

**9.3 NO. 12 (LOT: 6; D/P: 2360) FLORENCE STREET, WEST PERTH - PROPOSED FOUR GROUPED DWELLINGS**

- Attachments:**
1. Consultation and Location Map
  2. Development Plans
  3. Applicant's Supporting Documents
  4. Advertised Plans (Superseded)
  5. Summary of Submissions - Administration's Response
  6. Summary of Submissions - Applicant's Response
  7. Determination Advice Notes

**RECOMMENDATION:**

That Council in accordance with the provisions of the City of Vincent Local Planning Scheme No. 2 and the Metropolitan Region Scheme, **APPROVES** the application for four Grouped Dwellings at No. 12 (Lot: 6; D/P: 2360) Florence Street, West Perth, in accordance with the plans shown in Attachment 2, subject to the following conditions and the associated advice notes in Attachment 7:

**1. Development Plans**

This approval is for four new Grouped Dwellings as shown on the approved plans dated 27 October 2020. No other development forms part of this approval;

**2. Boundary Walls**

The surface finish of boundary walls facing an adjoining property shall be of a good and clean condition, prior to the practical completion of the development, and thereafter maintained, to the satisfaction of the City. The finish of boundary walls is to be fully rendered or face brick; or material as otherwise approved; to the satisfaction of the City;

**3. Stormwater**

Stormwater from all roofed and paved areas shall be collected and contained on site. Stormwater must not affect or be allowed to flow onto or into any other property or road reserve;

**4. Colours and Materials**

The colours, materials and finishes of the development shall be in accordance with the details and annotations as indicated on the approved plans which forms part of this approval;

**5. External Fixtures**

All external fixtures, such as television antennas (of a non-standard type), radio and other antennae, satellite dishes, solar panels, external hot water heaters, air conditioners, and the like, shall not be visible from the street(s), are designed integrally with the building, and be located so as not to be visually obtrusive;

**6. Landscaping**

**6.1** A detailed landscape and reticulation plan for the development site and adjoining road verge, to the satisfaction of the City, shall be lodged with and approved by the City prior to commencement of development. The plan shall be drawn to a scale of 1:100, prepared generally in accordance with the landscaping plans SK01-C and SK02-C dated 2 October 2020 and show the following:

- The location and type of existing and proposed trees and plants;
- Areas to be irrigated or reticulated;
- Minimum deep soil area of 12 percent and tree canopy coverage of 30 percent of the site area;

- The inclusion of additional landscaping treatment between the 'Visitor Bay' and Florence Street to screen hardstand and parking areas, to the City's satisfaction;
- The inclusion of additional landscaping treatment between the 'Visitor Bay' and Unit 1 dwelling to provide increased privacy whilst maintaining street surveillance from this outdoor area, to the City's satisfaction; and
- The 'permeable paving' shown on a portion of the 'Visitor Bay' being removed and replaced with hardstand; and

6.2 All works shown in the detailed landscaping plans shall be undertaken in accordance with the approved plans to the City's satisfaction, prior to occupancy or use of the development and maintained thereafter to the satisfaction of the City at the expense of the owners/occupiers;

## 7. Visual Privacy

Prior to occupancy or use of the development, privacy screening shall be installed as shown on the approved plans and on top of new fill and retained levels along the northern and eastern lot boundaries. Privacy screening shall be visually impermeable and is to comply in all respects with the requirements of Clause 5.4.1 of the Residential Design Codes (Visual Privacy) deemed to comply provisions, to the satisfaction of the City;

## 8. Sight lines

No walls, letterboxes or fences above 0.75 metres in height to be constructed within the 1.5 metre of where:

- 8.1 walls, letterboxes or fences adjoin vehicular access points to the site; or
- 8.2 a driveway meets a public street; or
- 8.3 two streets intersect; unless otherwise approved by the City of Vincent;

## 9. Car Parking and Access

- 9.1 The layout and dimensions of all driveway(s) and parking area(s) shall be in accordance with AS2890.1;
- 9.2 All driveways, car parking and manoeuvring area(s) which form part of this approval shall be sealed, drained, paved and line marked in accordance with the approved plans prior to the first occupation of the development and maintained thereafter by the owner/occupier to the satisfaction of the City;
- 9.3 No goods or materials being stored, either temporarily or permanently, in the parking or landscape areas or within access driveways. All goods and materials are to be stored within the buildings or store rooms, where provided;
- 9.4 Prior to the first occupation of the development, redundant or "blind" crossovers shall be removed and the verge and kerb made good to the satisfaction of the City, at the applicant/owner's full expense; and

All new crossovers to lots are subject to a separate application to be approved by the City. All new crossovers shall be constructed in accordance with the City's Standard Crossover Specifications and

10. Prior to the commencement of the development (including demolition and/or forward works), a Construction Management Plan that details how the construction of the development will be managed to minimise the impact on the surrounding area shall be lodged with and approved by the City. The Construction Management Plan is required to address, but is not limited to, the following matters:

- The delivery of and delivery times for materials and equipment to the site;
- Storage of materials and equipment on site;

- **Parking arrangements for contractors and sub-contractors;**
- **The impact on traffic movement;**
- **Dilapidation report of nearby surrounding properties (including 14 Florence Street);**
- **Construction times; and**
- **Notification to affected land owners;**

The management plan shall be complied with for the duration of the construction of the development.

#### **PURPOSE OF REPORT:**

To consider an application for development approval for four Grouped Dwellings at No. 12 Florence Street, West Perth (subject site).

#### **PROPOSAL:**

The application proposes the demolition of the existing dwelling at the subject site, and the construction of four three storey Grouped Dwellings in a battle-axe lot configuration fronting Florence Street.

The proposed dwellings have similar floor plans comprising:

- Double garages with vehicle access from a communal leg along the south of the site;
- Games rooms, outdoor living areas, bathrooms and laundries located on the ground floor;
- Primary living areas, ensuites, bedrooms and outdoor living terraces located on the first floor; and
- Bedrooms, studies and bathrooms located within the loft.

Pedestrian access is provided directly from Florence Street for Unit 1 and via the communal access leg for Units 2, 3 and 4. One visitor parking bay is provided in common property within the street setback area.

A location plan is included as **Attachment 1**. The proposed development plans have been included as **Attachment 2**. The applicant's supporting documents including an Urban Design Study and Environmentally Sustainable Design justification are included in **Attachment 3**.

#### **BACKGROUND:**

<b>Landowner:</b>	Xscope Pty Ltd
<b>Applicant:</b>	Daniel Lomma Design
<b>Date of Application:</b>	23 June 2020
<b>Zoning:</b>	MRS: Urban LPS2: Zone: Residential R Code: R50
<b>Built Form Area:</b>	Residential
<b>Existing Land Use:</b>	Single Dwelling
<b>Proposed Use Class:</b>	Grouped Dwelling
<b>Lot Area:</b>	1,020m <sup>2</sup>
<b>Right of Way (ROW):</b>	No
<b>Heritage List:</b>	No

The subject site is bound by Florence Street to the west, three single and two storey grouped dwellings to the south, a three storey apartment complex of 54 dwellings to the rear, a Federation style bungalow house listed on the City's Municipal Heritage Inventory to the north, and vacant land with a current development approval for 11 two storey Grouped Dwellings to the north and north-east accessed by Sheridan Lane. A location plan is included as **Attachment 1** and contextual analysis included in the applicant's urban design study as **Attachment 3**.

The subject site and surrounding properties are zoned Residential R50 under the City's Local Planning Scheme No. 2 (LPS2) with the exception of the rear adjoining apartment complex subject to an R80 density code.

The subject site and surrounding properties are within the Residential Built Form Area and have a permitted building height of two storeys under the City's Policy No. 7.1.1 – Built Form (Built Form Policy). The rear adjoining apartment site is subject to a three storey height limit under the Built Form Policy.

Nearby the subject site are properties subject to the City's Policy No. 7.5.15 – Heritage and Character Retention areas. To the north-east of the site are 15 properties in the Janet Street Heritage Area and to the south-west and south-east of the site is the Carr Street Character Retention Area of approximately 37 properties, which includes four listed as Heritage on the City's Municipal Heritage Inventory. Immediately adjoining the subject site to the north is a Federation style bungalow house listed on the City's Municipal Heritage Inventory.

### Summary Assessment

The table below summarises the planning assessment of the proposal against the provisions of the State Government's State Planning Policy 7.3 Residential Design Codes Volume 1 (R Codes Volume 1), and the City's Built Form Policy and Policy No. 7.6.1 – Heritage Management - Development Guidelines for Heritage and Adjacent Properties (Heritage Management Policy). In each instance where the proposal requires the discretion of Council, the relevant planning element is discussed in the Detailed Assessment section following from this table.

Planning Element	Deemed-to-Comply/Acceptable Development	Requires the Discretion of Council
Street Setback		✓
Lot Boundary Setbacks/Boundary Walls		✓
Open Space		✓
Building Height/Storeys		✓
Setback of Garages and Carports	✓	
Garage Width	✓	
Street Surveillance	✓	
Street Walls and Fences	✓	
Outdoor Living Areas	✓	
Landscaping	✓	
Parking & Access	✓	
Site Works/Retaining Walls		✓
Visual Privacy		✓
Solar Access	✓	
Essential Facilities	✓	
External Fixtures	✓	
Environmentally Sustainable Design		✓
Urban Design Study		✓
Heritage Management Policy		✓

### Detailed Assessment

The deemed-to-comply assessment of the elements that require the discretion of Council is as follows:

Street Setback	
Deemed-to-Comply Standard	Proposal
<b>Built Form Policy Volume 1 Clause 5.1</b>  Walls on upper floors setback a minimum of 2.0 metres behind the ground floor predominant building line.	The first floor is setback 0.67 metres behind the ground floor games/guest room predominant building line.
Lot Boundary Setbacks / Boundary Walls	
Deemed-to-Comply Standard	Proposal
<b>R Codes Volume 1 Clause 5.1.3</b>  <u>Lot Boundary Setbacks</u> <i>North boundary:</i> Units 1 to 4 - First floor living room recesses: 1.2 metres Unit 1 - Loft bed 2: 4.6 metres	Units 1 to 4 - First floor living room recesses: 1.0 metres Unit 1 - Loft bed 2: 4.58 metres

Units 2 and 3 - Loft bed 3 & study: 4.8 metres  Boundary Walls Average wall height permitted: 3.0 metres Maximum wall height permitted: 3.5 metres	Units 2 and 3 - Loft bed 3 & study: 4.58 metres  Units 3 and 4 - Store and laundry: 3.3 metre average wall height and 3.7 metre maximum wall height  Unit 2 - Ground floor store: 3.25 metre average boundary wall height
Open Space	
Deemed-to-Comply Standard	Proposal
<b>R Codes Volume 1 Clause 5.1.4</b>  40% open space for each dwelling site	Units 2 and 3: 38.0% open space
Building Height	
Deemed-to-Comply Standard	Proposal
<b>Built Form Policy Volume 1 Clause 5.3</b>  Permitted building height: <ul style="list-style-type: none"> <li>• Two storeys</li> <li>• External wall height: 7.0 metres where the roof is concealed; and 6.0 metres where the roof is exposed above.</li> <li>• Roof pitch: 9.0 metres.</li> </ul>	Units 1 to 4: Three storeys  Unit 1 – Loft: Maximum external wall height of 9.5 metres and roof pitch height of 10.5 metres  Units 2 and 3 – Loft: Maximum external wall height of 10.2 metres and roof pitch of 11.0 metres  Unit 4 - Maximum external wall height of 9.3 metres and roof pitch of 11.1 metres
Site Works/Retaining Walls	
Deemed-to-Comply Standard	Proposal
<b>R Codes Volume 1 Clause 5.3.7 and 5.3.8</b>  Fill and retaining greater than 0.5 metres above natural ground level setback in accordance with Tables 2a/2b.	<i>Eastern boundary:</i> Unit 4 – Courtyard: Maximum height of fill and retaining 0.66 metres with a nil setback
Visual Privacy	
Deemed-to-Comply Standard	Proposal
<b>R Codes Volume 1 Clause 5.4.1</b>  Visual setback distances from: <ul style="list-style-type: none"> <li>• Major openings to bedrooms and studies: 4.5 metres</li> <li>• Major openings to other habitable rooms including kitchens and living rooms: 6.0 metres</li> <li>• Unenclosed outdoor active habitable spaces: 7.5 metres</li> </ul>	<i>Southern boundary:</i> Units 1 to 4 - Kitchen: 4.0 metre setback Unit 1 - Study: 4.08 metre setback  <i>Northern boundary:</i> Unit 4 - Ground floor courtyard: 2.6 metre setback Unit 4 - First floor terrace: 1.5 metre setback Unit 4 - First floor living: 2.8 metre setback  <i>Eastern boundary:</i> Unit 4 - Ground floor courtyard: nil setback Unit 4 - First floor terrace: 1.7 metre setback
Development Guidelines for Heritage and Adjacent Properties	
Acceptable Development Standard	Proposal
<b>Heritage Management Policy</b>  New development adjacent to heritage listed places shall have:	<i>Front Setback</i> Unit 1: Ground and first floor setback 1.8 metres

<ul style="list-style-type: none"> <li>• Equivalent setback and/or is no less than that of the heritage building;</li> <li>• Side setbacks reflect that of the heritage building; and</li> <li>• Height that is compatible with the heritage building. Staggering the building is an acceptable method to achieve this.</li> </ul>	<p>and 1.0 metre respectively forward of the heritage dwelling proper to the north. The overall development is 0.7 metres behind the verandah of the heritage dwelling.</p> <p><i>Side Setback</i> Units 2 to 4: Stores located on northern boundary</p> <p><i>Building Height</i> Unit 1: The maximum external wall height is 4.7 metres and roof height is 2.5 metres higher.</p>
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The above elements of the proposal do not meet the specified deemed-to-comply standards and is discussed in the Comments section below.

#### CONSULTATION/ADVERTISING:

Community consultation was undertaken in accordance with the *Planning and Development (Local Planning Scheme) Regulations 2015* for a period of 14 days from 7 October 2020 to 20 October 2020. The method of consultation included notice on the City's website and 233 letters mailed to all owners and occupiers of the properties within a 75 metre radius from the subject site, as shown in **Attachment 1**.

At the conclusion of the consultation period a total of 15 submissions were received, 13 objecting to the proposal and two in support. The submissions raised the following concerns:

- The proposed development does not fit within the established character context of the streetscape, and the built form does not reflect the existing Federation character;
- The three storey building height is non-compliant with the Built Form Policy and is excessive for the site and area context;
- The proposal is an overdevelopment of the site and would have detrimental overshadowing and bulk impacts on adjoining the dwellings;
- The proposal would result in reduced visual privacy from overlooking, particularly from Unit 4 to the north-east into future dwelling kitchen and outdoor living area approved at No. 26 Sheridan Lane, and generally towards the dwellings at No. 10 Florence Street;
- The proposal would result in increased traffic and parking congestion in the street;
- The proposed visitor parking in the front setback does not positively respond to the predominate streetscape features; and
- The proposed development does not comply and therefore should not be supported.

A summary of the submissions received along with Administration's comments on each are provided in **Attachment 5**. The applicant also provided a written response to the submissions received, as provided in **Attachment 6**.

A copy of the plans that were advertised to adjoining properties are included in **Attachment 4**.

The applicant submitted amended plans to address some of the concerns raised during the community consultation period and comments from the Design Review Panel (DRP) Chair. These changes related to modifying the Unit 1 street façade to better reflect built features of the streetscape and reducing the mass and bulk of Unit 4 where it terminates the communal access leg and adjacent to the southern side boundary.

Submitters have been notified that amended plans were provided. These amended plans were not readvertised to invite further comments. This is because Council reporting timeframes would not allow for this and also the changes made do not result in any additional departures to previously advertised deemed-to-comply standards thereby not triggering the need to undertake further public consultation under the City's Community Consultation Policy.

#### Design Review Panel (DRP):

Referred to DRP: Yes

The proposal was reviewed on two occasions by the DRP prior to the application being lodged. The proposal was referred to the Chair of the DRP on a further two occasions following lodgement.

Following lodgement of the application, the proposal was first referred back to the DRP Chair during the public consultation. These plans referred to the DRP are included in **Attachment 4**. The following key comments were provided by the DRP chair, which also reference previous DRP advice made during pre-lodgement:

- The proposal does not retain the front façade of the existing house which is an acceptable outcome given retention of the existing façade would not add value based on the current design envelope and layout;
- The visitor car parking bay location negatively impacts the visual approach to the dwelling and compromises some greater landscaping opportunity, however constraints within the design layout for re-location is acknowledged. Notwithstanding this, the lack of high front fencing is a positive outcome;
- The alignment of the upper loft setback behind the lower levels at the street positively responds to the adjoining single storey character dwellings;
- Landscaping including tree canopy coverage has increased, particularly along the driveway and noting a new large tree within the front setback;
- Reducing the length and height of the boundary wall on the northern boundary would be positive. The ground level Unit 4 corridor space is quite inefficient so it looks like this could be achieved;
- Increasing the Unit 4 first floor and loft level eastern and southern setbacks would be a positive (even if they are compliant). In general, the overshadowing of the site to the south does seem to align with the built form on the adjacent site. Information on how the overshadowing relates to the openings and outdoor spaces of this development would be helpful;
- The angled loft style roof forms are sympathetic in terms of massing but it still looks overdeveloped at the rear which to me indicates three levels at the rear may not be appropriate; and
- The aerial perspective shows the loft massing of Unit 4 located right in the south eastern corner of the site. This area generally appears quite tight. Shifting this Unit 4 loft massing in a west direction closer to the centre of the site could be an option which may improve the issue.

The applicant submitted amended plans and additional information in response to the comments received from the DRP Chair and community consultation. Key changes reflected in these amended plans and additional information include:

- Modifying the Unit 4 loft wall and roof alignment to reduce building height by 0.7 metre along the southern elevation;
- Modifying the architectural language of the street façade of Unit 1 by:
  - Reducing the thickness of the ground floor porch and eave banding;
  - Incorporating narrow vertical windows in the upper floors;
  - Incorporating a narrow vertical feature of brickwork adjacent to the communal driveway encompassing the Unit 1 laundry and bath 1 shower wall; and
  - Upper floor windows provided with a re-interpreted traditional window awning in a contemporary form; and
- Providing additional contextual assessment of surrounding property developments, including a vertical overshadowing diagram illustrating the shadow effect on the established grouped dwellings to the south.

The applicant did not make any modifications to the location of the visitor bay located within the front setback area.

The amended plans being the final set of plans that the applicant is seeking approval for are included as **Attachment 2**.

The DRP Chair reviewed the amended plans and advised that the changes improved key concerns regarding contextual analysis informing the street presentation of Unit 1 and impacts associated with mass and visual privacy from Unit 4. A summary of the DRP Chair's comments is as follows:

- The streetscape façade and architectural language has improved throughout the process and is supported. Hit and miss feature brickwork has been introduced which is a strong part of the surrounding context and character. The proposed lighter colours are generally more sympathetic to the character of the area than the previous darker colours, and the upper level (loft floor) is setback significantly behind the lower levels;
- Additional windows overlooking the streetscape have been introduced providing increased passive surveillance of the streetscape. The front window proportions have changed from a horizontal to a vertical emphasis which references the windows on surrounding character houses;

- Improvements have been made to reducing the massing and bulk of Unit 4 at the rear portion of the development, including increasing the upper level setback to the south side;
- Based on the use of pitched roof forms to the rear loft levels and overshadowing diagrams the proposal has demonstrated design strategies to minimise the impact on adjacent neighbours and the impact on adjoining properties is minimal;
- The applicant has now provided overshadowing diagrams illustrating the impact on the adjoining neighbours to the south is comparable to a compliant building height and setback of 1.5 metres; and
- The applicant has provided greater surrounding context which includes a mixture of existing and future housing, which have reduced concerns relating to the impact on the future grouped dwelling development to the north.

The below table demonstrates how the proposal has progressed through the DRP process in accordance with the Ten Principles of Good Design.

Design Review Progress				
	Supported			
	Pending further attention			
	Not supported			
	No comment provided			
	DRP 1 04/09/2019	DRP 2 11/12/2019	Referral to DRP Chair 08/10/2020	Referral to DRP Chair 05/11/2020
Principle 1 – <b>Context &amp; Character</b>				
Principle 2 – <b>Landscape Quality</b>				
Principle 3 – <b>Built Form and Scale</b>				
Principle 4 – <b>Functionality &amp; Built Quality</b>				
Principle 5 – <b>Sustainability</b>				
Principle 6 – <b>Amenity</b>				
Principle 7 – <b>Legibility</b>				
Principle 8 – <b>Safety</b>				
Principle 9 – <b>Community</b>				
Principle 10 – <b>Aesthetics</b>				

#### LEGAL/POLICY:

- *Planning and Development Act 2005*;
- *Planning and Development (Local Planning Schemes) Regulations 2015*;
- City of Vincent Local Planning Scheme No. 2;
- State Planning Policy 7.3 – Residential Design Codes Volume 1;
- Policy No. 4.1.5 – Community Consultation;
- Policy No. 7.1.1 – Built Form;
- Policy No. 7.5.23 – Construction Management Plans; and
- Policy No. 7.6.1 – Heritage Management – Development Guidelines for Heritage and Adjacent Properties.

In accordance with Schedule 2, Clause 76(2) of the *Planning and Development (Local Planning Schemes) Regulations 2015* and Part 14 of the *Planning and Development Act 2005*, the applicant will have the right to apply to the State Administrative Tribunal for a review of Council's determination.

#### Delegation to Determine Applications:

This matter is being referred to Council in accordance with the City's Delegated Authority Register as the delegation does not extend to applications for development approval that propose a height of three storeys or more and do not meet the applicable Building Height deemed-to-comply standard. The application has also received more than five objections during the City's community consultation period.

**RISK MANAGEMENT IMPLICATIONS:**

There are minimal risks to Council and the City's business function when Council exercises its discretionary power to determine a planning application.

**STRATEGIC IMPLICATIONS:**

This is in keeping with the City's Strategic Community Plan 2018-2028:

Innovative and Accountable

*We are open and accountable to an engaged community.*

**SUSTAINABILITY IMPLICATIONS:**

The City has assessed the application against the environmentally sustainable design provisions of the City's Policy No. 7.1.1 – Built Form. These provisions are informed by the key sustainability outcomes of the City's Sustainable Environment Strategy 2019-2024, which requires new developments to demonstrate best practice in respect to reductions in energy, water and waste and improving urban greening.

**PUBLIC HEALTH IMPLICATIONS:**

Nil.

**FINANCIAL/BUDGET IMPLICATIONS:**

Nil.

**COMMENTS:**Street Setback

The Built Form Policy deemed-to-comply standard requires walls on upper floors to have a minimum setback of 2.0 metres behind the ground floor predominant building line from Florence Street. The first floor is setback 0.67 metre behind the predominant building line of the ground floor.

Administration received submissions during community consultation that raised concerns that the contemporary design does not fit within the established character context of the streetscape.

The proposed street setback satisfies the local housing objectives of the Built Form Policy and the design principles of the R Codes Volume 1 for the following reasons:

- The ground floor setback satisfies the deemed-to-comply street setback requirement of 6.5 metres and the upper floor setbacks are stepped to reduce the perception of building bulk from the upper floor walls. The ground floor is proposed to be setback 6.7 metres, with the first floor and loft setback 7.3 metres and 11.5 metres respectively;
- The stepping of setbacks has effectively responded to the immediate adjoining development context of the heritage dwelling to the north at No. 14 Florence Street. The proposed building setback from Unit 1 to Florence Street is behind the verandah alignment of the adjoining heritage dwelling. To reduce visible bulk and scale, the proposed first floor walk in robe as viewed from Florence Street is in alignment with the adjoining heritage dwelling face. Further, the Unit 1 bed 1 wall is setback 3.2 metres from the northern side boundary to reduce bulk and dominance of the heritage dwelling;
- Open space between the proposed development and the grouped dwellings on the southern adjoining property responds positively to the established street setback and development context. This is due to the location of the 4.0 metres wide communal access leg of the subject site coupled with the 3.0 metres wide communal access leg of the adjoining property. This minimum separation distance of 7.0 metres between dwellings significantly reduces the bulk and scale of the development as viewed from the streetscape and adjoining property to the south;
- The street presentation has incorporated features that positively responds and contributes to the character and context of the established streetscape, as follows:
  - The front window proportions provide a vertical emphasis which references the windows of surrounding character houses. The street facing window awnings have re-interpreted traditional

- feature awnings found broadly in the area without faux imitation and in respect to the contemporary design;
- The overall light colour palette positively responds to predominate light colours featured in the streetscape. Hit and miss feature brickwork provides a varied material and texture finish responding to existing development in the street, particularly No. 4b Florence Street; and
- The use of white masonry banding along the porch and eave of the street façade responds to the masonry fence feature of the heritage building to the north, specifically the masonry finish, white colour and wall thickness. Further, the masonry banding feature clearly distinguishes the ground floor from the first floor, with the first floor setback behind the porch and eave banding minimising the visual bulk;
- The proposed setback is suitable to accommodate the following site planning considerations:
  - Adequate landscaping is provided in the street setback area to soften the visual impact of development which includes three medium sized and one large tree contributing towards 58.7 percent of the street setback area being provided with tree canopy coverage;
  - Power meter boxes are setback 6.0 metres from the street boundary and located along the southern boundary. These utilities are visually softened by trees and a landscaped garden bed as viewed from Florence Street;
  - The development satisfies the deemed-to-comply requirements of the R Codes Volume 1 in respect to car parking, with double garages proposed for each dwelling and one uncovered visitor bay provided within the front setback area. Whilst this visitor car bay does contribute additional hardstand within the front setback area, car parking within the front setback is a feature of this locality. There is car parking within the street setback area at No.'s 4a, 4b, 6, 8, 10A, 11, 21, 24, 38, 40 49 and 51 Florence Street. The car bay is uncovered to reduce any perception of building bulk and the dwelling maintains clear sightlines to provide surveillance of and connectivity with the street; and
  - A condition of approval is recommended to provide additional landscaping treatment between the proposed visitor bay and Florence Street, and between the low rendered brick wall in the front setback area of Unit 1 and the proposed visitor bay. This is to reduce the visual impact of hardstand area and parked vehicle in the front setback area as viewed from the street. This is also to protect the amenity and privacy of the Unit 1 occupants through landscape design together with the physical separation between the proposed visitor bay and the Unit 1 games/guest wall which is 2.7 metres, whilst still maintaining street surveillance from this outdoor area of Unit 1 to the front setback area and to the street. Within a detailed landscape plan a suitable species around the visitor bay will be required and may result in a reconfiguration of the existing low walls to achieve a high quality outcome. Permeable paving annotated in the visitor bay of the landscape concept plans is not supported given vehicle parking in this location would result in significant shade limiting grass growth. The proposed 'grass crete' spaces on either side of the visitor bay are necessary for sufficient vehicle manoeuvring and should perform satisfactorily due to access to natural sunlight; and
- The DRP chair is supportive of the Unit 1 presentation to Florence Street, commending the integration of character and context from the streetscape and use of stepping upper floor walls to break up bulk and scale.

### Building Height

The Built Form Policy specifies a deemed-to-comply building height of two storeys, including an external wall height of 6.0 metres where a roof is visible above, 7.0 metres for an external wall that has a concealed roof and 9.0 metres to the roof pitch. The proposed development is three storeys in height with the third floor referenced as a loft on the plans.

Administration received submissions during community consultation that raised concerns that the building height, particularly the third storey loft, and its design not fitting in the established context and character of the streetscape, which is predominantly single storey.

The proposed building height satisfies the local housing objectives of the Built Form Policy and the design principles of the R Codes Volume 1 for the following reasons:

- The loft floors have been located and designed so as to not dominate and detract from the streetscape and adjoining properties. The loft has a significant street setback of 11.5 metres from Florence Street and is located behind the floors below, specifically 4.73 metres behind the ground floor and 4.1 metres behind the first floor. The southern side elevation of the dwellings have external wall heights between 7.0 and 7.5 metres before pitching to the roof form to give the impression of two storeys as viewed from

the south, with the third floor being contained within the roof;

- The Unit 1 loft as viewed from the north does not dominate the adjoining heritage dwelling due to the development context and articulated setbacks provided. The loft sits 2.9 metres behind the adjoining property dwelling. Whilst this existing heritage dwelling on the adjoining property is single storey, its highest point of the roof pitch sits at the bed 3 window sill height of the Unit 1 loft. This demonstrates that the proposed development is not significantly out of proportion with the building height envelope of the existing adjoining heritage dwelling. This building height envelope is depicted with a dotted line on the northern elevation of the development plans included as **Attachment 2**;
- The northern side setback to loft walls and articulated design reduce the impacts of bulk and scale. The setbacks of the loft from the northern boundary vary between 3.4 metres and 4.5 metres, and are located between 2.0 and 3.0 metres behind the predominate setback line of the lower levels;
- The building envelopes of the lofts are provided with separations of 5.8 metres between Unit 1 and Unit 2, and 12.1 metres between Units 3 and 4 to break up building bulk;
- The setbacks of the lofts to the southern boundary reduce bulk and overshadowing. Units 1 to 3 are setback between 3.9 metres to 5.3 metres from the southern boundary, while Unit 4 is setback 1.85 metres. These setbacks have sought to offset the loft overshadowing to the south by achieving an overshadowing extent equal or lesser than that of the deemed-to-comply two storey wall height with a permitted 1.5 metre setback to the southern boundary. Vertical overshadowing diagrams provided by the applicant are included in **Attachment 3**. The overshadowing diagrams illustrate two ground floor lounge room windows of No. 10A Florence Street and two ground floor lounge room windows of No. 10B Florence Street would be impacted by shadow cast. The majority of north facing windows of No. 10B Florence Street are not affected by overshadowing and will allow for sufficient direct sunlight into the living spaces of the dwelling. This is demonstrated in the applicant's overshadowing perspectives on page 11 of **Attachment 3**. Similarly, No. 10A Florence Street has a large north facing dining window that would not be impacted by shadow cast from the loft, which would allow for direct sunlight into this primary living space of the dwelling;
- Notwithstanding the two storey height limit under the Built Form Policy, there are a number of established three storey dwellings in the surrounding area, including at No's. 4 and 37-43 Florence Street, and No's. 76A, 76B, 76C. 78A. 78B and 82 Carr Street. There is also a three storey apartment building at No. 147-159 Charles Street adjoining the subject site to the rear of a similar wall and roof height to the proposal; and
- The proposed ground floor finished levels of the dwellings closely respond to the natural topography of the site with departures kept to a minimum. The greatest extent of retaining and fill is 0.66 metres in height along the rear eastern boundary. The impact of this would be minor as discussed further below under Site Works and Retaining Walls.

### Lot Boundary Setbacks

#### *Boundary Setbacks*

Reduced setbacks to the deemed-to-comply standards in R Codes Volume 1 are proposed to the northern boundary from living room recesses for each dwelling on the first floor, loft bed 2 of Unit 1, and loft bed 3 and study of Units 2 and 3.

Administration received submissions during community consultation that raised concerns that the proposal is an overdevelopment of the site and imposes detrimental building bulk on adjoining properties.

The proposed setbacks satisfy the local housing objectives of the Built Form Policy and the design principles of the R Codes Volume 1 for the following reasons:

- The living room 'TV recesses'/projections are limited in length and area to reduce impacts associated with building bulk. These building projections are isolated wall areas between 3.0 to 3.3 metres height from the first floor levels and 3.2 to 4.1 metres width. The projections are spaced across the elevation with walls and windows recessed between to break up bulk, and to provide articulation and sufficient light and ventilation to the dwellings;
- The living room projections sit above the windows of the adjoining property dwelling limiting visible bulk from these adjacent windows and maintaining ventilation;
- The orientation of the site results in setbacks to the northern boundary having no direct sunlight restriction and overshadowing of the adjoining property dwelling;
- The loft window openings are designed to improve solar and ventilation access. A mix of major openings and highlight windows are used facing north and south with appropriate awnings for solar moderation, and are operable to improve cross-ventilation; and

- The loft walls are designed and articulated with significant setbacks, separation and windows to reduce impacts associated with bulk and ventilation restriction. No single loft wall length exceeds 9.0 metres, using indentations, awnings, and windows to break up bulk. The lofts are also provided with adequate separations between proposed Units to further mitigate bulk and scale impacts.

### *Boundary Walls*

#### *North*

The deemed-to-comply standard of the R Codes Volume 1 requires buildings on the boundary to be no higher than a maximum of 3.5 metres and an average of 3.0 metres. The proposed Units 3 and 4 store and laundry boundary wall is a maximum height of 3.7 metres and an average height of 3.3 metres, while the Unit 2 store is proposed with an average height of 3.25 metres.

The proposed boundary wall heights satisfy the local housing objectives of the Built Form Policy and the design principles of the R Codes Volume 1 for the following reasons:

- Minimal and short lengths of boundary wall are used to reduce impacts associated with bulk and ventilation restriction. Cumulative boundary wall lengths of 15.5 metres are limited to the northern side boundary, in lieu of being permitted for 39.0 metres length up to two side boundaries. This is intended to reduce the impacts of building bulk. The boundary wall sections are also provided with adequate separation to provide relief from bulk and scale. In these sections are proposed two landscaped courtyards which provide for enhanced amenity between properties, including light and ventilation access; and
- The heights of the boundary walls are similar to established and approved wall heights on the adjoining property to the north. The established dwelling to the north has a wall height 0.1 metre to 0.4 metre higher than the proposed Unit 2 store boundary wall, and is setback 0.7 metre from the boundary wall with a small non-major window opening. The Unit 2 store boundary wall would have no detrimental visual bulk or ventilation restriction on the adjacent portion of the dwelling on the adjoining property to the north. Adjacent to the proposed boundary wall of Units 3 and 4 is a vacant site with approval for 11 grouped dwellings, which has blank walls on the boundary of 3.2 metres height and some minor recess portions connecting to ground floor garages. Having regard to this current and future development context there would be minimal impact resulting from the additional height sought for the proposed boundary walls.

### Open Space

The R Codes Volume 1 deemed-to-comply standard requires a minimum of 40 percent open space provision for each proposed dwelling. Units 2 and 3 have open space of 38.0 percent each.

Administration received submissions during community consultation that raised concerns that the proposal is overdevelopment of the site.

The proposed open space satisfies the design principles of the R Codes Volume 1 for the following reasons:

- Open space averaged across all of the proposed dwelling sites is 41%, indicating that the overall development footprint is consistent with the R Codes Volume 1 deemed-to-comply standards for the R40 density;
- The street facing Unit 1 is compliant with open space and primary street setback for the predominant ground floor building line deemed-to-comply requirements. This would ensure that the development provides adequate open space and separation to the street, respecting and contributing to the existing and desired streetscape character;
- The development provides for a total landscaped deep soil area of 17.8 percent and tree canopy coverage of 30.5 percent, which meets the deemed-to-comply requirements of the Built Form Policy. The development has been designed to contribute to an attractive setting for the building and streetscape;
- The central courtyard and terrace designs of the dwellings reduce bulk, provides adequate space for outdoor pursuits and increases natural light access. These open areas provide significant breaks in the middle of the building footprint along the northern boundary reducing actual and perceived bulk from the adjoining property and provides ventilation for building openings. The courtyards and terraces are north facing for optimal access to sunlight to habitable spaces; and
- Essential fixtures and facilities are provided for in side setbacks to the northern boundary for Units 2 and

3, including bin storage, clothes drying and air-conditioning units, which are not visible from the proposed outdoor and internal living areas.

### Visual Privacy

The R Codes Volume 1 deemed-to-comply standards stipulate visual privacy setbacks or screening where major openings or active habitable spaces overlook adjoining residential properties. The development proposes reduced privacy setbacks to the kitchen of Units 1 to 4 and study of Unit 1 along the southern boundary, and the courtyard and terrace of Unit 4 along the northern and eastern boundaries.

Administration received submissions during community consultation that raised concerns that overlooking from the development detrimentally impacts resident privacy to the south and future dwellings to the north including outdoor living and kitchen areas.

The visual privacy setbacks satisfy the design principles of the R Codes Volume 1 for the following reasons:

#### *Southern boundary (Kitchen of Units 1 – 4 and Study of Unit 1)*

- The required 6.0 metres and 4.5 metres cone of vision from the kitchen and study windows, respectively, fall over the vehicle access leg of the subject site and adjoining property. The nearest adjoining property dwelling and windows are of No. 10A Florence Street at ground level. Given the kitchen and study are on first floor levels and have benches 0.8 metre in depth to the wall, overlooking is indirect and at an effective distance of 8.5 metres to the adjoining 10A Florence Street property dwelling. This effective visual setback and indirect angle results in no detrimental loss in visual privacy; and
- Trees located along the southern boundary would visually obscure overlooking through maturity, specifically there are 21 Pyrus Calleryana trees spaced 2.4 metres apart along the southern boundary. The tree species Pyrus Calleryana can grow approximately 8.0 to 10.0 metres in height with a canopy diameter of approximately 2.0 to 4.0 metres. Given the number, height and spread of these trees, there will be substantial screening to further assist in the prevention of any overlooking and to enhance privacy at tree maturity.

