A Van is a 99.8th percentile vehicle equivalent to the *AS2890.1:2004 – Parking facilities – Part 1: Off-street car parking* B99 vehicle or large car.

Editor's note – A Coach is an inter-city 12.5m tourist bus from *Austroads*.

Table 9.4.13-10: Bicycle Parking Rates

This table sets out the minimum number of bicycle spaces required according to the use applied for. Where the calculated number of spaces is not a whole number, the number of bicycle spaces required is the next highest whole number.

Land use	Long and medium term off-street bicycle parking (staff and residents – Security level B)	Short term off-street bicycle parking (visitors – Security level C)	Additional end-of-trip facilities required (refer to Table 9.4.13-11: End of trip facilities for active travel users)
Adult store	1 per 100m² TUA	1 per 50m² TUA	No
Child care centre	1 per 10 staff	2 per centre	Yes
Club	1 per 25m² TUA public bar area plus 1 per 100m² public lounge and beer garden area	1 per 100m² TUA	Yes
Educational establishment	1 per 3 students Year 4 and above plus 1 per 10 staff	N/A	Yes
Food and drink outlet	1 per 100m² TUA	1 per 50m² TUA	No
Health care services	1 per 8 consultation rooms	1 per 4 consultation rooms	Yes
High impact industry	1 per 800m² TUA	N/A	No
Hotel	1 per 25m² TUA public bar area plus 1 per 100m² public lounge and beer garden area	1 per 100m² TUA	No
Indoor sport and recreation	1 per 4 employees	1 per 200m² TUA	Yes
Low impact industry	1 per 150m² TUA	N/A	No
Medium impact industry	1 per 150m² TUA	N/A	No
Multiple dwelling	1 per dwelling	1 per 12 dwellings, to a maximum of 20 spaces	No
Office	1 per 100m² where within 800m walking distance to light rail station, otherwise 1 per	1 per 500m² TUA	Yes

Land use	Long and medium term off-street bicycle parking (staff and residents – Security level B)	Short term off-street bicycle parking (visitors – Security level C)	Additional end-of-trip facilities required (refer to Table 9.4.13-11: End of trip facilities for active travel users)
	200m² TUA		
Rooming accommodation	1 per bedroom	N/A	No
Rooming accommodation if for a hostel	1 per 3 rooms	1 per 12 rooms	No
Residential care facility	1 per 5 beds	1 per 10 staff, based on maximum residential occupancy	No
Retirement facility	1 per dwelling	1 per 3 dwellings	No
Service industry	1 per 100m² TUA	1 per 50m² TUA	No
Service station	1 per 200m² TUA	2 per Service station	No
Shop	1 per 100m² TUA	1 per 50m² TUA	No
Short-term accommodation	1 per 40 dwellings	1 per 20 dwellings	No
Showroom	1 per 800m² TUA	1 per 200m² TUA	No
Warehouse	1 per 800m² TUA	1 per 200m² TUA	No
Waterfront industry	1 per 150m² TUA	N/A	No

Note: User Class as referred to and defined in *AS 2890.3:2015 Parking facilities Part 3: Bicycle parking.*

Table 9.4.13-11: End of trip facilities for active travel users

This table sets out the minimum number of end of trip facilities required according to the number of long-term bicycle spaces to be provided. Where the calculated number is not a whole number, the number required is the next highest whole number.

Number of long-term bicycle spaces to be provided	Number of lockers to be provided	Number of showers (within an associated change room) to be provided		Number of toilets to be provided	Number of wash basin stations (including mirrors, electrical outlet & counter top
1-5	1.5 per bicycle space	1 shower and change room of unisex design		1	1
		Male	**Female**		
6-10	1.5 per bicycle space	1 plus change room	1 plus change room	1	2
11-20	1.5 per bicycle space	2 plus change room	2 plus change room	2	4
21-30	1.5 per bicycle space	3 plus change room	3 plus change room	2	6
31-40	1.5 per bicycle space	4 plus change room	4 plus change room	3	8
41-50	1.5 per bicycle space	5 plus change room	5 plus change room	1 per 3 showers required or part thereof	1 per shower
50+	1.5 per bicycle space	4 showers, plus 1 shower for each 10 bicycle spaces provided	4 showers, plus 1 shower for each 10 bicycle spaces provided	1 per 3 showers required or part thereof	1 per shower

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.4.14 Vegetation management code

9.4.14.1 Application

This code applies to assessing material change of use, reconfiguring a lot or operational work for development where indicated within **Part 5 Tables of assessment**.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

The requirements for accepted development in Part A of this code provide guidance on what is considered acceptable damage to assessable vegetation before it becomes assessable development. Each required outcome in Part A will apply to a particular circumstance. The table below outlines the applicable provision relating to the type of damage.

Damage type	Provision(s)
Vegetation close to property boundaries	RO1 – RO2
Vegetation close to buildings	RO3
Vegetation close to pool fencing	RO4
Pest species vegetation	RO5
Threatening vegetation	RO6
Damage to vegetation for fire safety	RO7
Damage on agricultural land	RO8

Damage type	Provision(s)
Vegetation maintenance	RO9
All damage not described in the required outcomes	PO1

Note: The required outcomes in Part A of this code will not apply to vegetation that is identified under a vegetation protection order or planted as an approved landscape plan or condition of approval.

Note: For general guidance on pruning and managing the growth of vegetation refer to *AS 4373–2007 Pruning of amenity trees*.

Note: Vegetation clearing must not result in harm to native wildlife. Where native wildlife is present it is recommended that a licensed wildlife spotter catcher be employed to oversee works.

9.4.14.2 Purpose

(1) The purpose of the Vegetation management code is to provide for the protection and management of assessable vegetation.

(2) The purpose of the code will be achieved through the following overall outcomes:

(a) Vegetation of environmental, historical, cultural, visual and character significance is retained.

(b) Vegetation is retained to provide habitats for threatened flora and fauna, prevent erosion and ensure slope stabilisation.

(c) Damage to assessable vegetation is only undertaken if it directly obstructs approved development or is a threat to persons or property.

(d) Vegetation management plans are prepared for development which has the potential to cause damage to vegetation.

(e) Any potential damage caused to vegetation by development is extensively investigated and mitigated.

9.4.14.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.4.14-2: Vegetation management code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Vegetation management plan			
PO1 Damage to assessable vegetation does not occur where the vegetation:	**AO1** A Vegetation Management Plan, prepared by a suitably qualified person, is submitted as part of an	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
(a) provides habitats for threatened flora and fauna; (b) is of historical, cultural or visual significance; (c) provides erosion prevention and slope stabilisation; (d) is necessary to maintain the character of the local area; or (e) assists in the conservation of the city's biodiversity. **Note: A Vegetation Management Plan, prepared in accordance with SC6.8 City Plan policy – Environmental management plans is the Council's preferred method of addressing this performance outcome.**	Operational Work (Vegetation Clearing) application to show compliance with the Performance outcome. This plan includes, but is not limited to: (a) the location of the existing or approved dwellings, building or structures; (b) the location of waterways, ridge tops and steep slopes (greater than 25%) on and adjacent to the site; (c) the location of the assessable vegetation to which the damage is proposed, and reasonable particulars of its vegetation type, including species, height and girth and whether it is: • habitat for threatened flora and fauna; • of historical, cultural, character or visual significance; • essential for erosion prevention and slope stabilisation, including within waterway buffers; • significant to the conservation of the city's biodiversity; • vegetation that contributes to waterway and wetland health. (d) a statement of the reasons for the damage and any relevant factors associated with the purpose of the		

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	proposed damage; (e) particulars of how vegetation to be retained will be protected during works in accordance with *AS 4970–2009 Protection of trees* on development sites; (f) particulars of how the vegetation is to be damaged and, if relevant, how the damaged material is to be removed or disposed of; (g) a plan indicating the location, size and species of replacement vegetation to compensate for the loss of damaged vegetation; and (h) a staging plan for clearing greater than 4ha of vegetation. **Note: To remove a single tree on residential premises only a basic Vegetation Management Plan is required to be submitted to Council. The Vegetation Management Plan can be prepared by the property owner and may only require limited details about the above elements. Guidance on the content of a Vegetation Management Plan can be found in SC6.8 City Plan policy – Environmental management plans.**		

