PROJECT CORRESPONDENCE

Umow Lai
INTEGRAL GROUP

Umow Lai VIC Pty Ltd
Consulting Engineers
ABN: 29 143 564 738
L4, 10 Yarra Street
South Yarra VIC 3141 Australia
T +61 3 9249 0288
ulmelb@umowlai.com.au
www.umowlai.com.au

Melbourne Sydney Brisbane

Date: 30-10-19

To: Hayball

Attention: Lucas Amon

From: Kavita Gusain

Project Name: **346-350 MACAULAY ROAD MIXED USE APARTMENTS**

Project No: M.UAG.0101

Email/Fax No: lamon@hayball.com.au

Sent	Company	Name	Email/Fax
	Hayball	Lucas Amon	lamon@hayball.com.au

Dear Lucas,

This project correspondence provides response to the RFIs of City of Melbourne for the Town Planning application of 346-350 Macaulay Road project.

City of Melbourne (CoM) RFI's and responses:

	CoM's comment	Response
1	Green Star Pathway	
	10 points are claimed for the innovation category	The project team would like to clarify that only 5 points were targeted under innovation category.
	It is recommended that additional points are targeted in other categories to offset the reliance on innovation category points, typically a 10% buffer would be standard practice.	The Green Star scorecard has been revised and considers 6.6 points in buffer while targeting only 6 points under the innovation category.
	Financial transparency credit must be removed from the Green Star Pathway and not targeted in future for any Green Star Equivalency ratings.	The project team has excluded Financial Transparency credit from the Green Star Pathway. Innovation credit targeted include Universal design, Microbial control in Hot Water Systems, Local procurement, Recreational Facilities and Groundskeeping. Innovation for exceeding green star benchmark is targeted for ultra low VOC paints,
	Any preliminary calculators or modelling undertaken to inform the Green Star Pathway should be included in the ESD report.	A preliminary Potable Water calculation was performed for the project and is attached in the revised SMP report.
2	Energy	

	The preliminary NatHERS ratings provided are not sufficiently representative of the entire development. Additional preliminary ratings should be undertaken to demonstrate Better Apartments compliance and average NatHERS performance.	Additional preliminary modelling was performed to check average NatHERS compliance and the results are included in the revised SMP.
	Given the site's location in an urban growth area, the energy target of average 6.6 star NatHERS and minimum 5 Star for apartments is considered a minimum response. Industry best practice for similar building typologies achieve a 7 star average NatHERS, and an improved target should be set for this development.	The project has revised the average and minimum NatHERS star rating targets. The project is now set to achieve an average of at least 7 star in the overall development with a minimum of 6 star rating in all individual apartments.
	The ESD report and proposed Green Star pathways are inconsistent.	The Green Star Pathway has been revised to include only 7 points under the Energy credit.
3	Renewable Energy	
	The ESD report references the inclusion of Solar PV for the project, however no system capacity has been included and no PV system is shown in plans.	The proposed Solar PV capacity and location is now included in the revised SMP report.
4	Transport	
	Inconsistency in the number of bicycle spaces in the ESD report and GTA consultants	The SMP report has been revised to have consistent bicycle spaces.
	Low Emission Vehicle Infrastructure credit is not targeted. It is strongly recommended that the ESD report and plans be updated to include at a minimum the required electrical infrastructure to allow the future installation of electric vehicle charging (i.e. spare capacity in distribution boards, wiring and electricity supply sizing).	The Green Star pathway targets a performance based approach under the Transport credit and hence Low Emission Vehicle Infrastructure credit is not targeted. However the SMP has been revised to include required electrical infrastructure to allow the future installation of charging points, as advised by the Council.
5	Stormwater Management	
	It is strongly recommended that the proprietary stormwater treatment system is replaced by a suitable sized and located raingarden integrated into the landscaping design.	As recommended by the Council, the project team is considering designing a raingarden to replace proprietary system. The proposed raingarden location is marked in the landscape layout and has been included in the revised SMP report.

The revised SMP report along with all attachments is provided with this project correspondence.

Please see PDF for bookmarking. Should you have any questions, please do not hesitate to contact.

Regards

Kavita Gusian
Sustainability Consultant
Umow Lai

Umow Lai
INTEGRAL GROUP

Sustainable Management Planning

Mixed Use Apartment Project

346-350 Macaulay Road, Kensington

Report No M.UAG-0101_ SMP Report_R2
Date 30th October 2019

engineering sustainable environments

REPORT AUTHORISATION

PROJECT: **SUSTAINABLE MANAGEMENT PLANNING**
346-350 MACAULAY ROAD, KENSINGTON

REPORT NO: **M.UAG-0101_ SMP REPORT_R2**

Date	Rev	Comment	Prepared by	Checked by	Authorised by
04-04-19	00	Draft	KG	SRE	SRE
28-06-19	01	Issue for TP Submission	KG	SRE	SRE
07-10-19	02	Revised to respond to RFI	KG	SRE	SRE

Melbourne Office
Umow Lai Pty Ltd
L4, 10 Yarra Street
South Yarra VIC 3141
Australia
Tel: +61 3 9249 0288
Fax: + 61 3 9249 0299
Email: ulmelb@umowlai.com.au
Web: www.umowlai.com.au
ABN: 27 748 212 498

Sydney Office
Umow Lai Enginuity Pty Ltd
657 Pacific Highway
St Leonards NSW 2065
Australia
Tel: +61 2 9431 9431
Fax: +61 2 9437 3120
Email: ulsyd@umowlai.com.au
Web: www.umowlai.com.au
ABN: 99 150 174 782

Brisbane Office
Level 7, 200 Creek Street,
Brisbane QLD 4000
Australia
Tel: +61 7 3917 8888
Fax: +61 7 3917 8887
Email: ulbris@umowlai.com.au
Web: www.umowlai.com.au
ABN: 91 142 668 773

EXECUTIVE SUMMARY

This report provides an overview of the sustainable design principles to be included in the 346-350 Macaulay Road mixed use apartment project.

In particular the report addresses the specific sustainability requirements of the City of Melbourne as outlined in Clause 22.19 of the Melbourne Planning Scheme. The report has been revised to include additional measures advised by the City of Melbourne.

The development will incorporate Environmentally Sustainable Design (ESD) initiatives through integrated design of the services, structure and architecture. It is the intention of this project to demonstrate leading best practice in environmentally sustainable design for mixed use apartment projects.

The design has a number of specific targets that are imposed as part of either the developer requirements or the Melbourne Planning Scheme. These targets include the following:

(a) Green Star Design and As Built v1.2, 5.0 Star Rating Benchmark

(b) Minimum of 1 point under the Wat-1 Green Star credit

(c) The new apartment design standards for Victoria: Better Apartments Design Standards & the Neighbourhood and Site Description and Design Response – Clause 55.01.

The proposed design includes numerous leading sustainable design features that will demonstrate the environmental leadership of the building that meets or surpasses the ESD benchmarks noted above. Current ESD controls for planning will also be met by the level of sustainability proposed. Key innovative aspects of the sustainable design proposed include the following:

- The use of high performance glazing and façade systems including double glazing to reduce solar loads while providing good levels of daylight and connection to the outside.
- Apartment NatHERS Star rating performance in excess of minimum code requirements.
- High efficiency LED lighting.
- High performance air conditioning, engineered to reduce energy consumption in comparison to more conventional apartment air conditioning approaches.
- Water conservation through the use of high efficiency fixtures, rainwater harvesting and re-use of harvested water for irrigation.
- Installation of Solar PV Panels.
- Sustainable Materials selection.

CONTENTS

1. INTRODUCTION

This report provides an overview of the sustainable design principles to be included in the 346-350 Macaulay Road mixed use apartment project in Kensington.

In particular this report addresses the specific sustainability requirements of the City of Melbourne as outlined in *Clause 22.19 Energy, Water and Waste Efficiency* of the Melbourne Planning Scheme.

The development will incorporate Environmentally Sustainable Design (ESD) initiatives through integrated design of the services and architecture. It is the intention of this project to demonstrate best practice in ESD for mixed use apartment projects.

The proposed design includes numerous sustainable design features that will demonstrate the environmental leadership of the building that meets the current ESD controls for planning. Key innovative aspects of the sustainable design proposed include the following:

- The use of high performance glazing and façade systems including double glazing to reduce solar loads while providing good levels of daylight and connection to the outside.
- Apartment NatHERS Star rating performance in excess of minimum code requirements.
- High efficiency LED lighting.
- High performance air conditioning, engineered to reduce energy consumption in comparison to more conventional apartment air conditioning approaches.
- Water conservation through the use of high efficiency fixtures, rainwater harvesting and re-use of harvested water for irrigation.
- Installation of Solar PV Panels.
- Sustainable Materials selection.

The Project Team has readily identified a number of initiatives that should be assessed further as the project is developed. The real environmental benefit, when considered against criteria such as capital investment, embodied energy and overall design impact, will be examined. Ongoing maintenance commitments and cost are also weighing factors.

The project is currently benchmarked to achieve a 5-Star Green Star rating (equivalency), signifying 'Australian Excellence' in the Australian marketplace.

Please refer to Appendix A for the breakdown of the current Green Star benchmarking for the project.

The Sustainable Design Statement has been prepared on the basis of architectural initial planning documentation (plans, sections & elevations) prepared by Hayball, as at 23rd May 2019 (Consultant Set).

Based on the available roof area, the project is proposed to install 60kW Solar PV Panels.

2. THE PROJECT

2.1 THE SITE

The development site is located at 346-350 Macaulay Road in Kensington.