#### *Northern boundary (Courtyard and Terrace of Unit 4)*

- Considering the layout of the future new dwellings to the north, there would be no detrimental visual overlooking of sensitive areas, including major openings to habitable rooms and outdoor living areas. The building footprint of approved dwellings to the north are shown in the development floor and site plans (refer to **Attachment 2**). Directly adjacent and immediately overlooked walls of these future dwellings are boundary walls and highlight windows. Open space that would be overlooked is a future common property area with one visitor car parking bay perpendicular to the subject site boundary, two bicycle parking bays and a small seat and BBQ space of dimensions 2.3 metres width by 5.5 metres length running perpendicular to the visitor bay. These spaces are not considered to be private and sensitive to visual overlooking given the space is expected to be used by visitors and occupants of the site predominately for parking purposes. The BBQ and seating area appears limited in its ability for active use given the minimum width dimension and the abutting visitor car parking bay location;
- Indirect overlooking from the courtyard would affect a portion of the top of the kitchen window of a future dwelling to the adjoining northern property. The portion of the kitchen window that would be impacted is above 2.1 metres in height measured from the ground level of the adjoining property. This accounts for the ground level difference and the adjoining property being 0.4 metres below the subject site as well as the construction of a standard 1.8 metre high dividing fence and perpendicular wall face of the kitchen which reduces the extent of overlooking. The kitchen opening affected by overlooking sits perpendicular to the subject site and are subject to acute angled indirect overlooking. The top of the kitchen window sill sits near the top of a future dividing fence given the level difference proposed between properties, and for this reason overlooking from the ground floor courtyard can be mitigated by a dividing fence. Similarly overlooking of a future outdoor living area of the adjoining property is predominately mitigated by the dividing fence and a 1.4 metre high screen around the outdoor living area;
- Indirect overlooking from the first floor terrace cone of vision affects a 0.2 square metre area of landscaped space of a future dwelling. The acute angle and small cone of vision projection into the landscaped area associated with the outdoor living area results in limited detrimental impact to privacy for this future dwelling; and
- Indirect overlooking from the first floor terrace cone of vision affects a kitchen window of a future

dwelling which sits perpendicular to the subject site boundary. The adjoining property development sits 0.4 metre lower than the subject site creating an acute angle of overlooking from the terrace and provides for a new top of dividing fence level matching the top of the affected kitchen window. These features mitigate the majority of overlooking from the terrace area to the future kitchen window. Further, the kitchen window of this dwelling is directly adjacent to a common property visitor car parking bay of this site. Overlooking of this window from future visitors and occupants at the site will occur whilst using the visitor car parking bay.

#### *Eastern boundary (Courtyard and Terrace of Unit 4)*

- Direct overlooking falls over a vacant site on the northern portion of No. 19 Sheridan Lane, which has planning approval for 11 grouped dwellings. The approved development at this adjoining site along the eastern boundary has blank walls on the boundary and setback; and
- Adjacent to the southern portion of the eastern boundary on the adjoining property is a communal swimming pool area forming part of an existing apartment complex at No. 147-159 Charles Street. A 2.0 metre length of screening is provided along the eastern portion of the terrace to mitigate direct overlooking of this area. Views towards the communal pool area from the remainder of the terrace would be restricted by a double storey boundary wall forming part of the approved development at No. 19 Sheridan Lane, although this has yet to be constructed.

#### Site Works and Retaining Walls

The deemed-to-comply standards of the R Codes Volume 1 requires fill and retaining walls greater than 0.5 metres in height to be setback a minimum of 1 metre from a lot boundary. Unit 4 fill and retaining is proposed to a maximum height of 0.66 metres and setback nil from the eastern boundary.

The proposed fill and retaining to the eastern boundary satisfies the design principles of the R Codes Volume 1 for the following reasons:

- The fill and retaining is minimal in extent and adjoins a vacant site. The fill and retaining where it is greater than 0.5 metres height affects a 6.5 metre length of the eastern boundary. An approved development directly adjoining the fill and retaining wall location on the vacant site is a building on the boundary with an effective height of approximately 2.0 metres above the proposed fill and retaining level;
- The proposed fill and retaining levels of Unit 4 have been nominated responding to a balance of natural ground levels between the northern and southern boundaries. The north of the courtyard area is stepped down to respond to the natural ground level to reduce fill and retaining. The natural ground level at the southern boundary reflects the proposed fill and retaining level within 0.3 metres; and
- The retaining and fill levels create useable and functional spaces around Unit 4 which provides access, landscaping, bin storage and clothes drying.

#### Environmentally Sustainable Design

Clause 5.11 of the Built Form Policy provides local housing objectives relating to environmentally sustainable design. The applicant has provided justification and a Life Cycle Assessment (LCA) to demonstrate how the development has incorporated features of environmentally sustainable design and satisfied these local housing objectives. These are provided as **Attachment 3** and include the following:

- The site planning has optimised the northern aspect of the site for direct sunlight into habitable and active spaces for enhanced solar passive design, specifically using central courtyards and terraces, and north facing windows of games, bedrooms and primary living areas. Winter and summer solar angles provided demonstrate solar passive design in the Urban Design Study in **Attachment 3**;
- Use of suitable new and reused materials within the design for enhanced environmental performance, including reuse of existing building materials through salvaging of the existing dwelling red face bricks, use of light weight building materials in the first floor and loft floor, metal roofing and wall cladding provided with a solar absorptance value of 0.4;
- Using upper floor building projections over lower floors, eaves, screens and awnings to provide shading of north, west and east facing glazing;
- Cross ventilation for dwelling spaces is effectively demonstrated in the applicant's supporting documents in **Attachment 3**. Ceiling fans are proposed in all living and bedroom areas and operable windows used to aid ventilation. Primary living spaces are designed with the ability to be isolated to limit the volume required to heat or cool a space, reducing energy demands and cost; and

- Rooftop solar photovoltaic is able to be installed on the flat roof sections above each living room. Conduit pre-lay and panel roof space is provided such that solar photovoltaic can be either installed during construction or readily fitted after completion.

Administration has reviewed the attached justification and LCA and is satisfied that the development has incorporated sufficient environmentally sustainable design features to meet the local housing objectives.

#### Urban Design Study

Clause 5.12 of the Built Form Policy provides local housing objectives which require proposed development to be informed by an urban design study. The applicant's urban design study is included as **Attachment 3** and details the key built form references and details of the streetscape and surrounding area considered within the proposal, including the following:

- Face brick as a feature of the streetscape seen in the facades of dwellings and front fences;
- Contemporary Colorbond wall and roof cladding;
- Use of light colours in external walls and roofing complementing established traditional and contemporary development;
- White masonry banding in the façade;
- Articulated wall setbacks and loft forms; and
- Landscaping and canopy coverage provided in the front setback area.

As per the Street Setback section of this report and the final comments received from the DRP Chair, the development has incorporated design features that ensure the development appropriately references and integrates with the surrounding built form context and streetscape.

#### Development Adjacent to Heritage Listed Buildings

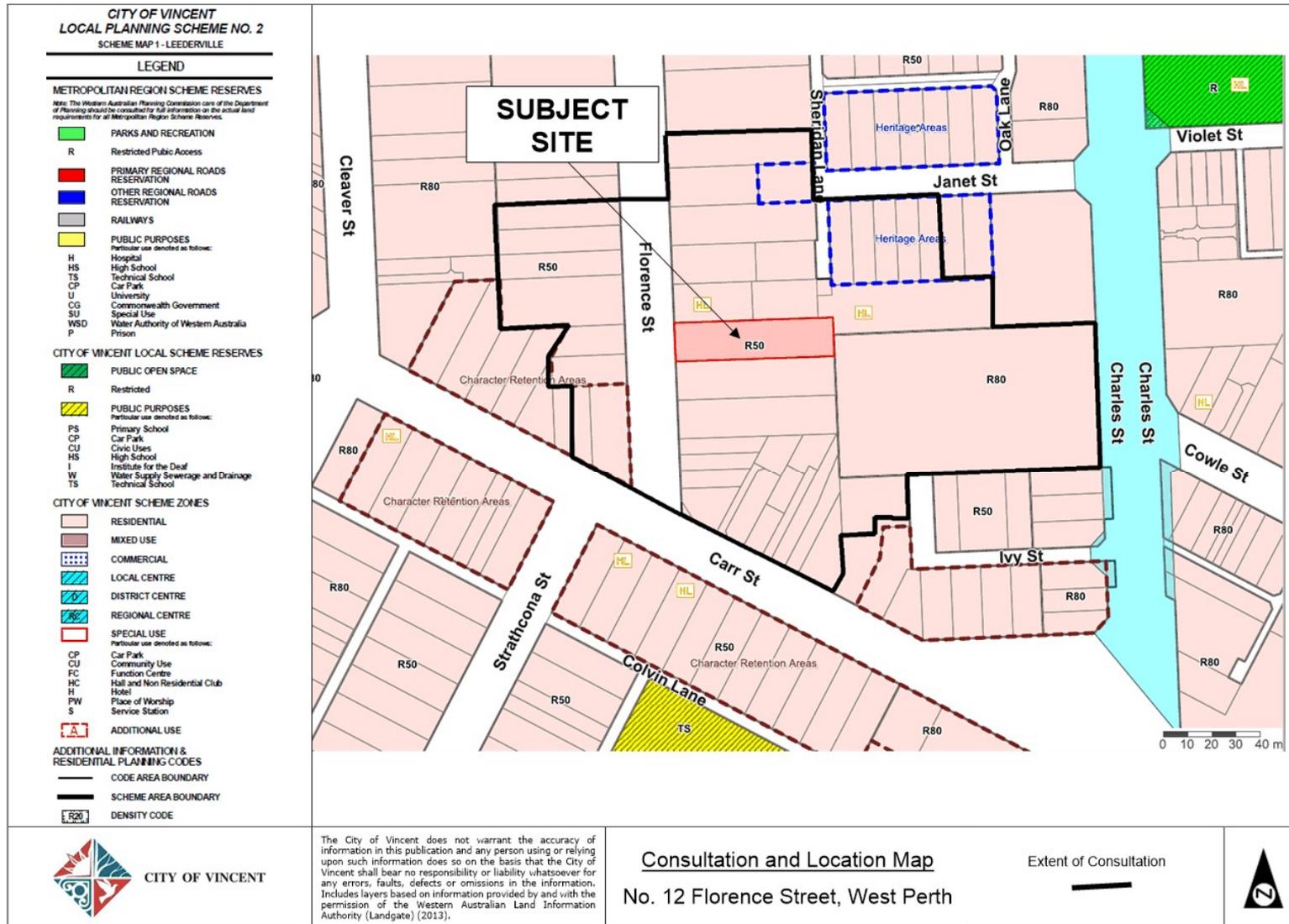
The development site is adjacent to a heritage listed Federation bungalow at No. 14 Florence Street that is on the City's Municipal Heritage Inventory and subject to provisions under the City's Heritage Management Policy.

The proposed development satisfies the applicable performance criteria of the Heritage Management Policy for the following reasons:

- The development uses staggering and significant side setbacks to maintain the view and vista to the adjacent heritage building. Where projecting forward of the heritage dwelling façade, between 1.0 and 1.8 metres, the ground floor games/guest room has a side setback of 2.5 metres and first floor bed 1 setback of 3.2 metres. This staggering using generous side setbacks maintains a view angle greater than 45 degrees from the heritage building façade to Florence Street;
- The visually prominent bullnose verandah feature of the heritage building is 0.7 metres forward of the proposed development;
- The development has incorporated contemporary architectural features which have not attempted to mimic the style of the heritage building, rather complement its significance. The development has incorporated traditional style window sizes, a light colour palette including white masonry and a contemporary take on a traditional window awning;
- The development has incorporated staggering of setbacks to upper floors to ensure the scale and mass of the development respects the heritage building. Detailed in the Street Setback comments in this report, the loft is setback 2.9 metres behind the adjoining heritage dwelling face. Similarly, side setbacks are of the loft level is staggered between 2.0 metres and 2.6 metres behind the ground and first floor levels that are 1.5 metres setback from the lot boundary. These setbacks along the northern elevation are greater than the lot boundary setbacks of the adjacent heritage building; and
- The proposed development has side setbacks greater than 1.0 metre with the exception of a short store boundary wall adjacent to the heritage building. The heritage building has a continuous side setback of 0.7 metres along the shared boundary. The store boundary wall is 4.0 metres in length and is setback 22.3 metres from the Florence Street boundary, and would not be visually prominent as viewed from the street.

With respect to the proposed development adjoining a heritage property at No. 14 Florence Street, recommended Condition 10 requires the preparation of a construction management plan. This condition has been imposed consistent with the City's Policy No. 7.5.23 – Construction Management Plans, as the proposal is for the construction of a multiple storey development with buildings on the boundary and located

adjoining a heritage listed property. The construction management plan will include the need to prepare dilapidation reports for surrounding properties, including the heritage building at No. 14 Florence Street.





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**CALCULATIONS**

RESIDENCE 1	
GROUND FLOOR	82.40m <sup>2</sup>
GARAGE + STORE	45.15m <sup>2</sup>
FIRST FLOOR	127.80m <sup>2</sup>
TERRACE	16.75m <sup>2</sup>
LOFT	72.15m <sup>2</sup>
TOTAL UNIT AREA	344.25m <sup>2</sup>

RESIDENCE 2	
GROUND FLOOR	87.05m <sup>2</sup>
GARAGE + STORE	31.15m <sup>2</sup>
FIRST FLOOR	122.20m <sup>2</sup>
TERRACE	16.75m <sup>2</sup>
LOFT	64.00m <sup>2</sup>
TOTAL UNIT AREA	321.15m <sup>2</sup>

RESIDENCE 3	
GROUND FLOOR	87.05m <sup>2</sup>
GARAGE + STORE	31.15m <sup>2</sup>
FIRST FLOOR	122.20m <sup>2</sup>
TERRACE	16.75m <sup>2</sup>
LOFT	64.00m <sup>2</sup>
TOTAL UNIT AREA	321.15m <sup>2</sup>

RESIDENCE 4	
GROUND FLOOR	87.05m <sup>2</sup>
GARAGE + STORE	42.20m <sup>2</sup>
FIRST FLOOR	118.20m <sup>2</sup>
TERRACE	22.40m <sup>2</sup>
LOFT	62.75m <sup>2</sup>
TOTAL UNIT AREA	332.60m <sup>2</sup>

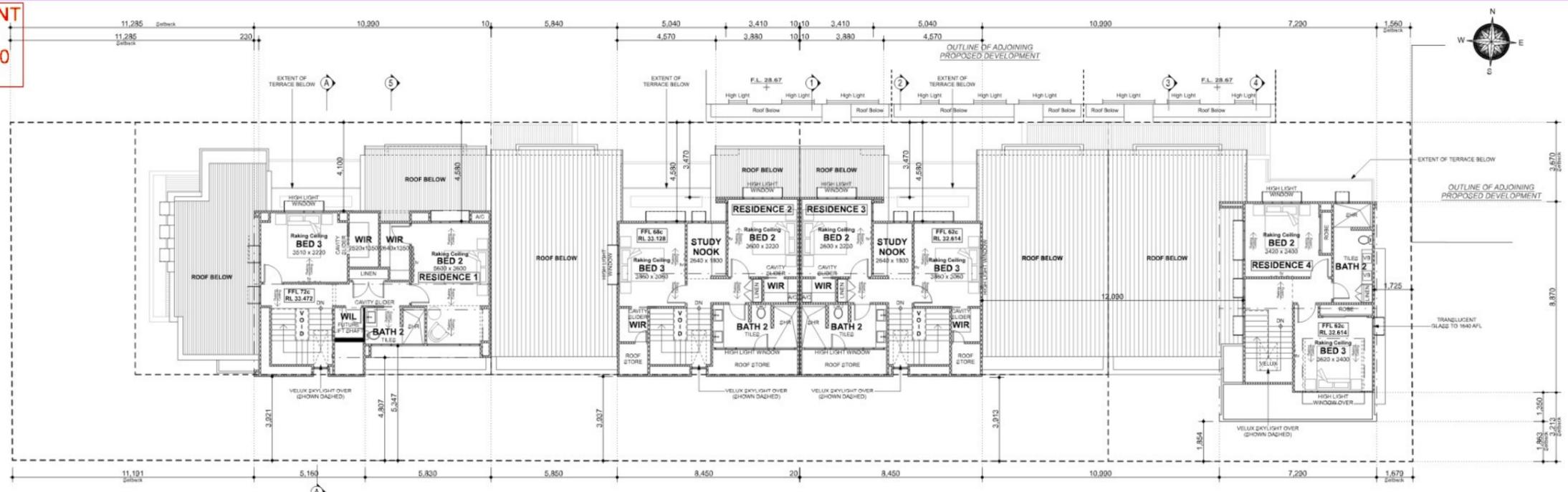
SITE AREA	1828m <sup>2</sup>
SITE COVER	478m <sup>2</sup> (26%)
OPEN SPACE	342m <sup>2</sup> (19%)



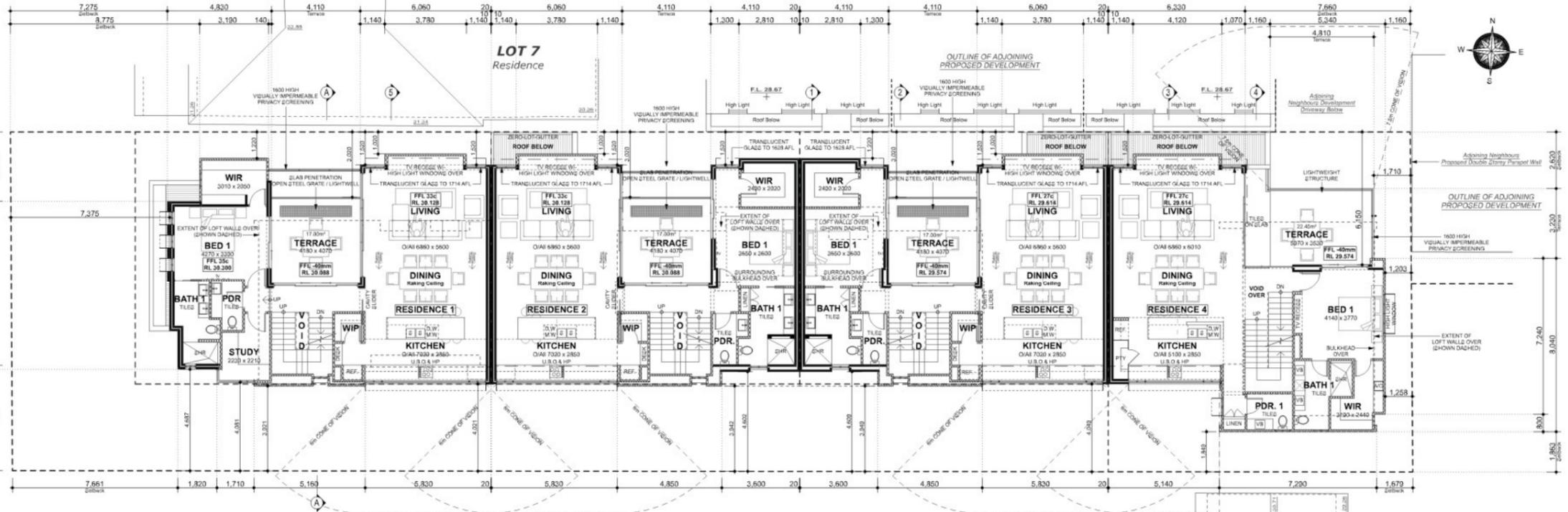
PROJECT	Proposed Group Dwellings	DRAWN	D.L.	REVISION	
CLIENT	XScope Pty Ltd (van Dommelen)	DATE	JUNE 2020	27 - 10 - 2020	18 - 09 - 2020
ADDRESS	Lot 6 (# 12) Florence Street West Perth	SCALE	1 : 100	© Copyright	
JOB NO.	110-18 (A1)	SHEET	1 OF 6		
BDAWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 08 9497 2021 A/B: 3403 022 F/0 P.O. BOX 1032 APPIN C/O: 2026 W.A. 6003	WWW.DANELLOMMADESIGN.COM			



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LOFT FLOOR PLANS  
SCALE 1:100

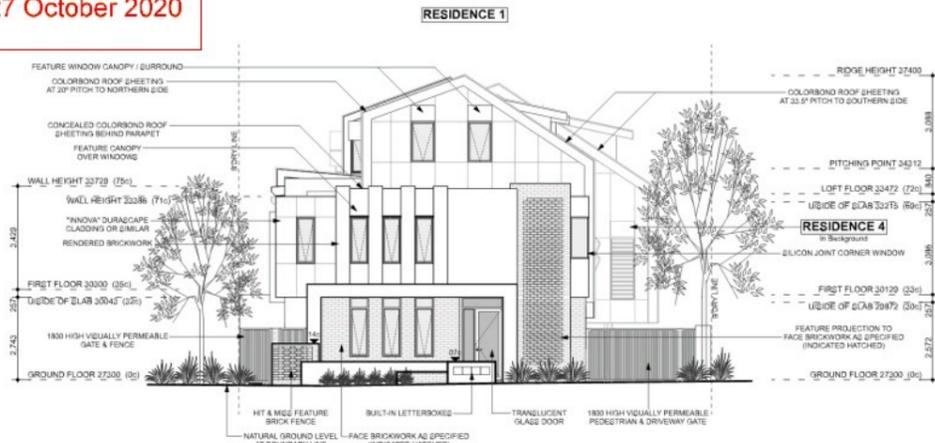


FIRST FLOOR PLANS  
SCALE 1:100

PROJECT	Proposed Group Dwellings	DRAWN	D.L.	REVISION	
CLIENT	XScope Pty Ltd (van Dommelen)	DATE	JUNE 2020	27 - 10 - 2020	
ADDRESS	Lot 6 (# 12) Florence Street West Perth	SCALE	1 : 100	18 - 09 - 2020	
JOB NO.	110-18 (A1)			© Copyright	
				SHEET 2 OF 6	



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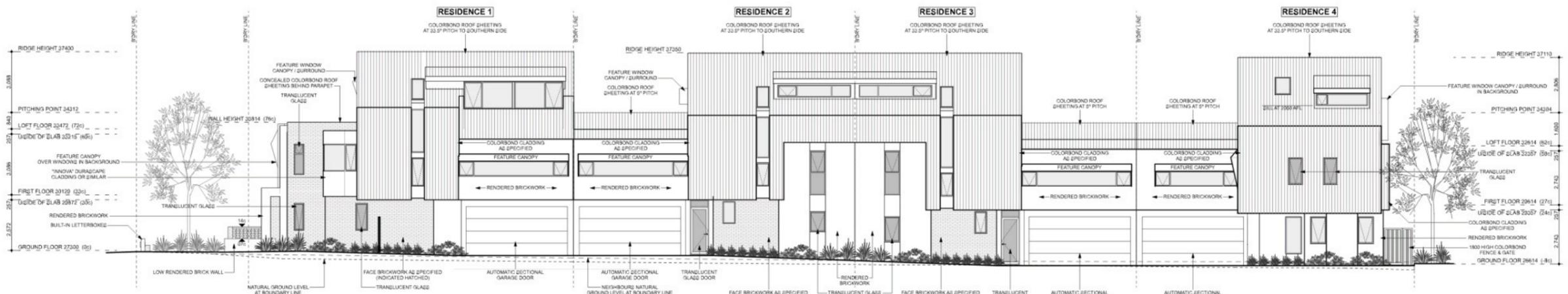


FLORENCE STREET  
WEST ELEVATION  
SCALE 1:100  
NOTE: Landscaping indicative only

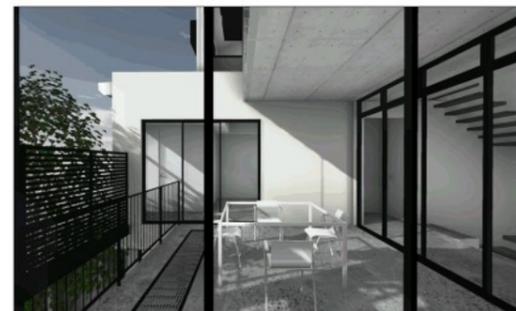


EAST ELEVATION  
SCALE 1:100  
NOTE: Landscaping indicative only

EXTERNAL FINISHES & COLOUR SCHEDULE	
EXTERNAL WALLS (INDICATED NOT HATCHED)	RENDERED BRICKWORK "DULUX LEXICON WHITE"
FEATURE WALLS (INDICATED HATCHED)	FACE BRICK "AUSTRAL BRICKS MOSCATO"
BRICK FENCE	RENDERED BRICKWORK "DULUX LEXICON"
CLADDING ROOF	FACE BRICK "AUSTRAL BRICKS MOSCATO"
GLASSING	COLORBOND STEEL LONGLINE 305 "SHALE GREY"
ROOF	COLORBOND STEEL LONGLINE 305 "SHALE GREY"
GUTTERS	COLORBOND STEEL SHEETING IN "SHALE GREY"
EAVES LINING AND SOFFIT	COLORBOND STEEL SHEETING IN "SHALE GREY"
BARGE BOARDS	DULUX LEXICON WHITE
STEEL COLUMNS	COLORBOND STEEL IN "SHALE GREY"
WINDOW FRAMES	PAINTED GALVANISED STEEL IN "MONUMENT"
DRIVEWAY & CROSSOVER	PONDERCOATED ALUMINIUM FRAME (ANODIC DARK GREY)
COURTYARDS	BRICKMAKERS GRANITE COLLECTION (SEA MIST)
	EXPOSED GREY CONCRETE SLAB



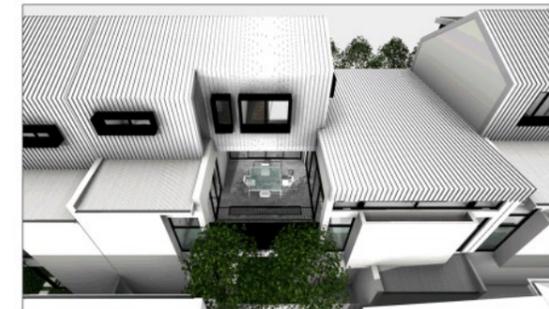
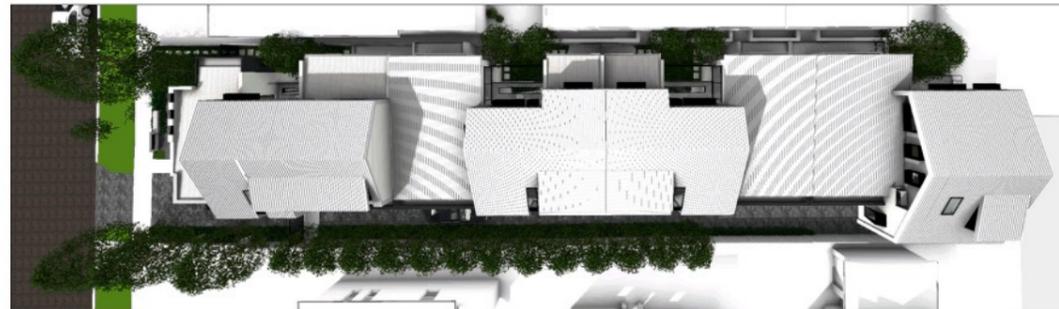
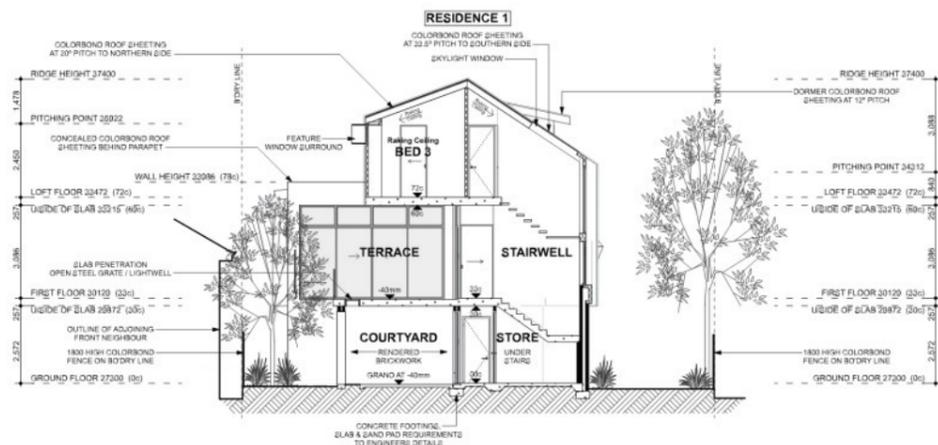
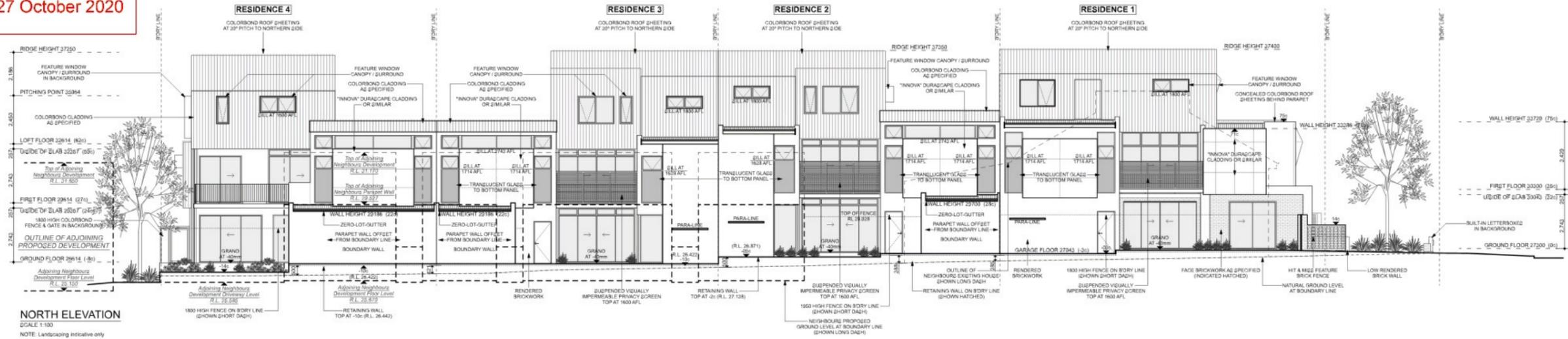
SOUTH ELEVATION  
SCALE 1:100  
NOTE: Landscaping indicative only



PROJECT	Proposed Group Dwellings	DRAWN	D.L.	REVISION	
CLIENT	XScope Pty Ltd (van Dommelen)	DATE	JUNE 2020	27 - 10 - 2020	18 - 09 - 2020
ADDRESS	Lot 6 (# 12) Florence Street West Perth	SCALE	1 : 100	© Copyright	
JOB NO.	110-18 (A1)				
	RD/AVA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 94 947 8221 MOB: 9423 822 719 P.O. BOX 1532 APRIL CREEK WA 6003	WWW.DANIELLOMMADESIGN.COM		



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27 October 2020**



PROJECT Proposed Group Dwellings	DRAWN D.L.	REVISION 27 - 10 - 2020
CLIENT XScope Pty Ltd (van Dommelen)	DATE JUNE 2020	18 - 09 - 2020
ADDRESS Lot 6 (# 12) Florence Street West Perth	SCALE 1 : 100	© Copyright
JOB NO. 110-18 (A1)	SHEET 4 OF 6	
BOAWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 94 947 3321 MOB: 9433 3322 P.O. BOX 1532 APRIL CROSSLAND W.A. 6003	WWW.DANIELLOMMADESIGN.COM



# LANDSCAPE CONCEPT PLAN

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**LEGEND**

- 1 Existing tree and grass verge to be retained and reinstate where necessary.
- 2 Small size tree with combination of native shrubs and groundcovers giving sense of welcoming to the main entrance.
- 3 Well trimmed hedges and tree planting along the driveway creating visual interest to the driveway.
- 4 Narrow and upright form tree such as *Pyrus calleryana* along the driveway ramp providing formal look as well as a buffer to adjacent property.
- 5 Lower courtyard to be filled with shade tolerant plants such as *Philodendron* and *Rhapis excelsa* to create unique feature to dwelling entry area.
- 6 Design intent to create a lush and colorful garden with mix of native and exotic species.
- 7 Tree planting in 1.2-1.5m high removable soakwell concrete case to be proposed as above ground planter providing more tree canopy cover at the rear property.

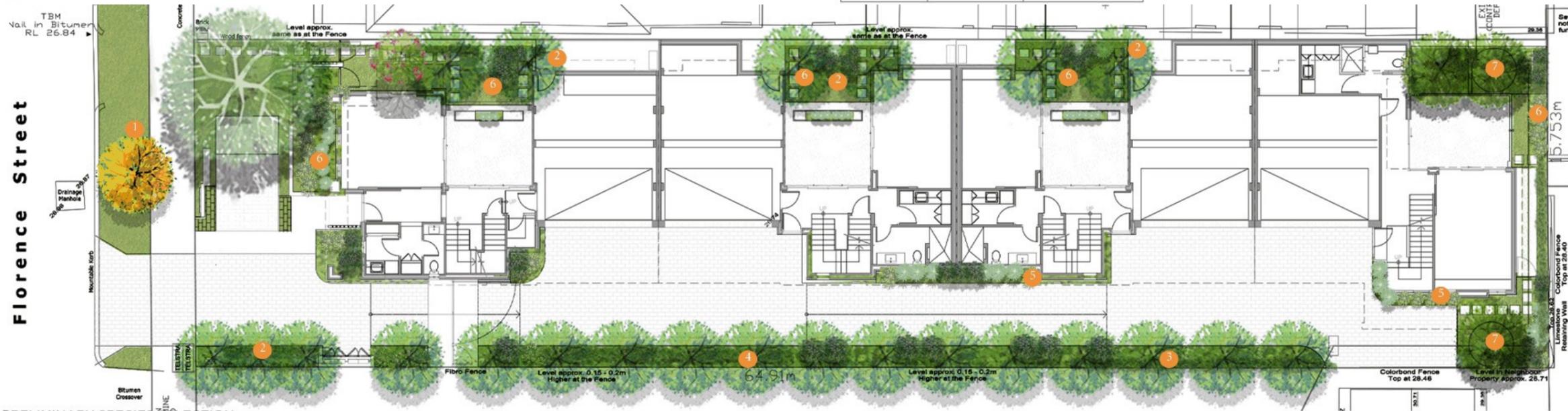


**SPP7.3 COMPLIANCE CRITERIA**

SITE AREA SPP7.3	MIN. DSA SPP 7.3	MIN. TREES SPP7.3
Less than 700m <sup>2</sup>		1 medium tree plus small trees to suit area
700-1000m <sup>2</sup>		2 medium trees OR 1 large tree and small trees to suit area
Greater than 1000m <sup>2</sup>	10% OR 7% trees retained (% site area)	1 large tree and 1 medium tree for each additional 400m <sup>2</sup> in excess of 1000m <sup>2</sup> OR 1 large tree for each additional 900m <sup>2</sup> in excess of 1000m <sup>2</sup> and small trees to suit area

**LANDSCAPE DESIGN INTENT**

- All planting beds are to be fully irrigated and operated off a timed controller with rain sensor shut-off.
- Irrigation design to comply with waterwise design principles and the City's Street Verge Guidelines. Detailed irrigation plan to be provided at building license stage.
- Water efficient irrigation system to be installed to best WSUD practice, using hydro-zoning and water harvesting principals where appropriate.
- Additional waterwise design principles employed:
  - > Low water use plant selection suited to the local soil complex.
  - > Complete omission of water intensive turf areas.
  - > Water retention soil preparation.
  - > Reduction in soil water loss through prescribing course mulch.
- Proposed plant distribution rate 4 per m<sup>2</sup>.
- Proposed plant pot sizes:
  - > Small Tree 100L
  - > Medium 200L
  - > Large Tree 500L
  - > Shrubs/groundcovers 140mm-200mm



**PRELIMINARY SPECIES SELECTION**

**TREES**



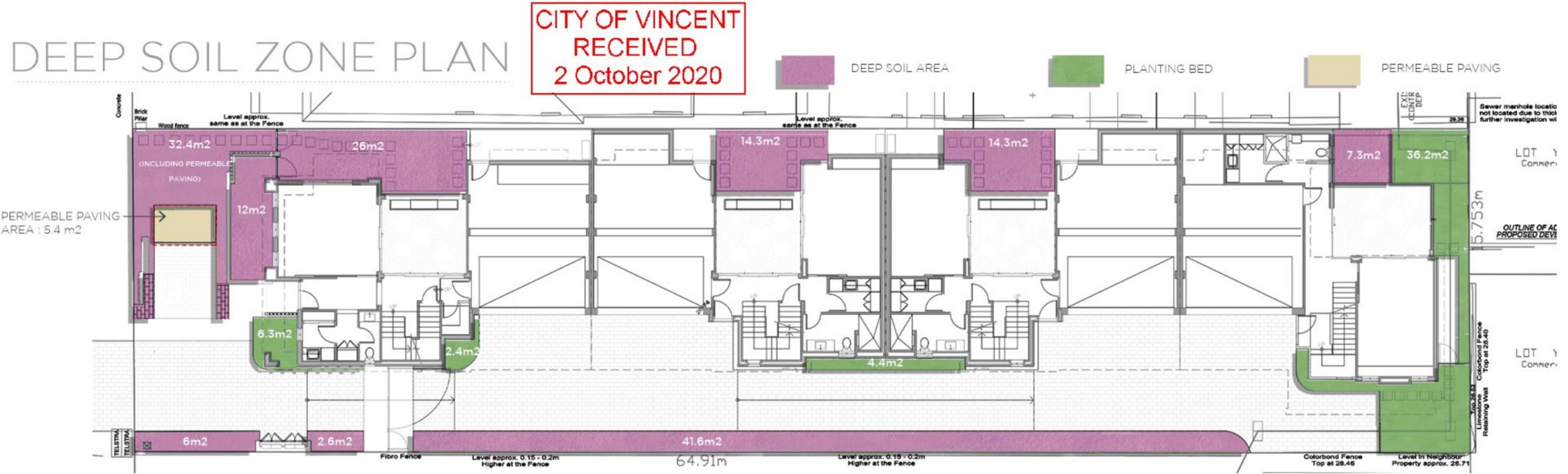
**SHRUBS / GROUNDCOVERS**



AUTHOR: JR      Q.A: RB      PROJECT #: 11578-FLO      1:200 @ A3

LOT 6 FLORENCE STREET - WEST  
LANDSCAPE CONCEPT

SK01-C



**LANDSCAPE AREA SUMMARIES**

TOTAL SITE AREA	: 1020 m <sup>2</sup>
DEEP SOIL AREA REQUIREMENT	: 153 m <sup>2</sup> (15 % FROM TOTAL SITE AREA)
SITE DEEP SOIL AREA	: 156.5 m <sup>2</sup> (15.3%)
SITE CANOPY COVERAGE	: 305 m <sup>2</sup> (30%)



**PROPOSED TREE 1 - LARGE**  
 GLEDITSIA TRICHANTOS  
 MATURE CANOPY COVER :  
 15 Dia.  
 MATURE HEIGHT : 8m - 12m



**PROPOSED TREE 2 - SMALL**  
 PYRUS CALLERYANA  
 MATURE CANOPY COVER :  
 5 Dia.  
 MATURE HEIGHT : 7m - 10m

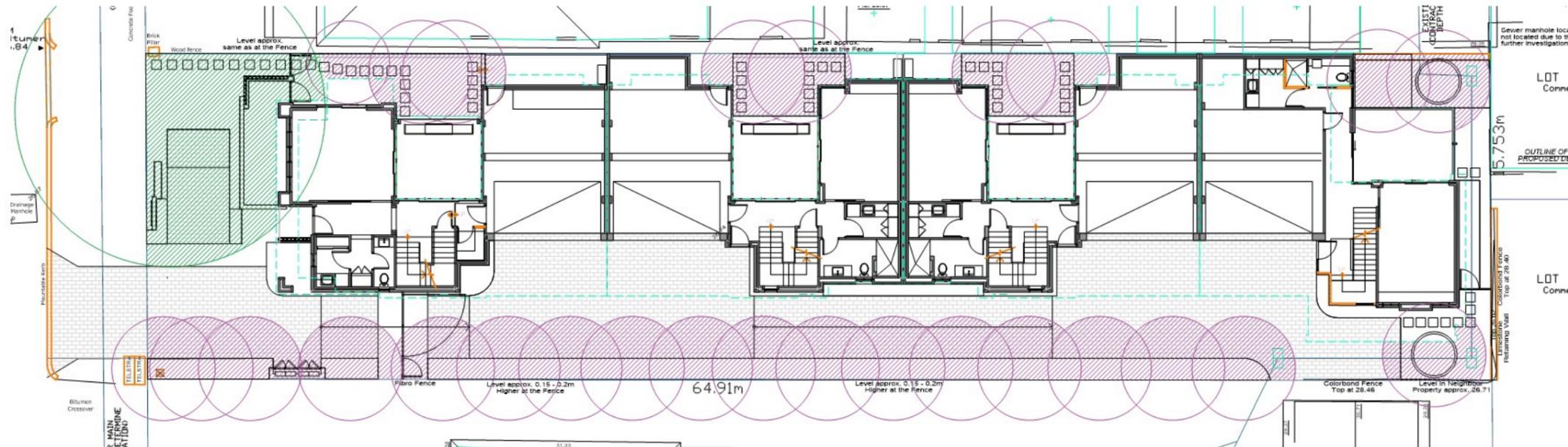


**PROPOSED TREE 3 - MEDIUM**  
 SAPIUM SEBIFERUM/  
 PLUMERIA RUBRA  
 MATURE CANOPY COVER :  
 5-6 Dia.  
 MATURE HEIGHT : 3m - 9m



**PROPOSED TREE 4 - SMALL**  
 LAGERSTROEMIA INDICA  
 MATURE CANOPY COVER :  
 4 Dia.  
 MATURE HEIGHT : 3m - 6m

# TREE CANOPY COVER PLAN



AUTHOR: JR    Q.A: RB

PROJECT #: 11578-FLO

1:200 @ A3

LOT 6 FLORENCE STREET - WEST PERTH  
 LANDSCAPE CONCEPT

SK02-C



**APPLICATION FOR PLANNING APPROVAL**

**LOT 6 (12) FLORENCE STREET, WEST PERTH**  
**SUPPLEMENTARY URBAN DESIGN ANALYSIS**

**XSCOPE PTY LTD**  
**TOWN OF VINCENT**  
13 October 2020

**fpdc**  
Ferraro planning and development consultancy

Office: Unit 217/096 Scarborough Beach Road Osborne Park WA 6017 – Mail: PO Box 1563 Melville South WA 6156 – Nkagem Pty Ltd as Trustee for The Ferraro Family Trust ABN 62 090 106 272

REVIEW OF THE BUILT AND NATURAL ENVIRONMENT

Florence Street is located only 2km north west of the centre of the Perth CBD. The area was developed early in the colonisation of the State and is evidenced through a wide range of character homes that remain in the area, ranging from modest 19<sup>th</sup> and 20<sup>th</sup> century weatherboard homes, federation bungalows through to new contemporary dwellings.