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
General				
PO1 Development for filling or excavation minimises visual impacts from retaining walls and earthworks.	**AO1** Development ensures that the total height of any cut and fill, whether or not retained, does not exceed: (a) 2.5m in a zone in the Industry zones category; (b) 1m in all other zones, or if adjoining a sensitive zone.	✓	**RO1** The proposal complies. Initially, the development area of the subject site will be cleared of any existing structures and vegetation and a level pad will be provided for the proposed development. Basement retaining walls will be constructed as part of the initial bulk earthworks stage. This will form part of the building structure. Temporary boundary retention will be required given the extent of the proposed basement level car park and its proximity to the property boundaries of the subject site. All proposed retaining walls will be incorporated as part of the building structure. Therefore, there will be minimal impact to the visual amenity for surrounding properties as a result of the proposed development.	
PO2 Development of a retaining wall proposed as a result of filling or excavation: (a) is designed and constructed to be fit for purpose; (b) does not impact adversely on significant vegetation; (c) is capable of easy maintenance.	**AO2.1** Development of a retaining structure, including footings, surface drainage and subsoil drainage: (a) is wholly contained within the site; (b) if the total height to be retained is greater than 1m, then: (i) the retaining wall at the property boundary is no greater than 1m above the ground level; (ii) all further terracing from the 1m high	✓	**RO2.1** All retaining structures proposed for the development will be contained wholly within the site.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Editor's note—A retaining wall also needs to comply with the Building Regulation and embankment gradients will need to comply with theBuilding Regulation. Note—Guidance on the protection of native vegetation is included in the Biodiversity areas planning scheme policy.	boundary retaining wall is 1 vertical unit:1 horizontal unit; (iii) the distance between each successive retaining wall (back of lower wall to face of higher wall) is no less than 1m horizontally to incorporate planting areas.			
	AO2.2 Development of a retaining wall over 1m in height protects significant vegetation on the site and on adjoining land and is designed and constructed in accordance with the structures standards in the Infrastructure design planning scheme policy and certified by a Registered Professional Engineer Queensland.	✓	**RO2.2** All proposed retaining walls will be design and constructed in accordance with the stuctures standas in the CoGC Planning Scheme Policies by a Registered Professional Engineer of Queensland.	
	AO2.3 Development provides a retaining wall finish that presents to adjoining land that is maintenance free if the setback is less than 750mm from the boundary.	✓	**RO2.3** All proposed retaining walls to adjoining land will have a finish that is maintenance free and will not be visually intrusive to the neighbouring development.	
	AO2.4 Development for filling only uses clean fill that does not include any construction rubble, debris, weed seed or viable parts of plant species listed as an undesirable plant species in the Planting species planning scheme policy.	✓	**RO2.4** All fill imported to site will be free of contaminants.	
PO3 Development ensures that a rock anchor is designed and constructed to be fit for purpose.	**AO3** Development ensures that a rock anchor: ▪ is constructed in accordance with the standards in the Infrastructure design planning scheme policy; (b) where it extends beyond the property boundary, is supported by a letter of consent from the adjoining land and building owners.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
PO4 Development protects all services and public utilities.	**AO4** Development protects services and public utilities and ensures that any alteration or relocation of services or public utilities meets the standard design specifications of the responsible service authorities.	✓	**RO4** Prior to construction the contractor will confirm the correct locations of all existing services whether indicated or not on the plans. The construction of the proposed development will ensure the protection of all existing services or public utilities.	
PO5 Development provides surface and sub-surface drainage to prevent water seepage, concentration of run-off or ponding of stormwater on adjacent land.	**AO5** Development ensures all flows and subsoil drainage are directed to a lawful point of discharge of a surface water diversion drain, including to the top or toe of a retaining wall in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	✓	**RO5** All proposed excavation will be undertaken in accordance with the CoGC Health Waters Code of the Planning Scheme Policies. Earthworks will be designed to prevent ponding of stormwater on the site and on neighbouring land. All stormwater surface runoff and subsoil flows will be directed to the lawful point of discharge. Refer to the SBSMP prepared by MCE.	
PO6 Development ensures that the design and construction of all open drainage works is undertaken in accordance with natural channel design principles, being the development of a stormwater conveyance system for major flows, by using a vegetated open channel or drain that approximates the features and functions of a natural waterway to enhance or improve riparian values of those stormwater conveyance systems. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural	**AO6** Filling or excavation does not involve the construction of open drainage.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
channel design guidelines.				
PO7 Development for filling or excavation: (a) does not degrade water quality or adversely affect environmental values in receiving waters; (b) ensures site sediment and erosion control standards are best practice.	**AO7.1** Development for filling or excavation provides water quality treatment that complies with the stormwater drainage section of the Infrastructure design planning scheme policy.	✓	**RO7.1** An Erosion and Sediment Control Plan shall be prepared (prior to commencement of construction) and maintained for the management of the sediment laden stormwater runoff during the construction phase in accordance with the CoGC Healthy Waters Code of the Planning Scheme Policies.	
	AO7.2 Development provides erosion and sediment control standards that are in accordance with the stormwater drainage section of the Infrastructure design planning scheme policy.	✓	**RO7.2** Refer to RO7.1 above.	
PO8 Development for filling or excavation is conducted such that adverse impacts at a sensitive use due to noise and dust are prevented or minimised. Note—A noise and dust impact management plan prepared in accordance with the Management plans planning scheme policy can assist in demonstrating achievement of this performance outcome.	**AO8.1** Development ensures that no dust emissions extend beyond the boundary of the site, including dust from construction vehicles entering and leaving the site.	✓	**RO8.1** Water trucks shall be used to minimise dust emissions. An ESC plan is to be prepared for the construction phase.	
	AO8.2 Development for filling or excavation activity only occurs between the hours of 6:30am and 6:30pm Monday to Saturday, excluding public holidays.	✓	**RO8.2** Bulk earthworks for the proposed development shall be performed within the hours nominated in AO8.2.	
PO9 Development ensures that vibration generated by the filling or excavation operation does not exceed the vibration criteria in Table 9.4.3.3.B, Table 9.4.3.3.C, Table 9.4.3.3.D and Table 9.4.3.3.E. Note—A noise management report	**AO9** Development involving filling or excavation does not cause a ground-borne vibration beyond the boundary of the site.	✓	**RO9** Minimal vibration will result beyond the boundary of the site during the construction phase of the proposed development.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
prepared in accordance with theNoise impact assessment planning scheme policy can assist in demonstrating achievement of this performance outcome.				
PO10 Development ensures that heavy trucks hauling material to and from the site do not affect the amenity of established areas and limits environmental nuisance impact on adjacent land.	**AO10** Development ensures that heavy trucks hauling material to and from the site: (a) occur for a maximum of 3 weeks; (b) use a major road to access the site; (c) only use a minor road for the shortest-most-direct route that has the least amount of environmental nuisance if there is no major road alternative.	✓	**RO11** Haul routes from trucks used to transport fill/spoil and material to and from the site will only use major roads as required. Alternatively, if there is no major road route to the site, haul trucks will use minor roads with the shortest, most direct route that will have the least amount of environmental impact. This will be clearly documented in the Construction Management Plan. For the limits of environment nuisance impacts on adjacent land, refer to RO7.1. The bulk excavation for the new pad will be completed within 3 weeks of commencement of excavation works.	
PO11 Development for filling or excavation protects the environment and community health and wellbeing from exposure to contaminated land and contaminated material.	**AO11** Development does not involve: (a) excavation on land previously occupied by a notifiable activity or on land listed on the Environmental Management Register or the Contaminated Land Register; (b) filling with material containing a contaminant.	✓	**RO11** A search will be undertaken to verify whether the development falls on land listed on the Environmental Management Register and/or the Contaminated Land Register.	
PO12 Development provides for: (a) landscaping for water conservation	**AO12.1** Development provides landscaping which is designed using the standards in	✓	**RO12.1** Refer Concept landscaping advice	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
purposes; (b) water sensitive urban design measures which are employed within the landscape design to maximise stormwater use and to reduce any adverse impacts on the landscape; (c) stormwater harvesting to be maximised and any adverse impacts of stormwater minimised.	the Landscape design guidelines for water conservation planning scheme policy.			
	AO12.2 Development ensures that the design and requirements for irrigation are in compliance with the standards in the Landscape design guidelines for water conservation planning scheme policy.	✓	**RO12.2** Refer Concept landscaping advice	
	AO12.3 Development provides areas of pavement, turf and mulched garden beds which are drained. Note—This may be achieved through the provision and/or treatment of swales, spoon drains, field gullies, sub-surface drainage and stormwater connections.	✓	**RO12.3** Refer Concept landscaping advice	
PO13 Development ensures cutting and filling for the development of canals or artificial waterways avoids adverse impacts on coastal resources and processes.	**AO13** Development does not involve the creation of canals or artificial waterways.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Erosion and Sediment Control				
PO1 Stormwater discharge from a development site achieves the construction phase water quality objectives of **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards.**	**AO1** No acceptable outcome provided.	✓	**RO1** The proposal complies. Refer to the SBSMP prepared by MCE.	
PO2 Erosion, sediment and dust is appropriately managed during the construction phase.	**AO2** The level of risk for soil erosion and sediment pollution to the environment is determined by an erosion hazard assessment, completed by a suitably-qualified person in accordance with the criteria in **Table 9.4.5-4: Erosion hazard assessment**. Where the erosion hazard assessment has a risk score of: (a) less than or equal to 10: A deemed to comply report is prepared by a suitably qualified person for Council approval, including conceptual location and design drawings of each treatment measure in plan and section views, in accordance with the *Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008, Australasia Chapter 2008.* (b) greater than 10 or developments involving multiple stages of disturbance or more than 1.25 ha of land: (i) For material change of use or reconfiguring a lot, a conceptual erosion and sediment control plan (ESCP) is prepared by a	✓	**RO2** An Erosion and Sediment Control Plan shall be prepared (prior to commencement of construction) and maintained for the management of the sediment laden stormwater runoff during the construction phase in accordance with the criteria in **Table 9.4.5-4: Erosion hazard assessment**.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	suitably-qualified person for Council approval in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**, and the *Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008*. (ii) For operational work, a detailed ESCP is prepared by a suitably-qualified person in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**, and *Best Practice Erosion and Sediment Control: International Erosion Control Association (IECA) 2008, Australasia Chapter 2008*. The ESCP is to detail appropriate treatment measures for the construction phase of development, demonstrating how the minimum design objectives in **Table 9.4.5-5: Stormwater design objectives** are achieved, including: (a) measures to ensure the release of sediment-laden stormwater for the nominated design storm are minimised when the design storm is exceeded; (b) detailed design, installation, construction, monitoring and maintenance requirements of all approved proprietary products in accordance with local conditions and			