Figure 1 displays an aerial image of the site, showing the existing environs.

Figure 1 *346-350 Macaulay Road residential tower site*

For planning purposes, the development site lies within the jurisdiction of the City of Melbourne LGA. The development site is exceptionally well served by public transport.

2.2 THE DEVELOPMENT

The proposed development scheme is for the construction of six towers. The project will consist 3 underground parking floors, a street activation level (including apartments, lobbies, resident amenities, above-ground carpark and potential retail spaces) and 7 apartment levels.

Figure 2 displays the site plan of the 346-350 Macaulay Road mixed use apartment project.

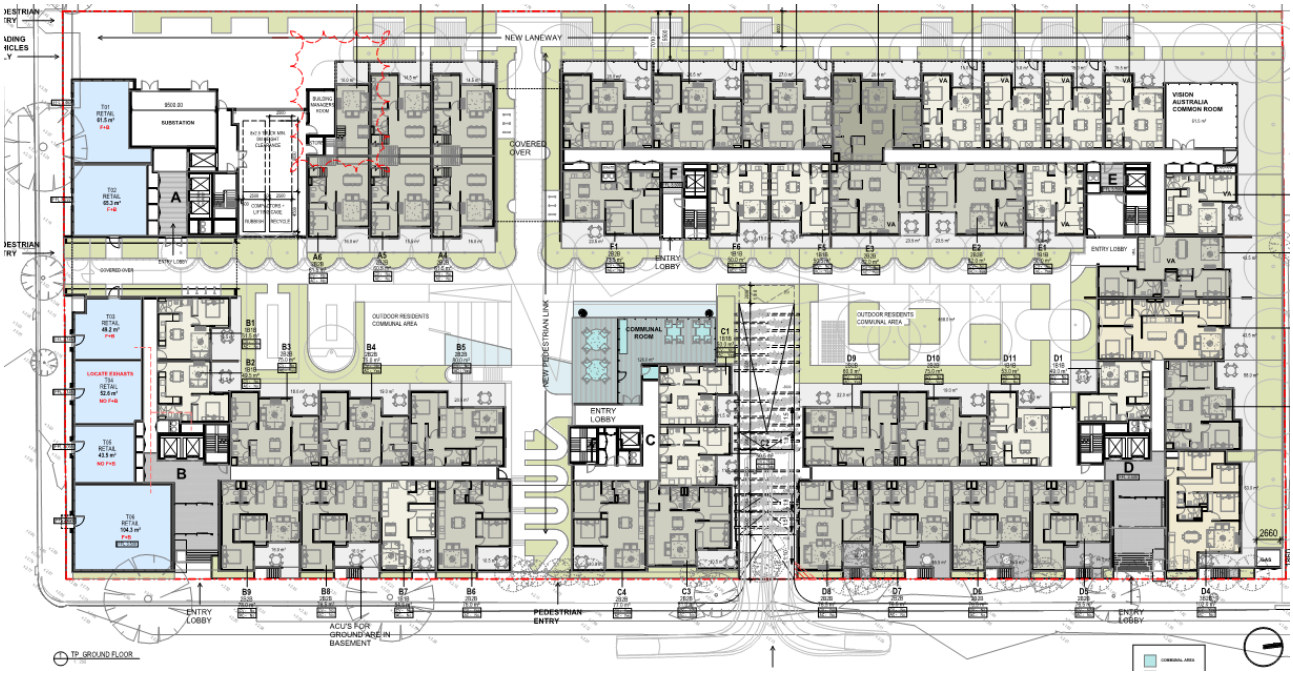


Figure 2 *Site Plan and Street Activation Level*

3. REGULATORY COMPLIANCE REQUIREMENTS

Regulatory compliance requirements pertaining to ESD are limited to City of Melbourne town planning minimum sustainability performance and compliance with Section J Energy Efficiency of the NCC 2016. These are further discussed below.

3.1 MELBOURNE PLANNING SCHEME REQUIREMENTS

3.1.1. Clause 22.19 Energy, Water and Waste Efficiency

The City of Melbourne implemented updated planning requirements for Energy, Water and Waste Efficiency, approved by the Minister for Planning and implemented in full from April 2013.

These requirements are contained in Clause 22.19 of the Melbourne Planning Scheme.

Figure 3 *City of Melbourne*

This policy basis is structured around the reduction of consumption of non-renewable resources and reductions in greenhouse gas emissions.

The objectives of this policy are outlined within Clause 22.19-2 as:

- To ensure buildings achieve high environmental performance standards at design, construction and operation phases;
- To minimise the city's contribution to climate change impacts by reducing greenhouse gas emissions;
- To improve the water efficiency of buildings and encourage the use of alternative water sources;
- To minimise the quantity of waste going to landfill and maximise the recycling and reuse of materials;
- To minimise the impacts of waste on the community; and,
- To encourage the connection of buildings to available or planned district energy, water and waste systems in urban renewal areas in order to achieve additional energy, water & waste efficiency arising from a precinct-wide approach to infrastructure where appropriate.

The application of Clause 22.19 requires, additionally to a compliant waste management plan, an Environmentally Sustainable Design Statement which demonstrates how the development meets the policy objectives. The sustainable design statement must also include a statement from a suitably qualified professional verifying that the building has the ***preliminary design potential*** to achieve the relevant required performance measures set out in Clause 22.19-5.

Umow Lai notes the emphasis on "preliminary design potential", which is interpreted for the purposes of a sustainable design statement, as inclusive of design initiatives which are known and also design initiative which require further assessment of applicability during detailed design.

Table 1 provides a summary of the performance measures for minimum energy, water and waste requirements, depending on building size, as per Clause 22.19-5.

Table 1 *City of Melbourne Clause 22.19 Performance Measures*

TYPE OF BUILDING		PERFORMANCE MEASURE		
		Energy Efficiency	Water Efficiency	Waste Efficiency
Office	Up to 2,000 square metres gross floor area	Compliance with the energy efficiency requirements of the Sustainable Design Scorecard or equivalent.	3 points for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star –Office rating tool or equivalent	A Waste Management Plan prepared in accordance with the City of Melbourne's *Guidelines for Waste Management Plans*
	More than 2,000 square metres gross floor area	NABERS Office – Energy 5 Stars or equivalent.	3 points for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star –Office rating tool or equivalent	A Waste Management Plan prepared in accordance with the City of Melbourne's *Guidelines for Waste Management Plans*
	Over 5,000 square metres gross floor area	Same minimum energy, water & waste requirements as buildings over 2,000 square metres plus a 5 star rating under a current version of Green Star - Office rating tool or equivalent		
Retail premises	Up to 2,000 square metres gross floor area	N/A (sufficiently covered by the Building Code of Australia)	5 points for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star – Retail rating tool or equivalent	A Waste Management Plan prepared in accordance with the City of Melbourne's *Guidelines for Waste Management Plans*
	More than 2,000 square metres gross floor area	N/A (sufficiently covered by the Building Code of Australia)	5 points for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star – Retail Centre rating tool or equivalent.	A Waste Management Plan prepared in accordance with the City of Melbourne's *Guidelines for Waste Management Plans*
	Over 5,000 square metres gross floor area	Same minimum energy, water & waste requirements as buildings over 2,000 square metres plus a 5 star rating under a current version of Green Star - Retail Centre rating tool or equivalent		
Education centre	Up to 2,000 square metres gross floor area	Compliance with the energy efficiency requirements of the Sustainable Design Scorecard or equivalent.	3 points for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star – Education rating tool or equivalent	A Waste Management Plan prepared in accordance with the City of Melbourne's *Guidelines for Waste Management Plans*
	More than 2,000 square metres gross floor area	5 points for Ene-1 credit under a current version of the Green Building Council of Australia's Green Star – Education rating tool or equivalent.	3 points for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star – Education rating tool or equivalent.	A Waste Management Plan prepared in accordance with the City of Melbourne's *Guidelines for Waste Management Plans*

	Over 5,000 square metres gross floor area	Same minimum energy, water & waste requirements as buildings over 2,000 square metres plus 5 star rating under a current version of Green Star - Education rating tool or equivalent		
Accommodation (except for Dependant Person's Unit, Camping & Caravan Park, Corrective Institution, Host Farm)	Up to 5,000 square metres gross floor area	N/A (sufficiently covered by the Building Code of Australia)	1 point for Wat-1 credit under a current version of the Green Building Council of Australia's Green Star – Multi Unit Residential rating tool or equivalent.	A Waste Management Plan prepared in accordance with the City of Melbourne's *Guidelines for Waste Management Plans*
	Over 5,000 square metres gross floor area	Same minimum energy, water & waste requirements as buildings up to 5,000 square metres plus a 5 star rating under a current version of Green Star - Multi Unit Residential rating tool or equivalent		

Additionally to the performance measures outlined above, Clause 22.19 provides further guidance in the application of the performance measures:

1. *"Mixed use developments should be assessed against the performance measures in the table above applicable to each use component of the development."*
2. *"Applications for alterations and additions should be assessed against the performance measures in the table above in so far as they are applicable to the alterations and additions to the building."*
3. *"Applications for development may use alternative rating tools or assessment methods provided that equivalence of the development to the performance measures listed in the table can be demonstrated."*
4. *"Proposals that do not meet these performance measures may still meet the objectives of this policy."*

3.1.2. Site Specific Melbourne Planning Scheme Requirements

On the basis of the space use type and the size of the 346-350 Macaulay Road mixed use apartment project, the following minimum planning requirements are per Clause 22.19:

- A 5-Star ***preliminary design potential*** performance level under a current version of Green Star rating tool or equivalent.