The area has been the subject of extensive rebuilding over the years and now accommodates a wide range of housing types from large free standing homes through to large multiple housing complexes.

There is no apparent consistent building style or material use evident throughout the suburb, with buildings largely reflecting the trends of the era in which they were built.

While metal roofs can be found on the older dwellings, clays tiles are now prevalent throughout.

The natural environment is largely confined to historical open space areas, such as Hyde Park and Smiths Lake, while active playing areas make up the balance of the green space.

The medium density grouped housing development proposed for 12 Florence Street is consistent with the more recent form and type of development that has been approved and developed in the area. The presentation of major openings to the public realm, together with interesting and varied architectural features add interest and creates a visual separation from the character buildings that remain in the area. The use of light colours and metal roofing aims to complement the original dwellings and create an interesting and harmonic streetscape.



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## URBAN DESIGN ANALYSIS

Lot 6 (12) FLORENCE STREET, WEST PERTH



EXISTING STREET VIEW - 10 - 14 FLORENCE STREET



PROPOSED STREET VIEW - 10 - 14 FLORENCE STREET



### 12 FLORENCE ST WEST PERTH - SUPPLEMENTARY NEIGHBOURING DWELLING HEIGHT STUDY

**APPROVED DEVELOPMENT APPLICATION ON 14 FLORENCE ST AND DIRECTLY TO REAR - 2 STOREY CONSTRUCTION AND ZERO SETBACK RETAINING APPROVED**

**VIEW OF 3 AND 4 STOREY APARTMENTS**

**REAR ASPECT OF 12 FLORENCE ST SHOWN**

**Permitted 7m Wall Height (Shown Short Dash) 33.410**

**REAR ELEVATION**

**EXAMPLES OF EXISTING FLORENCE ST ELEVATIONS**

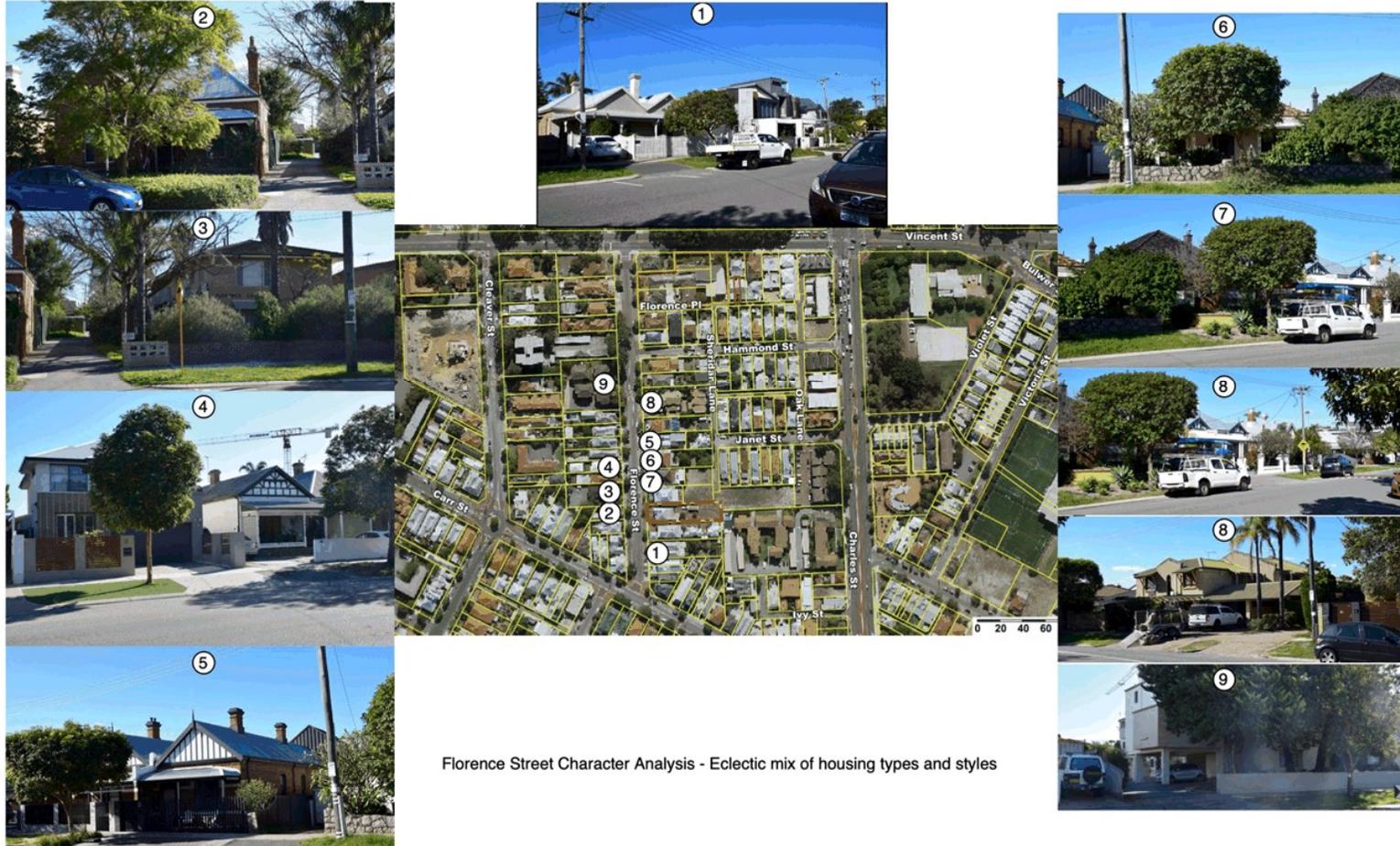
**12 FLORENCE ST / LOT 6**

<p>PROJECT: Proposed Group Dwellings</p> <p>CLIENT: XScope Pty Ltd (van Dommelen)</p> <p>ADDRESS: Lot 6 (# 12) Florence Street West Perth</p> <p>SDWA Building Designers Association of Western Australia</p>	<p>DATE: JUNE 2020</p> <p>SCALE: 1 : 100</p> <p>JOB NO: 110-18 (A1)</p> <p>DANIEL LOWMA DESIGN T: 08 9467 0331 M: 08 0428 932 710 PO BOX 1102 APPLECROSS W.A. 6053</p>	<p>DATE: 27 - 10 - 2020 18 - 09 - 2020</p> <p>© Copyright</p> <p>SHEET 4B OF 6</p>
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# URBAN DESIGN ANALYSIS

Lot 6 (12) FLORENCE STREET, WEST PERTH



Florence Street Character Analysis - Eclectic mix of housing types and styles

## URBAN DESIGN ANALYSIS

Lot 6 (12) FLORENCE STREET, WEST PERTH



FLORENCE STREET, NORTH



4 FLORENCE STREET



7 CARR STREET



### DESIGN INFLUENCES

Florence Street and its surrounds are characterised by a range of housing types, styles and ages. The streetscape provides evidence of intergenerations changes in housing styles ranging from Federation bungalows through to contemporary dwellings.

The use of solid masonry on ground floor levels is a consistent theme throughout the area regardless of the age of the building.

The front facades of many new dwellings include a variety of geometric shapes and features which provides a clear distinction between the housing styles of the heritage buildings, while reflecting the aspirations of the new residents to the area. The design features proposed for Lot 6, have been drawn from many of the design elements that have been applied in the area. The design includes bold geometric shapes, partly concealed roofing and the use of distinct masonry features, reflect elements that are now common in the area.

CLEAVER STREET - NEW BUILD



CARR STREET, SOUTH



CLEAVER STREET, NEW AGED CAR UNDER CONSTRUCTION



CLEAVER STREET

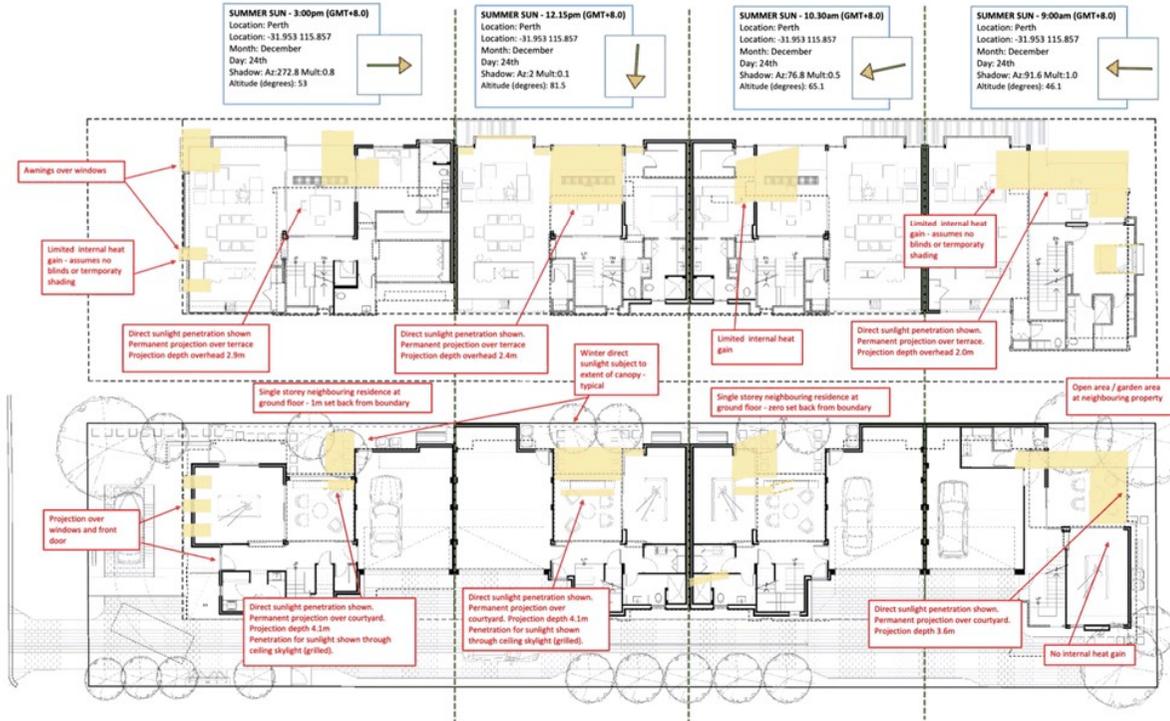
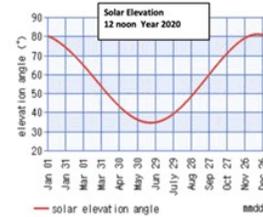


WEST LEEDERVILLE

SUNLIGHT PENETRATION ANALYSIS -SUMMER

**PASSIVE SOLAR DESIGN STUDY**  
**SUMMER - 24th December**  
**NORTH ORIENTATED TERRACE**  
**UNWANTED NORTHERN SUMMER SUN**

Position:  
 -31.95285360,115.85733890



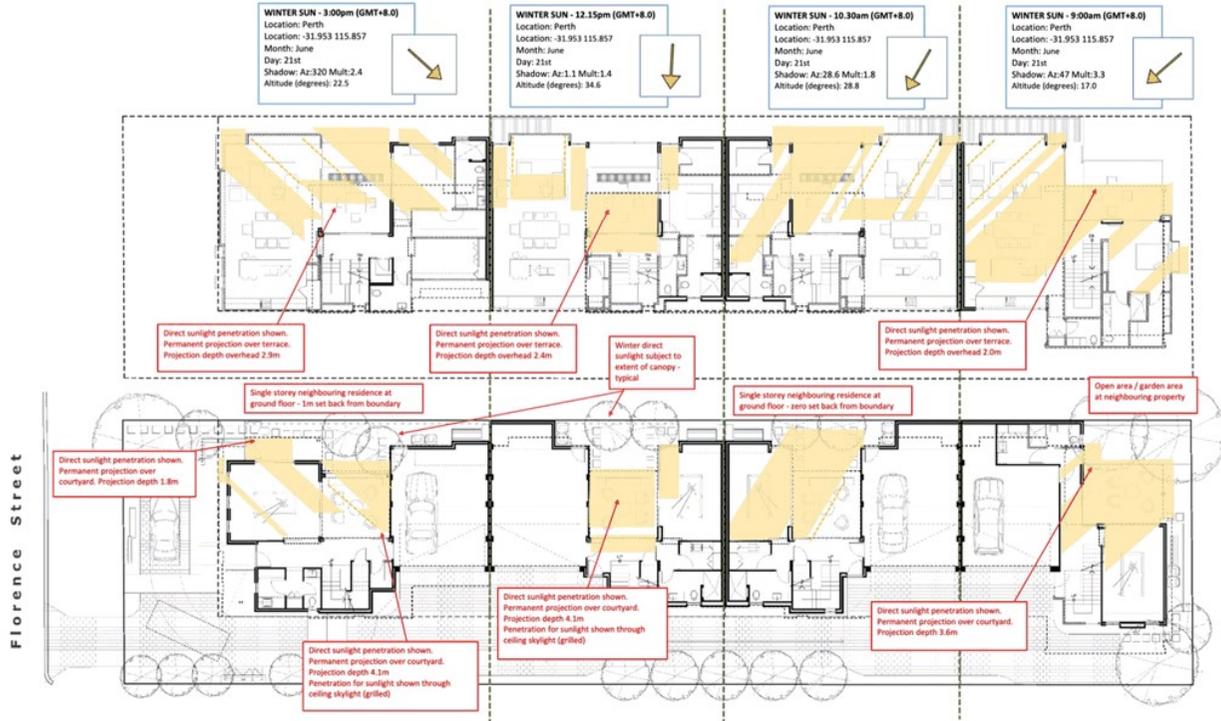
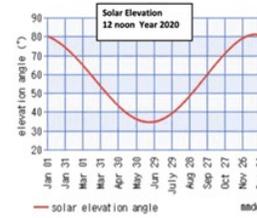
Florence Street

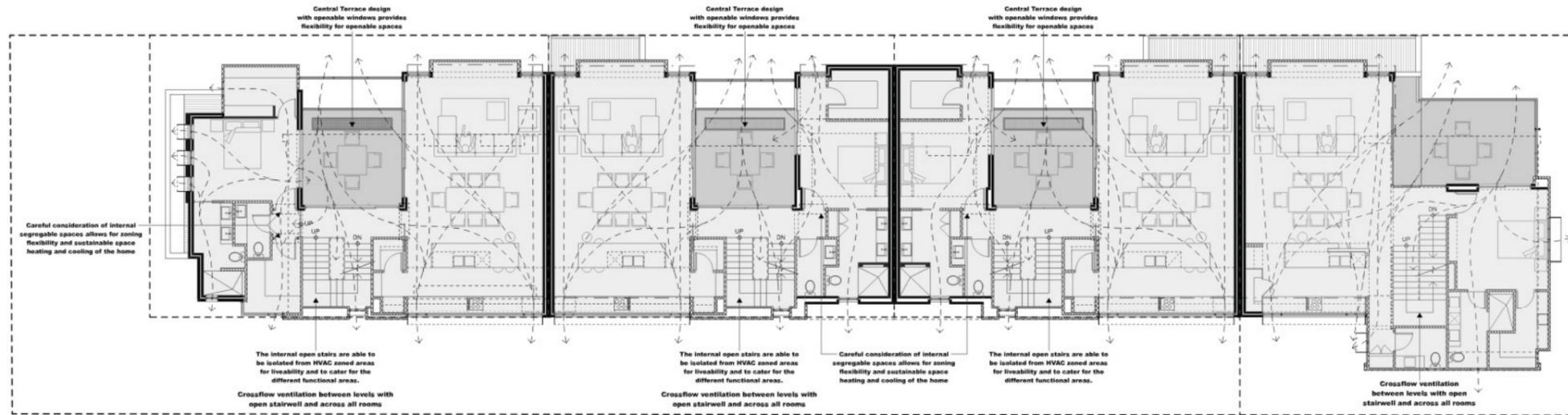


SUNLIGHT PENETRATION ANALYSIS - WINTER

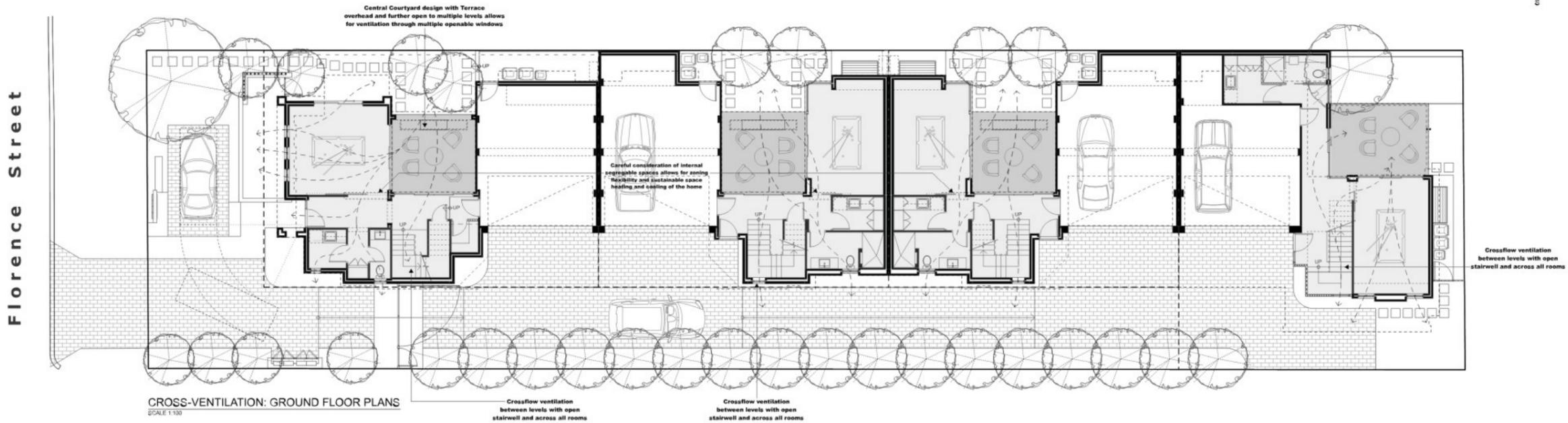
**PASSIVE SOLAR DESIGN STUDY**  
**WINTER - 21st June**  
**NORTH ORIENTATED TERRACE**  
**BENEFICIAL NORTHERN WINTER SUN**

Position:  
 -31.95285360,115.85733890





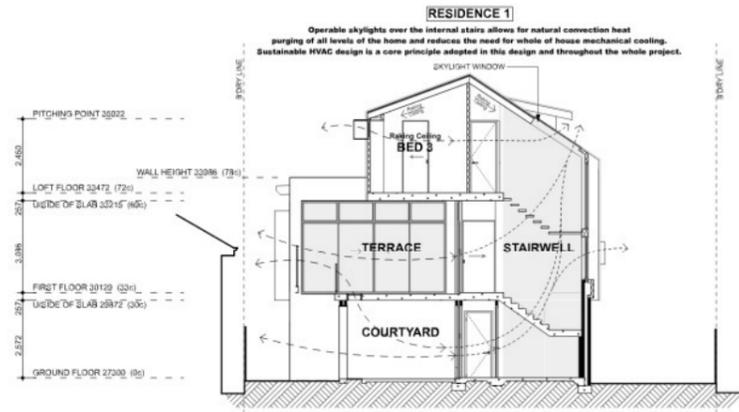
CROSS-VENTILATION: FIRST FLOOR PLANS  
SCALE 1:100



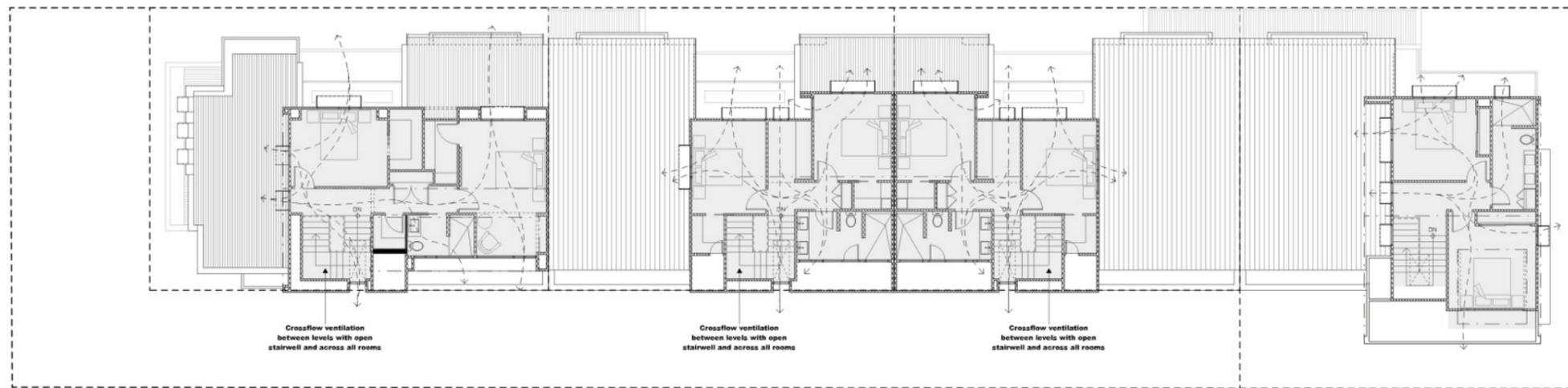
CROSS-VENTILATION: GROUND FLOOR PLANS  
SCALE 1:100

PROJECT Proposed Group Dwellings	DRAWN D.L.	REVISION 27 - 10 - 2020
CLIENT XScope Pty Ltd (van Dommelen)	DATE JUNE 2020	18 - 09 - 2020
ADDRESS Lot 6 (# 12) Florence Street West Perth	SCALE 1 : 100	© Copyright
JOB NO. 110-18 (A1)	SHEET 4A OF 6	
BDAWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 94 947 8221 MOB: 9423 8222 P.O. BOX 1032 APRIL CROSSLAND W.A. 6003	





CROSS-VENTILATION: SECTION  
SCALE 1:100



CROSS-VENTILATION: LOFT FLOOR PLANS  
SCALE 1:100

PROJECT Proposed Group Dwellings	DRAWN D.L.	REVISION
CLIENT XScope Pty Ltd (van Dommelen)	DATE JUNE 2020	27 - 10 - 2020 18 - 09 - 2020
ADDRESS Lot 6 (# 12) Florence Street West Perth	SCALE 1 : 100	© Copyright
	JOB NO. 110-18 (A1)	SHEET 4B OF 6
BDWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 9437 5221 FAX: 9432 2121 P.O. BOX 1532 APPIN CROSS W.A. 6003	WWW.DANIELLOMMADESIGN.COM

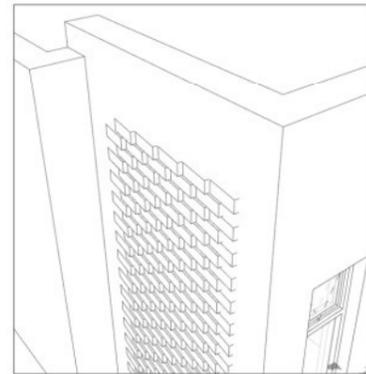




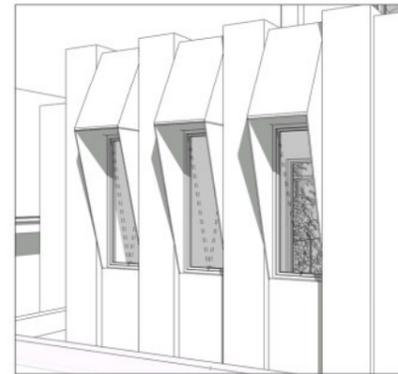
OVERSHADOWING STUDY TO ESTABLISHED DWELLING TO THE SOUTH



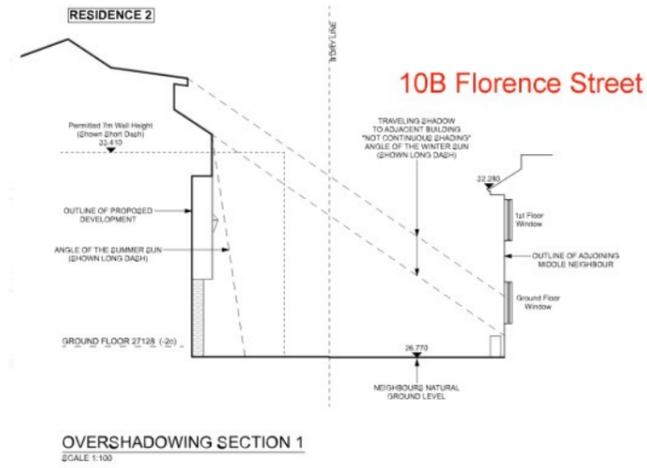
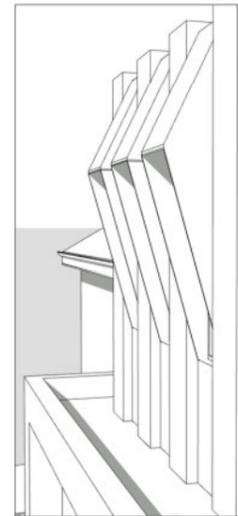
FEATURE BRICK PROJECTIONS



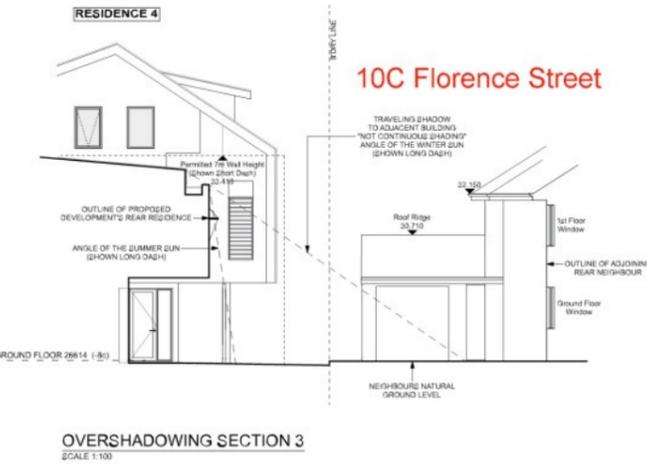
FEATURE BRICK PROJECTIONS



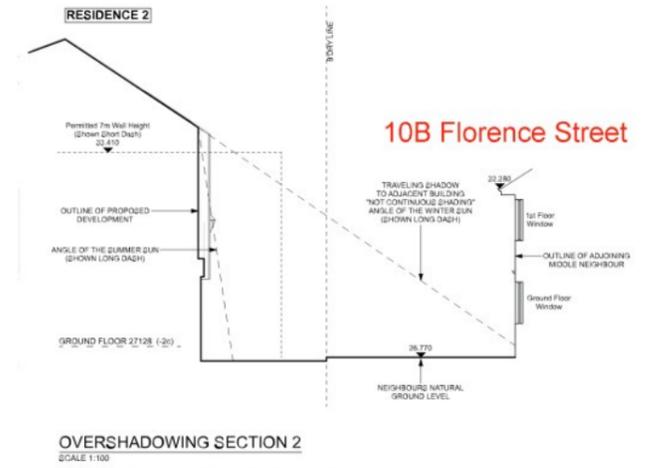
MODERN TAKE ON TRADITIONAL AWNING / WINDOW CANOPY



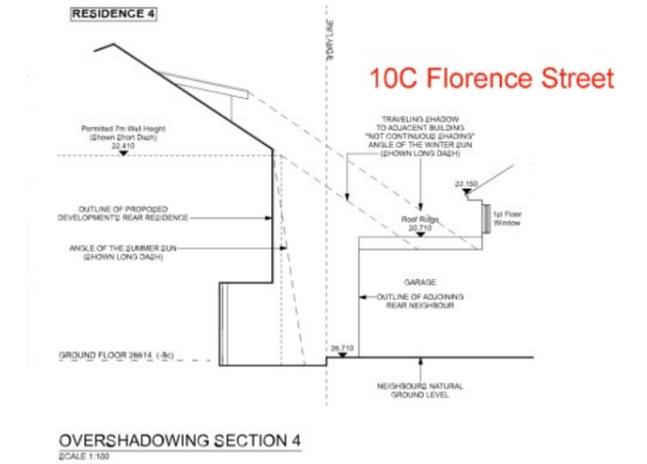
OVERSHADOWING SECTION 1  
SCALE 1:100



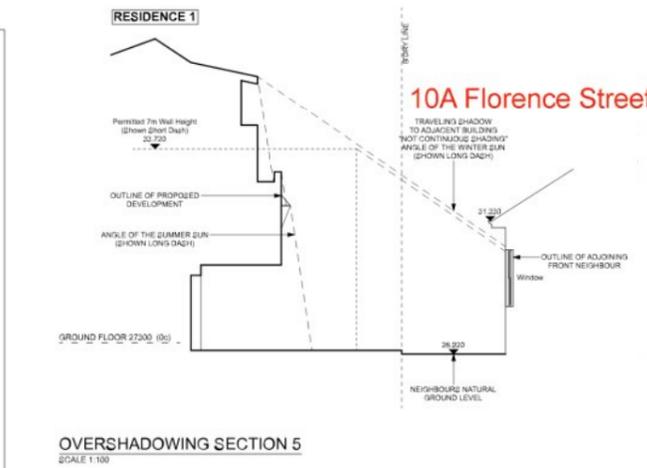
OVERSHADOWING SECTION 3  
SCALE 1:100



OVERSHADOWING SECTION 2  
SCALE 1:100



OVERSHADOWING SECTION 4  
SCALE 1:100



OVERSHADOWING SECTION 5  
SCALE 1:100

PROJECT	Proposed Group Dwellings	DRAWN	D.L.	REVISION
CLIENT	XScope Pty Ltd (van Dommelen)	DATE	OCT. 2020	27 - 10 - 2020 26 - 10 - 2020
ADDRESS	Lot 6 (# 12) Florence Street West Perth	SCALE	1 : 100	© Copyright
		JOB NO.	110-18 (A1)	SHEET OF
		DANIEL LOMMA DESIGN TEL: 94 847 8221 MR 9423 222 710 P.O. BOX 1032 APPA CROSSLANDS W.A. 6003		





Environmentally Sustainable Design Requirements – Template for Single Houses and Grouped Dwellings

**12 Florence St Leederville**

**4 Grouped Housing Development**

**Revised 10 Oct 2020 Including CoV Requirements**

**Revised 28 Oct 2020 Including Environmental Performance Study Agreement**

The City’s Built Form Policy includes Local Housing Objectives related to achieving a development which incorporates Environmentally Sustainable Design (ESD) principles.

These principles seek to achieve new developments which have a reduced environmental impact, improved energy and water efficiency, and reduced reliance on non-renewable energy sources. The development of energy efficient buildings also delivers medium to long-term savings for owners and occupants.

By considering these principles of ESD through the development application process, a more holistic approach can be taken towards incorporating ESD principles into the building design, rather than retrospectively once the building design has been completed.

The Local Housing Objectives in the Built Form Policy are performance-based, which requires consideration as to how each of these have been achieved.

To assist landowners and applicants in preparing a development application, the below table outlines the Local Housing Objectives applicable to Single Houses and Grouped Dwellings, and information on how these can be addressed through principles of ESD.