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	manufacturer's recommendations; and (c) details of how the ESCP aligns with the approved development staging plan.			
Stormwater Quality				
PO3 Development appropriately manages stormwater quality to: (d) protect natural ecosystems; (e) protect water quality; (f) reduce runoff and peak flows; and (g) meet the water quality objectives and environmental values for Queensland waters. **Note: Water quality objectives and environmental values for Queensland waters are contained within** *Schedule 1* **of the** *Environmental Protection (Water) Policy 2009***. Water quality objectives are locally specific and vary between and within river catchments.** Note: A stormwater quality management plan prepared by a suitably qualified person in accordance with SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards, is Council's preferred method for addressing this performance outcome.	**AO3.1** For post developed sites, the following minimum pollutant reduction targets are achieved: (h) Gross pollutants (>5mm) – 90%; (i) Total Suspended Solids (TSS) – 80%, (j) Total Phosphorus (TP) – 60%; and Total Nitrogen (TN) – 45%.	✓	**RO3.1** The proposal complies. Refer to the SBSMP prepared by MCE.	
	AO3.2 For development on land less than 1.25ha, a deemed to comply solution for stormwater quality is achieved in accordance with **Table 9.4.5-6: Stormwater quality deemed to comply solutions**.	**N/A**		
	AO3.3 For development on land greater than 1.25ha, a stormwater quality management plan is to be prepared by a suitably qualified person in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**, is required.	**N/A**	**RO3.3** The proposal complies and is in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**. Refer to the SBSMP prepared by MCE.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Waterway Stability				
PO4 In-stream erosion, downstream of urban development is prevented by controlling the rate (or magnitude) and duration of sediment transporting flows.	**AO4** Post-development peak 0.632 Annual Exceedance Probability (AEP) event discharge within receiving waterway is limited to pre-development peak 0.632 AEP event discharge and is in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.**	✓	**RO4** The proposal complies and is in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.**	
Stormwater Quantity Control				
PO5 Stormwater quantity management outcomes demonstrate no adverse impact on stormwater flooding or the drainage of properties external to the subject site.	**AO5** The following is achieved external to the development site: (a) no increase in peak flood flow rate from the development site for all events up to and including the 1% AEP; (b) no increase in peak flood velocities from the development site for all events up to and including the 1% AEP; (c) no increase in peak flood level from the development site for all events up to and including the 1% AEP; and (d) stormwater outfalls or discharge is located to avoid conflict with existing usage of downstream land or impacts on existing watercourse or drainage.	✓	**RO5** The proposal complies. Refer to the SBSMP prepared by MCE.	
Lawful point of discharge				
PO6 Development ensures the stormwater systems are designed to not cause actionable nuisance that would adversely affect adjoining (upstream or downstream) properties.	**AO6** A lawful point of discharge must be identified and demonstrated that all discharge point/s from the development are in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive**	✓	**RO6** The proposal complies and is in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water**	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	urban design standards.		**sensitive urban design standards**.	
Overland flow paths				
PO7 Development must not obstruct free open surface flow of stormwater through a site.	**AO7** Overland flowing stormwater is allowed free open surface flow between the street and any waterway at the rear or sides of a property, in accordance with the provisions of the *Building Code of Australia.*	✓	**RO7** The proposal complies.	
Whole of life costs				
PO8 Stormwater infrastructure is designed and constructed to: (k) remain fit for purpose for the life of the development and maintains full functionality in the design flood event; (l) be cost effective to maintain; and (m) ensure no structural damage to existing stormwater infrastructure.	**AO8** No acceptable outcome provided.	✓	**RO8** The proposal complies.	
Landscape integration				
PO9 Stormwater treatment devices and stormwater infrastructure are designed to: (n) integrate with the urban design and landscape outcomes of the development; (o) complement natural environments, wetlands and watercourses; (p) protect environmental values; (q) enhance visual amenity; and	**AO9.1** Where stormwater treatment devices and stormwater infrastructure are integrated into public open space, a Statement of Landscape Intent is to be prepared by a suitably qualified person, for approval by Council. The plan is to demonstrate that the operation of stormwater infrastructure does not compromise the function of any co-located uses and reflect the design principles within **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards.**	✓	**RO9.1** The proposal complies and reflects the design principles within **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.	

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
(r) incorporate CPTED principles in accordance with **SC6.12 City Plan policy – Land development guidelines, Section 4 – Stormwater drainage and water sensitive urban design standards**.	**Note: A Statement of landscape intent is to be prepared in accordance with SC6.13 City Plan policy – Landscape work.**			
	AO9.2 Stormwater treatment devices are located offline to any upstream catchment. **Note: This provision relates to the integration of stormwater treatment devices and stormwater infrastructure into the landscape. Development identified on the Environmental significance – wetlands and watercourse overlay map will still require assessment against the Environmental significance overlay code.**	✓	**RO9.2** Refer to RO9.1.	
	AO9.3 All stormwater outlets that are located adjacent to watercourses, creeks and drainage paths are aligned at a maximum of 45 degrees to the downstream direction of flow, and energy dissipation measures installed to minimise scour.	✓	**RO9.2** Refer to RO9.1.	
Public safety				
PO10 Stormwater treatment devices and stormwater infrastructure minimise impacts on public health and safety.	**AO10** All stormwater quantity control measures are designed in accordance with **SC6.12 City Plan policy – Land development guidelines**, **Section 4 – Stormwater drainage and water sensitive urban design standards**.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
Maintenance access				
PO11 Maintenance access is provided for all stormwater management systems and considers: (s) the type of vehicle or machinery needed to service particular assets; and (t) the need to ensure a safe working environment for maintenance personnel and the public.	**AO11.1** All weather vehicle access is to be provided to inlet zones of the stormwater treatment systems in accordance with **Table 9.4.5-7: Maintenance access requirements (slope).**	**N/A**		
	AO11.2 Maintenance access is to be provided around the perimeter of all stormwater treatment systems in accordance with **Table 9.4.5-8: Maintenance access requirements (size).**	**N/A**		
	AO11.3 A maintenance buffer is provided around the perimeter of all stormwater treatment devices and adjoining private property equal to: (a) 1m in width; or (b) the width of a perimeter maintenance access, as delivered in AO11.2, plus 0.5m. The maintenance buffer is measured from the adjacent allotment boundary to the top of batter around the treatment measure. The maximum slope on the maintenance buffer is 1 in 10.	**N/A**		
Fauna movement				
PO12 Stormwater conveyance structures and channels are designed to ensure the safe movement of native fauna and provide for terrestrial and aquatic passage.	**AO12.1** Stormwater drainage structures and channels minimise impacts on aquatic fauna and associated habitats and provide opportunities for beneficial habitat uses of structures in accordance with the *Department of Primary Industries and Fisheries – Fisheries guidelines for Fish-friendly structures (2006).*	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	AO12.2 Stormwater drainage structures allow for the safe movement of terrestrial fauna in accordance with: (a) the Queensland Government Fauna Sensitive Road Design Manual Volume 2: Preferred Practices; and (b) the Queensland Government Koala-Sensitive Design Guidelines.	**N/A**		
Wastewater management				
PO13 Development does not discharge wastewater to receiving waters or areas external to the site unless demonstrated to be the best-practice environmental management for that site and takes into consideration: (a) the applicable water quality objectives for the receiving waters; and (b) the potential adverse impact on ecosystem health of receiving waters.	**AO13** Where the development involves the discharge of wastewater, a Wastewater Management Plan (WWMP) is prepared, demonstrating compliance with the performance outcome, by a suitably qualified person and submitted to the Council, detailing all of the following: (a) wastewater type; (b) climatic conditions; (c) water quality objectives; (d) best-practice environmental management; (e) waste management hierarchy; and (f) the WWMP provides for the management of wastewater in accordance with a wastewater management hierarchy that: (i) avoids wastewater discharge to watercourses; or (ii) if wastewater discharge to the environment cannot practicably be avoided wastewater discharge to watercourses is minimised through re-use, recycling, recovery and treatment	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