  For this project, this is proposed to be the **Green Star Design and As Built v1.2** tool, which is the most current and up to date tool produced by the GBCA. The Green Star Multi Unit Residential v1 is no longer supported by the GBCA (since end of 2015) – refer Section 3.3 below;
- A reduction in water consumption for the development, demonstrated by the use of the water calculator provided with Green Star:
  - At least 1 point for Wat-1 under the Green Star Design & As-Built v1.2 rating tool
- A reduction in the generation of waste that is sent to landfill:
  - A Waste Management Plan to be prepared in accordance with the City of Melbourne's Guidelines for Waste Management Plans, covering the whole development (Waste Management Plan to be provided by waste management consultant).

3.2 NCC Section J Energy Efficiency

3.2.1. Section J Compliance

Section J of the National Construction Code (NCC) stipulates the minimum energy efficiency requirements for residential (Class 1, 2, 3 & 4) and non-residential buildings (Class 5 to 9) within all states and territories of Australia where Section J has been mandated.

Section J is comprised of eight parts, each specifically outlining minimum deemed-to-satisfy criteria. Those sections that are applicable within Victoria cover the performance of the building fabric, glazing, building sealing, HVAC systems, artificial lighting and power and access for maintenance.

Compliance with these requirements is ensured by the design team, and must be demonstrated before being approved for a building permit.

For Class 6 and 9b areas, compliance is demonstrated via the Deemed-to-Satisfy requirements of Part J1 to J3 (where applicable) or performance verification (JV3 modelling).

3.2.2. Nationwide House Energy Rating Scheme (NatHERS)

A major element of the compliance requirements for any mixed use apartment project in Australia is the requirement of assessment via the Nationwide House Energy Rating Scheme (NatHERS). In Victoria, this rating is a key feature of the Victorian Government's environmental policy and is designed to help drive the design and construction of efficient homes and to save energy resources.

Introduced from 1 July 2005, the energy rating for a new dwelling indicates how much energy will be needed to heat and cool the home over the course of a year. The FirstRate5 House Energy Rating software was developed by the Victorian Government to facilitate the rating process. It provides a simple and quick method to assess and improve the energy efficiency of house designs and completed homes.

The thermal calculation method to be used must comply with the NatHERS Protocol for House Energy Rating Scheme (HERS) Software. In Victoria, the preferred compliant thermal calculation method is through the use of FirstRate5, which is an officially approved software.

FirstRate was originally developed as a correlating program against NatHERS computations, but the latest FirstRate product incorporates the full CSIRO HERS calculation engine.

The FirstRate house energy rating is an estimate of the energy saving potential of the building fabric, including walls, ceilings, roofs, floors and glazing constructions, using applicable patterns of heating and cooling.

All apartments in the development will be assessed using the FirstRate5 software program. For all apartments, the minimum compliance with NCC BCA Part 3.12 requirements is **5 Stars**. With a minimum areas weighted average of 6 Stars. Please refer to part 3.1.2 Building Fabric for the thermal insulation requirements nominated to achieve this level of performance.

As part of the Green Star minimum requirements, a 33% improvement on the minimum BCA compliance is targeted. Thus, an area weighted average of 7.0 Stars is targeted for the 346-350 Macaulay Road project.

This performance will result in efficiency measures incorporated in the development have real benefits in terms of the energy efficiency of the overall building, as well as to individual home owners.

3.3 PERFORMANCE MEASURE – GREEN STAR

Green Star is referenced as a performance measure per Clause 22.19-5, specifically the Green Star Multi Unit Residential v1 rating tool for accommodation type developments.

The Green Star environmental rating system for buildings was created for the property industry in order to:

- Establish a common language
- Set a standard of measurement for green buildings
- Promote integrated, whole-building design
- Recognise environmental leadership
- Identify building life-cycle impacts; and
- Raise awareness of green building benefits.

The GBCA has historically managed a suite of Green Star rating tools for different building types (e.g. Office, Education, Healthcare etc.). These tools have had significant penetration into the property and construction sector, becoming the default "yard-stick" for environmental performance of property development.

Green Star has had significant adoption within central business district commercial markets where it is seldom that large commercial projects proceed without defining Green Star objectives. The use of the Green Star Education tool is also popular within the tertiary education sector with numerous projects of significance defining Green Star objectives.

With a recent overhaul and change of strategic direction, the sector specific rating tools are now referred to as "legacy" rating tools, including the Green Star Multi Unit Residential v1, and have been replaced by a "fourth generation" Green Star rating tool.

As of late 2014, the GBCA has released a new rating tool to replace all previous legacy rating tools, which is known as 'Green Star Design & As-Built v1. This tool was updated to Green Star Design & As-Built v1.2 July 2017.

Green Star Design & As-Built v1.2 (Green Star DAB v1.2)

The Green Star DAB is a single rating tool which can be applied to any eligible building type.

On mixed-use developments, a single tool can now be used for the whole project. Previously with legacy rating tools, each different space type would need to use the specific tool for that space type (i.e. Office, Education and Multi Unit Residential).

Umow Lai notes the significant changes within the Green Star DAB compared to the legacy rating tools:

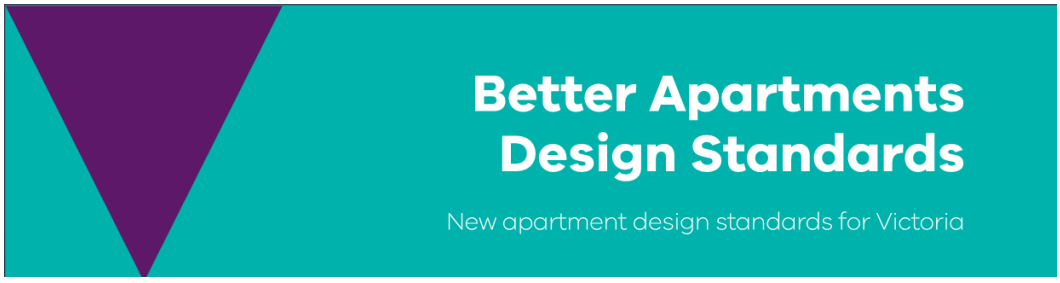
- The number of credits have been rationalised with the number of points available limited to approximately 100, plus an additional 10 points;
- The rating system no longer uses “weighting factors” to allocate different emphasis on environmental issues;
- The rating achieved is an As-Built rating only, although an option exists to have the GBCA undertake a ‘Design Review’ rating achieved as the design develops;
- Significant changes have been made to credit criteria;
- A significant emphasis is placed on Life Cycle Assessment within the materials category;
- The Innovation category has been completely revised with the integration of Innovation Challenges;

Umow Lai’s assessment of this tool against the previous legacy tools is that it represents a step forward in the adoptability and applicability of the rating tool, however stringency of credit criteria has increased, with redundant issues (which the industry has broadly met) being omitted.

As the Green Star Design & As-Built rating tool charts the intended course of the GBCA for the next phase of its transformation of the Australian property and construction sector, it will no longer be possible to register any project under a legacy rating tool after 2015.

3.4 Better Apartments Design Standards & Melbourne City Planning Scheme – Clause 55

The Better Apartments Design Standards have been introduced in April 2017 to improve the liveability and sustainability of apartments across Victoria. The standards were developed in consultation with community members, architects, planning and design practitioners, technical experts, the development industry, councils, and state government agencies.



3.4.1. Energy Efficiency

As described in Table 2, the 346-350 Macaulay Road mixed use apartment project is located in Climate Zone 60.

Table 2 *Cooling Loads*

NatHERS CLIMATE ZONE	NatHERS MAXIMUM COOLING LOAD MJ/M² PER ANNUM
Melbourne Central (Climate Zone 21 Melbourne)	30
Melbourne North and West (Climate Zone 60 Tullamarine)	22
Melbourne South and East (Climate Zone 62 Moorabbin)	21

The size, orientation, layout and glazing properties for each apartment will be monitored to ensure that the NatHERS maximum cooling load is be under 22 MJ/m2.

3.4.2. Solar Access to Communal Open Space

The proposed design allows for a communal outdoor open space on Ground level and Level-6 which will be designed to ensure minimal direct sunlight access as prescribed by the Better Apartment Design Standards requirements.

3.4.3. Landscaping

Landscape spaces on street level have been included to address the heat absorption and stormwater management issues. Landscape will include a deep soil rain garden spread over 685 m² area (Refer appendix for location of rain garden). The rain garden will collect and slow stormwater run off and increase its infiltration into the soil.

Provision for landscape will be assessed against the Better Apartment Design Standards requirements.

3.4.4. Waste and Recycling

The 346-350 Macaulay Road mixed use apartment project is designed to encourage waste management.

Waste bin area has been provided for collection of normal and recycling waste from the development. It is proposed to provide a diverter system within the towers to make recycling as easy to undertake as removal of normal waste. This simple provision has the potential to ensure that recycling is maximised for the development.

Provision for additional waste and recycling strategies will be assessed against the Better Apartment Design Standards requirements.

3.4.5. Integrated Water and Stormwater Management

The 346-350 Macaulay Road mixed use apartment project will put in action a stormwater strategy to ensure that post-development peak event discharge from site does not exceed the pre-development peak event discharge. All stormwater from the site also meets the prescribed pollution reduction targets.

An initial MUSIC modelling has been performed to demonstrate compliance. Refer Appendix-B for inputs and outputs of the MUSIC Modelling. The targets will be achieved by providing Rainwater tanks of a total capacity 80,000 L within the site and the collected water will be re-used for irrigation.