**For further information and further examples of what you could provide, please refer to the City’s Environmentally Sustainable Design Information Sheet [HERE](#). Alternatively, feel free to contact the City’s Development and Design team on 9273 6000.**

**Please outline how each of the following elements have been addressed and attach any relevant or supporting photos, images, diagrams or drawings where applicable.**

What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective
<b>Environmental Impact</b> <i>Development that considers the whole of life environmental impact of the building and incorporates measures to reduce this impact.</i>	
The environmental impact of developments can be impact by considerations such as building orientation, design and construction materials. Construction	The grouped dwelling footprint extends in an overall east-west orientation to achieve an advantageous north facing aspect for

What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective
<p>materials which are durable and are low maintenance generally have a low environmental impact.</p> <p>Some examples of building materials and design choices with reduced environmental impacts include:</p> <ul style="list-style-type: none"> <li>• Incorporating an east-west orientation (where possible);</li> <li>• Minimising the extent of the building footprint;</li> <li>• Incorporating good solar-passive design;</li> <li>• Reverse brick veneer (internal thermal mass, external insulation);</li> <li>• Low emission concrete;</li> <li>• Lightweight, recycled, non-toxic, minimally processed and recyclable materials;</li> <li>• Gabion walls filled with demolition waste;</li> <li>• High quality (durable), energy and water saving fixtures and fittings (such as reversible ceiling fans, water efficient taps and toilets); and</li> <li>• Installation of appropriate and effective insulation.</li> </ul>	<p>courtyards and terrace windows. The built form has been designed within the R50 requirements and seeks a balance between access to external space, landscaping and internal liveability whilst maintaining the deep soil and permeability requirements.</p> <p>The building materials include a mixture of rendered brickwork, face brickwork, cladding (Innova Durascape, Axon cladding or similar) and Colorbond cladding as required. Demolition of an existing brick house allows for salvage of reclaimed red face bricks to be used in select feature panels and internal walls.</p> <p>The first level and under roof loft space is designed to utilise timber framed walls and lightweight building materials where possible. The use of external Colorbond cladding that accentuates the roof shape and further used to define the articulated building elements on the south face provides further opportunity to maintain a lightweight structure.</p> <p>LED lighting, ceiling fans in all living and bedrooms areas, energy efficient appliances and rainwater tanks for garden use will achieved a high quality and energy sensitive project.</p>
<p><b>Thermal Performance</b>  <i>Development that optimises thermal performance of the building throughout the year through design elements and material selection.</i></p>	
<p>Thermal performance relates to the efficiency of buildings and materials to retain or transmit heat. In summer, a development with poor thermal performance will often absorb and retain more heat, resulting in the inside of the building feeling hotter.</p> <p>Design elements which can assist with achieving a high level of thermal performance relate to solar-passive design and includes the orientation and layout of the building, the placement of thermal mass, and the use of insulation.</p> <p>Material selection which can assist with achieving a high level of thermal performance can include those which have thermal mass (such as concrete, brick, tile, rammed earth) and insulation properties (such lightweight</p>	<p>12 Florence St has sought to maximise the north facing aspect for the first floor terraces and the ground floor courtyards to promote passive solar design elements. The internal courtyard layout has been used to introduce direct sunlight in winter and to provide protection from direct sunlight in summer through the use of building projections over the majority of the terrace glazed elements.</p> <p>The direct winter sunlight on the concrete internal floors, as well as the first floor terrace slab that runs through to the internal spaces will further provide passive thermal performance in winter through the use of retained daytime heat and built up thermal inertia to reduce the heating requirements in winter. These floor slabs are substantially protected from direct sunlight and are shaded during the summer months.</p>

What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective
<p>cladding, wood, recycled plastic composite, range of insulation materials, strategic use of air gaps).</p>	<p>Cavity insulation (Aircell) is employed where double brick walls are nominated, with rockwool or batts and vapour seals used for light weight walls. Roofs are installed with both Anticon under the Colorbond metal roof and R4 insulation batts installed above the internal ceilings under each of the roofs.</p> <p>Operable skylights mounted over the stair wells in each of the dwellings, with skylights provided with both rain sensors and sun blinds, allows for evening purging of summer heat as well as ventilation of each floor via the central open stairs.</p> <p>The living space and functional spaces can be isolated to limit the volume that requires space heating or cooling and provide the occupant operating flexibility of the reverse cycle air-conditioning provided by ducted and zone-controlled home air conditioning systems. The floor layout seeks to recognise that both passive and active solar and HVAC design should have configurable controls and work together to reduce the need for whole of house space heating /cooling when only some areas are in use.</p> <p>Review of the winter and summer solar angles are provided in document Urban Design Supplementary Analysis 20200724.</p>
<p><b>Solar Passive Design</b>  <i>Development shall incorporate site planning principles that maximise solar passive design opportunities for both summer and winter</i></p>	
<ul style="list-style-type: none"> <li>• Where the long axis of building runs east-west, the majority of glazing being provided to the north, with limited glazing provided to the east and west; and/or</li> <li>• The inclusion of a central light well or courtyard can help to maximise access to northern light.</li> </ul>	<p>The solar passive design has been addressed under the Thermal Performance section above.</p> <p>Central light wells and courtyards have been fundamental to the design of the dwellings, and this detail has previously been presented to the DRP as being the preferred solution for this project. The design allows for wrap around glazing where blinds or curtains are not required to be employed year-round to achieve internal comfort or privacy, and achieves viewing angles across the house at each floor.</p> <p>Windows facing east and west are screened with window surrounds or structural elements that project over the windows.</p>

What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective
	<p>Units 1 through to 3 also include a grilled penetration in the terrace concrete floor to throw additional direct and indirect natural light into the ground floor courtyard. The floor penetrations on the northern edge of the first floor terraces have been located so that it not directly shaded during summer and winter. Furthermore, the angle of solar elevation will allow winter sun to reach further into the ground floor courtyard during winter noon hours and prevent direct summer solar light during summer noon hours.</p> <p>A grilled penetration in the unit 4 terrace has not been required to introduce additional natural light at the ground floor level due to the set back of the building at the rear/east end of this development.</p>
<p><b>Sunlight and Ventilation</b>  <i>The provision of natural ventilation and daylight penetration to reduce energy consumption</i></p>	
<ul style="list-style-type: none"> <li>• Rooms provided with ventilation openings on both sides to allow cross-flow of air;</li> <li>• Maximum glazing provided to north-facing living areas;</li> <li>• Bedrooms being located on the south; and/or</li> <li>• Utility rooms and garages being located on east and west sides of a dwelling.</li> </ul>	<p>The cross flow or air has been detailed for each room in the provided document titled Urban Design Supplementary Analysis 20200724.</p> <p>The north facing glazing has been addressed in the Thermal Performance and Solar Passive Design discussion points provided above.</p> <p>Glazing that faces directly east or west has been reduced and internal lightwell / courtyard glazing has been maximised.</p>
<p><b>Solar Heating</b>  <i>The provision of daytime areas with north-facing glazing to allow passive solar heating during winter</i></p>	
<ul style="list-style-type: none"> <li>• Up to 80% of the glazing provided to north facing living areas being unshaded in winter, and fully shaded by external structures in summer.</li> </ul>	<p>Please refer to the provided document Urban Design Supplementary Analysis 20200724 which identifies the consideration given to solar elevations for different times of year. The projections over north facing and courtyard facing glazing achieves significant summer shading.</p>
<p><b>Cross Ventilation</b>  <i>The provision of openable windows and/or ceiling fans to habitable rooms or occupied spaces that allow natural and cross ventilation</i></p>	
<ul style="list-style-type: none"> <li>• Windows located on north and south side of the dwelling being openable to utilise cooling breezes in summer; and/or</li> <li>• Reversible ceiling fans facilitate cooling in summer and improve air dispersion for more efficient heating in winter.</li> </ul>	<p>Openable widows are generously provided for to achieve indoor/outdoor access to the courtyard as well as cross flow within each floor and up the central open stairs.</p>

What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective
	Ceiling fans are allowed as addressed under the above Environmental Impact discussion points.
<b>Water Re-use</b> <i>The provision of recovery and re-use of rainwater, storm water, grey water and/or black water for non-potable water applications</i>	
<ul style="list-style-type: none"> <li>• Rainwater captured in tank/s above or below ground and plumbed into toilet and laundry;</li> <li>• Greywater used for garden irrigation, or hand basin draining into toilet cistern for flushing; and/or</li> <li>• Soft landscaping is maximised to increase on-site stormwater infiltration.</li> </ul>	<p>Rainwater tanks are proposed to capture and use for garden water.</p> <p>Greywater systems will require further consideration as the project will already include many energy efficiency design, study and submission components at considerable cost. This consideration will become budget driven.</p> <p>Soft landscaping is as detailed in the landscaping plan provided.</p>
<b>Solar Gain</b> <i>Incorporation of shading devices to reduce unwanted solar gain in summer and increase passive solar gain in winter</i>	
<ul style="list-style-type: none"> <li>• Eaves, pergolas and other external shade structures designed to the correct depth to provide 0% shading in mid-winter and 100% shading in mid-summer.</li> <li>• Such structures may also be movable, (e.g. mobile screens and adjustable pergolas) to allow increased control over light and heat gain.</li> </ul>	<p>These details are discussed in the sections above.</p>
<b>Energy Consumption</b> <i>Integration of renewable energy and energy storage systems to optimise energy consumption.</i>	
<ul style="list-style-type: none"> <li>• Solar photovoltaic system (with or without battery storage) for electricity generation;</li> <li>• Solar or heat pump hot water system; and/or</li> <li>• Smart-wired home to enable automated diversion of excess solar energy to power air conditioners and other appliances and reduce energy use at other times.</li> </ul>	<p>Rooftop PV is able to be installed on the flat roof sections above each living room. Conduit pre-lay and panel roof space is provided such that Solar PV can be either installed during construction or readily fitted after completion. The owners will decide the extent of PV rooftop solar that will be installed to suit their use case, as the solar design will take into consideration lifestyle and daytime use, as well as the integration and need for storage and EV facilities. We see this evolve rapidly over the next few years and will progress the design and integration to suit during the build phase.</p>
<b>Solar Absorptance</b> <i>Flat roof structures that are not visible from the street or adjacent properties shall have a maximum solar absorptance rating of 0.4</i>	

What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective
<p>or  <b><i>Pitched roof</i></b> structures or roof structures that are visible from the street or adjacent properties shall have a maximum solar absorptance rating of 0.5, unless a suitable alternative is identified in the Urban Design Study</p> <p>Solar absorptance rating is a measure of how much solar energy a material absorbs and therefore how hot it gets when exposed to the sun. A rating of zero means no absorption and the material remains cool. A rating of 1 is 100% absorption and the material becomes very hot.</p> <p>As a general rule, light roof colours have lower absorptance values than dark roof colours. Roofing material suppliers can provide the absorptance values of their colour range.</p> <p>Roofs that are visible from the street or adjacent properties are permitted a higher absorptance value because lighter colours (which have lower absorptance values) may be visually less comfortable for some neighbours.</p>	<p>The flat roofs (not forming part of the loft roof elements) are proposed to be Colorbond colour Shale Grey or Surfsmist with Solar Absorptance values of 0.43 and 0.32 respectively. Surfsmist is classified as a light colour under NCC Volume Two 2019 and we would seek to understand if a more reflective roof is accepted by CoV before adopting this option, as other councils have preferred Shale Grey or similar.</p> <p>Loft roofs and pitched roofs were originally proposed to be colorbond Monument as they provide a dramatic design feature. Following DRP input and consultation Basalt was proposed as a lighter material (albeit other similar details in the precinct that rely on Colorbond Monument or black coloured cladding for dramatic shape language).</p> <p>Whilst there are multiple dwellings in the area with dark roofs under construction, we have been advised by CoV that for this and DA submissions going forward that these colours would be rejected.</p> <p><u>The design has now been resubmitted with roof colours and cladding selected as Shale Grey with a Solar Absorptance value of 0.43 to satisfy CoV requirements.</u></p> <p>Selection of Colorbond colours that achieve a Solar Absorptance value of 0.5 or less for roof and wall cladding for the loft pitched roof and wall cladding restrict selection to 6 of the available standard colours.</p>

What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective																																														
	<table border="1"> <thead> <tr> <th data-bbox="1144 231 1379 256">Colour</th> <th data-bbox="1379 231 1615 256">Solar Absorptance</th> </tr> </thead> <tbody> <tr> <td data-bbox="1144 256 1379 298">Surfmist®</td> <td data-bbox="1379 256 1615 298">0.32</td> </tr> <tr> <td data-bbox="1144 298 1379 339">Classic Cream™</td> <td data-bbox="1379 298 1615 339">0.32</td> </tr> <tr> <td data-bbox="1144 339 1379 381">Paperbark®</td> <td data-bbox="1379 339 1615 381">0.42</td> </tr> <tr> <td data-bbox="1144 381 1379 422">Evening Haze®</td> <td data-bbox="1379 381 1615 422">0.43</td> </tr> <tr> <td data-bbox="1144 422 1379 464">Shale Grey™</td> <td data-bbox="1379 422 1615 464">0.43</td> </tr> <tr> <td data-bbox="1144 464 1379 505">Dune®</td> <td data-bbox="1379 464 1615 505">0.47</td> </tr> <tr> <td data-bbox="1144 505 1379 547">Cove™</td> <td data-bbox="1379 505 1615 547">0.54</td> </tr> <tr> <td data-bbox="1144 547 1379 588">Windspray®</td> <td data-bbox="1379 547 1615 588">0.58</td> </tr> <tr> <td data-bbox="1144 588 1379 630">Pale Eucalypt®</td> <td data-bbox="1379 588 1615 630">0.60</td> </tr> <tr> <td data-bbox="1144 630 1379 671">Gully™</td> <td data-bbox="1379 630 1615 671">0.63</td> </tr> <tr> <td data-bbox="1144 671 1379 713">Mangrove®</td> <td data-bbox="1379 671 1615 713">0.64</td> </tr> <tr> <td data-bbox="1144 713 1379 754">Wallaby®</td> <td data-bbox="1379 713 1615 754">0.64</td> </tr> <tr> <td data-bbox="1144 754 1379 796">Jasper®</td> <td data-bbox="1379 754 1615 796">0.68</td> </tr> <tr> <td data-bbox="1144 796 1379 837">Basalt®</td> <td data-bbox="1379 796 1615 837">0.69</td> </tr> <tr> <td data-bbox="1144 837 1379 879">Manor Red®</td> <td data-bbox="1379 837 1615 879">0.69</td> </tr> <tr> <td data-bbox="1144 879 1379 920">Terrain®</td> <td data-bbox="1379 879 1615 920">0.69</td> </tr> <tr> <td data-bbox="1144 920 1379 962">Woodland Grey®</td> <td data-bbox="1379 920 1615 962">0.71</td> </tr> <tr> <td data-bbox="1144 962 1379 1003">Monument®</td> <td data-bbox="1379 962 1615 1003">0.73</td> </tr> <tr> <td data-bbox="1144 1003 1379 1045">Ironstone®</td> <td data-bbox="1379 1003 1615 1045">0.74</td> </tr> <tr> <td data-bbox="1144 1045 1379 1086">Cottage Green®</td> <td data-bbox="1379 1045 1615 1086">0.75</td> </tr> <tr> <td data-bbox="1144 1086 1379 1128">Deep Ocean®</td> <td data-bbox="1379 1086 1615 1128">0.75</td> </tr> <tr> <td data-bbox="1144 1128 1379 1169">Nightsky®</td> <td data-bbox="1379 1128 1615 1169">0.96</td> </tr> </tbody> </table> <p data-bbox="1464 694 1816 946">Allowed colours for wall and roof cladding – understood to be applied to all CoV developments. Council has confirmed that darker roof colours and alternatives can not be proposed for all future developments.</p>	Colour	Solar Absorptance	Surfmist®	0.32	Classic Cream™	0.32	Paperbark®	0.42	Evening Haze®	0.43	Shale Grey™	0.43	Dune®	0.47	Cove™	0.54	Windspray®	0.58	Pale Eucalypt®	0.60	Gully™	0.63	Mangrove®	0.64	Wallaby®	0.64	Jasper®	0.68	Basalt®	0.69	Manor Red®	0.69	Terrain®	0.69	Woodland Grey®	0.71	Monument®	0.73	Ironstone®	0.74	Cottage Green®	0.75	Deep Ocean®	0.75	Nightsky®	0.96
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What Does This Mean and How Can I Achieve This?	Applicant Comment – How I have achieved this objective
<p><b>Environmental Performance</b></p> <p>Demonstrate that the development is capable of achieving the following performance standards when compared against the Perth statistical average for residences:</p> <ul style="list-style-type: none"> <li>• 50% reduction in global warming potential (greenhouse gas emissions); and</li> <li>• 50% reduction in net fresh water use.</li> </ul> <p>The acceptable method for demonstrating this is an independently reviewed EN15978 compliant Target Setting life cycle assessment (LCA) with a 20% factor of safety applied to improvement strategies</p>	
<p>Applications for new Single Houses and Grouped Dwellings should be accompanied by a target setting LCA which measures the environmental performance of the building over its lifetime, to understand how the design contribute towards reduced environmental impacts.</p> <p>You can find an LCA assessor by contacting the <a href="#">Australian Life Cycle Assessment Society</a> (ALCAS) or by doing a general internet search. Please ensure that you or the assessor you engage use methodologies compliant with:</p> <ul style="list-style-type: none"> <li>• Environmental standard <a href="#">EN15978</a> – Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method; and</li> <li>• That the system boundary includes all Life Cycle Modules (A1-2, B1-7, C1-4 and D) in addition to non-integrated energy (plug loads).</li> </ul> <p>As an alternative to the LCA for Single and Grouped Dwellings, the City may accept an 8 star NatHERS rating, in conjunction with the development meeting the other local housing objectives listed above.</p> <p>The City can also consider other environmental sustainable design reports, however it is recommended these be discussed with the City prior to engaging someone, to ensure that the report will be accepted by the City.</p>	<p>Unit 2 Environmental Performance study is under development as a representative study for all 4 units, these being closely aligned in construction methodology, floor area, window set out and energy efficient appliances, HVAC and fixtures.</p>

Please complete all sections of this template and send to [mail@vincent.wa.gov.au](mailto:mail@vincent.wa.gov.au) along with all relevant attachments. Alternatively, you can submit your application in person at our **Administration Centre (244 Vincent Street, Leederville)** or post to **PO Box 82, Leederville, 6902**.



**Life Cycle Assessment**

**12 Florence Street, West Perth, WA 6005**

**City of Vincent**

**Date : 13 November 2020**

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**Email : info@etoolglobal.com**

**Peer Reviewer : Fei Ngeow**

**Version : 1**





### eToolLCD Software Disclaimer

The LCA predictions of embodied and operational impacts (including costs) conducted in eToolLCD software, by their very nature, cannot be exact. It is not possible to track all the impacts associated with a product or service back through history, let alone do this accurately. eToolLCD software has been built and tested to enable informed decisions when comparing design options. Generic cost and environmental impact coefficients do not necessarily correspond to those of individual brands of the same product or service due to differences within industries in the way these products and services are delivered.

eTool PTY LTD cannot make assurances regarding the accuracy of these reports for the above reasons.

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### Executive Summary

This Life Cycle Assessment has been completed for a number of design options for Lot 2 - 12 Florence Street, City of Vincent located at 12 Florence Street, West Perth, WA 6005. The Author of the study is Michelle Jessup of ETool and the critical review has been conducted by Fei Ngeow of eTool PTY LTD.

The goal of this study is to profile and improve the environmental performance of the construction works at 12 Florence Street, West Perth, WA 6005. The life cycle performance of the project is compared to other designs. The study has been conducted in accordance with ISO 14044 and EN15978.

Characterised Impacts Per Occupant Per Year		Benchmark Design	Scenario Design	Scenario Design Savings Against Benchmark Design
<b>Environmental Impacts</b>				
Global Warming Potential, GWP	kg CO2 eq	3.66e+3	1.31e+3	64%
Ozone Depletion Potential, ODP	kg CFC-11 eq	1.69e-4	3.21e-4	90%
Acidification Potential for Soil and Water, AP	kg SO2 eq.	1.01e+1	7.2722	28%
Eutrophication potential, EP	kg PO4-- eq	3.29e+0	2.99e+0	9%
Photochemical Ozone Creation Potential, POCP	kg ethylene	6.57e-1	6.66e-1	-1%
Abiotic Depletion Potential - Elements, ADPE	kg antimony	1.15e-1	1.45e-1	-26%
Abiotic Depletion Potential - Fossil Fuels, ADPF	MJ	4.99e+4	1.67e+4	67%
<b>Resource Use</b>				
Net use of fresh water, FW	m3	9.26e+4	4.66e+4	50%

Table 1: Summary of Results

The Scenario Design shows an expected performance improvement against Business as Usual for 5 of the 8 environmental indicators.

The following low impact strategies are included in the Scenario Design:

Design Strategy Performance	GWP	ODP	AP	EP	POCP	ADPE	ADPF	FW
HVAC: Residential Ceiling Fans Assisted Cooling	0.61%	-0.19%	-0.11%	0.82%	-0.30%	-0.46%	0.54%	0.05%
Replacement: Recycled Bricks	0.26%	0.15%	0.17%	0.11%	0.26%	0.07%	0.18%	0.01%
Finishes: Reduce Floor Coverings (Tile to Polished concrete/Timber)	4.88%	7.76%	6.62%	5.30%	8.33%	26.89%	5.03%	0.40%
Finishes: Reduce Floor Coverings (Carpet to Polished concrete)	0.13%	0.06%	0.14%	0.08%	0.31%	0.11%	0.13%	0.00%
Open Exposed Ceiling (no plasterboard)	2.41%	5.06%	3.59%	2.76%	4.26%	3.10%	3.02%	0.25%
6.6kW PV system with 5kW Inverter Single Phase Connection (Connected)	60.94%	4.22%	36.81%	33.93%	13.67%	24.55%	57.96%	5.23%
Water-wise gardens (minimise lawn/native plants)	0.30%	0.11%	0.23%	0.22%	0.23%	0.10%	0.28%	8.60%
Dripper Irrigation System (in place of sprays)	0.14%	0.05%	0.10%	0.10%	0.10%	0.04%	0.13%	3.87%
2kL Rainwater Tank for Garden Irrigation Water	-0.39%	-0.81%	-0.53%	-0.69%	-0.40%	-0.57%	-0.59%	7.09%
Low Flow Shower Heads (7.5L/min)	0.64%	0.14%	0.26%	0.57%	0.39%	0.17%	0.70%	4.55%
Water efficient fixtures and fittings (Mixers and Toilets only)	0.45%	0.23%	0.37%	0.88%	0.37%	0.28%	0.39%	7.47%
Proposed Design	0%	0%	0%	0%	0%	0%	0%	0%

Table 2: Design Strategies in Scenario Design



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### Scenario Design Performance against Benchmark



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## 1 Introduction

Managing the environmental impacts that arise from the construction and operation of Building is of key importance in mitigating the damage caused directly and indirectly on the biosphere. Life Cycle Assessment (LCA) is the leading industry standard in clearly identifying optimum strategies for reducing environmental impacts. This report presents the results of the LCA completed for the Scenario Design, City of Vincent Project located at 12 Florence Street, West Perth, WA 6005. eToolLCD software has been used to model the infrastructure's environmental impacts.

The study has been conducted in accordance with the following standards:

- International Standards 14040 and 14044.
- European Standard EN 15978: *Sustainability of Construction Works – Assessment of Environmental Performance of Buildings – Calculation Method*

The Author of the study is Michelle Jessup (Lead) of ETool and the critical review has been conducted by Fei Ngeow of eTool PTY LTD.

## 2 Goal of the study

The goal of this study is to provide profile and improve the environmental performance of the construction works at 12 Florence Street, West Perth, WA 6005. The life cycle performance of the project is compared to other designs and as such this is a comparative study. The results of the study are intended to be made public.

## 3 Scope of the study

The LCA study has been conducted in accordance with the EN 15978 standard to assess the direct and indirect potential environmental impacts associated with the construction works at 12 Florence Street, West Perth, WA 6005 as part of the City of Vincent project.

### 3.1 Functional Unit

The function of the Building must reflect the core purpose of the asset such that it can be compared accurately to different designs. In this case the functional focus is the Residential and the chosen functional unit is the provision of this function for one Occupant over one year.

The estimated design life of the design is 55 years which has been adopted for the LCA study period. This takes into consideration the structural service life limit (120 years), as well as redevelopment pressure on the asset such as surrounding density, asset ownership structures, and the architectural design quality.

Note that products with expected service lives of less than the life span of the project are assumed to be replaced at increments reflecting their service life.

### 3.2 System Boundary

The system boundary, shown in Figure 1, follows guidance given in EN15978.



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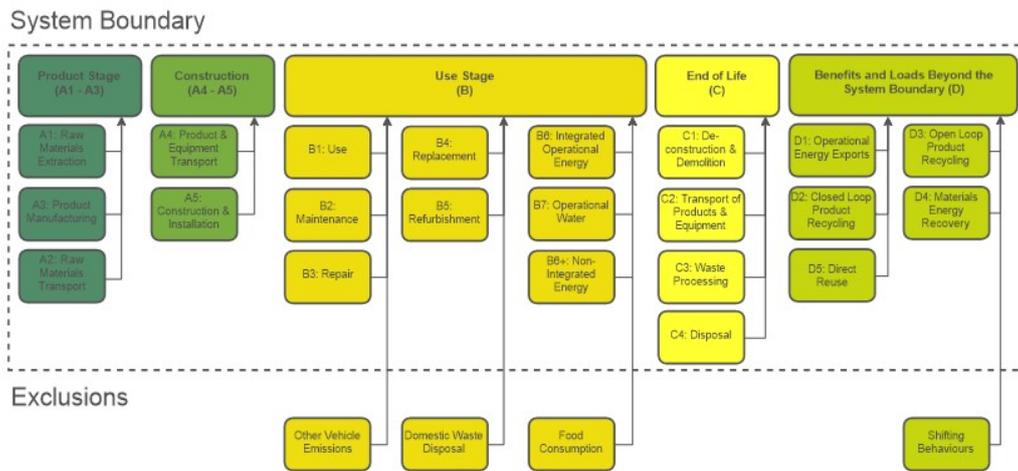


Figure 1: System Boundary Diagram

### 3.3 Environmental Indicators

The environmental indicators have been included in the study are detailed in Table 2. For further information regarding the environmental indicators please refer to Appendix A.

Environmental Indicator	Unit	Abbreviation	Characterisation Method
<b>Environmental Impacts</b>			
Global Warming Potential, GWP	kg CO2 eq	GWP	CML-IA baseline V4.5
Ozone Depletion Potential, ODP	kg CFC-11 eq	ODP	CML-IA baseline V4.5
Acidification Potential for Soil and Water, AP	kg SO2 eq.	AP	CML-IA baseline V4.5
Eutrophication potential, EP	kg PO4-- eq	EP	CML-IA baseline V4.5
Photochemical Ozone Creation Potential, POCP	kg ethylene	POCP	Institute of Environmental Sciences (CML)
Abiotic Depletion Potential - Elements, ADPE	kg antimony	ADPE	CML-IA baseline V4.5
Abiotic Depletion Potential - Fossil Fuels, ADPF	MJ	ADPF	CML-IA baseline V4.5
<b>Resource Use</b>			
Net use of fresh water, FW	m3	FW	Not Applicable - 1:1 factor on H2O Consumed

Table 2: Environmental Indicators Included in LCA study.

### 3.4 System Description

The object of the assessment is the structure itself. The assessment includes all the upstream and downstream processes needed to provide the primary function of the structure from construction, maintenance, operation, and finally demolition and disposal. The



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inventory includes the extraction of raw materials or energy and the release of substances back to the environment or to the point where inventory items exit the system boundary either during or at the end of the project life cycle.

The area of the project is the City of Vincent local government in Western Australia. This local government authority covers an area of approximately 10.4 square kilometres in metropolitan Perth, the capital of Western Australia, and lies about 3 km from the Perth CBD. It includes the suburbs of Highgate, Leederville, Mount Hawthorn, North Perth, as well as parts of Coolbinia, East Perth, Mount Lawley, Osborne Park, Perth and West Perth. The City of Vincent maintains 139 km of roads and 104 ha of parks and gardens.

New developments in the area must comply with the city's [built form policy released in 2020](#).

The project location is shown in figures 2 and 3.



Figure 2: Location of the project - Global View.



Figure 3: Location of the project - Locality View.

Lot 2 is one of a 4 dwelling development. This lot comprises a single residential building on an 235sqm lot in West Perth. The building is a three storey, double brick construction to ground floor and framed construction above where structurally possible, concrete slabs and metal roof, with facebrick, render and cladding finishes. Each residence has 3 bedrooms, 3.5 bathrooms, games room, study nook and double garage.

Energy and water assumptions for the business as usual model have been made based on a code compliant Nateths 6 star dwelling.



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The Proposed Design has been orientated to promote passive solar design and cross ventilation elements with a sensor operated skylight over the stairwell that will open to purge excess heat reducing the energy demand for mechanical cooling. Sustainability features such as Solar PV, Ceiling Fans, Rainwater tanks, Waterwise landscaping and water saving fixtures have also been specified.

The motivation of this life cycle assessment is for the development to demonstrate how it achieves a 50% reduction in CO2 emissions and 50% reduction in fresh water use per occupant / per year as required by the City of Vincent Policy No 7.1.1 - Built Form; Clause 1.8 - Environmentally Sustainable Design.

The designs being assessed in the LCA include:

- Residential Benchmark building for City of Vincent representing a statistical average dwelling
- Business As Usual baseline design which represents a code compliant / standard practice version of the same design
- Proposed Design representing the design options selected by the client during the life cycle design feedback workshop

Table 3 below shows the key characteristics of the design.

	Business as Usual	Scenario Design
<b>Design Details</b>		
Design Name	AU WA Res Ave Code Compl CZ 5 (10 dwellings)	Proposed Design
Stories (#)	2	3
Primary Function	Single Family Residence	Residential
Structural Service Life Limit	100	120
Predicted Design Life	54	55
<b>Functional Characteristics</b>		
Dwellings	10	1
Bedrooms	30	3
Occupants	24	3
<b>Total Floor Areas</b>		
Usable Floor Area	2,140	281
Net Lettable Area	0	0
Fully Enclosed Covered Area	3,010	281
Unenclosed Covered Area	0	32
Gross Floor Area	3,010	313
Usable and Lettable Yield	71 %	90 %

Table 3: Design Characteristics Compared

Table 4 and 5 show the scope (structural and operational) of the inventory collection for the LCA. For further details on structure scope please refer to Appendix B.

**Summary Structure Scope Diagram**

Key: ✓ In Scope    ✓ Partial    ✗ Out of Scope

Category Name	Benchmark Design	Scenario Design
Substructure	✓	✓
Superstructure	✓	✓
Internal finishes	✓	✓
Fittings, furnishings and equipment	✓	✓
Services equipment	✓	✓
Prefabricated buildings and building units	✗	✗
Work to existing building	✗	✗
External works	✓	✓
Facilitating works	✗	✗
Project/design team	✓	✓
Undefined	✓	✓

Table 4: Structural scope of LCI collection



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**Operational Scope diagram**

Key: ✓ In Scope ✗ Out of Scope

Category Name	Benchmark Design	Scenario Design
Appliances   Dishwashers	✓	✓
Appliances   Entertainment	✓	✓
Appliances   Laundry Appliances	✓	✓
Appliances   Office Workstations	✓	✓
Communications	✓	✓
Cooking and Food Preparation	✓	✓
Domestic Water Heating	✓	✓
Electrical Parasitic Loads	✓	✓
Fire Protection	✗	✓
HVAC	✓	✓
Industrial & Manufacturing Equipment	✗	✓
Lifts, Elevators and Conveying	✗	✓
Lighting	✓	✓
Miscellaneous	✗	✓
Monitoring, Control and Automation	✓	✓
Power Generation and Storage	✓	✓
Refrigeration	✓	✓
Safety and Security	✓	✓
Swimming Pools	✓	✓
Water Pumping	✓	✓
Water Removal and Treatment	✓	✓
Water Supply	✓	✓
Workshops, Garage & Misc	✓	✓

Table 5: Operational scope of LCI collection

**3.5 Cut off Criteria**

The EN15978 cut-off criteria were used to ensure that all relevant potential environmental impacts were appropriately represented:

- Mass – if a flow is less than 1% of the mass at either a product-level or individual-process level, then it has been excluded, provided its environmental relevance is not of concern.
- Energy – if a flow is less than 1% of the energy at either a product-level or individual-process level, then it has been excluded, provided its environmental relevance is not a concern.
- The total of neglected input flows per module, e.g. per module A1-A3, A4-A5, B1-B5, B6-B7, C1-C4 and module D shall be a maximum of 5% of energy usage and mass.
- Environmental relevance – if a flow meets the above criteria for exclusion, but is considered to potentially have a significant environmental impact, it has been included. All material flows which leave the system (emissions) and whose environmental impact is higher than 1% of an impact category, have been included.

The Operational Guidance for Life Cycle Assessment Studies (Wittstock et al. 2012) states:

*The apparent paradox is that one must know the final result of the LCA (so one can show that the omission of a certain process is insignificant for the overall results) to be able to know which processes, elementary flows etc. can be left out.*

The approach taken in this study is to continue modelling smaller inputs until confidence is gained that the criteria is safely met.

**3.6 Allocation**

Allocation rules follow those of EN15804 as given below:

- Allocation will respect the main purpose of the studied processes. If the main purpose of combined processes cannot be defined (e.g. combined mining and extraction of nickel and precious metals), economic allocation may be used to divide resources and emissions between the products.



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- The principle of modularity is maintained. Where processes influence the product's environmental performance during its life cycle, they will be assigned to the module where they occur.
- The sum of the allocated inputs and outputs of a unit process are equal to the inputs and outputs of the unit process before allocation. This means no double counting of inputs or outputs is permissible.

### 3.7 Independent Review

The critical review has been undertaken in accordance with ISO14044.



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### 4 Inventory Analysis

The inventory analysis was aided by the following design documents:

- Other Design Documentation: Take-off from LCD Lite Helper Spreadsheet, November 2020 by
- Other Design Documentation: ABCB\_Nathers Heating and Cooling Load Limits\_extract, November 2020 by
- Other Design Documentation: Lot2 - Florence St\_LCD Lite Spreadsheet, November 2020 by
- Other Design Documentation: Lot2 - Florence St\_Occupancy Calculator, November 2020 by
- Architectural Documentation: van Dommelen (Florence Street) Amended TP (22-09-2020), November 2020 by
- Other Design Documentation: Lot2 - Florence St\_Rain Water Calculator, November 2020 by

The design has been modelled using the available eToolLCD elements, templates and EPDs as shown in Table 6.

eToolLCD Item Type	Count In Design	
	Benchmark	Scenario Design
Design Templates	24	179
Equipment and People Elements	495	241
Material Elements	841	363
Energy Elements	38	22
Water Elements	12	13
EPDs	0	0

Table 6: Count of elements, templates and EPDs in the design

The eToolLCD library templates are customisable and users may submit templates for validation. The template validation process is undertaken by experienced LCA practitioners and is a process of checking the user inputs and ensuring the assumptions are adequately referenced. Table 7 shows the extend to which validated templates were used in the model.

eToolLCD Item Type	Validated (%)	
	Benchmark	Scenario Design
Total Design Templates	8.33	55.31
Equipment and People Elements	1.01	62.24
Material Elements	.48	49.31
Energy Elements	0	0
Water Elements	0	0

Table 7: Use of validated templates

### 4.1 Templates Comparison

The eToolLCD templates found in each design are provided in Table 8.

Parent Template Name	Units	Quantity
		Scenario Design
<b>Fittings, furnishings and equipment</b>		
Appliances, Residential Average (AUS) Op&Em (2020 Update)	#	1
Cooking Res Gas Stove Electric Oven Op&Em	#	1
Kitchen Fittings, Furnishings & Equipment - medium sized	#	1
Refrigeration Residential Detailed (AUS) Op&Em	#	1
Standard 1st Bathroom - WC/Shower-bath/Basin/WallTiles	#	3
Standard Laundry sink (steel) + services	#	1
Standard Powder Room - WC/Basin	#	1
<b>Services equipment</b>		
Business as Usual Plumbing Fittings Mains Water and Offsite Treatment (Average Water Use & Treatment WA/AUS (no pool))	#	1
Electrical Fittings - sockets power points wiring embodied only (m2)	m2	312.7
HVAC Residential Ceiling Fans	#	5
HVAC Residential Split System Air Source Heat Pump (MEPs Average)	#	1
HWS - Gas Instantaneous	#	1
LED Outdoor Lighting (Residential - Standard Efficiency), m2	m2	80
Lighting Residential LED Med Natural Light	#	1
Rainwater tank and Pump for Residence (Above Ground)	m3	17



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Parent Template Name	Units	Quantity
		Scenario Design
Solar PV System Commercial - Zone 3 (Perth)	Other	6.6
Utilities Connection to Site Residential	#	1
<b>Superstructure</b>		
Concrete Floor - 172mm elevated slab 40MPa 3.8% reo (First flr)	m2	140
Concrete Floor - 172mm elevated slab 40MPa 3.8% reo (Loft Flr)	m2	64.5
Door - HollowCoreTimber/WoodenJam/painted	#	17
Door - SolidCoreTimber/WoodenJam/Painted	#	3
External Finish - 13mm Render (Cement)	m2	102
Garage Door (number of car bays)	#	2
Louvre aluminium screen (by area)	m2	6.5
Roof - TimberTruss/SteelSheeting/foil ins.	m2	148
Skylight, residential	m2	1
Staircase Concrete (40Mpa 2% reo by volume)	lm	2
Wall External Masonry double brick 110-50-110 insulated with finishes	m2	20
Wall External Masonry double brick 90-50-90 insulated with int. finishes (Boundary Wall)	m2	135
Wall External Masonry double brick 90-50-90 insulated with int. finishes (Render separate template)	m2	102
Wall Internal Framed Timber Stud Plasterboard and paint finish	m2	153.255
Wall Internal Masonry Single Brick Wall (90mm) with finishes	lm	50
Wall, External, Timber Stud with CFC Cladding, PB Lining, Insulation, Painted, m2	m2	20
Wall, External, Timber Stud with Sheet metal Cladding, PB Lining, Insulation and Footings, Painted, m2	m2	65
Windows Residential Aluminium Single Glaze fly screen	m2	61.2892
<b>Facilitating works</b>		
Demolition - Residential (End-of-Life)	#	1
<b>External works</b>		
External Works - Concrete Paving, poured in-situ, 125mm thick	m2	22
External Works - Paving (limestone pavers)	m2	20
<b>Substructure</b>		
Floor Covering - 13mm Hardwood, Timber Floating Floor with Acoustic Underlay	m2	20
Floor, 100mm slab on ground, strip foundation	m2	108.2
<b>Internal finishes</b>		
Floor Covering - Carpet (glue down/Nylon)	m2	47
Floor Covering - Tiles (ceramic/5mm) (Bathrooms)	m2	26.5
Floor Finish - Grind+Polished Concrete	m2	126.76

Table 8: Templates Comparison (showing master templates only)

### 4.2 eToolLCD software

eToolLCD software was used to model life cycle impacts of the project. eToolLCD uses third party background processes aggregated as mid-point indicators and stored in a number of libraries within the software which are coupled with algorithms and user inputs to output the environmental impact assessment. A map of user inputs, data sources and algorithms (outputs) is given in Figure 4.



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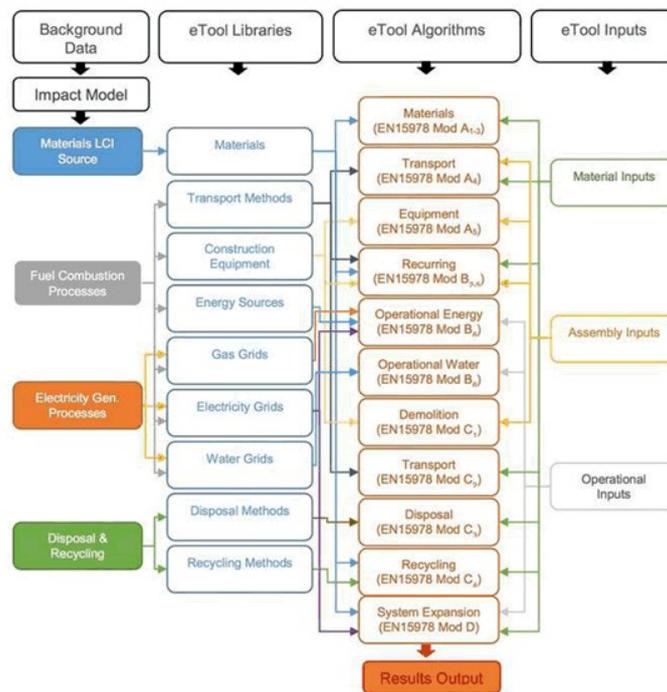


Figure 4: Relationship between LCI background data, eToolLCD software library, inputs and algorithms.