Performance Outcomes	Acceptable Outcomes	Solution[1]	Comments	Council Use
	for disposal to sewer, surface water and groundwater.			
Dewatering management				
PO14 Dewatering occurs in accordance with an approved Dewatering management plan.	**AO14** No acceptable outcome provided.	**N/A**		
Woongoolba flood mitigation catchment area				
PO15 In the Woongoolba flood mitigation catchment area, shown on the **Water catchments and dual supply system area overlay map**, peak outflow and its timing for Q2, Q5 and Q10 for rainfall events up to 72 hours does not change as a result of development.	**AO15** No acceptable outcome provided.	**N/A**		

[1] Solution: ✓ Acceptable Outcome
A/S Alternative Outcome
N/A Not applicable to this proposal

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

8.2.1 Acid sulfate soils overlay code

8.2.1.1 Application

This code applies to assessing material change of use, reconfiguring a lot and operational work, for development subject to the Acid sulfate soils overlay where indicated within **Part 5.10 Categories of development and assessment – Overlays.**

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

8.2.1.2 Purpose

(1) The Acid sulfate soils overlay deals with areas of land identified in a State planning policy as being subject to acid sulfate soils. It may include areas of land identified in the local government area as having potential or actual acid sulfate soils.

(2) The purpose of the Acid sulfate soils overlay code is to protect the natural environment, built environment and infrastructure from impacts of acid sulfate soils.

(3) The purpose of the code will be achieved through the following overall outcomes:

- (a) Acid sulfate soils are identified and managed to ensure the release of acid and associated metal contaminants into the environment does not occur.
- (b) Buildings and infrastructure are protected from the effects of acid sulfate soils.

8.2.1.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 8.2.1-1: Acid sulfate soils overlay code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Acid sulfate soils			
PO1 The extent and severity of the acid sulfate soils risk is accurately characterised.	**AO1** Acid sulfate soils are identified through an acid sulfate soils investigation, carried out in accordance with **SC6.2 City Plan policy – Acid sulfate soils management**.	**WILL COMPLY** No built form is proposed as part of the application, with future development requiring subsequent code assessable MCU applications. Acid sulfate soil investigations will occur at the construction stage.	
PO2 The natural environment, built environment and/or infrastructure is protected by ensuring that soil disturbance or development of land does not result in the release of acid and metal contaminants.	**AO2** Development does not: (a) excavate or otherwise remove soil or sediment identified as containing acid sulfate soils; (b) permanently or temporarily extract groundwater resulting in aeration of previously saturated acid sulfate soils; or (c) fill land (where at or below 5m AHD) that results in: (i) actual acid sulfate soils being moved below the watertable; or (ii) previously saturated potential acid sulfate soils being aerated. OR Where acid sulfate soils are disturbed, building design, infrastructure and filling/excavation works are managed in accordance with an acid	**WILL COMPLY** No built form is proposed as part of the application, with future development requiring subsequent code assessable MCU applications. Acid sulfate soil investigations will occur at the construction stage.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	sulfate soils management plan to: (a) protect the natural environment, buildings and infrastructure; and (b) neutralise existing acidity and ensure the release of acid and metal contaminants does not occur. The Acid sulfate soils management plan is to be prepared in accordance with **SC6.2 City Plan policy – Acid sulfate soils management**. **Note: A condition will be included on any approval requiring certification from a suitably qualified and experienced professional. This certification must be submitted to Council confirming that the management of the acid sulfate soils has complied with the approved management plan.**		

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

8.2.8 Flood overlay code

8.2.8.1 Application

This code applies to assessing operational work, material change of use or reconfiguration of a lot for development subject to the Flood overlay and identified in **Part 5.10 Categories of development and assessment – Overlays**

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

8.2.8.2 Purpose

(1) The Flood overlay deals with areas of land identified in a state planning policy. It may include the following area of land identified in the local government area as:

(a) areas of land with flooding and inundation potential.

(b) overland flow paths identified locally.

It applies, at a minimum, to development that:

(a) increases the number of people living and working in the natural hazard management area, except where the premises are occupied on a short term or intermittent basis; or

(b) involves institutional uses where evacuating people may be difficult; or

(c) involve the manufacture or storage of hazardous materials in bulk.

(2) The purpose of the Flood overlay code is to regulate development occurring in flood affected areas to ensure development does not cause, increase or have cumulative potential to cause or increase, the risks and/or hazards associated with flooding.

(3) The purpose of the code will be achieved through the following overall outcomes:

(a) Avoid, if practicable, or otherwise lessen, the adverse impacts of flooding and ensure development is located, designed and managed to mitigate the risk to life and property.

(b) No extra burden on the city's counter-disaster response efforts during a flood emergency.

(c) Development constraints and development potential within a single river catchment and its sub-catchments are equitably shared.

(d) The costs and benefits of flood-mitigation infrastructure within a river catchment and its sub-catchments are equitably shared.

(e) The flood storage function of the city's flood plains is protected.

(f) The flood discharge capacity of the city's rivers, streams and canals is protected.

(g) A best-practice approach to flood-plain management is achieved and maintained.

(h) The effects of flooding are managed by requiring certified engineering hydraulic studies and specific design criteria for certain types of land uses.

(i) Provide standards for development in these areas that will ensure that the runoff from land and/or premises does not create any adverse environmental impacts.

(j) The effects of future climate variability are taken into account.

(k) Development does not occur at the expense of other environmental values.

All proposals for development are fully evaluated against the following criteria:

- Whether the development is likely to cause damage that would adversely affect land and/or premises to an extent likely to be actionable (Nerang River Catchment is to be based on Hinze Dam Stage 2 flood levels).
- Whether the cumulative impact of development is likely to cause or increase the adverse impacts of flooding.
- Whether the development is likely to cause or worsen flood hazard.
- Whether the risks associated with the development are fully known, quantifiable and capable of being dealt with to Council's satisfaction, without any uncertainties.
- Whether flood mitigation works, intended to reduce flood risk, hazard and damage, do so without adversely impacting upon other land and/or premises.
- Whether the impacts of climate change have been taken into account; and
- Whether extra burden is placed on the city’s counter disaster response efforts during a flood emergency.