4. SUSTAINABILITY INITIATIVES

4.1 ENERGY EFFICIENCY

At this early stage of design, the building has been designed to ensure that energy efficiency is a priority and that associated greenhouse gas emissions are minimised.

The methods by which this is met include equivalent performance to a Green Star rating under the Green Star Design & As-built v1.2 tool, as well as energy performance of the residential units to NatHERS 6.0 Star or higher reaching target average of 7.0 Star.

Our preliminary estimates show that the target is achievable.

Table 3 *Summary of compliance requirements*

Building Sub-Classification	Zone Description	Compliance Requirement & Pathway	Comments
Class 2	Apartments	*NCC Section J via NatHERS* ▪ Individual Apartment ≥ **5 Stars**; and ▪ Building Average ≥ **6 Stars** *Eco City Goals via NatHERS & Green Star* ▪ *Building Average ≥* ***6.6 Stars***	*To meet both NCC and Eco City Goals the project is targeting:* ▪ Individual Apartment ≥ ***6.0*** **Stars**; and ▪ *Building Average ≥* ***7.0*** ***Stars***
Class 6	Retail space	*NCC Section J0, J1, J2 & J3 via Deemed-To-Satisfy (DTS)*	*JV3 Verification using a Reference Building can be used if DTS is not achievable.*
Class 9b	Common Facilities	*NCC Section J0, J1, J2 & J3 via Deemed-To-Satisfy (DTS)*	*JV3 Verification using a Reference Building can be used if DTS is not achievable.*

These measures are achieved by means outlined below.

4.1.1. Greenhouse Gas Emissions

As part of the development's target for a Green Star rating (or equivalent) 7 points have been targeted under the energy category credit Ene-1 Greenhouse Gas Emissions. This represents a 35% reduction in emissions, and is best practice.

The NatHERS ratings required as part of the NCC BCA 2016 Energy Efficiency compliance requirements sets a benchmark for the energy performance of the building, and thus reduce the greenhouse gas emissions associated with heating and cooling in private dwellings. The Green Star rating requires, as a Conditional Requirement to achieve a rating, a 10% improvement on this minimum BCA compliance. The development will target further improvements on this, based on achievable and cost-effective measures implemented in the design, from insulation and construction materials selection, to shading projection design and glazing specification. This level of performance will be further assessed as the design progresses. The project is currently targeting to achieve a minimum 6.0 Star rating for each individual apartment and an average 7.0 Star rating across the whole development.

4.1.2. Building Fabric

In order to reduce the energy consumption associated with active heating and cooling systems, the development will incorporate sufficient levels of insulation to provide a high performing building fabric. The levels of insulation to be incorporated within the building fabric are summarised in the following table.

Table 4 *Insulation levels proposed for Class 2 area*

Building Fabric Component	Recommended Insulation Level
Exposed Ceilings/Roof	≥ R4.5
Exposed Exterior Walls	≥ R2.8
Walls to unconditioned spaces	≥ R1.5
Exposed Ceiling to unconditioned space	≥ R2.0
Floors Suspended above non conditioned spaces	≥ R2.0
Total System Window U-Values	≤ 3.5 W/m^2/^{0}K
Total System Window SHGC	≤ 0.29

As insulation is the most effective and economical method of improving a building's fabric performance, the typical minimum suggested insulation levels for Melbourne have been met and/or exceeded. The insulation performance of glazing has also been optimised in order to minimise heat transfer. All doors and windows have been considered to be weather stripped

Table 5 *Insulation levels for other BCA Classifications*

Building Element	R-value	Comment
Walls – External	≥ R2.8	Including façade spandrel areas
Walls – To an Unconditioned Space	≥ R1.8	e.g. walls to plantroom, stairwells, risers etc.
Roofs/Ceiling – External	≥ R4.5	
Roofs/Ceiling – To an Unconditioned Space	≥ R3.0	
Floors / Soffit	≥ R2.0	

4.1.3. Summary of NatHERS performance modelling

Typical levels that represent the bulk of the building apartments have been assessed. Preliminary NatHERS rating estimates are provided in the table below.

Figure 5 displays an example of a preliminary NatHERS ratings undertaken for the 346-350 Macaulay Road mixed use apartment project.

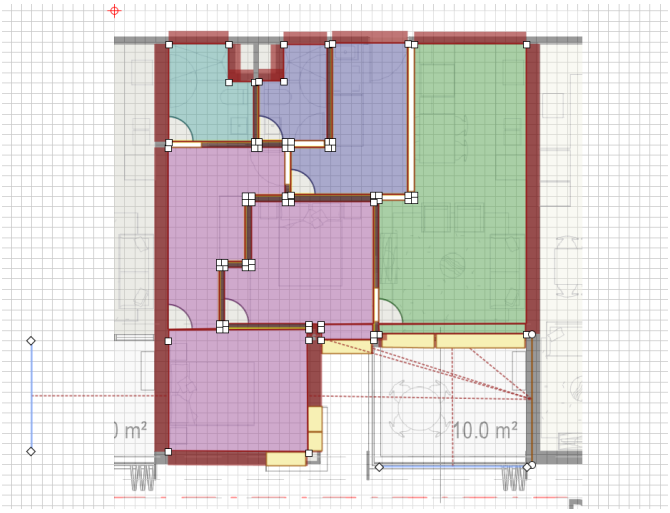


Figure 4 *Example: Preliminary NatHERS ratings*

Table 6 *NatHERS rating estimate for typical levels of the building.*

	Apartment No.	Number of Bedrooms	NatHERS Star Rating Estimate	Cooling Load (MJ/m2)
1	A705	1	6.8	19.2
2	E705	3	7.0	13.2
3	D702	3	7.4	8.9
4	B109	2	6.6	7.8
5	B103	2	6.7	5.3
6	C106	2	7.6	7.3
7	A2	2	7.4	20.2
8	B204	2	7.2	7.7
9	B3	2	8.2	7.1
10	A702	2	6.9	10.9
11	F207	3	7.2	7.0
12	A207	3	8.1	11.3
13	E508	3	7.2	5.1
14	A501	3	7.4	5.3
15	E607	1	7.0	7.0
16	C602	1	6.5	15.6
17	B608	3	7.0	2.9
18	C506	2	7.3	7.7
19	C606	3	6.2	16.8
20	D506	2	7.4	8.3
	Average Star Rating		***7.2***	

The project is anticipated to achieve an average 7.0 NatHERS Star rating which is well above the required average of 6.6 Stars. The minimum and average preliminary NatHERS rating estimations above show compliance with MCC planning requirements with respect to Energy efficiency can be achieved. The final NatHERS ratings are expected to vary but will be monitored to ensure that both NCC BCA and Eco City Goals requirements are met.

4.1.4. Solar Orientation and Sun Control

Solar orientation of a building can significantly impact the energy use for heating and cooling. Optimisation of solar access can have benefits including 'free' heating in winter and the reduction of unwanted gains in summer.

Interior solar control is provided to living zones through setbacks into balconies providing shading to the windows during peak summer months. These overhangs allow for beneficial winter gains.

A high-performance glazing specification will be used to minimise solar loads. Those dwellings that have restricted passive solar gain will be compensated with high-performance fabric components to minimise heat loss. Solar control is provided to all windows through the selection of glass with optimized solar heat gain coefficient, or SHGC. The glass will be selected to optimise solar gains in accordance with NatHERS and energy simulation requirements.

4.1.5. Energy & Controls

Controls can provide the means necessary to ensure that energy use is reduced, as well as providing linkages that allow for monitoring and management.

High efficiency and low carbon emission heating and cooling systems will be employed at this development. Heating can be provided via Gas a low emission source.

In the 346-350 Macaulay Road mixed use apartment project, all apartments are provided with shut-off switch capability for non-essential powered items at the apartment entrance, it has the potential to reduce standby and unintended energy use considerably.

4.1.6. Lighting

Artificial lighting consumes a significant part of a building's electrical energy. Most homes could reduce the amount of energy they use for lighting by 50% or more by making smarter lighting choices and moving to more efficient technologies.

Strategies that are being investigated to reduce energy use for electric lighting are:

- Optimising natural daylight levels (refer above) by maximising Glazing Visual light transmittance (VLT), glazed area and location;
- High efficiency light fittings including LED to be used in apartments;
- Non-vented light fittings have been considered (NatHERS);
- Appropriately designed exterior lighting, no direct light into the sky, complete with appropriate control systems (e.g. movement sensors, daylight sensors, time clocks etc.). All light fittings to be restricted to <5% up lighting component;
- Lighting in common areas to be occupancy controlled.

4.1.7. Domestic Hot Water (DHW) System

Natural gas booster hot water heating is one of the most energy efficient ways of heating water for domestic use, and will be considered for the development. This technology is one of the most efficient, and minimises greenhouse gas emissions in comparison with other hot water technologies.