### 4.3 Data Quality

The data quality requirements for the background data are detailed in Table 9. Each of the criteria has been assessed for compliance and results presented below.

Criteria	Background Data Requirement	Compliance	
		Benchmark	Scenario Design
Temporal Relevancy	For annually fluctuating processes like Grid electricity fuel mixes the datasets must have been updated within the last 2 years. More static processes like materials production must have been updated within the last 10 years. Product specific EPDs must have been updated in the last 5 years.	Passed Grid Passed Materials	Passed Grid Passed Materials
Geographical Relevancy	The background data should be specifically compiled for the same country (preferable) or continent as the project location.	Passed (Same Continent)	Passed (Same Country)
Precision	No requirement specified however a qualitative review undertaken to ensure no erroneous values	Passed	Passed
Completeness	Qualitative assessment of the process to ensure no obvious exclusions	Passed	Passed
Technological Relevancy	Ensure that technology assumptions are representative for the product or product group.	Passed	Passed
Consistency	The study methodology holds for the background data.	Passed	Passed
Reproducibility	The information available about the methodology and the data values reported should allow an independent practitioner to reproduce the results reported in the study.	Passed	Passed

Table 9: Summary of data quality requirements for the study.

Criteria	Inventory Collection Requirement (eToolLCD User Inputs)	Compliance	
		Benchmark	Scenario Design
Temporal Relevancy	All inputs into eToolLCD to be reflective of the project being assessed and if assumptions are made these are to be based on industry practices that are consistent with the project commissioning date.	Passed 0/5 Checks	Passed 1/1 Checks



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Criteria	Inventory Collection Requirement (eToolLCD User Inputs)	Compliance	
		Benchmark	Scenario Design
Geographical Relevancy	All inputs into eToolLCD must be reflective of the project being assessed and if assumptions are made these are based on the current practices employed in the project country.	Passed 0/5 Checks	Passed 3/3 Checks
Precision	To avoid aggregated errors a high level of precision is expected inputs into eToolLCD software, being either to 3 significant figures or: <ul style="list-style-type: none"> <li>• Two significant figures or nearest 10 hours for equipment run time</li> <li>• Two significant figures or nearest 10kg for material quantities</li> <li>• Two significant figures or nearest 100MJ / annum for operational energy</li> <li>• Two significant figures or nearest 100kL / annum for operational water use</li> </ul>	Passed 0/3 Checks	Passed 1/2 Checks
Completeness	Inputs to cover all life cycle phases and elements identified in the system boundary. The link between background data, eToolLCD algorithms and subsequent LCA results is not to introduce significant gaps in the data.	Passed 0/9 Checks	Passed 5/5 Checks
Technological Relevancy	All inputs into eToolLCD must be reflective of the project being assessed and if assumptions are made these must be drawn from appropriate examples of like technology.	Passed 0/5 Checks	Passed 1/1 Checks
Consistency	All inputs into eToolLCD must be reflective of the project being assessed and if assumptions are made these are drawn from the same reference library.	Passed 0/9 Checks	Passed 3/3 Checks
Reproducibility	The information available about the methodology and the data values reported should allow an independent practitioner to reproduce the results reported in the study.	Passed 0/10 Checks	Passed 2/2 Checks

Table 10: Summary of data quality requirements for the study.

### 4.4 Completeness

The study aims to follow EN15804 procedures for exclusion of inputs and outputs:

- All inputs and outputs to a (unit) process shall be included in the calculation, for which data are available.
- Data gaps may be filled by conservative assumptions with average or generic data. Any assumptions for such choices shall be documented.
- In case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1 % renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process.
- The total of neglected input flows per module, e.g. per module shall be a maximum of 5 % of energy usage and mass.
- Conservative assumptions in combination with plausibility considerations and expert judgement can be used to demonstrate compliance with these criteria.
- Particular care should be taken to include material and energy flows known to have the potential to cause significant emissions into air and water or soil related to the environmental indicators.

Two major tests were run to determine the compliance with the above cut-off rules.

#### 4.3.1 Inventory Mass Quantities

The cumulative mass of inventory entries is shown in Figure 5. Given that 227 material elements within the LCA base design make up the last 1% of mass inventory entries a high level of confidence exists that the cut off rules have been upheld.



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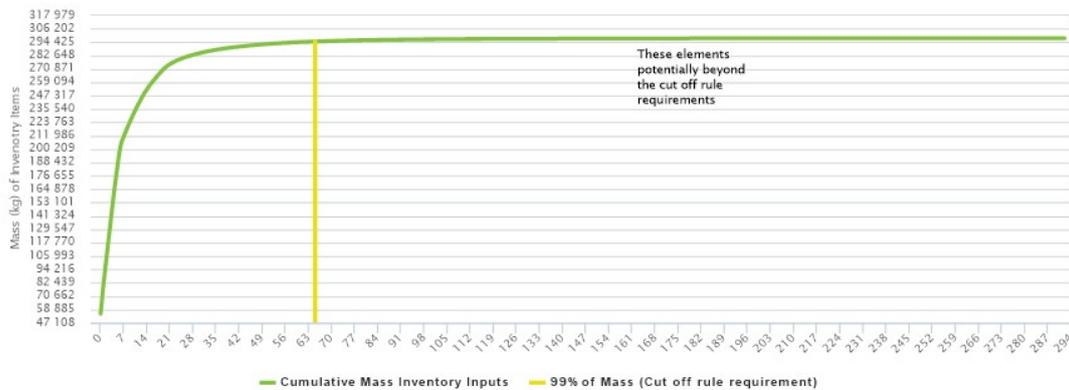


Figure 5: Cumulative Mass Inventory Entries. In this case 77.47% make up the last 5% of mass inventory entries.

4.3.2 Inventory Energy Analysis

The cumulative embodied energy of inventory entries is shown in Figure 6. Given that 278 elements within the LCA base design make up the last 1% of embodied energy inventory entries a high level of confidence exists that the cut off rules have been upheld.

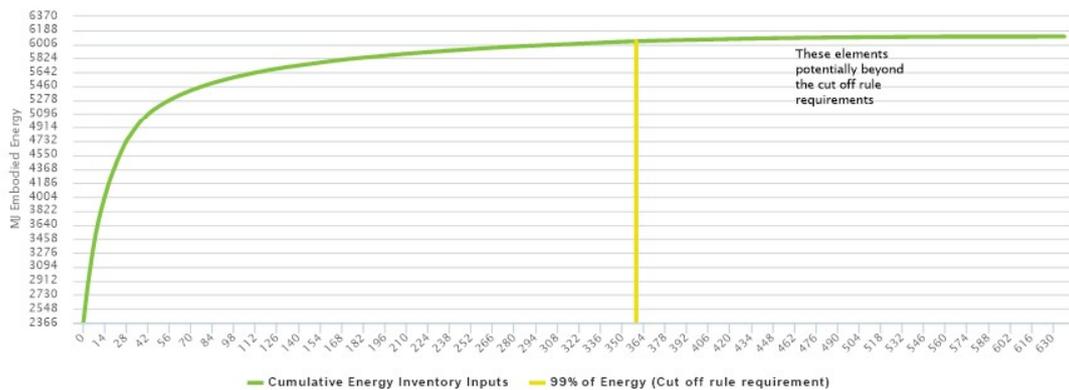


Figure 6: Cumulative Energy Inventory Entries. In this case 43.57% make up the last 5% of energy inventory entries.

5 Life Cycle Impact Assessment

The Life Cycle Impact Assessment (LCIA) results are provided in Table 11 and subsequent tables in the EN15978 reporting format. The heat map highlights the highest impacts for each indicators assessed and conversely in the comparison tables the highest savings observed. For further details on the LCIA please refer to interpretation.



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5.1 Scenario Design Environmental Impacts Indicators

Characterised Impacts Per Occupant Per Year	Materials and Construction	Use Stage											End of Life Stage				Benefits and Loads Beyond the System Boundary	Total
		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B6+	B7	C1	C2	C3	C4		
<b>Benchmark</b>																		
GWP	kg CO2 eq	6.18e+2	267.66	96.551	0	0	MNA	6.95e+2	0	3.40e+1	8.22e+2	1.66e+2	0	65.904	0	69.335	-76.099	3.66e+3
ODP	kg CFC-11 eq	3.00e-5	3.76e-5	1.49e-5	0	0	MNA	7.88e-5	0	4.88e-6	6.59e-6	3.61e-6	0	1.06e-5	0	4.61e-6	-2.27e-6	1.69e-4
AP	kg SO2 eq.	3.00e-1	0.8573	0.2703	0	0	MNA	3.088	0	-1.1599	1.5239	0.3678	0	0.1978	0	0.0906	-0.9942	1.01e+1
EP	kg PO4--- eq	1.28e+0	2.36e-1	4.71e-2	0	0	MNA	1.01e+0	0	3.81e-1	5.09e-1	2.43e-1	0	0.0432	0	1.94e-2	-4.81e-1	3.29e+0
POCP	kg ethylene	2.24e-1	5.13e-2	3.62e-2	0	0	MNA	2.03e-1	0	8.29e-2	4.24e-2	2.40e-2	0	1.31e-2	0	1.40e-2	-3.36e-2	6.57e-1
ADPE	kg antimony	1.18e-1	6.78e-2	2.61e-4	0	0	MNA	5.31e-2	0	4.21e-3	6.09e-3	2.88e-3	0	2.03e-3	0	1.11e-4	-1.88e-2	1.15e-1
ADPF	MJ	7674.4	3980.6	1310.7	0	0	MNA	9926.2	0	3.56e+1	1.06e+4	2002.3	0	1013.1	0	464	-864.5	4.99e+4
<b>Scenario Design</b>																		
GWP	kg CO2 eq	7.22e+2	3.06e+2	47.547	0	41.762	MNA	7.90e+2	0	-444.03	7.84e+2	95.286	16.178	55.496	4.759	1.01e+2	-1.21e+3	1.31e+3
ODP	kg CFC-11 eq	6.41e-5	4.09e-5	5.51e-6	0	9.96e-6	MNA	1.89e-5	0	-5.43e-6	6.29e-6	2.23e-6	2.48e-6	8.83e-6	1.34e-6	4.79e-6	-5.31e-6	3.21e-4
AP	kg SO2 eq.	4.85e-1	1.0164	0.1303	0	0.1133	MNA	3.468	0	-1.202	1.4537	0.2174	0.0501	0.1718	0.0941	0.0941	-2.9393	7.2722
EP	kg PO4--- eq	2.09e+0	2.96e-1	1.90e-2	0	4.19e-2	MNA	1.21e+0	0	-4.06e-1	4.86e-1	1.66e-1	1.24e-2	3.83e-2	0.0028	0.0202	-9.92e-1	2.99e+0
POCP	kg ethylene	1.93e-1	5.99e-2	2.92e-2	0	6.52e-3	MNA	2.30e-1	0	-1.54e-2	4.05e-2	1.41e-2	3.42e-3	1.14e-2	5.91e-4	1.56e-2	-8.14e-2	6.66e-1
ADPE	kg antimony	7.22e-2	1.00e-2	2.31e-4	0	1.43e-3	MNA	7.22e-2	0	-5.05e-3	5.81e-3	1.89e-3	3.11e-4	2.16e-3	5.55e-5	1.15e-4	-1.60e-2	1.45e-1
ADPF	MJ	8588.4	4540.3	539	0	444.7	MNA	9805.1	0	-4672.8	1.01e+4	1131.3	241.1	861.4	63.2	481.1	-1.55e+4	1.67e+4
<b>Savings (Scenario Design Compared to Benchmark)</b>																		
GWP	kg CO2 eq	-1.04e+2	-38.286	49.004	0	-31.762	MNA	-95.864	0	1.38e+3	37.83	70.312	-16.178	10.408	-4.759	-31.297	1.14e+3	64.3%
ODP	kg CFC-11 eq	-3.41e-5	-3.28e-6	9.36e-6	0	-9.96e-6	MNA	-1.27e-4	0	1.03e-5	3.03e-7	1.38e-6	-2.48e-6	1.79e-6	-1.34e-6	-1.71e-7	3.05e-6	-89.95%
AP	kg SO2 eq.	-1.1753	0.133	0.1401	0	-0.1133	MNA	-0.38	0	2.3619	0.0701	0.1504	-0.0501	0.026	-0.0139	-0.0035	1.9451	27.79%
EP	kg PO4--- eq	-8.12e-1	3.35e-1	2.81e-2	0	-4.19e-2	MNA	-1.99e-1	0	7.87e-1	2.34e-2	7.72e-2	-1.24e-2	4.93e-3	-0.0028	-7.60e-4	5.12e-1	9.24%
POCP	kg ethylene	-1.28e-1	3.67e-2	7.06e-3	0	-6.52e-3	MNA	-2.77e-2	0	9.83e-2	1.95e-3	9.94e-3	-3.42e-3	1.69e-3	-5.91e-4	-1.65e-3	4.78e-2	-1.41%
ADPE	kg antimony	-1.36e-2	3.22e-3	3.08e-5	0	-1.43e-3	MNA	-1.91e-2	0	9.26e-3	2.80e-4	9.84e-4	-3.11e-4	-1.31e-4	-5.55e-5	-4.06e-6	-2.84e-3	-26.18%
ADPF	MJ	-913.9	-559.7	771.7	0	-444.7	MNA	121.1	0	1.85e+4	488.9	871.1	-241.1	151.7	-63.2	-17	1.46e+4	66.53%

Table 11: Environmental Impacts Impact of Each Life Cycle Phase.

INA: Indicator Not Assessed, MNA: Module Not Assessed.

Impact Key: ■ Top 10% ■ Top 20% ■ Top 30%

Savings Key: ■ Top 10% ■ Top 20% ■ Top 30%



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5.2 Scenario Design Resource Use Indicators

Characterised Impacts Per Occupant Per Year		Materials and Construction			Use Stage							End of Life Stage				Benefits and Loads Beyond the System Boundary	Total		
		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B6+	B7	C1	C2	C3			C4	D
<b>Benchmark</b>																			
FW	m3	3.25e+3	554.93	173.5	0	0	MNA	2.15e+3	0	1.20e+3	1.76e+3	8.35e+3	0	121.48	0	494.8	-291.68	9.26e+4	
PERE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PERM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PERT	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PENRE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PENRM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PENRT	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
SM	KG	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
RSF	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
NRSF	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
<b>Scenario Design</b>																			
FW	m3	3.63e+3	669.35	95.01	0	71.65	MNA	3.29e+3	0	-1.46e+3	1.68e+3	8.11e+3	29.83	108.48	78.63	512	-3.25e+3	4.66e+4	
PERE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PERM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PERT	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PENRE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PENRM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
PENRT	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
SM	KG	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
RSF	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
NRSF	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0
<b>Savings (Scenario Design Compared to Benchmark)</b>																			
FW	m3	-327.26	116.42	78.5	0	-71.65	MNA	-1.14e+3	0	2.66e+3	80.89	4.21e+4	-29.83	12.99	-78.63	-17.2	2.95e+3	49.74%	
PERE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
PERM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
PERT	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
PENRE	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
PENRM	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
PENRT	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
SM	KG	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
RSF	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%
NRSF	MJ	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	INA	0%

Table 12: Resource Use Impact of Each Life Cycle Phase.  
 INA: Indicator Not Assessed. MNA: Module Not Assessed.

Impact Key: ■ Top 10% ■ Top 20% ■ Top 30%  
 Savings Key: ■ Top 10% ■ Top 20% ■ Top 30%



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## 6 Life Cycle Interpretation

The following sections provide more detailed results of the life cycle impact assessment for each environmental indicator with the aim of identifying the largest areas of impact. A one page profile for each indicator is provided on the subsequent pages giving detailed information about the indicator. Each chart provided is explained below.

### Impact Time Series Chart:

A chart displaying when impacts occur during the life of a design. This enables users to gain insights such the “environmental payback period” of a design compared to alternatives, or when there are jumps in an impact value during the life of the project (for example, relating to a large replacement item).

### Top Five Charts

Each top 5 chart categorises the buildings and expresses the environmental impacts by these categories. This enables a detailed understanding of what is responsible for the greatest environmental burdens and also compares these burdens between designs. The pie chart associated with each bar chart shows the proportion of the building that is represented in the bar chart. A brief description of the categories is provided below:

- **LC Module Impacts:** The EN15978 Life Cycle Modules. Generally 100% building impacts will be included in the bar chart.
- **Construction Category:** The breakdown of the impacts by construction category. The bar chart will generally only part of the total building impacts.
- **Operational Demand:** The building end use demands that are driving environmental impacts.
- **Energy Supply:** The supply of fuels to the building, in effect the upstream fuel sources supplying energy for on site use during construction, operational and demolition.
- **Materials:** The materials (grouped into common categories) that are driving the environmental impacts.
- **Equipment and People:** The equipment and people required during construction, maintenance and demolition and all associated transport trips that are driving the environmental impacts

All impact figures are quoted per the functional unit selected for the study.



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### 6.1 Global Warming Potential, GWP Profile

■ Business as Usual ■ Scenario Design

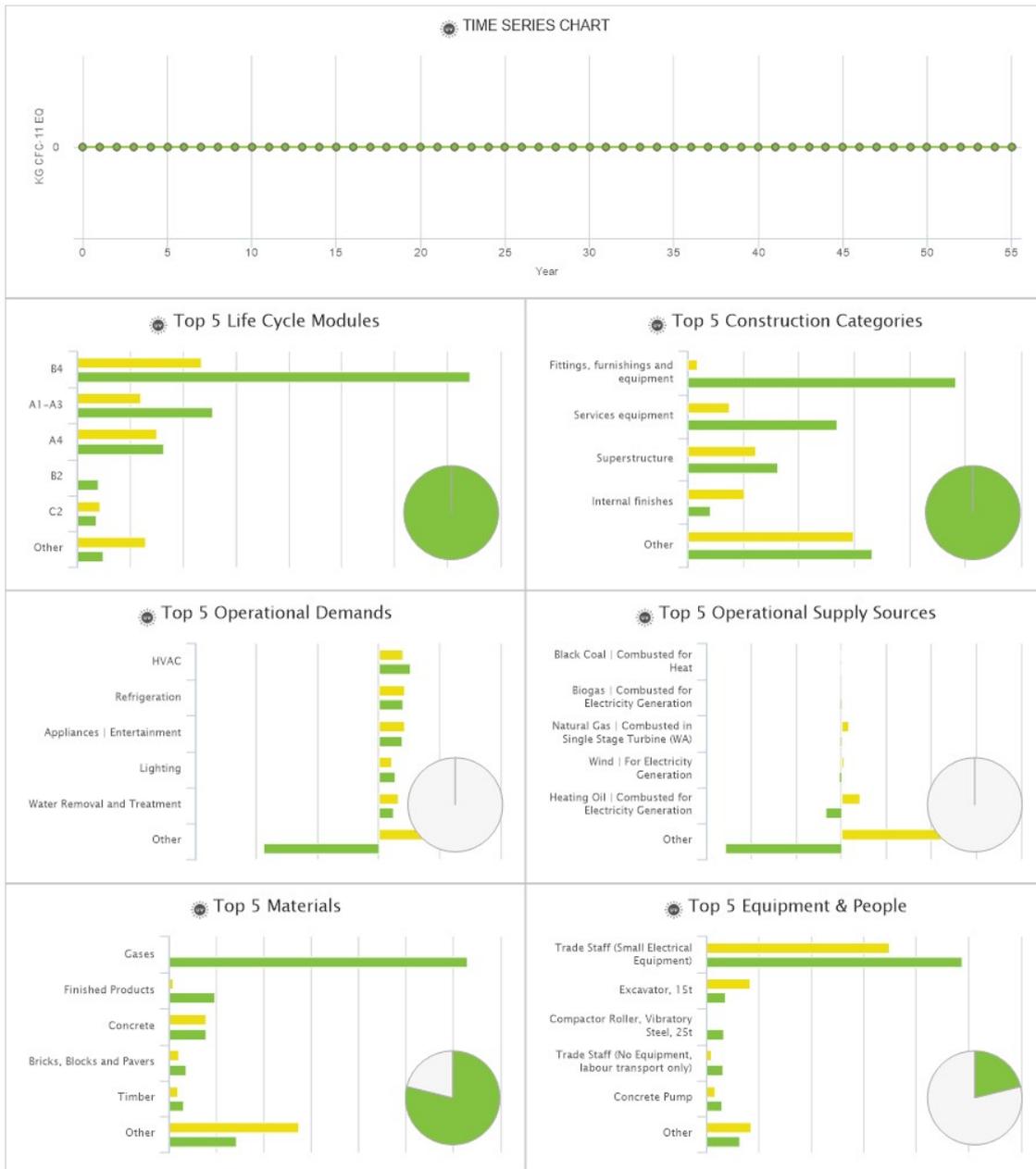


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### 6.2 Ozone Depletion Potential, ODP Profile

■ Business as Usual ■ Scenario Design



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### 6.3 Acidification Potential for Soil and Water, AP Profile

■ Business as Usual ■ Scenario Design



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### 6.4 Eutrophication potential, EP Profile

■ Business as Usual ■ Scenario Design

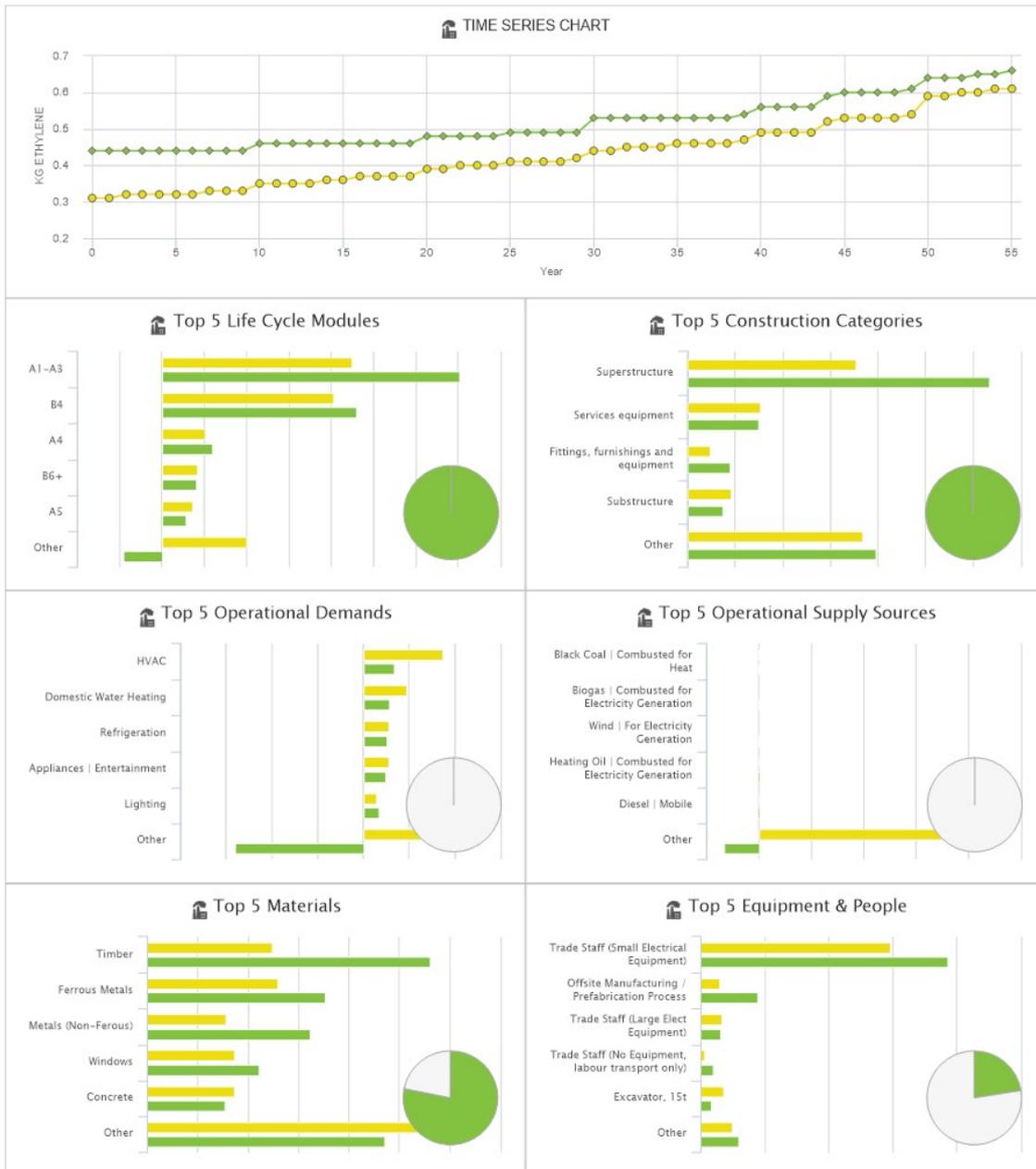


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### 6.5 Photochemical Ozone Creation Potential, POCP Profile

■ Business as Usual ■ Scenario Design

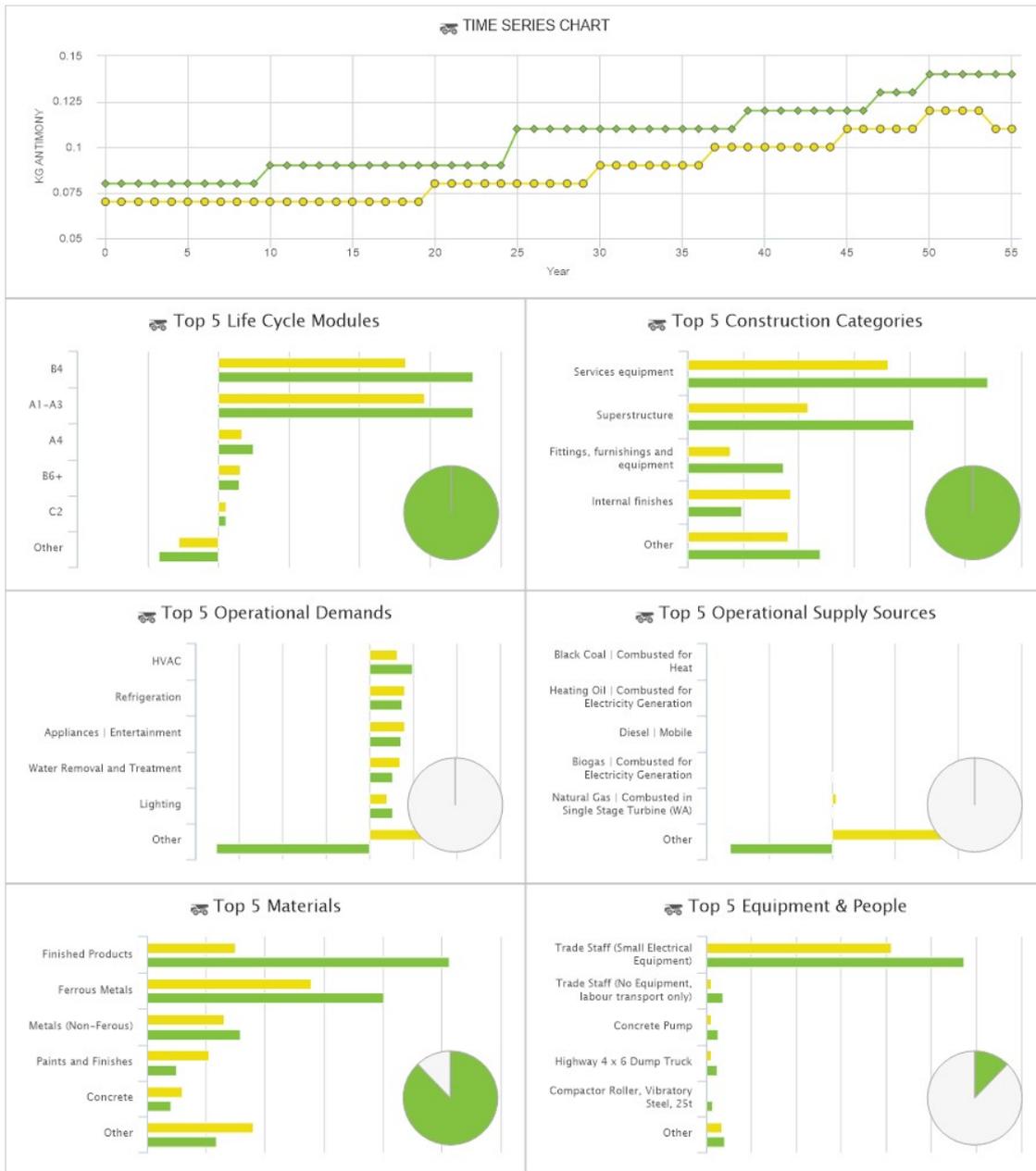


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### 6.6 Abiotic Depletion Potential - Elements, ADPE Profile

■ Business as Usual ■ Scenario Design



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### 6.7 Abiotic Depletion Potential - Fossil Fuels, ADPF Profile

■ Business as Usual ■ Scenario Design



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### 6.8 Net use of fresh water, FW Profile

■ Business as Usual ■ Scenario Design



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### 7 Low Impact Strategies

The following potential low impact design strategies were modelled in the LCA study to determine the relative benefits and aid the design decision making process.

The following low impact strategies are included in the Scenario Design:

Design Strategy Performance	GWP	ODP	AP	EP	POCP	ADPE	ADPF	FW
HVAC: Residential Ceiling Fans Assisted Cooling	0.61%	-0.19%	-0.11%	0.82%	-0.30%	-0.46%	0.54%	0.05%
Replacement: Recycled Bricks	0.26%	0.15%	0.17%	0.11%	0.26%	0.07%	0.18%	0.01%
Finishes: Reduce Floor Coverings (Tile to Polished concrete/Timber)	4.88%	7.76%	6.62%	5.30%	8.33%	26.89%	5.03%	0.40%
Finishes: Reduce Floor Coverings (Carpet to Polished concrete)	0.13%	0.06%	0.14%	0.08%	0.31%	0.11%	0.13%	0.00%
Open Exposed Ceiling (no plasterboard)	2.41%	5.06%	3.59%	2.76%	4.26%	3.10%	3.02%	0.25%
6.6kW PV system with 5kW Inverter Single Phase Connection (Connected)	60.94%	4.23%	36.81%	33.93%	13.67%	34.85%	57.96%	5.23%
Water-wise gardens (minimise lawn/native plants)	0.30%	0.11%	0.23%	0.22%	0.23%	0.10%	0.28%	8.60%
Dripper Irrigation System (in place of sprays)	0.14%	0.05%	0.10%	0.10%	0.10%	0.04%	0.13%	3.87%
2kL Rainwater Tank for Garden Irrigation Water	0.28%	-0.81%	-0.53%	-0.69%	0.48%	-0.57%	-0.59%	7.09%
Low Flow Shower Heads (7.5L/min)	0.64%	0.14%	0.26%	0.57%	0.39%	0.17%	0.70%	4.55%
Water efficient fixtures and fittings (Mixers and Toilets only)	0.45%	0.23%	0.37%	0.88%	0.37%	0.28%	0.39%	7.47%
Proposed Design	0%	0%	0%	0%	0%	0%	0%	0%

Table 11: Design Strategies in Scenario Design

For each design strategy, the relative savings for all indicators is provided and given in context to the other strategies. A basic description of the strategy is also provided.

### 7.1 Scenario Design Strategies



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7.1.1 HVAC: Residential Ceiling Fans Assisted Cooling

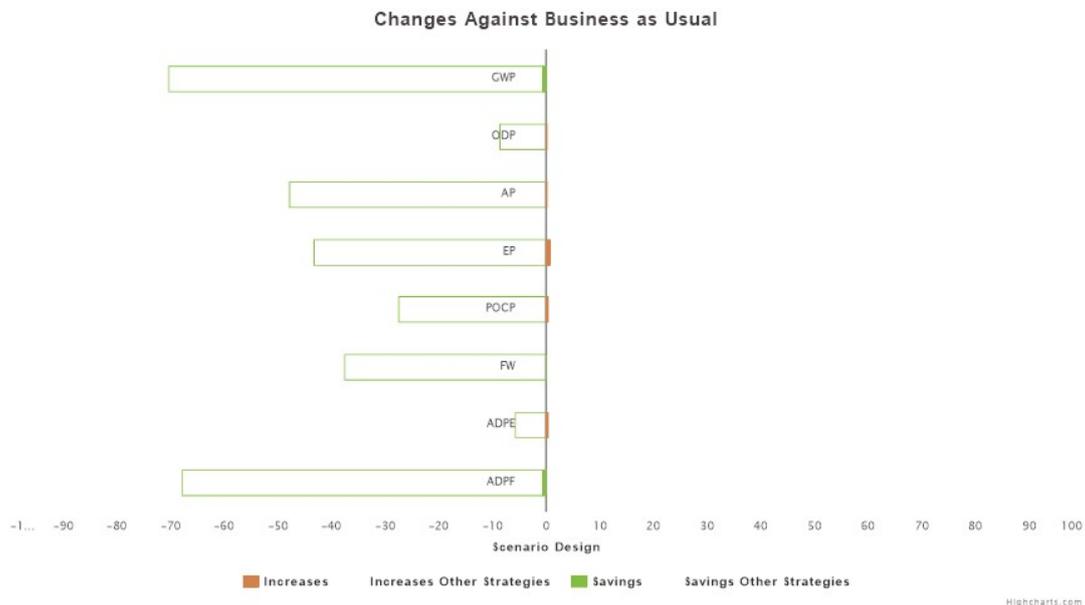


Figure 7: Impact savings (or increases) associated with the HVAC: Residential Ceiling Fans Assisted Cooling as a percentage of the base design.

The cooling requirements of modern code compliant houses can be easily met by low energy ceiling fans which in some ways are equally as effective as HVAC systems for cooling. They cool you by triggering evaporation from your skin. For comparison a central A/C unit runs on about 3000 watts per hour whereas a ceiling fan runs on only 30 watts per hour. Installing ceiling fans will allow occupants to choose this more efficient form of cooling over their costly air conditioning systems. A 20% reduction in air conditioning has been assumed.

If the implementation of this strategy is outside of the project budget the developer may offer the strategy as an upgrade package for purchasers. This eliminates the need for upfront capital while promoting best practices and educating the public.



(Image source: www.bigassfans.com)(Image source: www.bigassfans.com)



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7.1.2 Replacement: Recycled Bricks

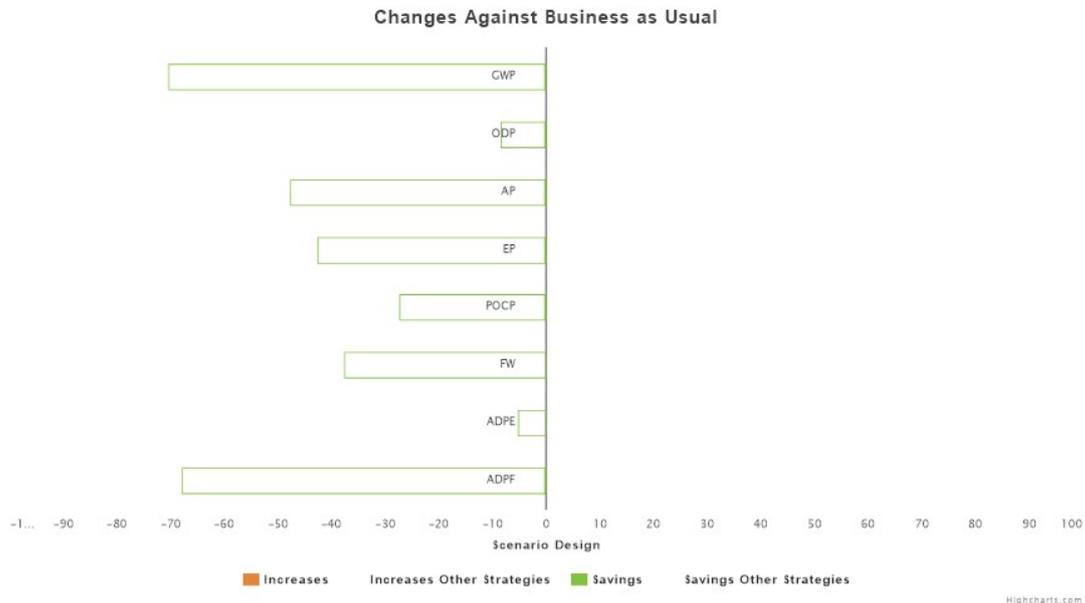


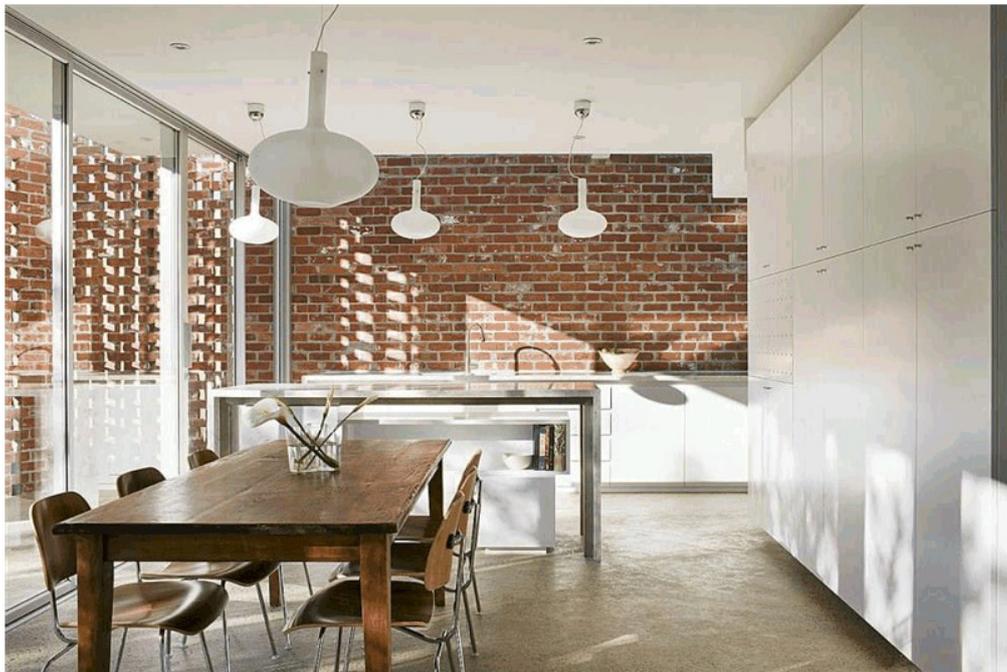
Figure 8: Impact savings (or increases) associated with the Replacement: Recycled Bricks as a percentage of the base design.