8.2.8.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 8.2.8-2: Flood overlay code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Flood storage			
PO1 All development activity conducted on land below the designated flood level must not detrimentally affect the flood storage capacity of the catchment and the drainage regime.	**AO1** The flood storage volume on the site is maintained up to the Designated Flood Level. **Note: The Designated Flood Level must be obtained from Council's Flood Search.**	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Building floor levels			
PO2 Development that is located on flood prone land shall not be inundated by floodwaters during a designated flood and allowance must be made for elements that could result in an elevated flood, including: (a) the hydraulic gradient above the main floodway (b) The impact of events such as wind and wave action on the flood surface; and (c) Uncertainty associated with the designated flood level.	**AO2.1** Building floor levels of habitable rooms must be at or above the height of the combined designated flood level and minimum freeboard derived from **Table 8.2.8-6 – table to acceptable outcome AO2.1**	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
	AO2.2 Where a proposed land use does not reasonably apply to any land use listed in the **Table 8.2.8-6: Table to acceptable outcome AO2.1**, the applicant is to submit: (a) the proposed minimum flood AEP for building floor levels; (b) the proposed design freeboard above	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	the specified flood level; and (c) a flood hazard and flood risk assessment for the proposed development, assessing the effects on costs, safety, access and potential losses.		
PO3 Building floor levels of garages and non-habitable rooms must be constructed at a height that reflects an acceptable flood risk for their purpose. **Note: PO3 does not apply to:** • **extensions to existing buildings;** • **structures detached from a dwelling, for which the use is ancillary to that of a dwelling, provided that use is not listed in column 1 of Table 8.2.8-3: Table to performance outcome PO7.**	**AO3.1** Building floor levels of garages and non-habitable rooms, constructed at approximately the same level as, and attached to, the main dwelling, are constructed at a height above the Designated Flood Level, except where the dwelling has a suspended floor, constructed one metre or more above ground, or where the building is to be constructed within a Rural zone.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
	AO3.2 Garages and car parks detached from the building are not inundated to cause more than a medium hazard, as identified within **Table 8.2.8-5 Table to acceptable outcome AO11**, for the designated flood.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Overland flow			
PO4 Development must not obstruct free open surface flow of stormwater through a site.	**AO4** Overland flowing stormwater is allowed free open surface flow between the street and any waterway at the rear of the property, in accordance with the provisions of the *Building Code of*	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	Australia.	Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Flooding risk			
PO5 Development in flood affected areas must not cause, or have the cumulative potential to cause, damage, must not increase the level of risk to life, or be to the detriment of flood evacuation procedures.	**AO5** Development does not: (a) increase the number of people calculated to be at risk from flooding; (b) increase the number of people likely to need evacuation; (c) shorten flood warning times; (d) impact on the ability of traffic to use evacuation routes, or unreasonably increase traffic volumes on evacuation routes, or as identified within Council's Counter Disaster Plan (flooding); (e) place additional burdens on Council's resources or emergency services; (f) increase the duration of flooding, unless that increase is part of a Council approved flood mitigation strategy.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Flood storage and conveyance			
PO6 Development with plans for earthworks in a floodplain on or over a water body or within a flood affected area below the Designated Flood Level must allow for the maintenance of flood storage, and flood conveyance of flood and drainage channels and overland flow paths.	**AO6.1** Provide flood storage calculations that demonstrate that flood storage volume, over the site below the Designated Flood Level, is maintained or increased.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
		is therefore considered to comply.	
	AO6.2 A certified hydraulic study (and, if necessary, a hydrologic study) is prepared by a suitably qualified and experienced engineer to investigate the hydraulic characteristics of both the undeveloped and developed site and make comparisons between them. Proposed developments in, on or over a water body, or within a flood affected area, must be tested for: (a) the 50%, 20%, 10%, 5%, 2% and 1% Annual Exceedance Probability (AEP) for local flood events; (b) the 5%, 2%, and 1% AEP floods. For the Nerang River Catchment Hinze Dam stage 2 condition must be used. (as specified in **Table 8.2.8-3: Table to performance outcome PO7**); and (c) any resultant afflux or increase in flood velocities sufficient to cause real damage to premises. The Assessment Manager may also require the development to be assessed against rarer floods.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Development for certain purposes			
PO7 Development is constructed at or above the Designated Flood Level, shown in **Table 8.2.8-3: Table to performance outcome PO7**. **Note: The designated flood level for the Nerang River is based on Hinze Dam**	**AO7** No acceptable outcome provided.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Stage 2 condition.		impact on site is considered marginal and is therefore considered to comply.	
PO8 Development must consider hydrologic and hydraulic impacts of development in flood affected areas with regard to future climate change.	**AO8** No acceptable outcome provided. **Note: As part of a hydrologic and hydraulic impact assessment, investigation has been undertaken to determine the impacts of future climate change. The findings of the investigation may be used to modify modelling parameters and boundary conditions used in modelling the hydrologic and hydraulic impacts of development in flood affected areas.**	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Hazard considerations for development			
PO9 Development listed in the **Table 8.2.8-4: Table to acceptable outcome AO9** below must be designed and constructed to avoid causing exposure to undue flood hazard.	**AO9** Development is to be designed and constructed so that users are not exposed to a greater degree of hazard than shown in **Table 8.2.8-4: Table to acceptable outcome AO9** for the range of flows specified in **Table 8.2.8-5: Table to acceptable outcome AO11**.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Storage of hazardous chemicals (exceeding a threshold) in a flood hazard area			
PO10 Storage, handling or manufacturing areas that are identified on the **Flood overlay map** and contain hazardous chemicals in quantities greater than 2500L or 2500kg must be located and designed to minimise the likelihood of: • inundation by flood waters from creeks, rivers, lakes or estuaries and • the possibility of spills to flood waters	**AO10.1** The base of any tank with a capacity >2500L or >2500kg is higher than the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1% AEP must be applied).	**NOT APPLICABLE**	
	AO10.2 Bulk tanks with a capacity >2500L or >2500kg: (a) are anchored so they remain stable and cannot float or topple if submerged or inundated by water, and (b) tank openings not provided with a liquid tight seal, i.e. an atmospheric vent, are extended above the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1 in 100 must be applied).	**NOT APPLICABLE**	
	AO10.3 The lowest point of any storage area for packages >2500L or >2500kg within an area identified on the Flood overlay map must be higher than the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1% AEP must be	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	applied). OR Package stores, for packages >2500L or >2500kg, are provided with impervious bund walls or racking systems higher than the designated flood level identified in **Table 8.2.8-3: Table to performance outcome PO7** (where the designated flood level is not specified a minimum flood level of 1% AEP must be applied).		
Access with respect to hazard			
PO11 All proposed development must demonstrate that sufficient access or egress will be available to enable evacuation during a range of floods, up to and including the designated flood.	**AO11** Development, not including underground car parks, must ensure that evacuation opportunities exist in accordance with the minimum levels of exposure outlined in **Table 8.2.8-5: Table to acceptable outcome AO11**, where means of access or egress may be: (a) an access route that is below the level of the designated flood, provided that route is classed as a low hazard, as defined in **Table 8.2.8-5: Table to acceptable outcome AO11**; or (b) an access route that is not the main access route. However, it must remain effective for the duration of a range of flood events, up to and including the designated flood; or (c) a temporary access arrangement, provided that access can be gained without significant preparation time being required.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	The access or egress must: (a) in the event of a designated flood: (i) not expose users to undue risk; (ii) not cause, or have the cumulative potential to cause, real damage to land and/or premises; (iii) not interrupt or materially change the surface water drainage from or onto adjoining land; (b) not create, in the event of a flood, a sudden change in flow distributions, flood level or velocity that could result in: (i) the breaking of a levee; or (ii) the establishment of blockage of a breakout; or (iii) excessive scour; or (iv) sedimentation; or (v) increased flood hazard.		
Filling, excavation and contouring			
PO12 Any change to ground level, by way of filling, excavation or contouring, must not result in damage, flood hazard or impediment to any Counter Disaster Plan, measure or create unreasonable change in the exposure to flood hazard.	**AO12** Changes to ground level, by way of filling, excavating or contouring, comply with a hydraulic master plan approved by Council. OR A flood study is prepared in accordance with the requirements set out in **AO6.1** and **AO6.2**, is approved by Council, and it is established that the development complies with, or does not impede, any	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	Counter Disaster Plan measure.		
PO13 Filling, excavation or contouring must not cause sedimentation, erosion or adverse impact on the City's drainage network.	**AO13** No acceptable outcome provided. For guidance, please refer to the **Healthy waters code**.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Landscaping			
PO14 Landscaping must not impede a natural waterway, a flood channel, flood storage or an overland flow path.	**AO14** Landscaping complies with a hydraulics master plan approved by Council. OR A flood study, allowing for the landscaping, is prepared in accordance with the requirements of **AO6.1 and AO6.2**, and is approved by the Assessment Manager.	**COMPLIES** While a portion of the site is identified within the Flood overlay, this is limited to a very small area at the northern portion of the site, with a maximum identified flood depth of 30cm. Considering this, the practical flood impact on site is considered marginal and is therefore considered to comply.	
Environmental values			
PO15 Works to mitigate flood risks avoid adverse impact on other environmental values.	**AO15** No acceptable outcome is provided.	**NOT APPLICABLE**	

Table 8.2.8-3: Table to performance outcome PO7

Land use	Designated flood[1]
Disaster management facilities	0.2% AEP

Land use	Designated flood[1]
Hospitals	0.2% AEP
Major electrical switchyards, power stations, water treatment plants	0.2% AEP
Fire/police stations	0.5% AEP
Places of refuge	0.5% AEP
Electricity substations	0.5% AEP
Sewage treatment plants	0.5% AEP
Home for the aged, hospice	0.5% AEP
Regional fuel storage	0.5% AEP
Food storage warehouses	0.5% AEP
Hotel residential	1.0% AEP
Education facilities	1.0% AEP
Residential buildings	1.0% AEP
Camping grounds, caravan parks and relocatable homes reclamation levels	1.0% AEP
Commercial	1.0% AEP
Light industrial/warehousing	1.0% AEP
Theme parks	Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in **AO11**
Clubs/non-habitable buildings associated with enjoyment of public open space	Not specified, but users should not be subjected to any more than high hazard conditions in the designated flood, as specified in **AO11**
Car parking below buildings	Not specified, but users should not be subjected to any

Land use	Designated flood[1]
	more than medium hazard conditions in the designated flood, as specified in **AO11**
Open space	Not specified, but ancillary structures are subject to appropriate hazard conditions in the designated flood, as specified in **AO11**
Rural	Not specified

Notes for Table to acceptable outcome AO7:

(1) The designated flood level is the level that is associated with the minimum flood annual exceedence probability (AEP) for different land use types. For the Nerang River catchment the flood AEP must be calculated based on the Hinze Dam stage 2 condition. Where a modelled flood AEP is not available, historic information must be used. The designated flood level for each site must be obtained from the Council's flood search database.