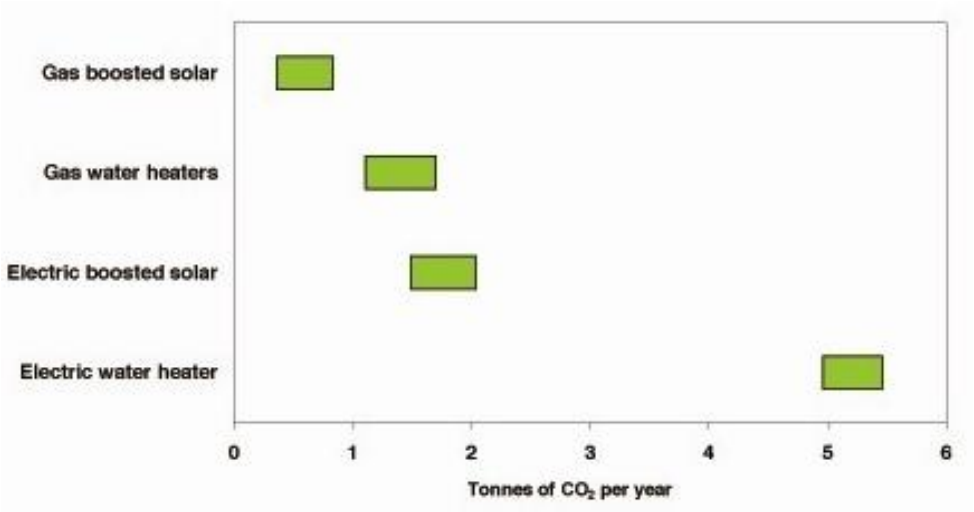


Figure 5 *Greenhouse gas emissions of different hot water systems*

The domestic hot water system option under consideration for all apartments is as follows:

- Centralised instantaneous gas fired booster units;

Figure 6 *Low emission technology: Gas instantaneous*

4.1.8. Commissioning and Building Tuning

Commissioning and building tuning ensure that a building will perform as intended, with focus on building services and building fabric measures. As responsibility passes from the design and construction team to the building owner and facility management team, the building's optimal operation can be lost in translation or left to an uninformed team.

The successful transfer of building information at the commissioning stage allows:

- Building operators to understand in detail what they need to do to operate the facility and further tune it to continuously improve and respond to changes in circumstance;
- Maintenance personnel to understand how to service the particular systems, not only for reliable operations, but also for energy and/or water efficiency;
- Future re-designers to understand the design basis for the building and systems so that these are not compromised by any changes.

4.1.9. Renewable Energy

Based on the available roof area, the project is proposed to install 60kW Solar PV Panels. Refer Appendix-C for further details.

4.2 INDOOR ENVIRONMENT QUALITY

4.2.1. Ventilation

Options for natural ventilation to the apartments will be considered based on building fabric performance and efficiency of proposed products. Assessment will include consideration of building thermal performance and building sealing.

Natural ventilation, unlike fan-forced ventilation, uses the natural forces of wind and buoyancy to deliver fresh air into buildings. Ventilating a building naturally can significantly reduce heating and cooling loads, while providing 100% outdoor air into the spaces it serves, creating a very clean environment for occupants.

The preliminary design incorporates openable windows to all apartments, including sliding door openings that allow natural ventilation.

Mechanical ventilation is proposed to be provided to the laundries, kitchens and bathrooms. Mechanical conditioned make up air is proposed for all apartments.

4.2.2. Thermal Comfort

Thermal comfort involves the provision of a space that is pleasant to occupy, and can be achieved through simple measures like providing an efficient building fabric (for reduced mechanical conditioning inputs) or ability to increase ventilation with openable windows.

Measures included in the preliminary design for the 346-350 Macaulay Road mixed use apartment project, aimed at enhancing thermal comfort, include:

- Targeting an average NatHERS rating of 7 Stars, representing an efficient building fabric that will provide an enhanced level of thermal stability. Measures introduced to ensure this performance include high-performance glazing, increased levels of insulation and openable windows;
- Operable windows also provide the ability to make instantaneous changes to the air movement and ventilation within apartments;
- Inclusion of thermal mass within apartments, allowing for radiant temperature balancing;
- Adequate window design and building sealing to prevent draughts.
- Provision of outside air make up system for mechanical exhaust systems to avoid draughts.

4.2.3. Daylight

Daylight not only provides an opportunity for reduced lighting energy consumption (in conjunction with appropriate lighting controls), but also has many psychological and physiological effects on building occupants, and provides the most appropriate environment for colour recognition and visual comfort. Hence, daylight is one of the key passive design features in the development.

Adequately designed daylighting improves the visibility through higher illumination levels and improves light quality through enhanced distribution of light, better colour rendition, absence of flicker and sparkle or highlights on three-dimensional objects.

Sufficient daylighting has been ensured through the following design measures:

- Provision of adequate glazing, in terms of size, type and placement of windows in relation to the building's depth of floor plate;
- Selection of glazing that allows for:

- Minimised solar heat gain in summer while allowing gains in winter (SHGC);
- Minimised heat transfer through transparent and opaque elements (U-value);
- Maximised visible light transmittance (VLT) while optimising the SHGC and U-value.

- Selection of adequate fabric materials and colours for interior fit outs.

4.3 WATER EFFICIENCY

As water resources are a significantly important consideration, particularly during this extended period of below average rainfall, the development strives to maximise water efficiency, water recycling opportunities and water sensitive urban design.

In line with the City of Melbourne's policy, the building will be designed with the aim of minimising mains potable water consumption, while encouraging the use of alternative water sources, such as rainwater.

The measures by which water efficiency is achieved are outlined below.

4.3.1. Domestic Water Use

To maximise water efficiency, the development includes the following design features:

- High-efficiency showerheads, basin taps, dishwashers and laundry mixers with a Water Efficiency Labelling and Standards (WELS) Scheme. The more stars, the more water efficient;
- Installation of dual-flush toilets;

Table 7 *WELS ratings of specified fixtures*

Fittings	WELS Rating	Flow rate
Toilets – dual flush	5 Star	3/4.5 L/flush
Taps - hand basins	6 Star	4 L/min
Taps - kitchens	6 Star	4 L/min
Showerheads	3 Star – Band 2	<7.5 L/min

4.3.2. Wat-1 Credit Points under Green Star Design & As-built v1.2

The 22.19 planning conditions require the development to achieve at least 1 point under the Wat-1 credit of the Green Star Design & As-built v1.2 tool. Based on the project design a calculation of the Wat-1 credit score has been undertaken using the relevant Green Star Potable Water Calculator:

Percentage reduction in Potable Water Consumption compared to the Standard Practice Building	34%
Points Achieved - General	**5**

Therefore the project has the capability to achieve more than 1 point for Wat-1, so it is able to meet the planning condition.

The small portion of other building classes will be provided with water efficient fixtures and fittings suitable for achieving the planning requirements.

4.4 WASTE AND MATERIALS

In line with the City of Melbourne's policy regarding waste management, the development will provide the facilities that will enable building users and occupants to reduce waste sent to landfill, maximise the recycling and reuse of materials and support the municipality's progress towards becoming a resource and material-efficient city

The measures by which this is achieved are outlined below.

4.4.1. Construction Materials and Waste

As per the requirements of the Green Star credit Man-7 Waste Management, the contractor(s) will be required to achieve a rate of recycling or reuse of demolition and construction waste greater than 80%.

To minimise the environmental impacts associated with materials use within the development, the following initiatives may be included:

- Where possible, building works should utilise sustainable materials such as Forest Stewardship Council (FSC) certified timbers or equivalent. Locally sourced and plantation timbers are preferred to those sourced from old growth forest and from distant locations where ecosystems may be under threat or poorly managed;
- PVC materials used are to be manufactured in line with Best Practice guidelines (as released by the GBCA);
- Where possible, recycled materials should be chosen. The use of recycled aggregate and cement replacements in concrete structures is one possibility. Other opportunities exist with recycled reinforcement steel, recycled timber and landscape products made from recycled plastic or concrete.

4.4.2. Embodied Energy

Many modern building materials have very high embodied energy content. When choosing materials during the design process consideration will be given to the following:

- Energy used in the manufacturing process of the material;
- Transport energy (sourcing local materials over interstate or imported materials);
- Materials with a high recycled content (e.g. steel, concrete aggregates);
- Materials with a high waste content (e.g. fly ash as a cement additive);
- Longevity of the completed product; and
- Ongoing maintenance requirements or material durability.

4.4.3. Waste Management

Waste bin area has been provided for collection of normal and recycling waste from the development. It is proposed to provide a diverter system within the towers to make recycling as easy to undertake as removal of normal waste. This simple provision has the potential to ensure that recycling is maximised for the development.

4.4.4. Materials and Indoor Environment Quality

To minimise the detrimental effects on occupant health and wellbeing, the following specifications have been made in regards to minimising indoor pollutants such as volatile organic compounds (VOCs) and formaldehyde:

- All dwelling interior surface paints (i.e. walls and ceilings) throughout will be specified as low-VOC and more than 50% of interior surface paints will be specified ultra-low VOC;
- All carpets and flooring used within dwellings will be low-VOC;
- All composite wood products will be low formaldehyde;
- Sealants and adhesives used indoors should be chosen to minimise the presence of volatile organic compounds (VOC's) in order to improve occupant health and productivity;
- Incorporation of low or zero emissions (i.e. E1 or E0) medium density fibreboard (MDF) as opposed to standard MDF for all uses within the development.

4.5 LANDSCAPING AND TRANSPORT

4.5.1. Local Amenities

It is recognised that residential projects which are within walking distance of required amenities, such as convenience stores, supermarkets, retail centres, restaurants, hospitals, libraries and schools, promote the use of transport options alternative to private cars. The location of the development strongly promotes the use of local amenities, being within 500m of a large range of amenities.

Easily accessible public transport, as well as excellent walking and cycling facilities surrounding the development, allow users to access local amenities without the need for private transport. The social, wellbeing and environmental impacts of this aspect of the design have the potential to make a significant impact on the development's long term emissions.