Using re-cycled clay bricks in all masonry walls will provide some carbon savings. Although there is a lot of labour involved in sourcing and cleaning bricks, they can be cost competitive with new bricks. The aesthetic look of recycled brick is also very popular in architecturally designed buildings.

For this scenario brick from the original house will be used for the 20m2 of feature facebrick wall.



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(Image source: Architizer.com)



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7.1.3 Finishes: Reduce Floor Coverings (Tile to Polished concrete/Timber)

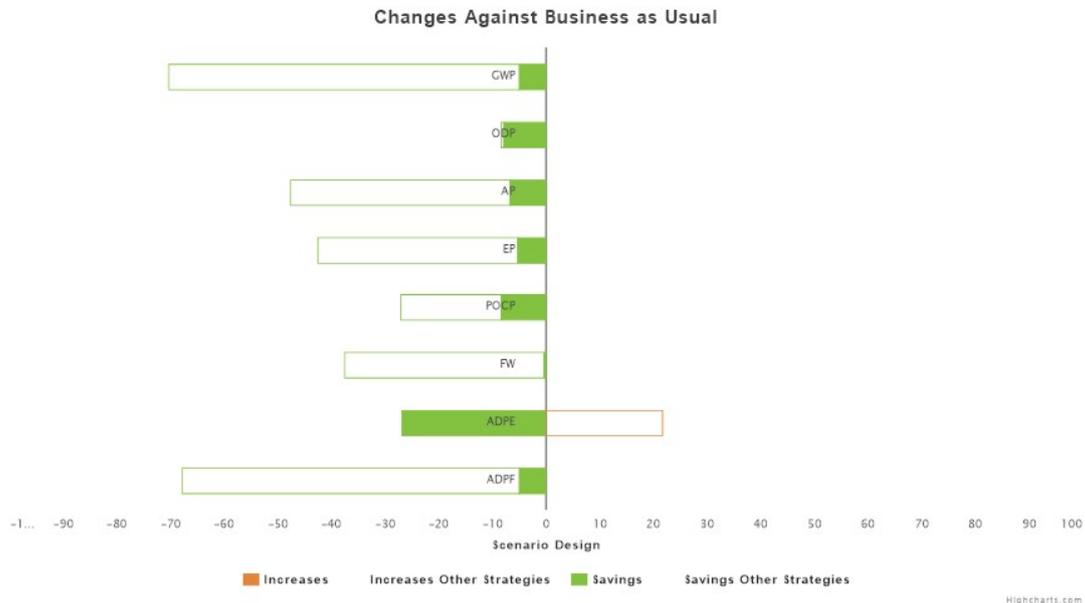


Figure 9: Impact savings (or increases) associated with the Finishes: Reduce Floor Coverings (Tile to Polished concrete/Timber) as a percentage of the base design.

Ceramic floor tiles have a large amount of embodied energy. Specifying polished concrete and timber floorings will have lower recurring impacts. Grind and polish concrete eliminates the use of a polyurethane seal/coating and reduces maintenance associated with a grind and seal finish.

For this recommendation, all tiled areas with the exception of the Games Room (20m2) are changed to grind & polished concrete.

The 20m2 for the Games room is to be a timber floor, which will also be a saving in embodied energy as timber is a unique material, because it enables the permanent capture of carbon. Although doesn't have the same savings and the polished concrete due to manufacturing, transportation elements of the product.



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(image source: <http://www.switcheroom.com>)



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7.1.4 Finishes: Reduce Floor Coverings (Carpet to Polished concrete)

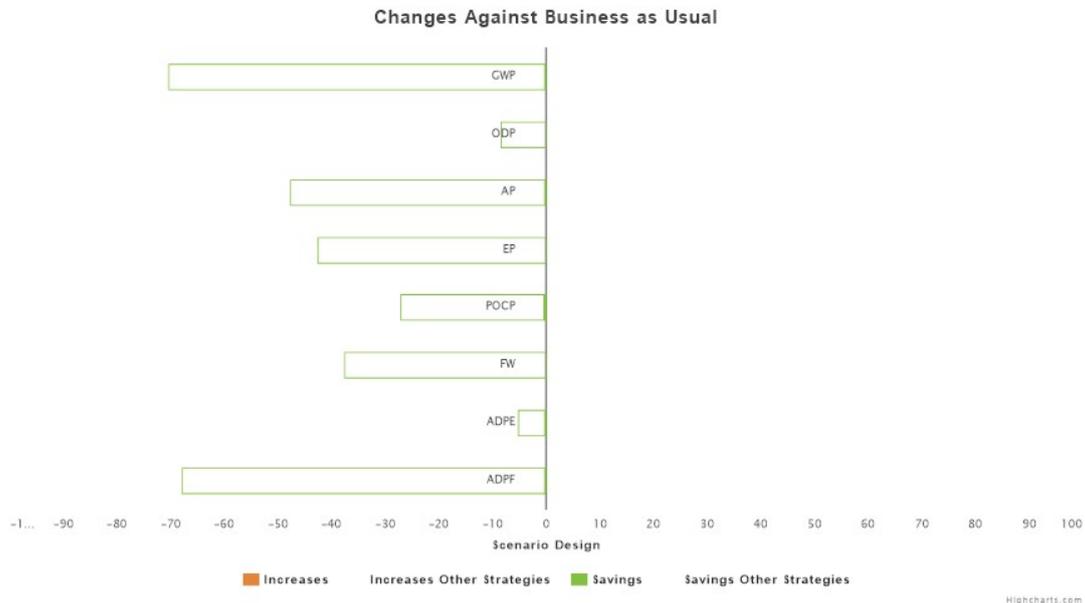


Figure 10: Impact savings (or increases) associated with the Finishes: Reduce Floor Coverings (Carpet to Polished concrete) as a percentage of the base design.

Carpets have significant life cycle impacts due to their heavy use and regular replacement. Specifying polished concrete and timber floorings will have lower recurring impacts. Grind and polish concrete eliminates the use of a polyurethane seal/coating and reduces maintenance associated with a grind and seal finish.

For this recommendation, only a small 6.76m<sup>2</sup> of carpeted area has been changed to grind & polished concrete.

It should be noted that carpets have significant life cycle impacts due to their heavy use and regular replacement. If no other material alternatives such as cork, timber or polished concrete are possible then Environmental Product Declaration (EPDs) and/or recycled carpet should be sought. EPDs provide LCA data specific to the product rather than the default industry average. Good suppliers of recycled carpet and floor finishes with EPDs include Interface and Forbo. This has not been modelled.



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7.1.5 Open Exposed Ceiling (no plasterboard)

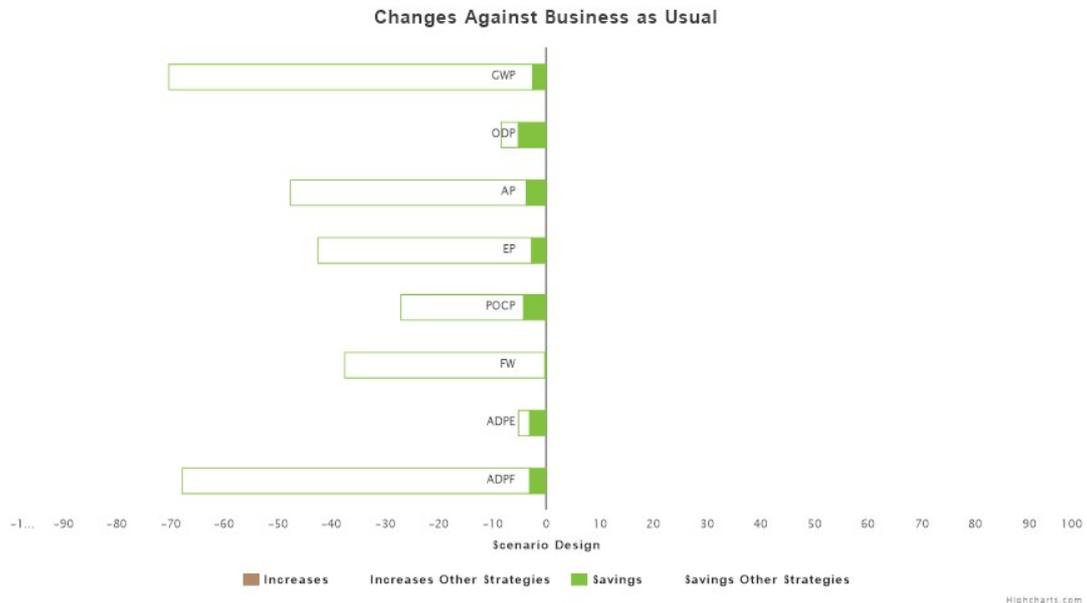


Figure 11: Impact savings (or increases) associated with the Open Exposed Ceiling (no plasterboard) as a percentage of the base design.

Due to the manufacturing process of plasterboard it has very high CO2 embodied impacts. Currently there is an architectural fashion to remove plasterboard ceilings and expose the underside of concrete floor slabs providing large CO2 savings.

Exposed Concrete ceilings bring a rawness and robustness, as well as thermal mass, to spaces with an industrial or contemporary aesthetic. They can be left raw, textured with the use of timber formwork or painted. Services can either be exposed, hidden within bulkheads or cast into the concrete.

For this recommendation, we have assumed that the building is fitted with an open ceiling and direct paint on the concrete.



*Open Ceiling in a residential context*



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7.1.6 6.6kW PV system with 5kW Inverter Single Phase Connection (Connected)

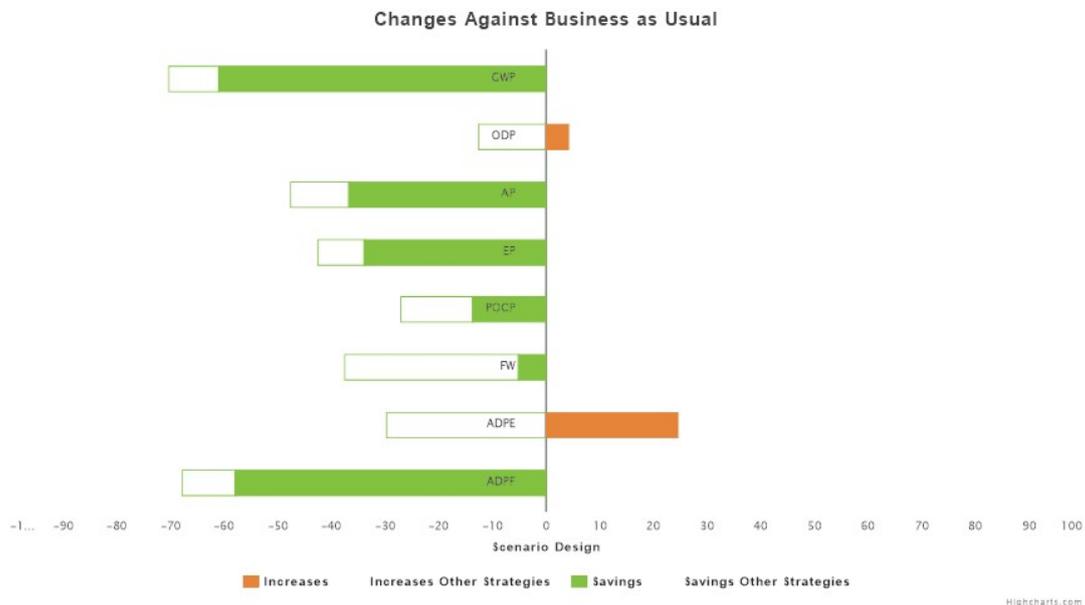


Figure 12: Impact savings (or increases) associated with the 6.6kW PV system with 5kW Inverter Single Phase Connection (Connected) as a percentage of the base design.

With the rising price of electricity, the economics of solar are very favourable and add to the value of the property. 22% of total Australian dwellings now have solar technologies on their roof. Using solar generated power on site results in much lower emissions associated with the dwelling compared to using the fossil fuel powered grid. Feeding out to the grid assumes a net environmental credit as the electricity will be consumed by a neighbouring consumer therefore reducing the demand on the grid.

By connecting the system to the grid electricity it produces that is not used onsite will feed back into the (predominantly fossil fuel fired grid). This can be thought of as offsetting the carbon associated with the materials used in constructing and maintaining the dwelling.

The embodied impacts of the solar PV system is included in the calculations.

eTool have assumed a conservative price of approximately \$3000/kW however recent quotes on projects suggest costs more in the range of \$1500-\$2000/kW. If the implementation of this strategy is outside of the project budget the developer may offer the strategy as an upgrade package for purchasers. This eliminates the need for upfront capital while promoting best practices and educating the public. Another option to save on upfront costs is to consider companies such as Amanda Energy (<https://amandaenergy.com.au/>) that rent your roof space to install solar PV while passing down the benefits to the tenant in the form of lower power bills.

Worst case panel dimensions 1070mm x 1685mm.



(Image source: www.forceofthesun.com)



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7.1.7 Water-wise gardens (minimise lawn/native plants)

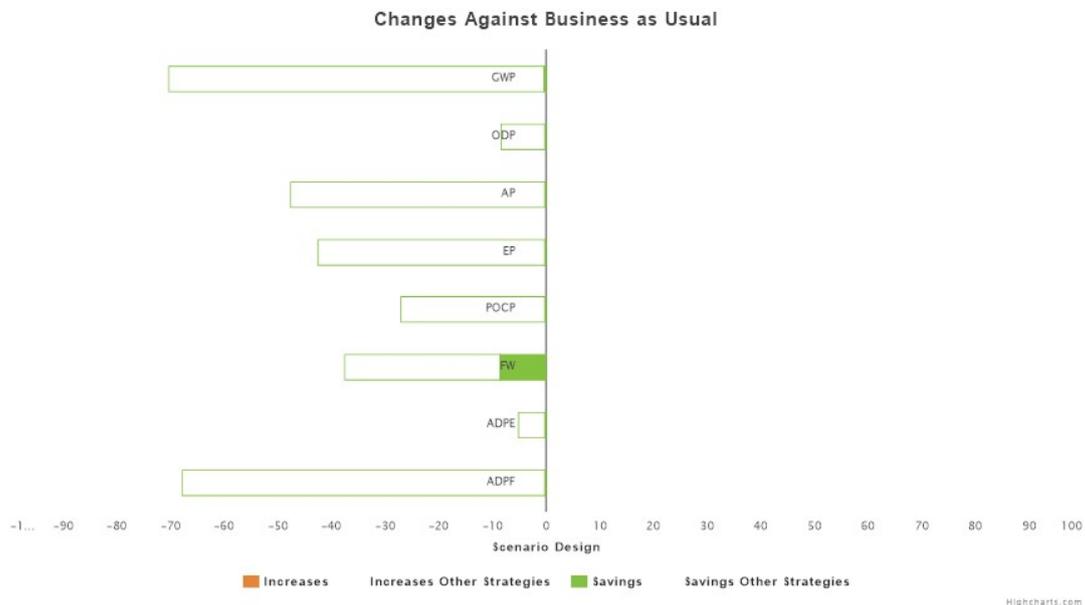


Figure 13: Impact savings (or increases) associated with the Water-wise gardens (minimise lawn/native plants) as a percentage of the base design.

Minimising lawn areas and planting native / drought-resistant plants only will ensure minimal water requirements for the landscape.

For this recommendation we have reduced lawn areas as per DA Drawings resulting in a reduction in irrigation water use. Assumed garden beds use 40% less water than lawns and no irrigation requirements on hard landscaping areas.



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7.1.8 Dripper Irrigation System (in place of sprays)

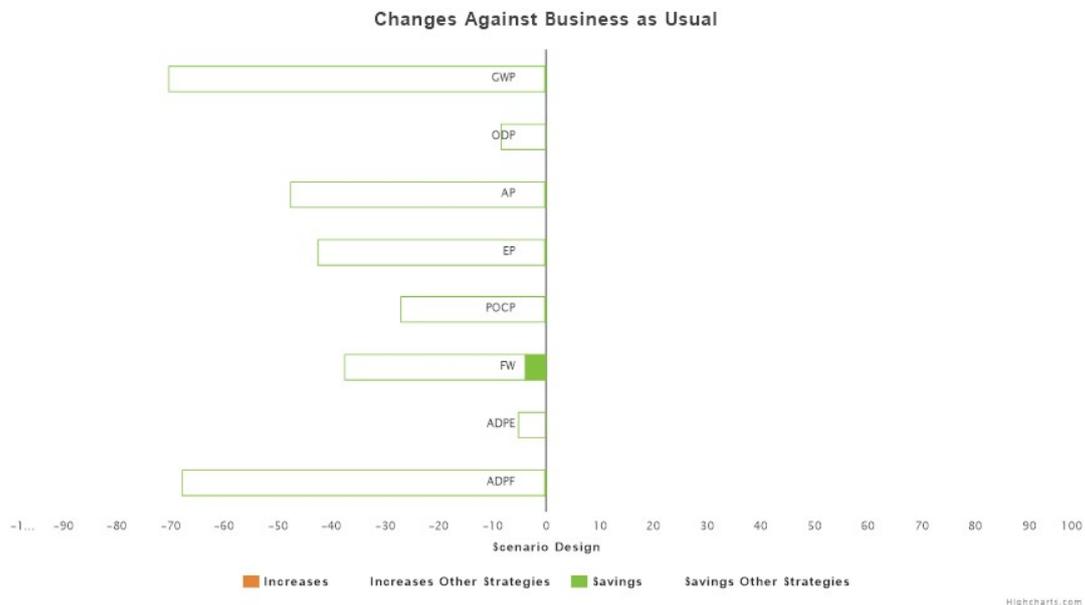


Figure 14: Impact savings (or increases) associated with the Dripper Irrigation System (in place of sprays) as a percentage of the base design.

Dripper irrigation saves between 20% and 50% of water use compared to conventional micro sprays. The savings are achieved due to a more direct application of water to the root zone and less evaporation. In modelling this strategy it is assumed a saving of 30% is achieved against 'business as normal' irrigation water use.



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7.1.9 2kL Rainwater Tank for Garden Irrigation Water

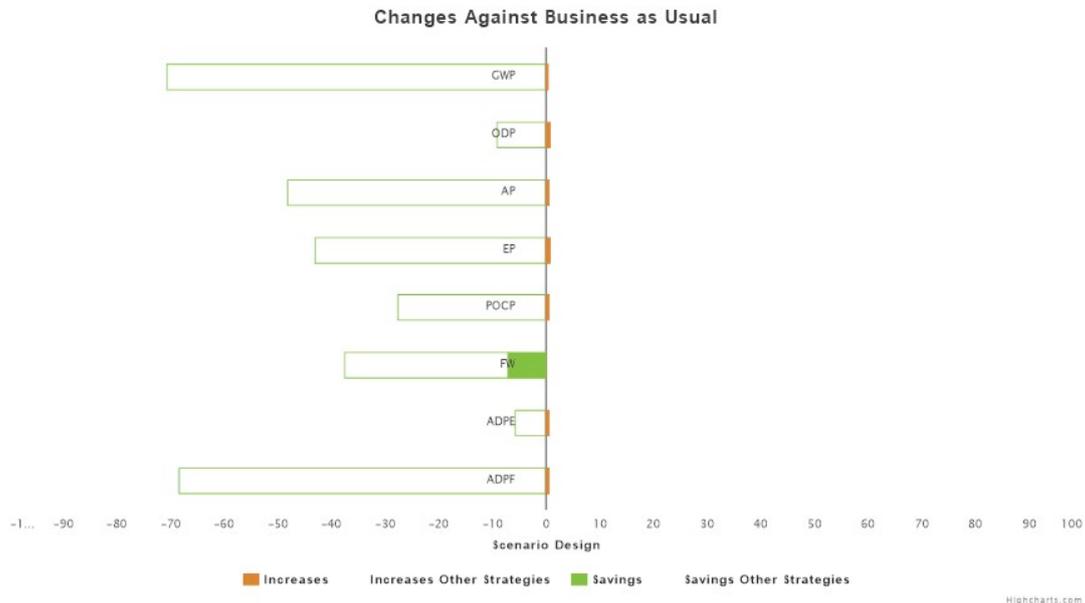
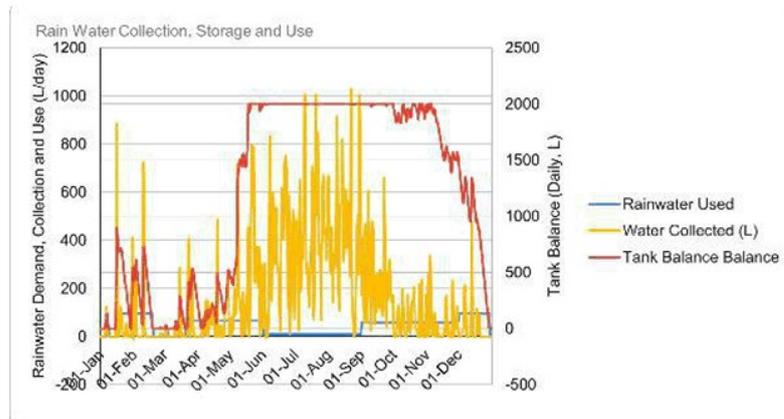


Figure 15: Impact savings (or increases) associated with the 2kL Rainwater Tank for Garden Irrigation Water as a percentage of the base design.

A rain water collection tank reduces water usage (laundry, toilets, outdoor) and water bills. It also reduces the load on storm water systems and reduces the need to build more store water dams.

Calculations are based on occupancy, roof size, storage capacity, size and type of garden. This strategy assumes the rainwater collected is used only for garden irrigation (25% of total water use). The 2kL tank supplies approximately 80% of the garden irrigation water use (see below collection, demand and use chart).



Further water savings could potentially be saved if rainwater is plumbed into the house for use in the toilets and laundry.



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(Image source: www.tankworks.com.au)



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7.1.10 Low Flow Shower Heads (7.5L/min)

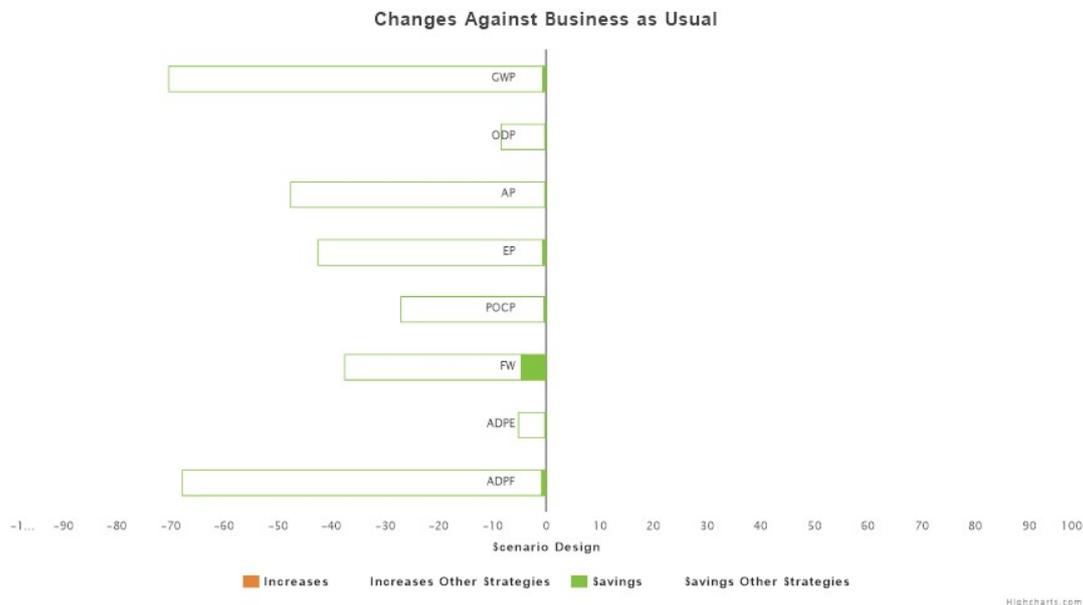


Figure 16: Impact savings (or increases) associated with the Low Flow Shower Heads (7.5L/min) as a percentage of the base design.

By specifying a 7.5L/min shower head, compared to a standard 9L/min, the total shower consumption is reduced by 17% and overall hot water consumption may be reduced by 11% assuming showering takes up 65% of the hot water use, leading to significant energy and water savings. It is recommended that tests are conducted to ensure the shower head chosen provides an adequate shower to avoid the tendency for residents to rip out the shower and replace with a less efficient model. Differentiation between products is based on the nominal flow rate @ 250kPa. However, flow rate measurements are made at 150kPa and 350kPa to determine the flow rate regulation across this pressure range. The shower heads also have to satisfy performance criteria, such as mean spray spread angle and temperature drop, while operating at lower flow rates.

The cost implications for this recommendation ranges from low to high depending on the manufacturer however the payback period is usually relatively quick. For example, the Methven shower head below from Pure Electric (4.5L/min or 5L/min) retails at \$135 at the point of writing and claims to have a 3 month payback period. The same manufacture will also be producing a 3L/min showerhead in the near future but for a higher retail price <http://etoolglobal.com/wp-content/uploads/2015/09/Low-flowSH.pdf>

Satisfying the technical requirements of AS 3662 enables the establishment of a rating based on the 'the average flow rate' as follows:

- more than 16L/min. or failing the performance requirement are nominated 0 star
- more than 12L/min. but not more than 16L/min. are nominated 1 star
- more than 9L/min. but not more than 12L/min. are nominated 2 star
- more than 7.5L/min. but not more than 9L/min. are nominated 3 star
- more than 6.0L/min. but not more than 7.5L/min. are nominated 3 star (including compliance with force of spray requirements) – to be 4 star but currently only 3 star available
- more than 4.5L/min. but not more than 6.0L/min. are nominated 3 star (including compliance with force of spray requirements) – to be 5 star but currently only 3 star available
- more than 4.5L/min. but not more than 6.0L/min. are nominated 3 star (including compliance with force of spray requirements and having bonus water saving features (e.g., a sensor with auto shut-off) – to be 6 star but currently only 3 star available



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(source: pure-electric.com.au/methven-kiri-satinjet-ultra-low-flow)



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7.1.11 Water efficient fixtures and fittings (Mixers and Toilets only)

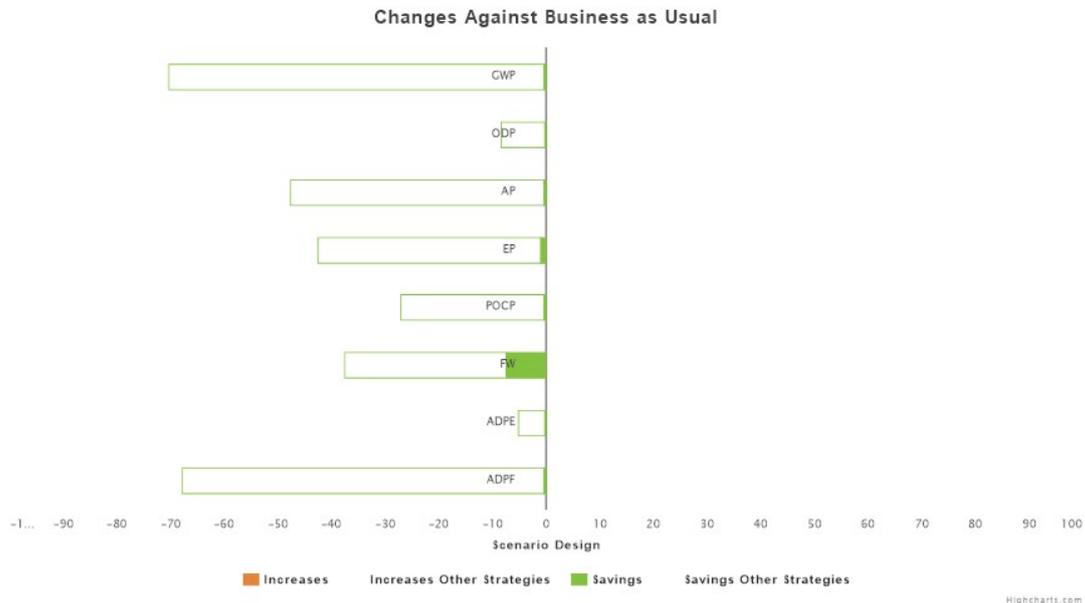


Figure 17: Impact savings (or increases) associated with the Water efficient fixtures and fittings (Mixers and Toilets only) as a percentage of the base design.

The highest WELS rated water fittings can achieve significant water savings compared to code compliant fittings:

- Basin Mixer: WELS 6 Star (50% water saving vs code compliant)
- Sink Mixer: WELS 6 Star (50% water saving vs code compliant)
- Toilet: WELS 4 Star 4.5L/ full flush and 3L/average flush (37.5% saving vs code complaint)
- Shower: Not defined
- Washing Machine: Not defined
- Dish Washer: Not Defined



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## 8 Conclusions

The Scenario Design shows an expected performance improvement against Business as Usual for 5 indicators.



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## 9 References

### 9.1 Background LCI Data

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### 9.2 Inventory - Design Documentation

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### 9.4 Environmental Product Declarations

No EPD references were recorded.



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## Appendix A: Environmental Indicators Description

### Global Warming Potential, GWP

Anthropogenic global warming is caused by an increase of greenhouse gasses (GHG) in the earth's atmosphere. These gasses reflect some of the heat radiated from the earth's surface that would normally escape into space back to the surface of the earth. Overtime this warms the earth. Common GHGs include CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub> and volatile organic compounds (VOCs). Global Warming Potential (GWP) is expressed in equivalent GHGs released, usually in kgCO<sub>2</sub>e.

### Ozone Depletion Potential, ODP

Ozone is formed and depleted naturally in the earth's stratosphere (between 15-40 km above the earth's surface). Halocarbon compounds are persistent synthetic halogen containing organic molecules that can reach the stratosphere leading to more rapid depletion of the ozone. As the ozone in the stratosphere is reduced more of the ultraviolet rays in sunlight can reach the earth's surface where they can cause skin cancer and reduced crop yields. Ozone Depletion Potential (ODP) is expressed in equivalent ozone depleting gasses (normally kgCFC11e).

### Acidification Potential for Soil and Water, AP

Acidification is a consequence of acids (and other compounds which can be transformed into acids) being emitted to the atmosphere and subsequently deposited in surface soils and water. Increased acidity can result in negative consequences for flora and fauna in addition to increased corrosion of manmade structures (buildings vehicles etc.). Acidification Potential (AP) is an indicator of such damage and is usually measured in kgSO<sub>2</sub>e

### Eutrophication potential, EP

Over enrichment of aquatic ecosystems with nutrients leading to increased production of plankton, algae and higher aquatic plants leading to a deterioration of the water quality and a reduction in the value and/or the utilisation of the aquatic ecosystem. Eutrophication is primarily caused by surplus nitrogen and phosphorus. Sources of nutrients include agriculture (fertilisers and manure), aquaculture, municipal wastewater, and nitrogen oxide emissions from fossil fuel combustion.

### Photochemical Ozone Creation Potential, POCP

Photochemical Ozone Creation Potential (POCP), commonly known as smog, is toxic to humans in high concentration. Although ozone is protective in the stratosphere at low levels it is problematic from both a health and nuisance perspective. Plant growth is also effected through damaged leaf surfaces and reduced photosynthesis. POCP is formed when sunlight and heat react with Volatile Organic Compounds (VOCs).

### Abiotic Depletion Potential - Elements, ADPE

Abiotic Resource Depletion of energy (ADPE) is a measure of the extraction and consumption of primary resources from the earth. Such exploitation reduces resources available to future generations and as such must be managed.

### Abiotic Depletion Potential - Fossil Fuels, ADPF

Abiotic Resource Depletion of energy (ARDE) is a measure of the extraction and consumption of non-renewable energy sources (primarily fossil fuels, but also inclusive of other energy sources such as uranium). Primary energy content of non-renewable energy sources including the embodied energy to extract, process and deliver the non renewable fuels, or manufacture, transport and install the renewable generator. Hence there is usually and non-renewable energy content associated with renewable fuels also.

### Net use of fresh water, FW

The pressure on global freshwater resources arises from the demand for everyday goods and services which use water in their production. The interconnected nature of global economic systems means that water abstraction can occur far from where final consumption occurs. Globally, water use has been increasing at more than twice the rate of population growth, and most withdrawals are in watersheds already experiencing water stress. Managing water resources is extremely important for the health of the environment and our current and future agricultural, industrial and personal water requirements. Fresh water can be derived from renewable sources (rain water) and somewhat non-renewable resources (aquifers). Consumptive water (H<sub>2</sub>O C) use is abstracted water that is no longer available for other uses because it has evaporated, transpired, been incorporated into products and crops, or consumed by man or livestock.