Table 8.2.8-4: Table to acceptable outcome AO9

Land use	Appropriate degree of hazard				
	Nil	Low	Medium	High	Extreme
Places of refuge	√				
Public open space/recreation	√	√	√	√	
Theme parks	√	√	√	√	
Clubs/non-habitable buildings associated with enjoyment of public open space	√	√	√	√	
Commercial/industrial	√	√	√		
Residential	√	√	√		
Public institutions	√	√	√	√	
Car parking below buildings/at basement	√	√	√		
Caravan parks	√	√	√		
Council offices	√	√			

Land use	Appropriate degree of hazard				
Educational facility (classrooms/office building	√				
Educational facility (sporting fields)	√	√	√		
Homes for the elderly	√	√			
Child Care Centre	√				
Hospitals	√	√			
Disaster management facility	√	√			
Police/fire stations	√	√			
Museums/libraries/archives/infrastructure plans repositories	√				
Telephone exchanges	√				

Note: √ Indicates an appropriate land use.

The above table examines the appropriateness of land use decisions from the aspect of flood hazard only. As such, it does not confer any land use rights or provide any indication that Council will reject or favourably consider various uses in particular areas. Such consideration will be dealt with appropriately, in the context of the City Plan, and based upon full consideration of all relevant issues.

Table 8.2.8-5: Table to acceptable outcome AO11

Criteria	Degree of flood hazard			
	Low	**Medium**	**High**	**Extreme**
Wading ability	If necessary children and the elderly could wade. (Generally, safe wading velocity depth product is less than 0.25.)	Fit adults can wade. (Generally, safe wading velocity depth product is less than 0.4.)	Fit adults would have difficulty wading. (Generally, where wading velocity depth product is less than 0.6.)	Wading is not an option.
Evacuation distances	<200metres	200-400metres	400-600metres	>600metres
Maximum flood depths	<0.3metres	<0.6metres	<1.2metres	>1.2metres
Maximum flood velocity	<0.4 metres per second	<0.8metres per second	<1.5metres per second	>1.5metres per second
Typical means of egress	Sedan	Sedan early, but 4WD or trucks later	4WD or trucks only in early stages, boats or helicopters	Large trucks. Boats or helicopters
Timing **Note:** **This category cannot be implemented until evacuation times have been established in the Counter Disaster Plan (flooding).**	Ample for flood forecasting. Warning and evacuation routes remain passable for twice as long as evacuation time.	Evacuation routes remain trafficable for 1.5 times as long as the evacuation time.	Evacuation routes remain trafficable for only up to minimum evacuation time.	There is insufficient evacuation time.

Note: The evacuation times for various facilities or areas would (but not necessarily) be included in the Counter Disaster Plan (flooding).
Generally, safe wading conditions assume even walking surfaces with no obstructions, steps, soft underfoot, etc.

Table 8.2.8-6: Table to acceptable outcome AO2.1

Land use	Designated flood level[1] plus minimum freeboard
Disaster management facilities	0.2% AEP + 500mm freeboard
Hospitals	0.2% AEP + 500mm freeboard
Major electrical switchyards, Power stations, Water treatment plants[2]	0.2% AEP + 500mm freeboard
Fire and Police stations[3]	0.5% AEP + 400mm freeboard
Places of refuge	0.5% AEP + 400mm freeboard
Electricity Substations[2]	0.5% AEP + 400mm freeboard
Sewage Treatment Plants[4]	0.5% AEP + 400mm freeboard
Homes for the aged, Hospice[5]	0.5% AEP + 400mm freeboard
Regional fuel storage	0.5% AEP + 400mm freeboard
Food storage warehouses	0.5% AEP + 400mm freeboard
Hotel residential	1.0% AEP + freeboard[8]
Educational facilities[6]	1.0% AEP + freeboard[8]
Residential buildings	1.0% AEP + freeboard[8]
Camping grounds, Caravan parks and Relocatable homes reclamation levels	1.0% AEP + freeboard[8]
Commercial[7]	1.0% AEP
Light industrial/Warehousing[7]	1.0% AEP
Theme parks	Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.
Clubs/Non-habitable buildings associated with enjoyment of public open space	Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.

Land use	Designated flood level[1] plus minimum freeboard
Car parking below buildings/at basement or detached	Not specified, but ancillary structures are subject to medium hazard considerations at the designated flood.
Open space	Not specified, but ancillary structures are subject to appropriate hazard considerations at the designated flood.
Rural	Not specified

Notes for Table to acceptable outcome AO2.1:

(1) The designated flood level is the level that is associated with the minimum flood annual exceedence probability (AEP) for different land use types. For the Nerang River catchment the flood AEP must be calculated based on the Hinze Dam stage 2 condition. Where a modelled flood AEP is not available, historic information must be used. The designated flood level for each site must be obtained from the Council's flood search database.

(2) Applies to switchyard components necessary for the operation of the facility during a flood emergency. This shall be determined by Powerlink.

(3) Excludes 'shop front' facilities and those not likely to be utilised during a flood emergency.

(4) Specifically, bunds, electrical and mechanical equipment necessary for the continued operation of a sewage treatment plant shall not be at risk of inundation during a flood emergency.

(5) The flood immunity specified is to meet the objective of not adding to the burden of flood emergency services.

(6) It is not necessary that all rooms within an education facility be above the 1% AEP level. However, there should be sufficient space to accommodate the whole of the school population during a flood event.

(7) Freeboard is not specified, as it is considered that commercial risk provisions should apply. If such land is developed to a flood immunity less than 1% AEP (as may be permitted by any local planning instrument), Council may endorse rates notices accordingly.

(8) for these uses the height of 300mm freeboard is as per the *Building Regulation 2006*.

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

9.3.4 Commercial design code

9.3.4.1 Application

This code applies to assessing material change of use for non-residential uses where indicated within **Part 5 Tables of assessment** and where there is no use code contained in **Part 9 Development codes**.

Note: Where development involves multiple land uses, each use is to be assessed against the applicable use code (e.g. for a mixed use building comprising residential uses, the residential component shall be assessed against the applicable residential use code in addition to this code).

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

9.3.4.2 Purpose

(1) The purpose of the Commercial design code is to ensure that non-residential development is designed to make a positive contribution to the character of the area in which it is located.

(2) The purpose of the code will be achieved through the following overall outcomes:

(a) Built form:

(i) allows for the flexible reuse of street level tenancies for future changing business and community needs;

(ii) visually integrates with the street and maintains the reasonable amenity expectation of the surrounding area through well designed building facades;

(iii) that incorporates glazing or screening of windows ensures that opportunities for casual surveillance and the creation of visual interest is preserved;

(iv) provides a safe and comfortable pedestrian experience by providing continuous shading along building frontages;

(v) of stand-alone small scale uses maintain a compatible form and scale to nearby development; and

(vi) accommodating retail and commercial activities, ensures large format retail and other land consumptive activities, are sensitively placed within buildings that integrate with the streetscape to maximise street life, safety and pedestrian activity.

(b) Off-street parking areas:

Mixed use centres

(i) are located behind or within the built form to maintain and improve the amenity of the street;

Neighbourhood centres

(ii) are located to minimise impacts on adjoining sensitive land uses, improve safety and are treated to minimise their visual impact from the street as required; and

In all other areas

(iii) are located beside, behind or within the built form to maintain and improve the amenity of the street and are treated to minimise their visual impact from the street as required;

(c) Service and loading areas:

(i) are located behind the building, underneath the building or in areas where they are screened from the public view to maintain the amenity of the street.

(d) Land uses:

(i) such as large format retail premises are sleeved by smaller tenancies; and

(ii) that are less active are located above more active ground floor uses.

9.3.4.3 Specific benchmarks for assessment

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

When this code is referred to in a table of assessment in **Part 5**:

(1) **Part A** applies to accepted development subject to requirements.

(2) **Part B** applies to assessable development as follows:

(a) **Table 9.3.4-2** applies to any non-residential use (excluding that described in point (b)); and

(b) **Table 9.3.4-3** applies to any non-residential use that is a stand-alone small scale use up to 150m^2.