4.5.2. Recreational Facilities

The project design considers inclusion of recreational facilities within the site. The recreational facilities includes 2 outdoor residents communal area (468 m^2 and 340 m^2) on the ground level, an indoor communal room (126 m^2) on Ground floor and a communal terrace (235 m^2) on Level-6 Tower E & D. These communal spaces are easily accessible to all residents and provide a well-designed space for recreational activities. Refer appendix for location of recreational facilities within the development.

4.5.3. Cyclist Facilities

The provision of cyclist facilities within the development also promotes use of bicycles to access nearby amenities and for leisure purposes, should public transport options not be used. Bicycle spaces are provided in line with the Planning Scheme. The current provision of cyclist facilities is 476 spaces.

Access to excellent amenities, including the city bike path network, are immediately accessible to the project.

4.5.4. Transport

From an ESD perspective, the major transport concerns are the reduction of the use of fossil fuel consuming vehicles for individual transport. Apart from their fossil fuel consumption and associated contribution to climate change, these vehicles are responsible for urban airborne pollution that harms people's health. The social benefits of utilising alternative transport options should also be considered, such as reducing traffic congestion and benefits to wellness and fitness.

In order to promote low emission vehicles the project will include infrastructure to support electric vehicles. Also preferred and reserved parking will be provided to low emission vehicles to encourage the use of green vehicles within the residents and visitors of the development.

A large number of amenities are nearby or within short commuting distance, including retail, restaurants, convenience and leisure amenities.

Kensington Railway station is 400m from the project site. Also bus route no. 402 runs from Macaulay Road.

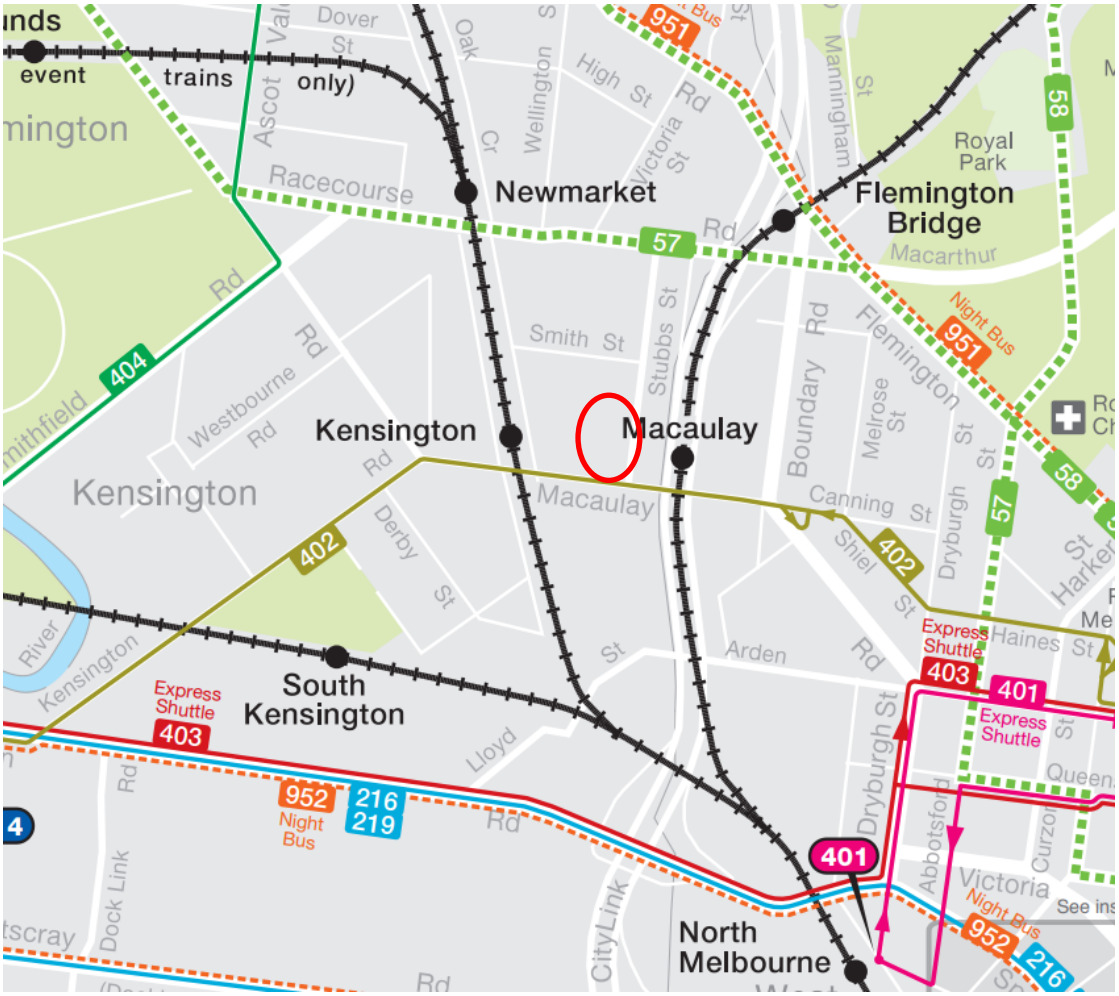


Figure 7 *Transport links around the development*

5. CONCLUSION

This report has demonstrates how the 346-350 Macaulay Road mixed use apartment project meets the planning conditions relating to ESD required by the City of Melbourne. These are in addition to the minimum compliance requirements of the BCA (i.e. Section J) and are targeted at meeting the requirements of the City of Melbourne's Energy, Water and Waste Efficiency section of the Planning Scheme.

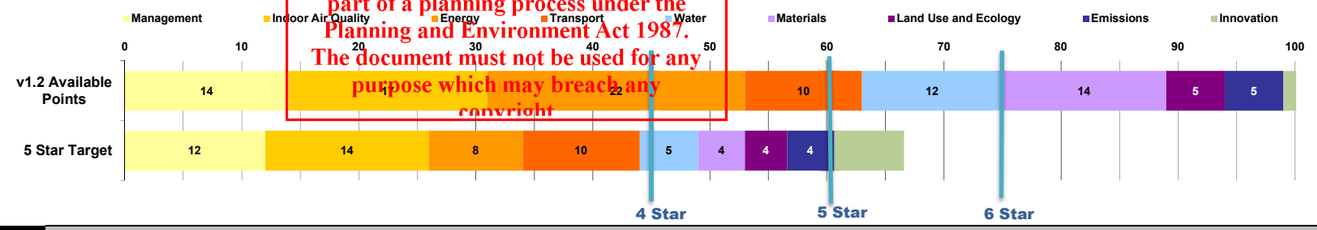
The sustainability measures implemented in the design aim to ensure that the development has enhanced energy efficiency, thus minimising the associated greenhouse gas emissions, reduces potable water use and investigates the use of alternative water sources and minimises waste going to landfill, while increasing the rate of material reuse and recycling.

As demonstrated by this ESD Statement, the 346-350 Macaulay Road mixed use apartment project can achieve the following targets:

- Provides a Green Star pathway for the achievement of an equivalent performance 5 Star Green Star Design & As Built v1.2 rating, relating to 22.19, Energy, Waste and Water performance.
- Potential to achieve a minimum Wat-1 score of 1 under the Green Star Design & As-Built v1.2 rating tool.
- A reduction in the generation of waste sent to landfill.

APPENDIX A PRELIMINARY GREEN STAR MATRIX

The table across the following pages shows the preliminary Green Star Design and As Built v1.2 assessment for the 346-350 Macaulay Road mixed use apartment project. The individual credits shown are indicative and may change; however the overall benchmark target of 5 stars would still be achieved.