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Appendix B: Detailed Structure Scope Diagram

Key: ✓ In Scope, In Design ✓ In Scope, Not In Design ✓ Partial ✗ Out of Scope

Parent Name	Sub Category Name	Benchmark Design	Scenario Design
Substructure	Substructure	✓	✓
	Standard foundations	✓	✓
	Specialist foundations	✓	✓
	Lowest floor construction	✓	✓
	Insulation	✓	✓
	Basement excavation	✓	✓
	Basement retaining walls	✓	✓
	Superstructure	Frame	✓
Frame		✓	✓
Upper floors		✓	✓
Floors		✓	✓
Insulation		✓	✓
Balconies		✓	✓
Drainage to balconies		✓	✓
Roof		✓	✓
Insulation		✓	✓
Roof structure		✓	✓
Roof coverings		✓	✓
Specialist roof systems		✓	✓
Roof drainage		✓	✓
Rooflights, skylights and openings		✓	✓
Roof features		✗	✗
Stairs and ramps		✓	✓
Stair/ramp structures		✓	✓
Stair/ramp finishes		✓	✓
Stair/ramp balustrades and handrails		✓	✓
Ladders/chutes/slides		✓	✓
External walls		✓	✓
External Paint, Textures and Renders		✓	✓
External enclosing walls above ground level		✓	✓
Insulation		✓	✓
External enclosing walls below ground level		✓	✓
Solar/rain screening		✓	✓
External soffits		✓	✓
Subsidiary walls, balustrades and proprietary balconies		✓	✓
Façade access/cleaning systems		✓	✓
Windows and external doors		✓	✓
External windows		✓	✓
Security and Fly Screens		✓	✓
External doors		✓	✓
Internal walls and partitions		✓	✓
Walls and partitions		✓	✓
Insulation		✓	✓
Balustrades and handrails		✓	✓
Moveable room dividers		✓	✓
Cubicles		✓	✓
Internal doors		✓	✓
Internal doors		✓	✓
Internal finishes		Wall finishes	✓
	Wall finishes	✓	✓
	Cornices & Shadowlines	✓	✓
	Paint - Walls	✓	✓
	Wet Area Walls	✓	✓
	Floor finishes	✓	✓
	Finishes to floors	✓	✓
	Wet Area Floors	✓	✓
Raised access floors	✓	✓	



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Parent Name	Sub Category Name	Benchmark Design	Scenario Design
Fittings, furnishings and equipment	Ceiling finishes	✓	✓
	Finishes to ceilings	✓	✓
	False ceilings	✓	✓
	Demountable suspended ceilings	✓	✓
	Fittings, furnishings and equipment	✓	✓
	General fittings, furnishings and equipment	✓	✓
	Domestic kitchen fittings and equipment	✓	✓
	Special purpose fittings, furnishings and equipment	✗	✗
	Signs/notices	✗	✗
	Works of art	✗	✗
	Non-mechanical and non-electrical equipment	✗	✗
	Internal planting	✗	✗
	Bird and vermin control	✗	✗
	Services equipment	Sanitary installations	✓
Sanitary appliances		✓	✓
Sanitary ancillaries		✓	✓
Services equipment		✓	✗
Services equipment		✓	✗
Disposal installations		✓	✓
Foul drainage above ground		✓	✓
Chemical, toxic and industrial liquid waste disposal		✗	✗
Refuse disposal		✓	✓
Water installations		✓	✓
Mains water supply		✓	✓
Cold water distribution		✓	✓
Hot water distribution		✓	✓
Local hot water distribution		✓	✓
Steam and condensate distribution		✗	✗
Heat source		✓	✓
Heat source		✓	✓
Space heating and air conditioning		✓	✓
Central heating		✓	✓
Local heating		✓	✓
Central cooling		✓	✓
Local cooling		✓	✓
Central heating and cooling		✓	✓
Local heating and cooling		✓	✓
Central air conditioning		✓	✓
Local air conditioning		✓	✓
Ventilation systems		✓	✓
Central ventilation		✓	✓
Local and special ventilation		✓	✓
Smoke extract/control		✓	✓
Electrical installations		✓	✓
Electric mains and sub-mains distribution		✓	✓
Power installations		✓	✓
Lighting installations		✓	✓
Specialist lighting installations		✓	✓
Local electricity generation systems		✓	✓
Earthing and bonding systems		✓	✓
Fuel installations		✗	✗
Fuel storage		✗	✗
Fuel distribution systems		✗	✗
Lift and conveyor installations		✓	✓
Lifts and enclosed hoists		✓	✓
Escalators		✓	✓
Moving pavements		✓	✗
Powered stairlifts		✗	✗
Conveyors		✗	✗
Dock levellers and scissor lifts		✗	✗



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Parent Name	Sub Category Name	Benchmark Design	Scenario Design
	Cranes and unenclosed hoists	X	X
	Car lifts, car stacking systems, turntables and the like	X	X
	Document handling systems	✓	✓
	Other lift and conveyor installations	✓	✓
	Fire and lightning protection	X	✓
	Fire-fighting systems	X	✓
	Fire suppression systems	X	✓
	Lightning protection	X	✓
	Communication, security and control systems	✓	✓
	Communication systems	✓	✓
	Security systems	✓	✓
	Central control/building management systems	✓	✓
	Specialist installations	✓	✓
	Specialist piped supply installations	X	X
	Specialist refrigeration systems	X	X
	Specialist mechanical installations	X	X
	Specialist electrical/electronic installations	X	X
	Water features	X	X
	Civil Engineering Structure	✓	✓
	Builder's Work in Connection (BWIC) with Services	X	X
	BWIC with services	X	X
Prefabricated buildings and building units	Prefabricated buildings and building units	X	X
	Complete buildings	X	X
	Building units	X	X
	Pods	X	X
Work to existing building	Minor demolitions and alterations	X	X
	Minor Demolitions and Alterations	X	X
	Repairs to existing services	X	X
	Repairs to existing services	X	X
	Damp proof course/fungus and beetle eradication	X	X
	Damp Proof Course/Fungus and Beetle Eradication	X	X
	Façade Retention	X	X
	Façade Retention	X	X
	Cleaning Existing Surfaces	X	X
	Cleaning Existing Surfaces	X	X
	Renovation work	X	X
	Renovation Work	X	X
External works	Site preparation works	✓	✓
	Site clearance	✓	✓
	Preparatory groundworks	✓	✓
	Roads, paths and pavings	✓	✓
	Roads, paths and pavings	✓	✓
	Special surfacings and pavings	✓	✓
	Soft landscaping, planting and irrigation systems	✓	✓
	Seeding and turfing	✓	✓
	External planting	✓	✓
	Irrigation systems	✓	✓
	Fencing, railings and walls	✓	✓
	Fencing and railings	✓	✓
	Walls and screens	✓	✓
	Retaining walls	✓	✓
	Barriers and guardrails	✓	✓
	External fixtures	X	X
	Site/street furniture and equipment	X	X
	Ornamental features	X	X
	External drainage	✓	✓
	Surface water and foul water drainage	X	X
	Ancillary drainage systems	X	X
	External chemical, toxic and industrial liquid waste drainage	X	X
	Land drainage	✓	✓



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Parent Name	Sub Category Name	Benchmark Design	Scenario Design
	External services	✓	✓
	Water mains supply	✓	✓
	Electricity mains supply	✓	✓
	External transformation devices	✓	✓
	Electricity distribution to external plant and equipment	✓	✓
	Gas mains supply	✓	✓
	Telecommunications and other communication system connections	✓	✓
	External fuel storage and piped distribution systems	✓	✓
	External security systems	✓	✓
	External/street lighting systems	✓	✓
	Local/district heating installations	✓	✓
	BWIC with external services	✓	✓
	Minor building works and ancillary buildings	✗	✗
	Minor building works	✗	✗
	Ancillary buildings and structures	✗	✗
	Underpinning to external site boundary walls	✗	✗
Facilitating works	Toxic/hazardous/contaminated material treatment	✗	✗
	Toxic/hazardous material removal	✗	✗
	Contaminated land	✗	✗
	Eradication of plant growth	✗	✗
	Major demolition works	✓	✗
	Demolition works	✓	✗
	Soft strip works	✓	✗
	Temporary support to adjacent structures	✗	✓
	Temporary support to adjacent structures	✗	✓
	Specialist groundworks	✗	✓
	Site dewatering and pumping	✗	✓
	Soil stabilisation measures	✗	✓
	Ground gas venting measures	✗	✗
	Temporary diversion works	✗	✗
	Temporary diversion works	✗	✗
	Extraordinary site investigation	✗	✗
	Archaeological investigation	✗	✗
	Reptile/wildlife mitigation measures	✗	✗
	Other extraordinary site investigation	✗	✗
Project/design team	Consultants	✓	✓
	Planning & Approvals	✓	✓
	Main contractor's pre-construction design	✓	✓
	Project Management	✓	✓
	Main contractor's design	✓	✓
	Sales and Marketing	✓	✓
Undefined			



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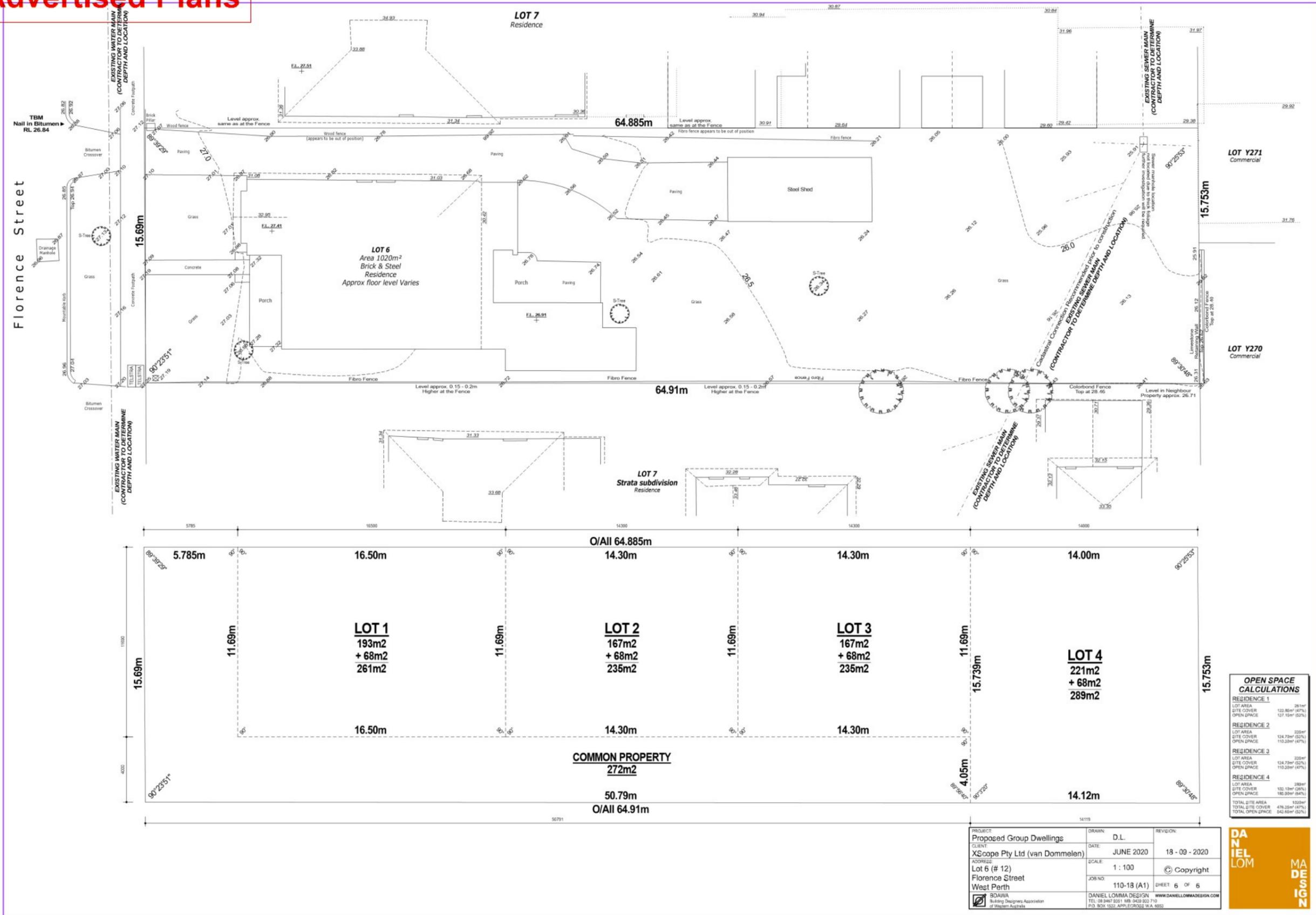




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**Advertised Plans**



**OPEN SPACE CALCULATIONS**

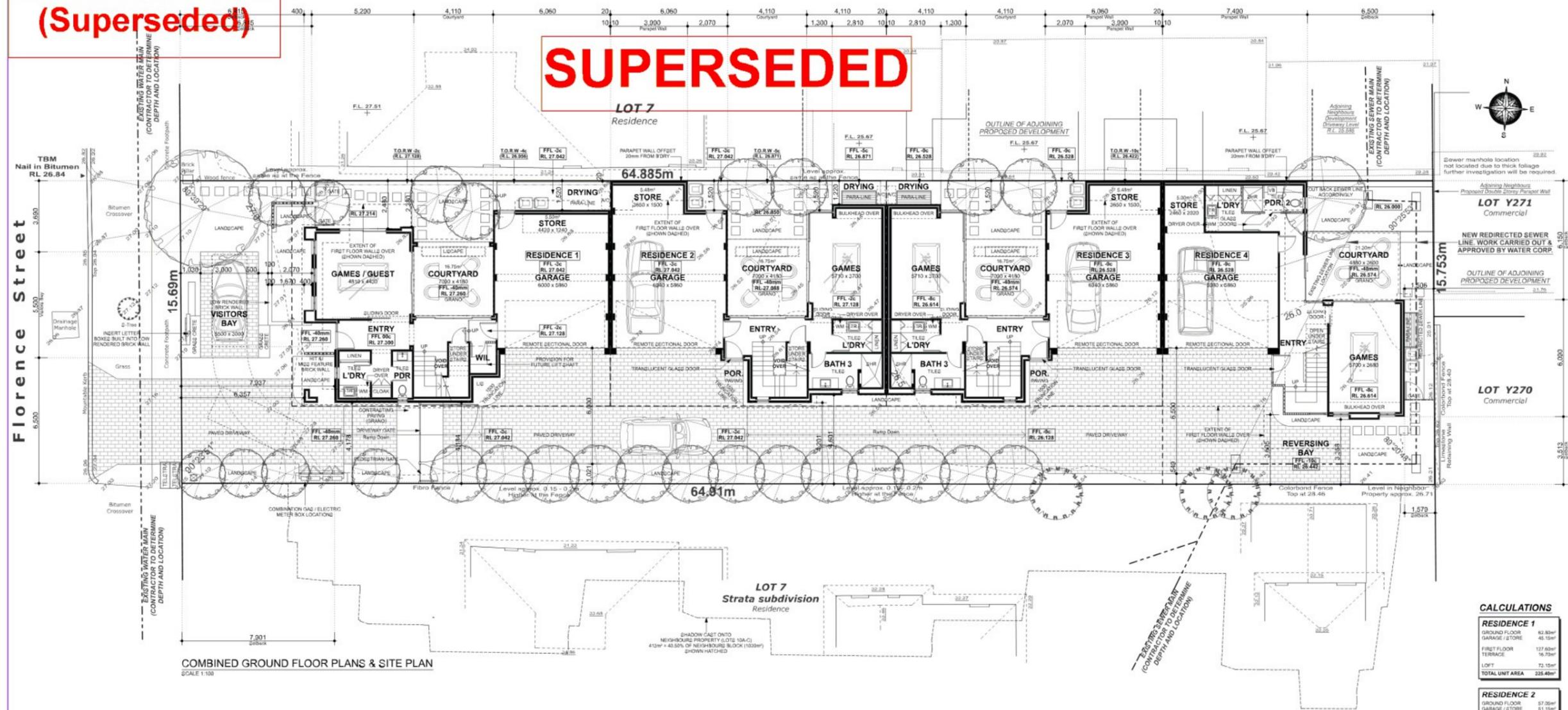
RESIDENCE 1	RESIDENCE 2	RESIDENCE 3	RESIDENCE 4
LOT AREA 261m <sup>2</sup>	LOT AREA 235m <sup>2</sup>	LOT AREA 235m <sup>2</sup>	LOT AREA 289m <sup>2</sup>
SITE COVER 133.80m <sup>2</sup> (51%)	SITE COVER 134.79m <sup>2</sup> (57%)	SITE COVER 134.79m <sup>2</sup> (57%)	SITE COVER 133.19m <sup>2</sup> (46%)
OPEN SPACE 127.19m <sup>2</sup> (49%)	OPEN SPACE 110.20m <sup>2</sup> (47%)	OPEN SPACE 110.20m <sup>2</sup> (47%)	OPEN SPACE 155.80m <sup>2</sup> (54%)
<b>TOTAL SITE AREA 1020m<sup>2</sup></b>	<b>TOTAL SITE COVER 476.28m<sup>2</sup> (47%)</b>	<b>TOTAL SITE COVER 476.28m<sup>2</sup> (47%)</b>	<b>TOTAL SITE COVER 476.28m<sup>2</sup> (47%)</b>
<b>TOTAL OPEN SPACE 543.72m<sup>2</sup> (53%)</b>			

PROJECT: Proposed Group Dwellings	DRAWN: D.L.	REVISION:
CLIENT: XScope Pty Ltd (van Dommelen)	DATE: JUNE 2020	18 - 09 - 2020
ADDRESS: Lot 6 (# 12) Florence Street West Perth	SCALE: 1 : 100	© Copyright
JOB NO: 110-18 (A1)	SHEET: 6 OF 6	
BDAWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 94 247 2211 MR 9423 222 F10 P.O. BOX 1032 APPA CRESNIE W.A. 6002	WWW.DANIELLOMMADESIGN.COM



**Advertised Plans  
(Superseded)**

**SUPERSEDED**



COMBINED GROUND FLOOR PLANS & SITE PLAN  
SCALE 1:100

**CALCULATIONS**

RESIDENCE 1	
GROUND FLOOR	62.80m <sup>2</sup>
GARAGE + STORE	46.15m <sup>2</sup>
FIRST FLOOR	117.80m <sup>2</sup>
TERRACE	16.75m <sup>2</sup>
LOFT	72.15m <sup>2</sup>
<b>TOTAL UNIT AREA</b>	<b>315.45m<sup>2</sup></b>

RESIDENCE 2	
GROUND FLOOR	57.25m <sup>2</sup>
GARAGE + STORE	31.15m <sup>2</sup>
FIRST FLOOR	132.20m <sup>2</sup>
TERRACE	16.75m <sup>2</sup>
LOFT	64.00m <sup>2</sup>
<b>TOTAL UNIT AREA</b>	<b>311.75m<sup>2</sup></b>

RESIDENCE 3	
GROUND FLOOR	57.25m <sup>2</sup>
GARAGE + STORE	31.15m <sup>2</sup>
FIRST FLOOR	132.20m <sup>2</sup>
TERRACE	16.75m <sup>2</sup>
LOFT	64.00m <sup>2</sup>
<b>TOTAL UNIT AREA</b>	<b>311.75m<sup>2</sup></b>

RESIDENCE 4	
GROUND FLOOR	57.25m <sup>2</sup>
GARAGE + STORE	42.35m <sup>2</sup>
FIRST FLOOR	118.20m <sup>2</sup>
TERRACE	22.40m <sup>2</sup>
LOFT	62.75m <sup>2</sup>
<b>TOTAL UNIT AREA</b>	<b>305.95m<sup>2</sup></b>

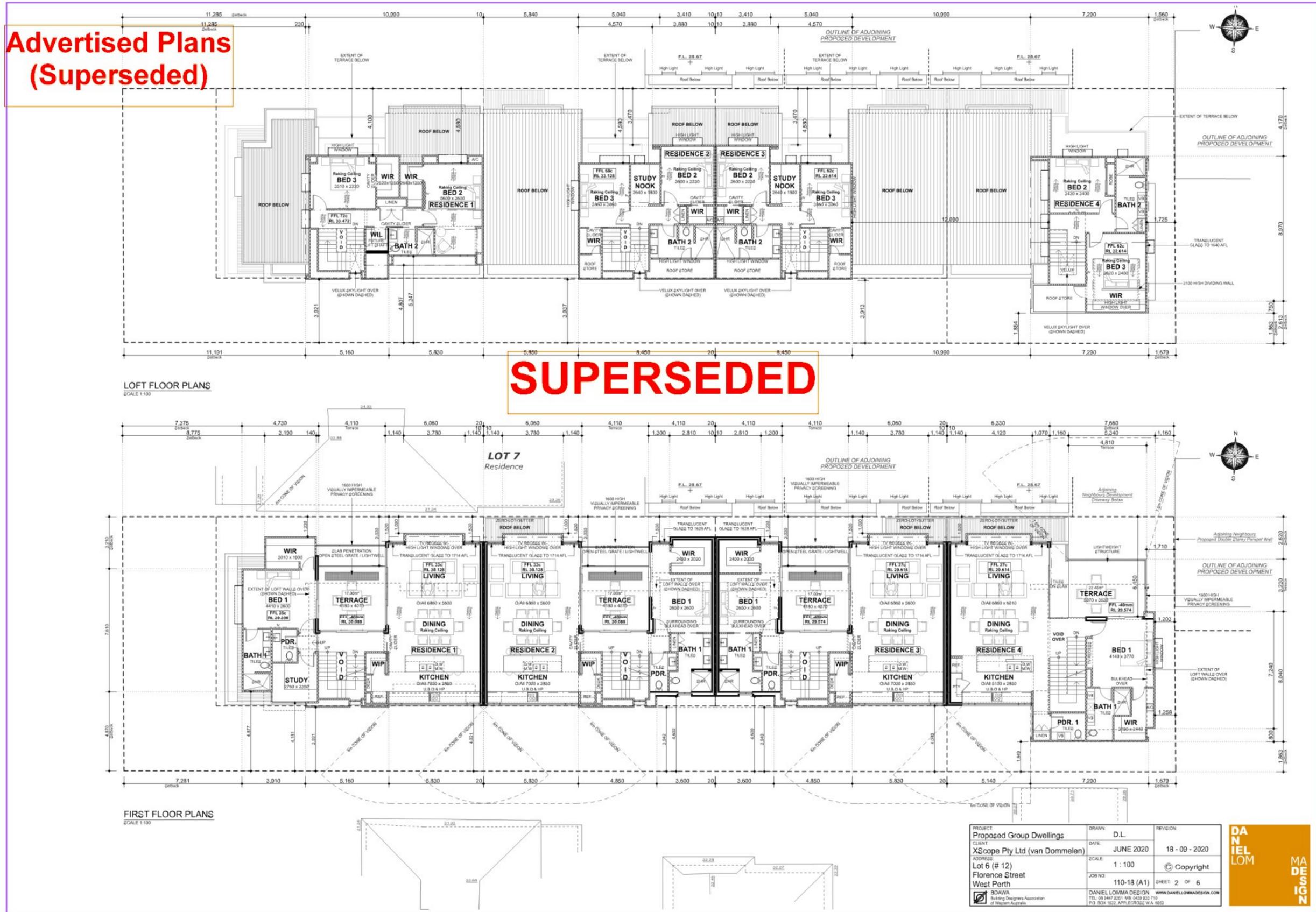
  

<b>SITE AREA</b>	<b>1828m<sup>2</sup></b>
<b>SITE COVER</b>	<b>478m<sup>2</sup> (26%)</b>
<b>OPEN SPACE</b>	<b>1350m<sup>2</sup> (74%)</b>

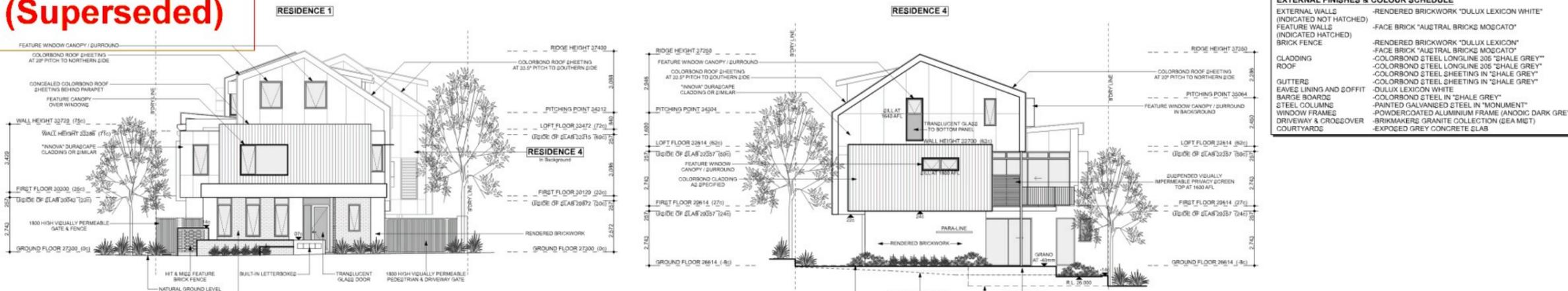


PROJECT	Proposed Group Dwellings	DRAWN	D.L.	REVISION	
CLIENT	XScope Pty Ltd (van Dommelen)	DATE	JUNE 2020		18 - 09 - 2020
ADDRESS	Lot 6 (# 12) Florence Street West Perth	SCALE	1 : 100		© Copyright
JOB NO.	110-18 (A1)	SHEET	1 OF 6		
BDAWA	Building Designers Association of Western Australia	DANIEL LOMMA DESIGN	WWW.DANIELLOMMADESIGN.COM		





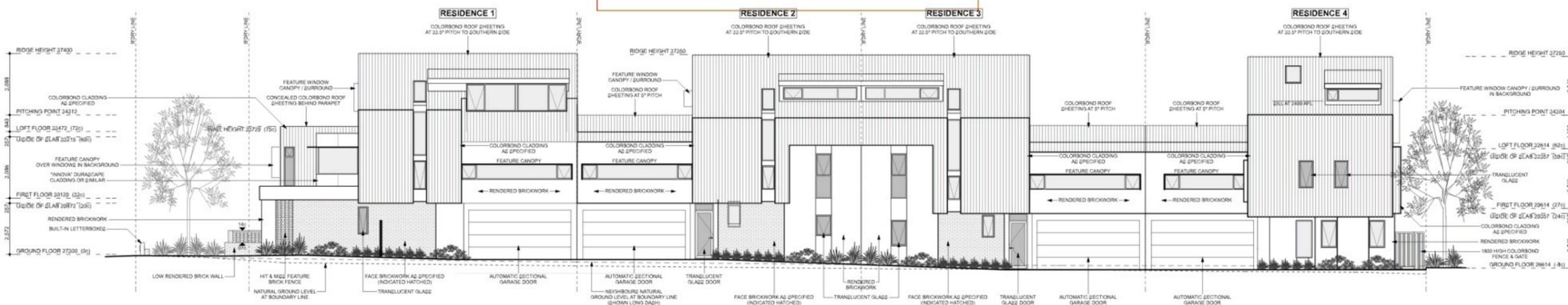
**Advertised Plans  
(Superseded)**



**EXTERNAL FINISHES & COLOUR SCHEDULE**

EXTERNAL WALLS (INDICATED NOT HATCHED)	- RENDERED BRICKWORK "DULUX LEXICON WHITE"
FEATURE WALLS (INDICATED HATCHED)	- FACE BRICK "AUSTRAL BRICKS MOSCATO"
BRICK FENCE	- RENDERED BRICKWORK "DULUX LEXICON"
CLADDING ROOF	- FACE BRICK "AUSTRAL BRICKS MOSCATO"
ROOF	- COLORBOND STEEL LONGLINE 305 "SHALE GREY"
GUTTERS	- COLORBOND STEEL SHEETING IN "SHALE GREY"
EAVES LINING AND SOFFIT	- COLORBOND STEEL SHEETING IN "SHALE GREY"
BARGE BOARDS	- DULUX LEXICON WHITE
STEEL COLUMNS	- COLORBOND STEEL IN "SHALE GREY"
WINDOW FRAMES	- PAINTED GALVANISED STEEL IN "MONUMENT"
DRIVEWAY & CROSSOVER	- POWDERCOATED ALUMINIUM FRAME (ANODIC DARK GREY)
COURTYARDS	- BRIMMAKERS GRANITE COLLECTION (SEA MIST)
	- EXPOSED GREY CONCRETE SLAB

**SUPERSEDED**



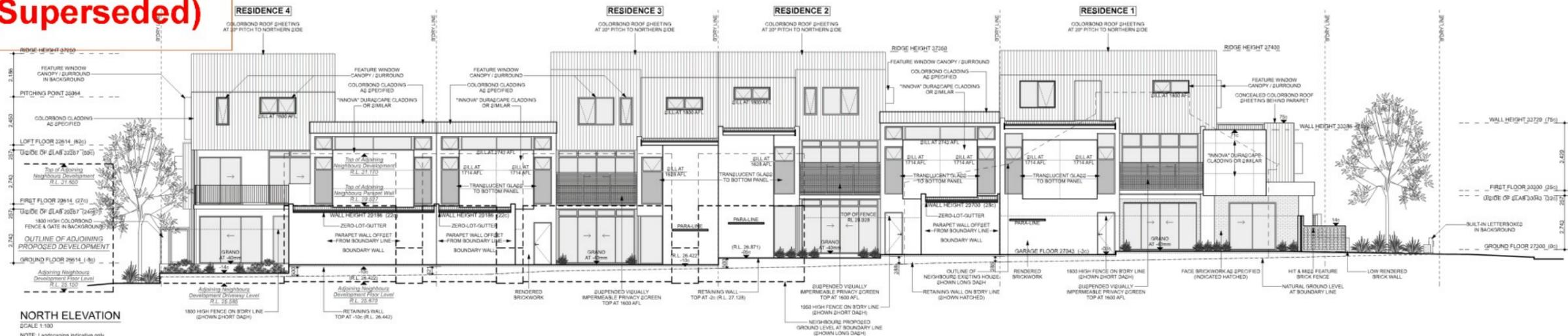
**SOUTH ELEVATION**  
SCALE 1:100  
NOTE: Landscaping indicative only



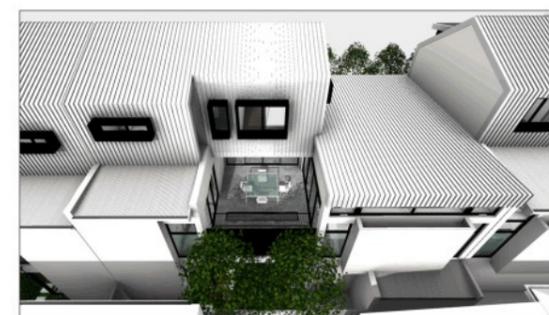
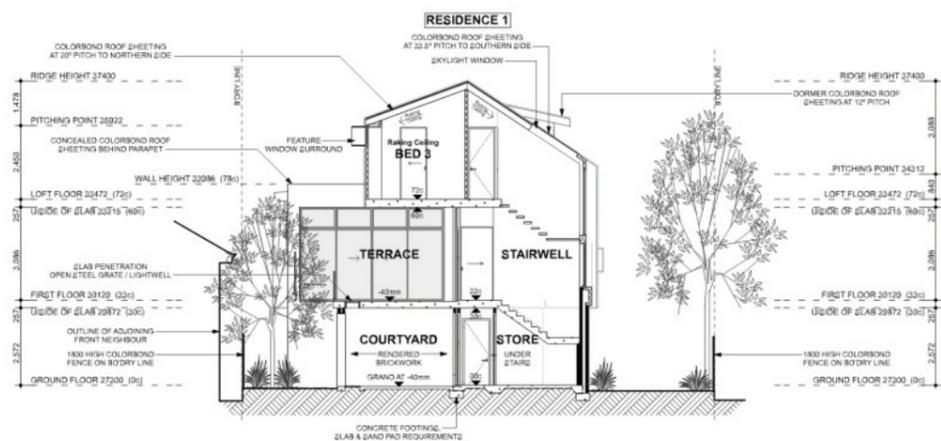
PROJECT	Proposed Group Dwellings	DRAWN	D.L.	REVISION	
CLIENT	XScope Pty Ltd (van Dommelen)	DATE	JUNE 2020	18 - 09 - 2020	
ADDRESS	Lot 6 (# 12) Florence Street West Perth	SCALE	1 : 100	© Copyright	
JOB NO.	110-18 (A1)	SHEET	3 OF 6		
BOAWA Building Designers Association of Western Australia		DANIEL LOMMA DESIGN TEL: 81 947 8221 MOB: 9423 822 719 P.O. BOX 1032 APPIN CROSSLANDS W.A. 6003			



**Advertised Plans  
(Superseded)**



**SUPERSEDED**



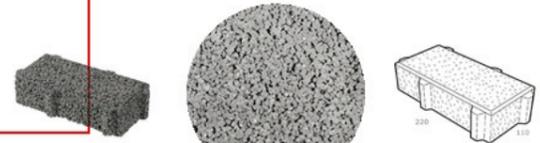
PROJECT Proposed Group Dwellings	DRAWN D.L.	REVISION
CLIENT XScope Pty Ltd (van Dommelen)	DATE JUNE 2020	18 - 09 - 2020
ADDRESS Lot 6 (# 12) Florence Street West Perth	SCALE 1 : 100	© Copyright
JOB NO. 110-18 (A1)	SHEET 4 OF 6	
BOAWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 81 847 3321 A/B: 3403 510 P.O. BOX 1032 APRIL CROSSLAND W.A. 6003	WWW.DANIELLOMMADESIGN.COM



# Advertised Plans

## LEGEND

- 1 Existing tree and grass verge to be retained and reinstate where necessary.
- 2 Small size tree with combination of native shrubs and groundcovers giving sense of welcoming to the main entrance.
- 3 Well trimmed hedges and tree planting along the driveway creating visual interest to the driveway.
- 4 Narrow and upright form tree such as *Pyrus calleryana* along the driveway ramp providing formal look as well as a buffer to adjacent property.
- 5 Lower courtyard to be filled with shade tolerant plants such as *Philodendron* and *Rhapis excelsa* to create unique feature to dwelling entry area.
- 6 Design intent to create a lush and colorful garden with mix of native and exotic species.
- 7 Tree planting in 1.2-1.5m high removable soakwell concrete case to be proposed as above ground planter providing more tree canopy cover at the rear property.



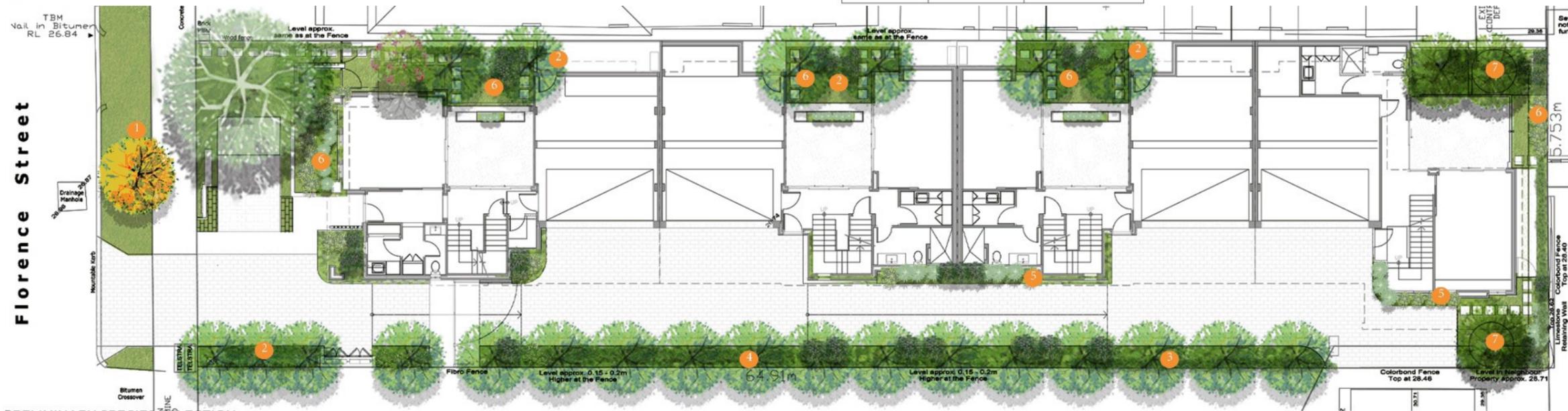
PERMEABLE PAVERS PRODUCTS : BRIKMAKERS PermaDrain 220 x 110 x 60mm or similar.

## SPP7.3 COMPLIANCE CRITERIA

SITE AREA SPP7.3	MIN. DSA SPP 7.3	MIN. TREES SPP7.3
Less than 700m <sup>2</sup>		1 medium tree plus small trees to suit area
700-1000m <sup>2</sup>		2 medium trees OR 1 large tree and small trees to suit area
Greater than 1000m <sup>2</sup>	10% OR 7% trees retained (% site area)	1 large tree and 1 medium tree for each additional 400m <sup>2</sup> in excess of 1000m <sup>2</sup> OR 1 large tree for each additional 900m <sup>2</sup> in excess of 1000m <sup>2</sup> and small trees to suit area

## LANDSCAPE DESIGN INTENT

- All planting beds are to be fully irrigated and operated off a timed controller with rain sensor shut-off.
- Irrigation design to comply with waterwise design principles and the City's Street Verge Guidelines. Detailed irrigation plan to be provided at building license stage.
- Water efficient irrigation system to be installed to best WSUD practice, using hydro-zoning and water harvesting principals where appropriate.
- Additional waterwise design principles employed:
  - > Low water use plant selection suited to the local soil complex.
  - > Complete omission of water intensive turf areas.
  - > Water retention soil preparation.
  - > Reduction in soil water loss through prescribing course mulch.
- Proposed plant distribution rate 4 per m<sup>2</sup>.
- Proposed plant pot sizes:
  - > Small Tree 100L
  - > Medium 200L
  - > Large Tree 500L
  - > Shrubs/groundcovers 140mm-200mm



## PRELIMINARY SPECIES SELECTION

### TREES



Gleditsia thademaster    Sapium sebiferum



Pyrus calleryana    Lagerstroemia indica

### SHRUBS / GROUNDCOVERS



Adenanthos cuneatus    Alyogyne huegii    Casuarina 'Cousin It'    Correa alba    Dampiera linearis    Dianella 'Casse Blue'    Eremophila glabra    Grevillea cherry cluster    Liriope muscari



Murraya paniculata    Philodendron xanadu    Pittosporum miss muffet    Rhapis excelsa    Senecio serpens    Tecoma capensis    Trachelospermum jasminoides    Viburnum tinus    Westringia Grey Box

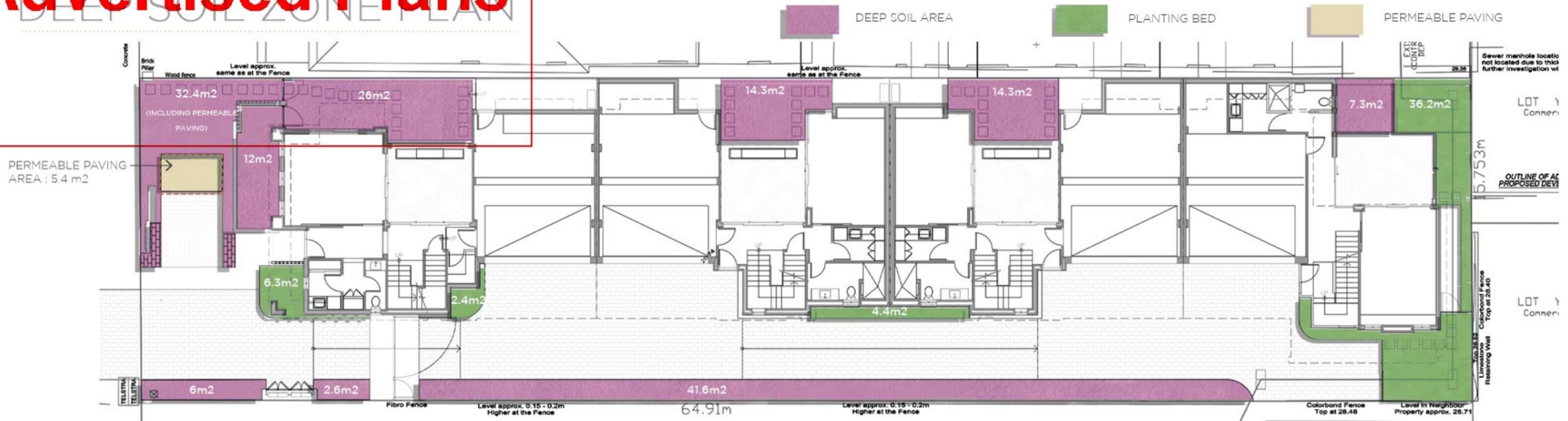


AUTHOR: JR    Q.A: RB    PROJECT #: 11578-FLO    1:200 @ A3

LOT 6 FLORENCE STREET - WEST  
LANDSCAPE CONCEPT

SK01-C

# Advertised Plans



## LANDSCAPE AREA SUMMARIES

TOTAL SITE AREA	: 1020 m <sup>2</sup>
DEEP SOIL AREA REQUIREMENT	: 153 m <sup>2</sup> (15 % FROM TOTAL SITE AREA)
SITE DEEP SOIL AREA	: 156.5 m <sup>2</sup> (15.3%)
SITE CANOPY COVERAGE	: 305 m <sup>2</sup> (30%)