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 9.3.4-2: Commercial design code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Design and appearance			
PO1 Development presents an attractive frontage to all streets and enhances the desired character of the area through: (a) its interface with the street and open space; (b) providing opportunities for casual surveillance; (c) clearly defined building entrances; and (d) visually integrating service and utility cabinets.	**AO1.1** Windows and balconies located above the ground floor overlook the street and public open spaces to provide opportunities for casual surveillance.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO1.2 Building entrances are clearly visible from the street.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO1.3 A minimum of 80% of the ground floor facade is windowed.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO1.4 The maximum screening of ground floor windows is 50%.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO1.5 Ground floor windows are no more than 900mm above ground level.	**NOT APPLICABLE** The proposed development does not involve built form.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
		Built form provisions will be addressed through subsequent code assessable MCU development applications.	
	AO1.6 Service and utility cabinets are visually integrated into building facades.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
 Figure 9.3.4-1 Example of large scale commercial development incorporating AO1.1 – AO1.6			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO2 Buildings are visually interesting through a combination of: (a) balconies and recesses; (b) variation in materials, colours, or textures; (c) recessions and projections in the roof and wall plane; or (d) variations in the building form.	**AO2** No acceptable outcome is provided.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
PO3 Large scale uses are sensitively placed within buildings and are sleeved by smaller tenancies or provide a shopfront presentation to the street.	**AO3** No acceptable outcome is provided.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
PO4 Roof forms provide a clean appearance where plant and equipment is integrated into the roof design.	**AO4** Roof top plant and equipment are: (a) contained within roof forms; (b) grouped together in one area; and (c) screened.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
PO5 Development creates a safe and comfortable pedestrian experience.	**AO5** Continuous shade is provided along all building frontages through the use of: (a) awnings; (b) overhanging first floor balconies; or (c) shade sails.	**NOT APPLICABLE** The proposed development does not involve built form. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
Off-street parking areas			
PO6 **Mixed use centres** Off-street parking areas are located behind	**AO6** **Mixed use centres** No acceptable outcome provided.	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
or within the building to maintain and improve the amenity of the street.			
PO7 **Neighbourhood centres** Off-street parking areas are located to minimise impacts on adjoining sensitive land uses, improve safety and are treated to minimise their visual impact from the street as required.	**AO7** **Neighbourhood centres** No acceptable outcome provided.	**WILL COMPLY** The master plan prepared in association with the Benowa gardens development code envisages all car parking to be delivered within the basement and podium levels. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
PO8 **All other areas** Off-street parking areas are located beside, behind or within the building and are treated to minimise their visual impact from the street as required.	**AO8** **All other areas** No acceptable outcome provided.	**NOT APPLICABLE**	
Service and loading areas			
PO9 Service and loading areas are: (a) located underground; (b) behind the use; or (c) visually screened from public areas.	**AO9** No acceptable outcome provided.	**WILL COMPLY** The master plan prepared in association with the Benowa gardens development code envisages all servicing to occur within the ground level parking area. Built form provisions will be addressed through subsequent code assessable MCU development applications.	
Land use			
PO10 Ground floor spaces are designed to enable flexible reuse of the tenancies to support changing community and business needs.	**AO10** No acceptable outcome provided.	**WILL COMPLY** The design and layout of the commercial tenancies across the development will allow for the flexible reuse for changing businesses	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO11 Active uses are located on the ground floor to encourage pedestrian activity and interaction. **Note: An example of 'active uses' could include uses such as shops and food and drink outlets.**	**AO11** No acceptable outcome provided.	**WILL COMPLY** The master plan will facilitate future development where active uses are located at the ground floor.	

Table 9.3.4-3: Commercial design code – for assessable development for stand–alone small scale uses up to 150m²

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Design and appearance			
PO12 Development maintains a compatible form and scale to nearby development.	**AO12** No acceptable outcome provided.	**NOT APPLICABLE**	

City Plan code template

This code template supports the preparation of a development application against either the acceptable outcome(s) or performance outcome(s) contained in the code. Development assessment rules are outlined in **Section 5.3.3** of the City Plan.

Please note:

For assessment against the overall outcomes, refer to the appropriate code.

Note: The whole of the planning scheme is identified as the assessment benchmark for impact assessable development. This specifically includes assessment of impact assessable development against this strategic framework. The strategic framework may contain intentions and requirements that are additional to and not necessarily repeated in zone, overlay or other codes. In particular, the performance outcomes in zone codes address only a limited number of aspects, predominantly related to built form. Development that is impact assessable must also be assessed against the overall outcomes of the code as well as the strategic framework.

8.2.2 Airport environs overlay code

8.2.2.1 Application

This code applies to assessing any Operational work or Material change of use where indicated as accepted subject to requirements or assessable development within **Part 5.10 Categories of development and assessment – Overlays**.

When using this code, reference should be made to **Section 5.3.2** and, where applicable, **Section 5.3.3**, in **Part 5**.

8.2.2.2 Purpose

(1) The airport environs overlay deals with issues relating to development in the vicinity of certain airports and aviation facilities. This includes:

- the Obstacle Limitation Surface (OLS)
- public safety area
- wildlife hazard buffer zones
- lighting area buffer zones
- Australian Noise Exposure Forecast (ANEF) contour
- Procedures for Air Navigation Services – Aircraft Operational (PANS-OPS) surfaces
- aviation facilities
- it may also include locally identified issues that relate to airport environments.

(2) The purpose of the Airport environs overlay code is to

(a) recognise Gold Coast Airport as essential economic infrastructure and protect and assure its ongoing operation and continued development;

(b) regulate development that may affect the operational efficiency of Gold Coast Airport at Coolangatta and the Airservices Australia Aviation Facilities related to the operation of the airport;

(c) minimise incompatible development within the public safety area adjacent to the airport;

(d) minimise the adverse impacts of airport noise on residential and other noise sensitive land uses in the vicinity of the airport.

(3) The purpose of the code will be achieved through the following overall outcomes:

(a) The Gold Coast Airport continues to contribute to the tourism industry, the business sector and communities of Gold Coast.

(b) Development does not impact on the operation of Gold Coast Airport.

(c) The maximum height of buildings and other structures, within the area designated as the airport's 'prescribed airspace' pursuant to the Airports (Protection of Airspace) Regulations 1996, as shown in the mapping of the **Obstacle Limitation Surface (OLS)** and the **Procedures for Air Navigation Services – Aircraft Operational (PANS-OPS) surfaces**, is not exceeded.

(d) Buildings and other structures do not encroach into the sensitive areas around aviation facilities pursuant to International Civil Aviation Organisation (ICAO) principles and *Air Services Act 1996*.

(e) The operation of artificial lighting sources does not exceed the maximum light source intensities imposed by the Gold Coast Airport Master Plan and the Civil Aviation Safety Authority.

(f) Potential hazards to safety of aircraft operations brought about by bird or bat strikes are minimised.

(g) Potential hazards to safety of aircraft operations resulting from the emission of smoke, dust or other particulate matter, or creation of air turbulence are minimised.

(h) Potential hazards to safety of aircraft operations resulting from reflection of sunlight, and any another potential causes of temporary interference with pilot vision are minimised.

(i) New development within the public safety area of the airport does not significantly increase population density or the use and storage of hazardous materials within this area.

(j) Potential impacts on residential and other noise-sensitive development in close proximity to the airport are minimised by ensuring that new development is subject to appropriate acoustic treatment pursuant to *AS 2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction*, according to noise contours shown on **Airport environs – Australian Noise Exposure Forecast (ANEF) contour overlay map**.