						Credit Responsibility Delegation			Green Star Equivalency Cost Comments		
Victoria	Green Star Design & As-Built Credit	v1.2 Available Points	5 Star Target	Optional for Consideration	Compliance Requirements & Comment	Client	Design Team	Contractor	Cost Impact	Comment	Comments
MANAGEMENT		**14%**									
1.0	Green Star Accredited Professional	1	1	-	A Green Star Accredited Professional (GSAP) to be included on the project. Umow Lai are providing GSAP role.		Y	Y	Negligible	Umow Lai provides GSAP role and has been engaged.	Achievable
2.0	Environmental Performance Targets	-	Complies	-	Targets for energy and water consumption to be set and documented. E.g. 25% improvement on min DTS Energy Performance. 50% potable water reduction than typical school building.		Y		Negligible	Design Intent Report can be prepared to document the design intent and the energy/water/IEQ targets for the project.	Achievable
2.1	Services and Maintainability Review	1	1	-	Developer's FM staff to review design during design stage and prior to construction. FM to consider commissionability, controlability, maintainability, fit for purpose and safety.	Y			Negligible	This would be done by Melbourne Council as good practice	Achievable
2.2	Building Commissioning	1	1	-	Pre-commissioning & commissioning must be undertaken to CIBSE, ASHRAE and/or AIRAH standards/guidelines. Now also requires air tightness testing. This is largely standard practice now for upper tier builders, with the exception of airtightness testing.		Y	Y	Low	This represents standard practice for large city of Melbourne projects now. Appropriate commissioning can be completed.	Achievable
2.3	Building Systems Tuning	1	1	-	12 month building tuning period is required with quarterly reviews and tuning, including analysis of data from monitoring systems and assessment of feedback from occupants.	Y	Y	Y	Low	This is targeting the common area spaces only	Achievable
2.4	Independent Commissioning Agent	1	-	-	Not Claimed. Requires engagement of specialist consultant to advise, monitor and verify the commissioning and tuning of building during all stages of project. Must be appointed from design stage.	-	-	-	Low	Not targeted. This is not considered a normal procedure for a residential project with appartments naturally ventilated.	-
3.1	Implementation of a Climate Adaptation Plan	2	2	-	Possible to achieve this credit. Requires engagement of specialist consultant to identify climate change related risks with specific design responses.	-	Y	-	Low	A Climate Adaption Plan can be developed for the project.	Achievable
4.0	Building Information	1	1	-	Development of Building User Information guide to be included in Head Contractor scope. Involves developing package for occupants about building functions, initiatives to enhance energy efficiency, and O&M Information package and a Building Log Book. Intent to provide central point of information for those managing the facility.			Y	Negligible	The appropriate documentation can be developed for the project. Generally included within Contractor scope as best practice hand-over materials.	Achievable
5.1	Environmental Building Performance	1	1	-	Require Council to commitment to set, measure and report on Environmental Performance targets set through Credit 2.0.	Y			Negligible	The appropriate documentation can be developed for the project.	Achievable
5.2	End of Life Waste Performance	1	-	-	Not claimed. Contractually limits the extent of fitouts within a specific period.	-	-	-	-	-	-
6.0	Metering	-	Complies	-	Metering to be provided to monitor building energy and water consumption. Sub-metering must be provided to all major energy/water/gas demands (more extensive than minimum compliance).		Y	Y	Low	A metering strategy can be developed to sub-meter base-building services and apartment areas.	Achievable
6.1	Monitoring Systems	1	1	-	Requires strategy for how to monitor and use data collected from BMS. Cloud based technology platforms can be applied for utility management and benchmarking.		Y	Y	Low	A monitoring strategy can be developed to provide an automated monitoring system.	Achievable
7.0	Environmental Management Plan	-	Complies	-	A comprehensive project-specific Environmental Management Plan (EMP) must be in place for construction. To be included in Head contractor clauses/specification.			Y	Negligible	The Contractor will be required to implement a compliant EMP.	Achievable
7.1	Formalised Environmental Management System	1	1	-	Formalised, systematic and methodical approach to planning, implementing and auditing the EMP to ensure conformance to EMP. To be included in Head contractor clauses/specification. Requires ISO14001 certification for the head contractor.			Y	Negligible	The Contractor will be required to hold a compliant EMP throughout the demolition and construction phase.	Achievable
7.2	High Quality Staff Support	1	1	-	Requires the promotion of positive mental and physical health outcomes of site workers through programs and solutions onsite. Good contractor practices.			Y	Negligible	Practices by responsible Contractor can meet this requirement.	Achievable
8B	Operational Waste	1	1	-	Requires on-site waste recycling system which are consistent with best practice requirements.		Y		Negligible	A Waste Management Plan is prepared in compliance with 22.19. Refer Waste Management Plan.	Achievable
	Category Total	14	**12**								
INDOOR ENVIRONMENTAL QUALITY		**17%**									
9.1	Ventilation System Attributes	1	1	-	Ventilation system design must meet best practice requirements with regards to intakes and exhaust locations		Y		Negligible	Mechanical services design can be designed compliant with requirements.	Achievable
9.2	Provision of Outdoor Air	2	2	-	Naturally ventilated spaces, two (2) points are awarded where the requirements of AS 1668.42012 are met. The nominated area must be provided with the quantity of outdoor air appropriate for the activities and conditions in the space.	-	-	-	Low	Appartments to be naturally ventilated.	Achievable
9.3	Exhaust or Elimination of Pollutants	1	1	-	Exhausting pollutants from print/photocopy equipment, cooking equipment, and carpark vehicle exhaust through dedicated exhaust systems. Print/photocopy must be isolated in enclosed spaces.		Y		Negligible	Mechanical services can be designed to eliminate pollutants.	Achievable
10.1	Internal Noise Levels	1	1	-	Acoustic Consultant to confirm. Internal ambient noise levels no more than 5dB(A) above the satisfactory levels provided in Table 1 AS/NZS 2107:2000.		Y		Low	May require acoustic systems beyond minimum requirements.	Achievable
10.2	Reverberation	1	-	-	Acoustic Consultant to confirm. Requires mitigation of reverberation in accordance with Australian Standard	-	-	-	Low	May require acoustic systems beyond minimum requirements.	-
10.3	Acoustic Separation	1	1	-	Acoustic Consultant to confirm. Partition between spaces should achieve a weighted sound reduction index (Rw) of at least 45.		Y		Negligible	Acoustic separation can be achieved.	Achievable
11.0	Minimum Lighting Comfort	-	Complies	-	Electrical Consultant to confirm. Lights to be flicker free and address perception of colour in the spaces.		Y		Negligible	Minimum lighting comfort can be achieved and is in accordance with good design	Achievable

Umow Lai
INTEGRAL GROUP

Victoria	Green Star Design & As-Built Credit	1/12 Available Points	5 Star Target	Optional for Consideration	Compliance Requirements & Comment	Client	Design Team	Contractor	Cost Impact	Comment	Comments
11.1	General Illuminance and Glare Reduction	1	1	-	Electrical Consultant to confirm. Lighting levels will comply with best practice guidelines (AS 1680.2.4) and glare is eliminated	-	Y	-	Negligible	General illuminance & glare reduction can be achieved and is in accordance with good design.	Achievable
11.2	Surface Illuminance	1	1	-	At least one wall in each living space, kitchen and bedrooms are provided with at least one specific wall-washing or a wall mounted fitting.	-	Y	-	Negligible	Wall washing lighting, or equivalent, can be provided within living spaces.	Achievable
11.3	Localised Lighting Control	1	1	-	Requires occupants to have the ability to control the lighting in their immediate environment.		Y		Negligible	Provision of power plugs and light control will be provided.	Achievable
12.0	Glare Reduction	-	Complies	-	Architects to confirm glare is reduced through a combination of blinds, screens, fixed shading devices or other means.		Y		Low	Blinds will be provided to the apartments to control glare.	Achievable
12.1	Daylight	2	1	-	Up to 2 points are available where a percentage of the nominated area receives compliant levels of daylight during 80% of the nominated hours. Compliant daylight levels are considered a Daylight Factor (DF) of no less than 2.0% at Finished Floor Level under either a CIE overcast or CIE uniform sky; 1 point - 40% of nominated area 2 points - 60% of nominated area Requires daylight modelling.		Y		Low	The glazing elements provided to the apartment spaces will provide for excellent levels of daylight, whilst controlling solar gains. Performance can be further reviewed in detailed design. Modelling cost to verify.	Achievable
12.2	Views	1	1	-	60% of total area has a clear line of site to a high quality internal or external view.		Y		Negligible	The glazing elements provided to the apartment spaces will provide for excellent external views.	Achievable
13.1	Paints, Adhesives, Sealants and Carpets	1	1	-	Internally applied paints, adhesives, sealants and carpets meet stipulated Total VOC Limits. Refer to Green Star Design and As-Built guidelines for limits.		Y	Y	Negligible	Standard industry practice.	Achievable
13.2	Engineered Wood Products	1	1	-	All engineered wood products meet stipulated formaldehyde limits or no new engineered wood products are used in the building. Refer to Green Star Design and As-Built guidelines for limits. Includes particleboard, plywood, fibreboard etc.		Y	Y	Negligible	Standard industry practice.	Achievable
14.1	Thermal Comfort	1	1	-	Requires thermal comfort modelling to prove a high degree of thermal comfort is provided to occupants.	Y	Y	Y		Achievable with Air-conditioning provided in the dwellings.	Achievable
14.2	Advanced Thermal Comfort	1	-	-	Not Claimed.	-	-	-	-		-
	Category Total	17	**14**								
ENERGY		**22%**									
15A.0	Conditional Requirement	-	Complies	-	Requires minimum Deemed-to-Satisfy (DTS) requirements of Parts J1 (building fabric) and J2 (glazing) of Section J to be exceeded by 5%.	-	-	-	-	-	-
15A.1	Building Envelope			-	Nominal increase of 15% over Section J minimum R-Value requirements for building fabric.	-	-	-	-	-	-
15A.2	Glazing			-	Requires 15% improvement on minimum Section J Glazing U-Value and SHGC requirements.	-	-	-	-	-	-
15A.3	Lighting			-	UL Electrical Engineers have confirmed lighting power density is 30% less than maximum allowed in Section J. Automated lighting control systems (occupant detection, daylight, time switches) provided.	-	-	-	-	-	-
15A.4	Ventilation and Air Conditioning			-	Confirmed by Umow Lai Mechanical. The space is naturally ventilated or 15% improvement on Section J efficiency requirements for fan, pump, water heater and air conditioning equipment.	-	-	-	-	-	-
15A.5	Domestic Hot Water			-	Domestic Hot Water to be powered by electric heat pump. Can be powered by natural gas but this is least preferable option.	-	-	-	-	-	-
15A.6	Building Sealing			-	Not Claimed. Requires a pressurised building air leakage test to be carried out on the completed building.	-	-	-	-	-	-
15A.7	Accredited GreenPower			-	Not Claimed. Achievable but requires ongoing purchase of green power energy premium.	-	-	-	-	-	-
15B	GHG Emissions Reduction - NatHERS Rating Pathway	20	7	-	Points are awarded on the calculated reduction of energy intensity in the base MJ/m2 metric rather than the NatHERS star rating score. Design checks for HVAC and natural ventilation are included within these points.		Y		Low	Considered 10% improvements over NatHERS minimum requirements under SMP. The project is considering a minimum avergae 7 star rating for the development	Achievable
16A	Peak Electricity Demand Reduction - On-Site Energy Generation	2	1	-	Requires to reduce total peak electricity demand by 15%. Achieved through the application of passive design features, efficient building services and embedded generation.	-	-	-	High	The project includes installation of Solar PV Panels.	Achievable
	Category Total	22	**8**								
TRANSPORT		**10%**									
17A	Transport - Performance Pathway	10	10	-	Considering project site's proximity to public transport, walkable neighbourhoods, active transport facilities, it is assumed that all points can be score (GBCA Transport Calculator).	Y	-	-	Negligible	The project is in close proximity to Public Transport and other amenities	Achievable
17B.1	Access by Public Transport	-	-	-	Up to 3 points are available based on the accessibility of the site by Public Transport. The score is calculated using the 'Access by Public Transport Calculator'.		-		-		-
17B.2	Reduced Car Parking Provision	-	-	-	0.5 points or 1 point is awarded where there is a reduction of car parking spaces for the proposed building when compared to the maximum rates allowed as determined by the Car Parking Accessibility Index (calculated automatically from the PT Accessibility Calculator).	-	-	-	-		-
17B.3	Low Emission Vehicle Infrastructure	-	-	-	Not Claimed. Requires provision of electric vehicle charging infrastructure and/or dedicated car share spaces.	-			-		-
17B.4	Active Transport Facilities	-	-	-	1 point is awarded where parking spaces and/or dedicated infrastructure is provided to support the uptake of low-emission vehicles.		-		-		-
17B.5	Walkable Neighbourhoods	-	-	-	The site achieves a good walk score (minimum required is 80).		-		-		-
	Category Total	10	**10**								