**PROPOSED TREE 1 - LARGE**  
 GLEDITSIA TRICHANTOS  
 MATURE CANOPY COVER :  
 15 Dia.  
 MATURE HEIGHT : 8m - 12m



**PROPOSED TREE 2 - SMALL**  
 PYRUS CALLERYANA  
 MATURE CANOPY COVER :  
 5 Dia.  
 MATURE HEIGHT : 7m - 10m

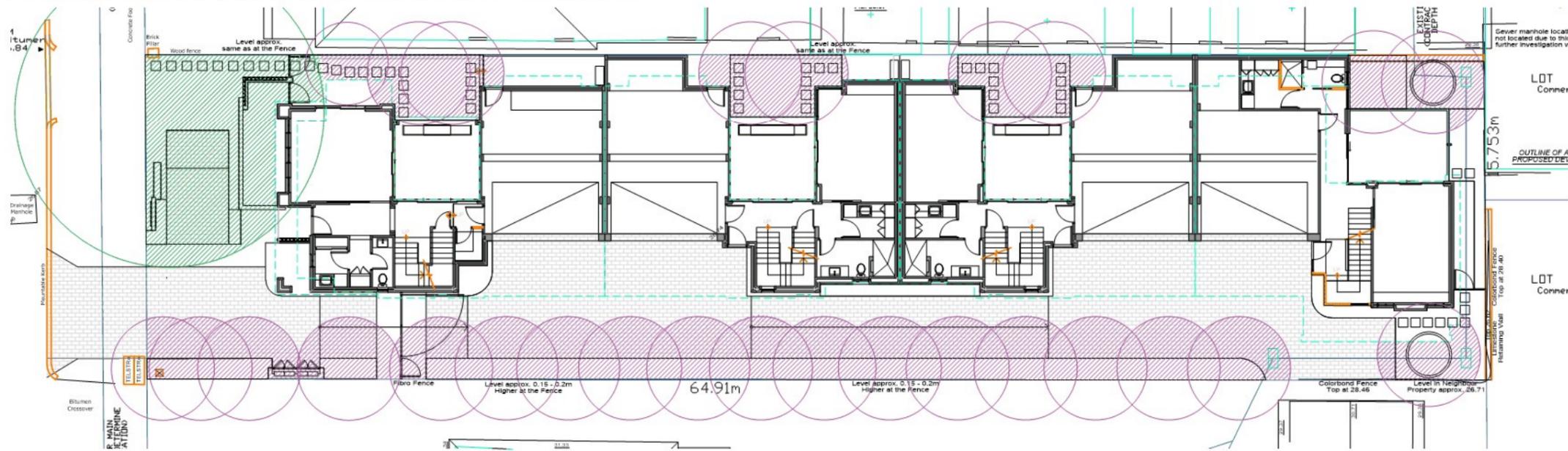


**PROPOSED TREE 3 - MEDIUM**  
 SAPIUM SEBIFERUM/  
 PLUMERIA RUBRA  
 MATURE CANOPY COVER :  
 5-6 Dia.  
 MATURE HEIGHT : 3m - 9m



**PROPOSED TREE 4 - SMALL**  
 LAGERSTROEMIA INDICA  
 MATURE CANOPY COVER :  
 4 Dia.  
 MATURE HEIGHT : 3m - 6m

## TREE CANOPY COVER PLAN



AUTHOR: JR Q.A: RB

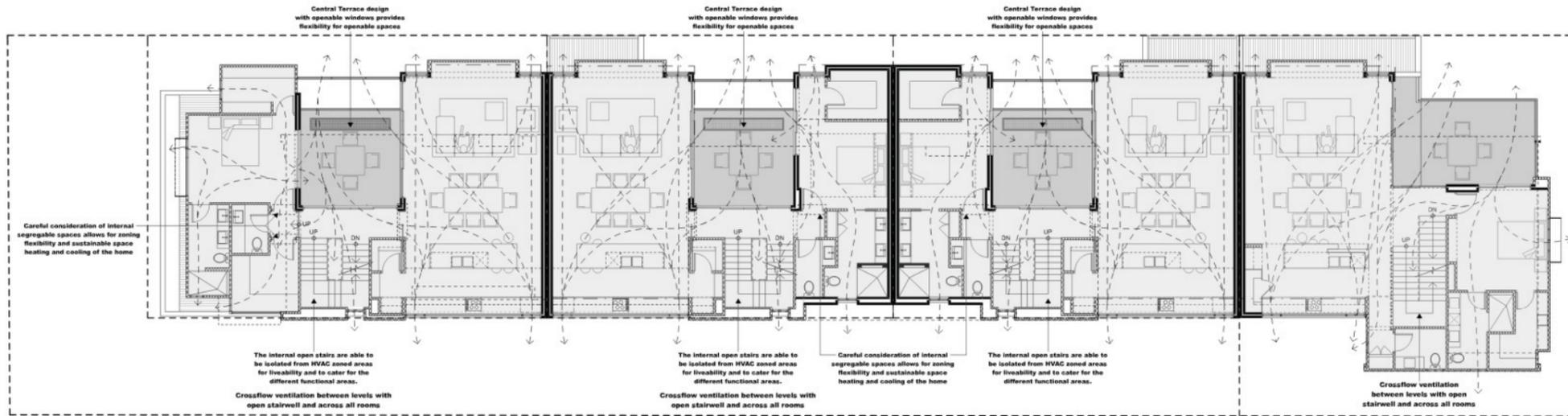
PROJECT #: 11578-FLO

1:200 @ A3

LOT 6 FLORENCE STREET - WEST PERTH  
 LANDSCAPE CONCEPT

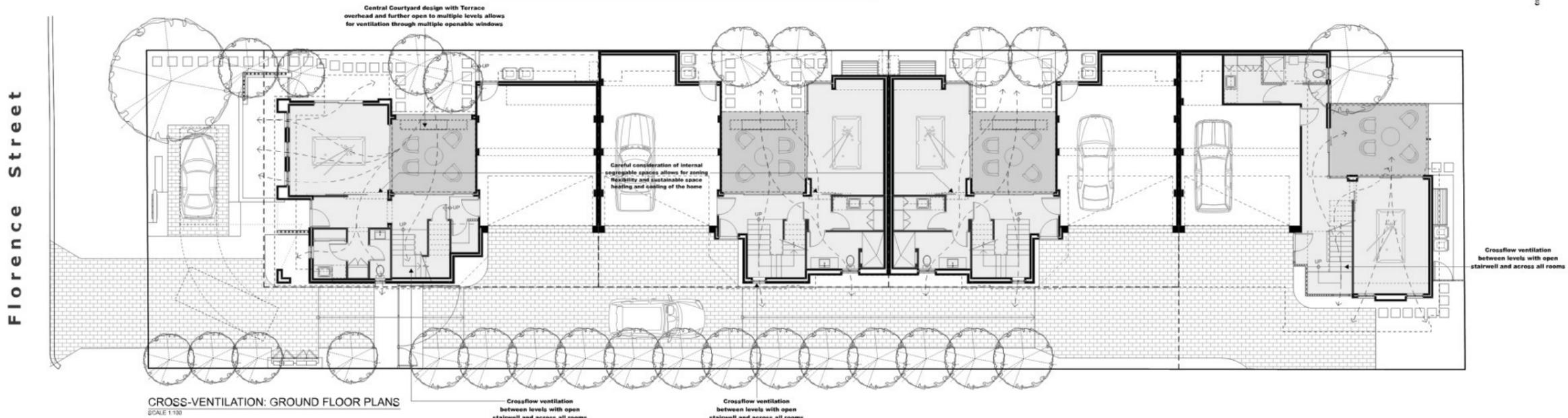
SK02-C

Advertised Plans



CROSS-VENTILATION: FIRST FLOOR PLANS  
SCALE 1:100

**SUPERSEDED**

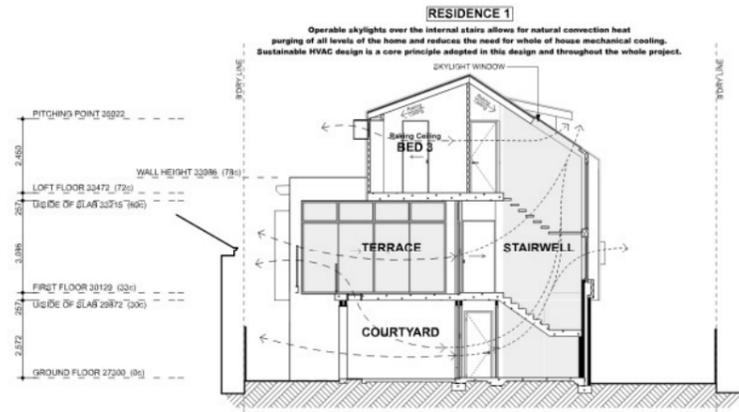


CROSS-VENTILATION: GROUND FLOOR PLANS  
SCALE 1:100

PROJECT Proposed Group Dwellings	DRAWN D.L.	REVISION
CLIENT XScope Pty Ltd (van Dommelen)	DATE JUNE 2020	18 - 09 - 2020
ADDRESS Lot 6 (# 12) Florence Street West Perth	SCALE 1 : 100	© Copyright
JOB NO. 110-18 (A1)	SHEET 4A OF 6	
BDAWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 94 947 8221 A/B 3403 822 P/B P.O. BOX 1032 APPIN CROSSLAND W.A. 6003	

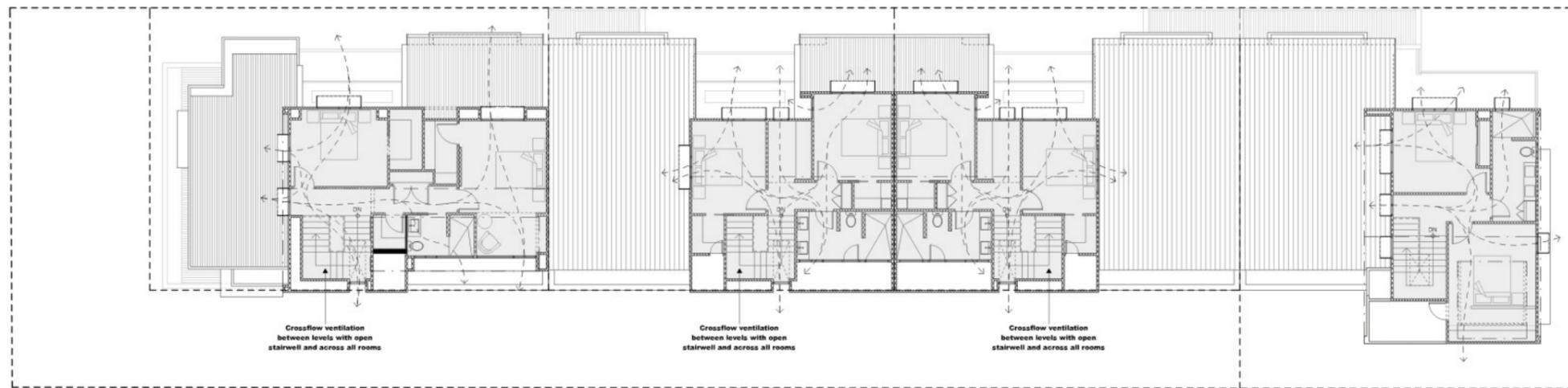


# Advertised Plans



CROSS-VENTILATION: SECTION  
SCALE 1:100

# SUPERSEDED



CROSS-VENTILATION: LOFT FLOOR PLANS  
SCALE 1:100

PROJECT Proposed Group Dwellings	DRAWN D.L.	REVISION
CLIENT XScope Pty Ltd (van Dommelen)	DATE JUNE 2020	18 - 09 - 2020
ADDRESS Lot 6 (# 12) Florence Street West Perth	SCALE 1 : 100	© Copyright
	JOB NO. 110-18 (A1)	SHEET 4B OF 6
BDAWA Building Designers Association of Western Australia	DANIEL LOMMA DESIGN TEL: 94 947 2211 MR 9423 212 F10 P.O. BOX 1032 APPA E-CORSE W.A. 6002	



# Advertised Plans

# REVIEW OF THE BUILT AND NATURAL ENVIRONMENT SUPERSEDED

Florence Street is located only 2km north west of the centre of the Perth CBD. The area was developed early in the colonisation of the State and is evidenced through a wide range of character homes that remain in the area, ranging from modest 19<sup>th</sup> and 20<sup>th</sup> century weatherboard homes, federation bungalows through to new contemporary dwellings.

The area has been the subject to extensive rebuilding over the years and now accommodates a wide range of housing types from large free standing homes through to large multiple housing complexes.

There is no apparent consistent building style or material use evident throughout the suburb, with buildings largely reflecting the trends of the era in which they were built.

While metal roofs can be found on the older dwellings, clays tiles are now prevalent throughout.

The natural environment is largely confined to historical open space areas, such as Hyde Park and Smiths Lake, while active playing areas make up the balance of the green space.

The medium density grouped housing development proposed for 12 Florence Street is consistent with the more recent form and type of development that has been approved and developed in the area. The presentation of major openings to the public realm, together with interesting and varied architectural features add interest and creates a visual separation from the character buildings that remain in the area. The use of light colours and metal roofing aims to complement the original dwellings and create an interesting and harmonic streetscape.



# SUPERSEDED

## URBAN DESIGN ANALYSIS

Lot 6 (12) FLORENCE STREET, WEST PERTH



# Advertised Plans

# SUPERSEDED

## URBAN DESIGN ANALYSIS

Lot 6 (12) FLORENCE STREET, WEST PERTH



FLORENCE STREET, NORTH



4 FLORENCE STREET



7 CARR STREET



### DESIGN INFLUENCES

Florence Street and its surrounds are characterised by a range of housing types, styles and ages. The streetscape provides evidence of intergenerations changes in housing styles ranging from Federation bungalows through to contemporary dwellings.

The use of solid masonry on ground floor levels is a consistent theme throughout the area regardless of the age of the building.

The front facades of many new dwellings include a variety of geometric shapes and features which provides a clear distinction between the housing styles of the heritage buildings, while reflecting the aspirations of the new residents to the area. The design features proposed for Lot 6, have been drawn from many of the design elements that have been applied in the area. The design includes bold geometric shapes, partly concealed roofing and the use of distinct masonry features, reflect elements that are now common in the area.

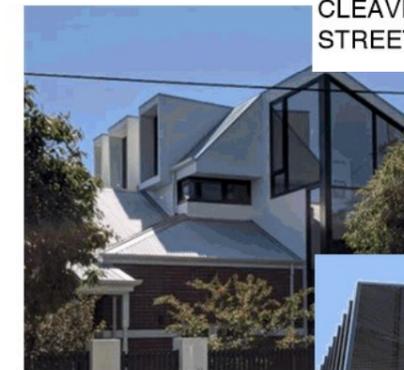
CLEAVER STREET - NEW BUILD



CARR STREET, SOUTH



CLEAVER STREET, NEW AGED CAR UNDER CONSTRUCTION



CLEAVER STREET



WEST LEEDERVILLE

**Summary of Submissions:**

The tables below summarise the comments received during the advertising period of the proposal, together with the Administration's response to each comment.

Comments Received in Support:	Administration Comment:
No comments provided in the two submissions of support.	No comment required.
Comments Received in Objection:	Administration Comment:
<p><u>Context and Character</u></p> <p>The proposed development does not fit within the established character context of the streetscape. Some suggestions were made to retain the existing federation character home or at least be reflective of this in built form.</p>	<p>Given the property is not subject to heritage listing, retention of the existing dwelling is not required. The development design has responded to the prevailing and immediate street setback context and has used staggered and stepped setbacks to upper levels, particularly the loft floor, to mitigate bulk and scale. Amendments to the plans after the community consultation period improved the architectural language in response to community submissions and comments from the City's Design Review Panel (DRP) chair, who is overall supportive of the character and context consideration in the design.</p>
<p><u>Building Height</u></p> <p>The three storey building height is excessive for the site and area context, and is non-compliant.</p>	<p>The City's Built Form Policy is designed to be flexible to allow for additional building height should applicable objectives and design principles be satisfied. In this instance the loft floors have been located and designed to be discrete using setbacks as not to dominate and detract from the streetscape and adjoining properties. Whilst two storeys is specified for the area under the Built Form Policy, there are a number of established three storey dwellings of a similar form within 100 metres of the site.</p>
<p><u>Overdevelopment</u></p> <ul style="list-style-type: none"> <li>• The proposal is an overdevelopment of the site.</li> <li>• Reduced setbacks and greater building height result in detrimental bulk impacts on adjoining properties.</li> </ul>	<ul style="list-style-type: none"> <li>• The site has a density code of R50 which allows for up to five grouped dwellings at the site, whereas only four dwellings are provided. Open space assessed across the site as a whole instead of individual dwelling sites results in open space of 41.9%, which is compatible with the density code expectation of 40%.</li> <li>• Setbacks have been articulated across the development proposal using staggering and stepping to reduce continuous lengths of large and bulky walls. Numerous and varied openings and materials are also used across floors and elevations to reduce the bulk of walls.</li> </ul>

**Summary of Submissions:**

Comments Received in Objection:	Administration Comment:
<p><u>Overshadowing</u></p> <p>Detrimental overshadowing impact, particularly on the dwellings to the south.</p>	<p>Total overshadowing of the adjoining site at midday winter solstice is 40.5% which is under the 50% permitted in accordance with Clause 5.4.2 – Solar Access for Adjoining Sites. The building height responds to its context with the loft mostly contained within the roof form along the southern elevation and provided with significant setbacks to the southern boundary to reduce overshadowing. Overshadowing from the highest loft walls, being dormer features inserted into the roof form, are comparable in impact to a development built to the permitted 7.0 metres wall height with a typical side setback of 1.5 metres as demonstrated in the supplementary information provided by the applicant.</p>
<p><u>Privacy</u></p> <ul style="list-style-type: none"> <li>• Reduced visual privacy from overlooking, particularly from Residence 4 to the north into future dwelling kitchen and outdoor living area approved at No. 14 Florence Street and overlooking south towards No. 10 Florence Street dwellings.</li> <li>• Reduced privacy of No. 16 Florence Street and dwellings fronting Janet Street.</li> </ul>	<ul style="list-style-type: none"> <li>• Due to the context and layout of established and approved development adjoining the site at No. 14 Florence Street, visual privacy is not detrimentally impacted. Overlooking to the south falls over vehicle access ways and is subject to an indirect view angle. Furthermore, trees proposed along the southern boundary at maturity will provide greater visual privacy in future.</li> <li>• Overlooking to the north is across a vacant site with approval for eleven grouped dwellings. Due to the layout of this approved development, overlooking falls mostly on blank walls, future fences and a communal parking space, with any excess overlooking of active habitable spaces indirect and minimal in extent. The properties located on Janet Street are approximately 14 metres from the subject site and will be separated by future development, so visual privacy would not be impacted by the proposal.</li> </ul>
<p><u>Traffic</u></p> <p>Increased traffic and parking congestion in the street.</p>	<p>The proposal provides two private car parking spaces for each dwelling and one communal visitor car parking space. The number of private car parking spaces is one greater than that required under the R Codes Volume 1. Considering the surplus in car parking the development should not result in vehicle congestion in the street.</p> <p>The density code of R50 allows for up to five dwellings at the site, therefore the amount of traffic generated by four dwellings is reasonably expected for the future development potential of the area. The Western Australian Planning Commissions Transport Impact Assessment Guidelines indicate that a development of this scale, being less than ten dwellings, would have a low impact on the surrounding road network.</p>

**Summary of Submissions:**

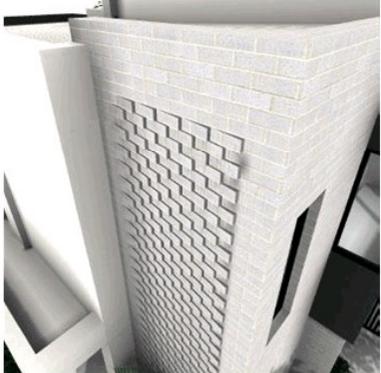
Comments Received in Objection:	Administration Comment:
<p><u>Visitor Parking</u></p> <p>Visitor parking in the front setback does not reflect predominate features of the streetscape character.</p>	<p>The location of the visitor bay is compliant with the R Codes Volume 1. Notwithstanding this, an analysis of the street context found car parking within the street setback is a predominate feature. Landscaping between the visitor bay and Unit 1 is required through the detailed landscape plan to soften the visual impact on this dwelling. Furthermore, sufficient landscaping is provided to soften with visual impact on Florence Street with four new trees provided within the street setback area.</p>
<p><u>Non-compliant development</u></p> <p>Proposed development doesn't comply and therefore should not be supported.</p>	<p>The applicable planning policies are intended to be applied flexibly opposed to rigid compliance with deemed-to-comply criteria provided design principles and objectives are satisfied. Deemed-to-comply criteria is the minimum applicable standards, where a development meets the 'deemed-to-comply' requirements this provides a straight forward pathway to approval.</p> <p>A proposal is required to demonstrate compliance with design principles and/or objectives where it does not satisfy the corresponding deemed-to-comply provisions, subject to the discretion of the delegated decision maker being the City of Vincent Council in this instance.</p>
<p><u>Sewer easement conflict</u></p> <p>The development appears to be directly built over a sewer easement.</p>	<p>As indicated on the development plans the sewer line is to be re-aligned with the works to be carried out and subject to Water Corporation approval.</p>
<p><u>Tree canopy overshadowing</u></p> <p>The proposed 'pyrus calleryana' trees along the southern boundary will contribute to loss of direct sunlight and create overshadowing.</p>	<p>The 'pyrus calleryana' tree is a deciduous species which will allow for light penetration through winter whilst providing shade across the southern vehicle access hardstand in summer to reduce the urban heat island effect.</p>

Note: Submissions are considered and assessed by issue rather than by individual submitter.

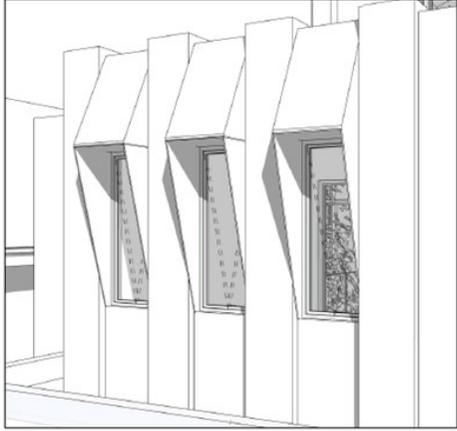
**Summary of Submissions:**

The tables below summarise the comments received during the advertising period of the proposal, together with the Applicant's response to each comment.

Comments Received in Support:	Applicants Comment:
No comments provided in the two submissions of support.	No comment required.

Comments Received in Objection:	Applicants Comment:
<p>Issue: Context and Character</p> <ul style="list-style-type: none"> <li>The proposed development does not fit within the established character context of the streetscape. Some suggestions were made to retain the existing federation character home or at least be reflective of this in built form.</li> </ul>	<p>Substantive changes have been made to the streetside elevation, in consultation with CoV and input from the CoV's nominated architect.</p> <p>These changes are now reflected in the updated drawings and draw in the suggested details from existing federation character homes and reflect these details in several key areas.</p> 

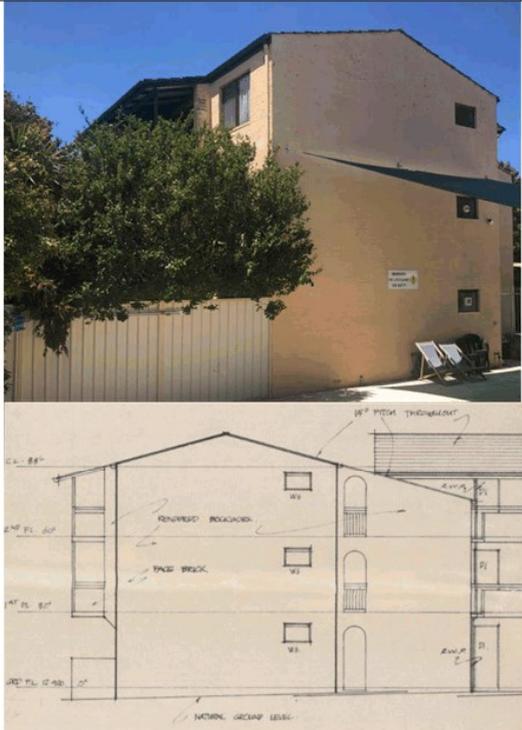
**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p data-bbox="1146 774 1541 829"><b>MODERN TAKE ON TRADITIONAL AWNING / WINDOW CANOPY</b></p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	
<p>Issue: Building Height</p> <ul style="list-style-type: none"> <li>The three storey building height is excessive for the site and area context, and is non-compliant.</li> </ul>	<p>The height follows extensive consultation with CoV as well as pre-design commencement meetings to discuss the nature, orientation and built form of the townhouses.</p> <p>The orientation, driveway location and number of levels is reflective of a considered and consultative approach incorporating CoV architectural review. The third storey is in the form of loft style elevations which is in character with the area and readily found in the immediate surrounds.</p> <p>The loft elements are set back from the front of the street with substantial articulation. The high elements will not be dominant from the perspective of the public realm. The roof line steps down to a height that is well below deemed to comply height limits to differentiate the townhouses as well as reduce overshadowing.</p> <p>Please also refer to the "SUPPLEMENTARY NEIGHBOURING DWELLING HEIGHT STUDY" attached and further examples of 3 storey dwellings on Florence and immediately adjacent streets.</p> <p><b>View from rear of 12 Florence – 3 storey blank wall</b></p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p data-bbox="1115 1042 1805 1085">14 Florence St – new neighbouring buildings approved with continuous zero setback wall to rear half and north boundary of 12 Florence Street.</p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p><b>34 Cleaver St – New build</b></p>

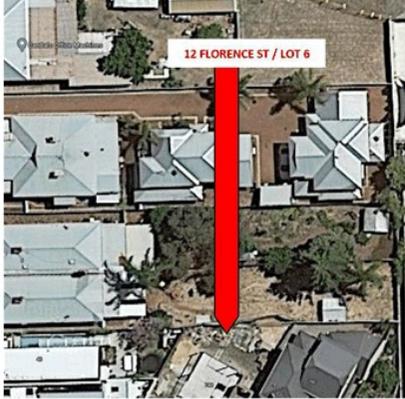
**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p data-bbox="1115 699 1662 721"><b>Cleaver St – Multi storey apartments under construction</b></p>  <p data-bbox="1115 1181 1559 1203"><b>4 Florence St: 4 storey build including garage</b></p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p data-bbox="1115 788 1809 831"><b>78B Carr St: 3 storeys build two rear lots away from rear of 12 Florence St</b></p> 

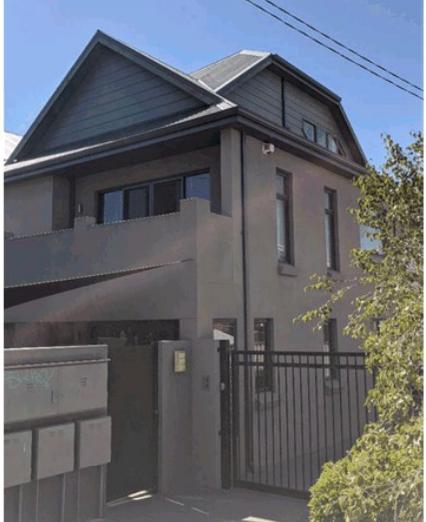
**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p data-bbox="1115 730 1827 756">78 Carr St: Newly constructed with full 3 storey elevation to front street</p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p data-bbox="1115 890 1704 912">76 Carr St: In line with rear of 12 Florence St – two lots away</p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	
<p>Issue: Overdevelopment</p> <ul style="list-style-type: none"> <li>• The proposal is an overdevelopment of the site.</li> <li>• Reduced setbacks and greater building height result in detrimental bulk impacts on adjoining properties.</li> </ul>	<p>There are several constraints on any built form or design that can be considered for this property. The width and length of the property has a natural geometry for 4 townhouses in a row. Any townhouses installed along the length of the property will have sight line screening or obscured glazing requirements due to the proximity to the boundary.</p> <p>The open space departs from the specified requirements by 2%. The landscaping design and open space exceeds many similar developments. There is significant demand and interest for inner city style developments and it is the opinion of the applicant that this proposal represents a generous and spacious design that does not seek to constrain the enjoyment and use of the dwellings by the occupants. Furthermore, it is not the applicants opinion that this design introduces more dwellings than that which is a reasonable and natural fit for this size of the lot, nor that the construction of this dwelling imposes itself on the neighbouring property. The proposed design has a high construction standard that will further differentiate this development and provide a high merit and pleasing addition to the locality. Visual privacy has been addressed by way of internal courtyards and terraces that significantly promote a sense of views without overlooking. Sight lines form the internal</p>

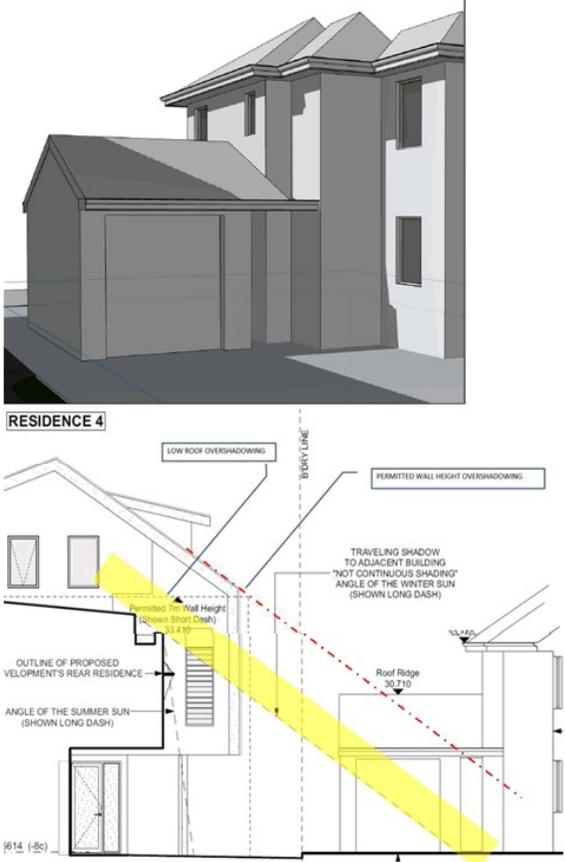
**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	<p>terraces that can intrude on neighbours have further screening to comply for overlooking. In researching other existing neighbouring buildings in the precinct we have not identified many examples where the design of dwellings seeks to integrate visual privacy as structurally as this proposal.</p> 

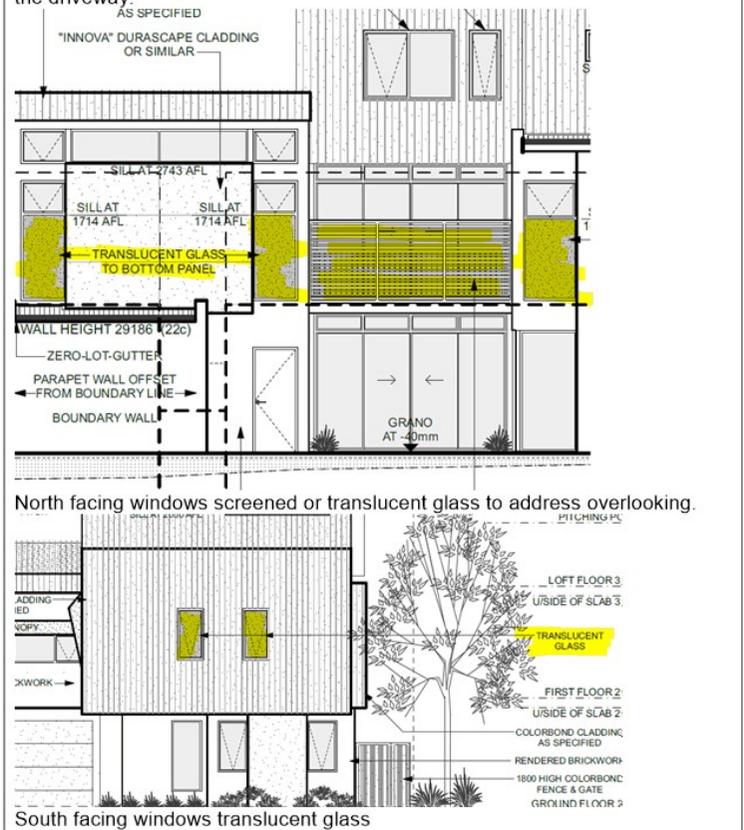
**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p data-bbox="1115 644 1832 759">Internal courtyard and terrace aspects with natural light and ventilation, with design elements that address overlooking from a concept stage onwards. The central open stairwell, the introduction of passive heating and cooling elements as well as avoiding viewing angles on adjacent neighbouring properties has been a key design brief for this project.</p>
<p data-bbox="398 762 600 783">Issue: Overshadowing</p> <ul data-bbox="398 810 1077 855" style="list-style-type: none"> <li data-bbox="398 810 1077 855">• Detrimental overshadowing impact, particularly on the dwellings to the south.</li> </ul>	<p data-bbox="1115 762 1832 948">The design and layouts have been amended and resubmitted following consultation with CoV. This includes both amended roof heights and further studies for overshadowing. This includes overshadowing of the driveway immediately adjacent to the south property boundary as well as selected windows that show vertical elevations. A further study has been requested and provided to show the extent of overshadowing from a deemed to comply wall height at the boundary (depending on the permitted length). These details are now included in the drawing set.</p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
	 <p><b>RESIDENCE 4</b></p> <p>LOW ROOF OVERSHADOWING</p> <p>BURY LINE</p> <p>PERMITTED WALL HEIGHT OVERSHADOWING</p> <p>TRAVELING SHADOW TO ADJACENT BUILDING "NOT CONTINUOUS SHADING" ANGLE OF THE WINTER SUN (SHOWN LONG DASH)</p> <p>Permitted Wall Height (Shown Short Dash) 33.410</p> <p>Roof Ridge 30.7°</p> <p>ANGLE OF THE SUMMER SUN (SHOWN LONG DASH)</p> <p>OUTLINE OF PROPOSED DEVELOPMENT'S REAR RESIDENCE</p> <p>3614 (-8c)</p> <p>Overshadowing for rear unit. Other examples on drawings provided.</p>
<p>Issue: Visual Privacy</p> <ul style="list-style-type: none"> <li>Reduced visual privacy from overlooking, particularly from Residence 4 to the north into future dwelling kitchen and outdoor living area approved</li> </ul>	<p>Due to the context and layout of established and approved development adjoining the site, visual privacy is not detrimentally impacted.</p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
<p>at 14 Florence Street and overlooking south towards 10 Florence Street dwellings.</p> <ul style="list-style-type: none"> <li>Reduced privacy of 16 Florence Street and dwellings fronting Janet Street.</li> </ul>	<p>North aspect windows and terraces include screening. We understand that this includes future lot 7C kitchen and lot 271A outdoor living area.</p> <p>There are limited windows looking south and these are set back by the width of the driveway.</p>  <p>North facing windows screened or translucent glass to address overlooking.</p> <p>South facing windows translucent glass</p>

**Summary of Submissions:**

Comments Received in Objection:	Applicants Comment:
<p>Issue: Traffic</p> <ul style="list-style-type: none"> <li>Increased traffic and parking congestion in the street.</li> </ul>	<p>There is significant parking provision with a double garage and visitor parking provided. In consultation with CoV it was questioned by council if we would consider reducing the parking allowance to 1 garage space for each townhouse. We therefore understood that reducing the onsite parking may be an option however have sought to remain with 2 parking bays per garage to avoid any issues with respect to sufficient parking. Florence St is generally a low traffic street and it would be surprising and unusual that 4 townhouses in this area would impact the amenity of the existing apartments, townhouses and dwellings.</p>
<p>Issue: Visitor Parking</p> <ul style="list-style-type: none"> <li>Visitor parking in the front setback does not reflect predominate features of the streetscape character.</li> </ul>	<p>It is unclear what this concern seeks to address, and we would welcome further discussion with CoV if there is a visitor parking preference that has not already been discussed during DRP/consultations.</p>
<p>Issue: Non-compliant development</p> <ul style="list-style-type: none"> <li>Proposed development doesn't comply and therefore should not be supported</li> </ul>	<p>No comment provided. This is addressed in Administration response to submissions.</p>
<p>Issue: Sewer easement conflict</p> <ul style="list-style-type: none"> <li>The development appears to be directly built over a sewer easement</li> </ul>	<p>No comment provided. This is addressed in Administration response to submissions.</p>
<p>Issue: Tree canopy overshadowing</p> <ul style="list-style-type: none"> <li>The proposed 'pyrus calleryana' trees along the southern boundary will contribute to loss of direct sunlight and create overshadowing</li> </ul>	<p>No comment provided. This is addressed in Administration response to submissions.</p>

Note: Submissions are considered and assessed by issue rather than by individual submitter.

**Determination Advice Notes:**

1. The owners of the subject land shall obtain the consent of the owners of relevant adjoining properties before entering those properties in order to make good the boundary walls.
2. No further consideration shall be given to the disposal of stormwater 'offsite' without the submission of a geotechnical report from a qualified consultant. Should approval to dispose of stormwater 'offsite' be subsequently provided, detailed design drainage plans and associated calculations for the proposed stormwater disposal shall be lodged together with the building permit application working drawings.
4. Clause 5.4.1 C1.2 Visual Privacy requirements of the R Codes states that *screening devices such as obscure glazing, timber screens, external blinds, window hoods and shutters are to be at least 1.6m in height, at least 75 percent obscure, permanently fixed, made of durable material and restrict view in the direction of the overlooking into any adjoining property.*
5. An Infrastructure Protection Bond together with a non-refundable inspection fee shall be lodged with the City by the applicant, prior to commencement of all building/development works, and shall be held until all building/development works have been completed and any disturbance of, or damage to the City's infrastructure, including verge trees, has been repaired/reinstated to the satisfaction of the City. An application for the refund of the bond must be made in writing. This bond is non-transferable.
6. The applicant/developer is advised to liaise with Telstra to convert the Telstra pit lid that adjoins the proposed crossover to a trafficable lid.
7. The movement of all path users, with or without disabilities, within the road reserve, shall not be impeded in any way during the course of the building works. This area shall be maintained in a safe and trafficable condition and a continuous path of travel (minimum width 1.5 metres) shall be maintained for all users at all times during construction works. If the safety of the path is compromised resulting from either construction damage or as a result of a temporary obstruction appropriate warning signs (in accordance with AS1742.3) shall be erected. Should a continuous path not be able to be maintained, an 'approved' temporary pedestrian facility suitable for all path users shall be put in place. If there is a request to erect scaffolding, site fencing etc. or if building materials are required to be stored within the road reserve, once a formal request has been received, the matter will be assessed by the City and if considered appropriate a permit shall be issued by the City. No permit will be issued if the proposed encroachment into the road reserve is deemed to be inappropriate.
8. The City accepts no liability for the relocation of any public utility and/or any other services that may be required as a consequence of this development. The applicant/owner shall ensure that the location of all services is identified prior to submitting an application of building permit. The cost of relocated any services shall be borne by the applicant/owner. The applicant/landowner is advised to liaise with the Water Corporation and Western Power in regards to servicing and infrastructure requirements for the development.