8.2.2.3 Specific benchmarks for assessment

PART B – ASSESSABLE DEVELOPMENT BENCHMARKS

Table 8.2.2-2: Airport environs overlay code – for assessable development

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Heights of buildings and other structures			
PO1 Building height and structure height does not affect the current or future operational efficiency of Gold Coast Airport or create a hazard to the safe navigation of aircraft using the airport's prescribed airspace. **Note: The requirements associated with the heights of buildings are also applicable to temporary intrusions into prescribed airspace, such as cranes utilised during building construction.** Editor's note – A development proposal involving a building, structure, crane or other construction equipment which exceeds 110m is required to be notified to CASA. Furthermore, any building, structure, crane or other construction equipment which exceeds 150m above ground level must be regarded as an obstacle unless assessed otherwise by CASA. Council is required to refer such development proposals to the airport manager for assessment, who will then refer the proposal to CASA. Refer to the SPP guidelines for more information regarding the Australian Government's role and assessment processes for intrusions into operational airspace of strategic airports.	**AO1** Building height and structure height does not exceed the current maximum allowable height applicable to the subject site, as identified on **Airport environs – Procedures for Air Navigation Services – Aircraft Operational (PANS-OPS) surfaces overlay map** and **Airport environs – Obstacle Limitation Surface (OLS) overlay map**. Editor's note – A development proposal involving a building, structure, crane or other construction equipment which encroaches into the operational airspace of a Leased Federal or other strategic airport must be referred by Council to the airport manager for assessment, who will on refer the proposal to the Australian Government if required.	**WILL COMPLY** As per the proposed building height overlay map forming part of the Benowa Gardens Plan of Development, the maximum allowable building height on site will be 54m. The site is identified as having a maximum allowable height of HP370.56m by the PANS-OPS overlay map.	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Acoustic treatment to buildings to lessen the impact of aircraft noise (on land within the Airport environs – Airport Noise Exposure Forecast (ANEF) contour overlay map)			
PO2 Development, other than an extension to an existing Dwelling house, on land within the 20 ANEF contour or greater as shown on the latest approved ANEF plan for Gold Coast Airport, is designed and constructed to prevent adverse impacts from aircraft noise. **Note: The current ANEF mapping for Gold Coast Airport as at the date of adoption of the planning scheme is shown in Airport environs – Australian Noise Exposure Forecast (ANEF) contour overlay map.**	**AO2** Development within the 20 ANEF contour or greater, as identified on **Airport environs – Australian Noise Exposure Forecast (ANEF) contour overlay map** is acoustically insulated to the applicable standard required by *AS 2021:2015 Acoustics – Aircraft noise intrusion – Building siting and construction*.	**NOT APPLICABLE**	
Reflective roof materials, advertising devices and artificial light sources (on land within the Gold Coast Airport lighting zone)			
PO3 Development involving reflective roof materials, illuminated advertising devices or other artificial light sources, including street lighting and coloured lights, do not create a visual hazard for aircraft operation on approach to, or take off from, the Gold Coast Airport. **Note: For advice on how to meet aviation safety requirements refer to *Civil Aviation Safety Authority (CASA) guidelines: Lighting in the Vicinity of Aerodromes – Advice to Lighting Designers*.** **Note: Use of a reflective roof surface in the Lighting Zone of Gold Coast Airport constitutes a 'controlled activity', and**	**AO3.1** The illuminated advertising device or artificial light source does not exceed the maximum intensity of illumination within the respective light intensity zone, as identified on **Airport environs – lighting area buffer zones overlay map**.	**WILL COMPLY**	
	AO3.2 Configurations of lights in straight parallel lines 500m to 1,000m long (e.g. sporting fields and large parking areas) are not located within the Outer lighting zone, as identified on **Airport environs – lighting area buffer zones overlay map**.	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
requires approval from the operator of Gold Coast Airport. (Roof materials having solar absorbency greater than 0.35 are deemed to be pre-approved).	**AO3.3** Glare or flashes (e.g. sporting stadia), flare plumes, refineries, upward shining lights, laser lights, flashing or sodium (yellow) lighting are not located within 6 km of the airport runway, as identified on **Airport environs – lighting area buffer zones overlay map**.	**NOT APPLICABLE**	
	AO3.4 The roof of any building located on land identified on **Airport environs – lighting area buffer zones overlay map** has a solar absorbency greater than 0.35.	**NOT APPLICABLE**	
Development within public safety areas			
PO4 Development within the Public Safety Area for Gold Coast Airport as identified on **Airport environs – public safety area overlay map** does not increase the amount of people living and using the area or increase the risk to airport operations.	**AO4** Development within the Public Safety Area for the Gold Coast Airport as identified on the **Airport environs – public safety area overlay map** does not: (a) Increase the number of people living in the area, and proposes no greater density than a Dwelling house. (b) Introduce or intensify community, commercial, industrial or any other uses. (c) Involve the manufacturing or bulk storage of hazardous (explosive or noxious) or flammable materials.	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Aviation facilities			
PO5 Development in the area, around Airservices Australia Aviation Facilities identified on **Airport environs – Airservices Australia aviation facilities overlay map**, does not adversely impact on the functioning of these facilities. **Note: If development has the potential to adversely affect the functioning of Airservices Australia Aviation Facilities, approval is required from the Manager, Operational Requirements and Services (Airservices Australia).**	**AO5.1** Development that involves electrical or electromagnetic fields (e.g. arc welding) or that creates a permanent or temporary physical line of sight obstruction between transmitting and receiving devices, is not located within the VHF 500m buffer overlay for the Springbrook VHF facility (as identified on the **Airport environs – Airservices Australia aviation facilities overlay map**).	**NOT APPLICABLE**	
	AO5.2 Development that involves any of the following, is not included within the VOR 1000m buffer overlay for the Jacobs Well VOR facility (as identified on **Airport environs – Airservices Australia aviation facilities overlay map**): (a) creating a permanent or temporary physical line of sight obstruction; (b) overhead lines exceeding 5m in height; (c) metallic structures exceeding 8m in height; (d) trees and open lattice towers exceeding 10m in height; (e) wooden structures exceeding 13m in height.	**NOT APPLICABLE**	
	AO5.3 Development that involves any of the following, is not located within the	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	building restricted area for the Mt Somerville PSR and SSR facilities (as identified on the **Airport environs - Airservices Australia aviation facilities overlay map**). (a) creating a permanent or temporary physical line of sight obstruction; (b) overhead lines exceeding 5m in height; (c) metallic structure exceeding 8m in height.		
	AO5.4 Development that involves any of the following, is not located within the building restricted area for the Coolangatta DVOR, DME and NDB facilities (as identified on the **Airport environs - Airservices Australia aviation facilities overlay map**). (a) creating a permanent or temporary physical line of sight obstruction; (b) overhead lines exceeding 5m in height; (c) metallic structures exceeding 8m in height.	**NOT APPLICABLE**	
Potential bird or bat strike on aircraft (on land within the Gold Coast Airport wildlife hazard buffer zones)			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO6 Development in the bird/bat strike zones of Gold Coast Airport, as identified on **Airport environs – wildlife hazard buffer zones overlay map**, does not exacerbate the potential for bird or bat strike on aircraft.	**AO6.1** In locations within 3km of the Gold Coast Airport, as identified on **Airport environs – wildlife hazard buffer zones overlay map**, where planting as part of a development could result in increased attraction of birds or bats, with the possibility of creating a hazard for aircraft operations, plant species will be selected which are not subject to heavy flowering or fruiting. **Editors Note: The operator of Gold Coast Airport maintains a preferred plant species list that is available for the assistance of development proponents, if required.**	**NOT APPLICABLE**	
	AO6.2 In the case of any development within an allotment located within 3km of the Gold Coast Airport, as identified on **Airport environs – wildlife hazard buffer zones overlay map**, with the potential to create or increase a hazard of bird or bat strike on aircraft evidence is provided to confirm that approval has been obtained from the operator of Gold Coast Airport.	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	AO6.3 The following land uses are not located within 3km of the airport runway, as identified on **Airport environs – wildlife hazard buffer zones overlay map**: (a) Cropping (turf farm or fruit tree farm) (b) Intensive animal industry (piggery) (c) Aquaculture (fish processing/packing plant) (d) Conservation state (e.g. wetland) (e) Major sport, recreation and entertainment facility (showground) (f) Low impact industry, Medium impact industry, high impact industry (food processing plant) (g) Food/organic waste facility: and (h) Putrescible waste facility (e.g. landfill, transfer station)	**NOT APPLICABLE**	
	AO6.4 Where the uses listed in AO6.3 are located between 3km and 13km from the airport runway, as identified on the **Airport environs – wildlife hazard buffer zones overlay map**, measures that prevent wildlife attraction are undertaken (e.g. covering of potential food/waste sources and other wildlife deterrence methods). **Note: Where exceptional circumstances justify approval of development within 3km – 13km of the airport runway, rigorous wildlife management measures to avoid**	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
	attracting wildlife should be incorporated in the development proposal.		
	AO6.5 The following land uses include appropriate measures that prevent wildlife attraction (e.g. covering of potential food/waste sources and other wildlife deterrence methods) if located within 13km of the airport runway, as identified on the **Airport environs – wildlife hazard buffer zones overlay map:** (a) Animal husbandry (cattle/dairy farm); (b) Intensive animal industry (poultry farm); (c) Conservation estate (all other than mentioned in AO6.3); (d) Major sport, recreation and entertainment facility (all other than mentioned in AO6.3); (e) Outdoor sport and recreation; (f) Park; (g) Non-putrescible waste facility (e.g. landfill, transfer station) (h) Sewerage/wastewater treatment facility	**NOT APPLICABLE**	

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
Emission of particulate matter and air turbulence (inside the outer horizontal surface 15km)			
PO7 Development in the Gold Coast Airport's prescribed airspace does not compromise the operation of aircraft engines or create air turbulence or a potential visual hazard for aircraft operation around the Gold Coast Airport due to emission of smoke, steam or other particulate matter. **Note: The Gold Coast Airport's 'Prescribed Airspace' is indicated by the OLS and the PANS-OPS on Airport environs – Procedures for Air Navigation Services – Aircraft Operational (PANS-OPS) surfaces overlay map and Airport environs – Obstacle Limitation Surface (OLS) overlay map.** **Note: If development has the potential to cause a hazard to aircraft operations through the emission of particulate matter, approval of the operator of Gold Coast Airport is required.**	**AO7.1** The development will not cause a potential hazard to the operation of aircraft through the emission of smoke, steam, dust or other particulate matter.	**NOT APPLICABLE**	
	AO7.2 The development will not cause a potential hazard to the operation of aircraft through the emission of a gaseous plume at a velocity exceeding 4.3m per second.	**NOT APPLICABLE**	
Transient aviation activities			

Performance outcomes	Acceptable outcomes	Does the proposal meet the acceptable outcome? If not, justify how the proposal meets either the performance outcome or overall outcome	Internal use
PO8 Development does not adversely impact on the Gold Coast Airport's prescribed airspace. **Note: The Gold Coast Airport's 'Prescribed Airspace' is indicated by the OLS and the PANS-OPS on Airport environs – Procedures for Air Navigation Services – Aircraft Operational (PANS-OPS) surfaces overlay map and Airport environs – Obstacle Limitation Surface (OLS) overlay map.**	**AO8** Activities involving transient intrusions such as parachuting, hot air ballooning or hang gliding are not located within the airspace of the Gold Coast Airport.	**NOT APPLICABLE**	