Victoria	Green Star Design & As-Built Credit	1.2 Available Points	5 Star Target	Optional for Consideration	Compliance Requirements & Comment	Client	Design Team	Contractor	Cost Impact	Comment	Comments
WATER		**12%**									
18A	Potable Water - Performance Pathway	12	5	-	Fixtures to meet minimum WELS ratings: taps (6 *), urinals (6 *), toilets (5 *), showers (3 *), rainwater harvesting, no water-based heat rejection, efficient landscape irrigation system and fire system test water harvesting (TBC fire protection system).		Y		Low	High water efficiency fixtures and fittings can be specified to achieve a minimum of 1 point in the Green Star Potable Water Calculator. Water use in this development will be dominated by amenity uses (i.e. showers and toilets) due to the main residential aspect of the development. Further investigation & analysis will be undertaken in detailed design for potential extra points.	Achievable
	Category Total	12	**5**								
MATERIALS		**14%**									
19	Life Cycle Impacts	7	-	-	Not Claimed. Requires the application of Life Cycle Analysis (LCA)	-	-	-	-	-	-
20.1	Structural and Reinforcing Steel	1	1	-	Requires appropriate procurement of steel. Steel manufacturer must have required accreditation.		Y	Y	Low	Limits steel suppliers to Australian steel manufacturers	Achievable
20.2	Timber Products	1	1	-	Requires timber used in building and construction to be from a reused source or certified by a forest certification scheme. To be included in Specification.		Y	Y	Low	Standard industry practices. Limits timber suppliers.	Achievable
20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1	-	Requires materials to have no PVC and have an Environmental Product Declaration, or PVC to meet best practice guidelines for PVC.			Y	Negligible	Standard industry practices.	Achievable
21	Product Transparency and Sustainability	3	-	-	Not claimed. Problematic credit as target is unrealistically high.	-	-	-	-	-	-
22B	Construction and Demolition Waste	1	1	-	Requires reducing construction waste going to landfill by reusing or recycling 90% of the waste generated during construction.			Y	Negligible	Good contractor practices.	Achievable
	Category Total	14	**4**								
LAND USE & ECOLOGY		**6%**									
23.0	Endangered, Threatened or Vulnerable Species	-	Complies	-		Y			Negligible	The mandatory requirement can be met.	Achievable
23.1	Ecological Value	3	1	-	Based on ecological value of site being improved by project (e.g. Inclusion of Landscaping).	-	Y	-	-	The Landscape includes substantial green are and excellent amenities. The ecological value of the site will be further improved by the addition of raingarden when compared to the 'before' state with all hardscape areas.	Achievable
24.0	Sustainable Site	-	Complies	-			Y		Negligible	The conditional requirement can be met.	Achievable
24.1	Reuse of Land	1	1	-	Given based on site located on previously developed land.		Y		Negligible	The site is reused.	Achievable
24.2	Contamination and Hazardous Materials	0	-	-	Assumed not applicable.	-	-	-	-	-	-
25.0	Heat Island Effect Reduction	1	1	-	Architect to confirm all roofing and hardscape material SRI values are >82 . Generally requires appropriate selection of roof materials, selection of hardscape treatment and extent of landscape/tree coverage.		Y		Low	Roof treatments can be selected to minimise heat island effect.	Achievable
	Category Total	5	**3**								
EMISSIONS		**5%**									
26.1	Stormwater: Reduced Peak Discharge	1	1	-	Post-development peak event discharge from site does not exceed the pre-development peak event discharge.		Y		Moderate	The site is developed currently and post development will maintain the same peak event discharge.	Achievable
26.2	Stormwater: Reduced Pollution Targets	1	1	-	All stormwater from the site meets specified Pollution Reduction Targets.		Y		Moderate	Civil works for proprietary treatment systems.	Achievable
27.0	Light Pollution to Neighbouring Bodies	-	Complies	-	Electrical Engineer to confirm. Project to comply with AS 4282:1997 Control of the Obtrusive Effects of Outdoor Lighting.		Y		Negligible	The mandatory credit requirement can be met.	Achievable
27.1	Light Pollution to Night Sky	1	1	-	Electrical Engineer to confirm. It can be demonstrated that a specified reduction in light pollution has been achieved.		Y		Negligible	Pollution to the night sky can be minimised.	Achievable
28.0	Legionella Impacts From Cooling Systems	1	1	-	Water-based heat rejection avoided for mechanical services.		Y		Negligible	Product of appropriate mechanical services design.	Achievable
29.0	Refrigerants Impacts	1	-	-	Not claimed. Challenging credit to achieve, requiring natural refrigerants.	-	-	-	-	-	-
	Category Total	5	**4**								
INNOVATION											
30A	Innovative Technology or Process			-		-	-	-	-	-	-

346-3450 MACAULAY ROAD: GREEN STAR PATHWAY

Victoria	Green Star Design & As-Built Credit	Available Points	5 Star Target	Optional for Consideration	Compliance Requirements & Comment	Client	Design Team	Contractor	Cost Impact	Comment	Comments
30B	Market Transformation	112	-	-		-	-	-	-	-	-
30C	Exceeding Green Star Benchmarks	10	1	-	Ultra low VOC paints	-	-	-	-	-	-
30D	Innovation Challenge		5	-	Universal design, Microbial control in Hot Water Systems, Local procurement, Recreational Facilities and Groundskeeping. Innovation for exceeding green star benchmark is targeted for ultra low VOC paints,	-	-	-	-		Achievable
30E	Global Sustainability			-		-	-	-	-	-	-
	Category Total	10	**6**								
TOTAL			**66.6**								
	Once certified the following rating could be achieved		**5**	**Stars**		**Stars**					

APPENDIX B Music Modelling Results

An initial MUSIC modelling has been performed to demonstrate that the project meets the Best Practice targets for Stormwater Pollutant levels leaving the site. Refer Appendix-B for inputs and outputs of the MUSIC Modelling.

WSUD Requirements:

Clause 22.23 (Stormwater management, Water Sensitive Urban Design) of planning scheme of City of Melbourne requires the stormwater management system to be designed to:

- Achieve the best practice water quality performance objectives as contained in the Urban stormwater – Best practice environmental management guidelines, CSIRO 1999 (or as amended). The current water quality performance objectives are outlined in Fig-B.1.
- To promote the use of water sensitive urban design, including stormwater re-use.
- To mitigate the detrimental effect of development on downstream waterways, by the application of best practice stormwater management through water sensitive urban design for new developments.
- To minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers and bays.

Pollutant	Receiving water objective:	Current best practice performance objective:
Post construction phase:		
Suspended solids (SS)	comply with SEPP (e.g. not exceed the 90th percentile of 80 mg/L) (1)	80% retention of the typical urban annual load
Total phosphorus (TP)	comply with SEPP (e.g. base flow concentration not to exceed 0.08 mg/L) (2)	45% retention of the typical urban annual load
Total nitrogen (TN)	comply with SEPP (e.g. base flow concentration not to exceed 0.9 mg/L) (2)	45% retention of the typical urban annual load
Litter	comply with SEPP (e.g. No litter in waterways) (1)	70% reduction of typical urban annual load (3)
Flows	Maintain flows at pre-urbanisation levels	Maintain discharges for the 1.5 year ARI at pre-development levels
Construction phase:		
Suspended solids	comply with SEPP	Effective treatment of 90% of daily run-off events (e.g. <4 months ARI). Effective treatment equates to a 50%ile SS concentration of 50 mg/L.
Litter	comply with SEPP (e.g. No litter in waterways) (1)	Prevent litter from entering the stormwater system.
Other pollutants	comply with SEPP	Limit the application, generation and migration of toxic substances to the maximum extent practicable

1 An example using *SEPP* (*Waters of Victoria* 1988), general surface waters segment.
2 SEPP Schedule F7—Yarra Catchment—urban waterways for the Yarra River main stream.
3 Litter is defined as anthropogenic material larger than five millimetres.

Figure B.1 Objectives for environmental management of stormwater

Design Details:

The existing site is considered as a 100% hardscaped area with a pitched roof. The image below shows the existing site.

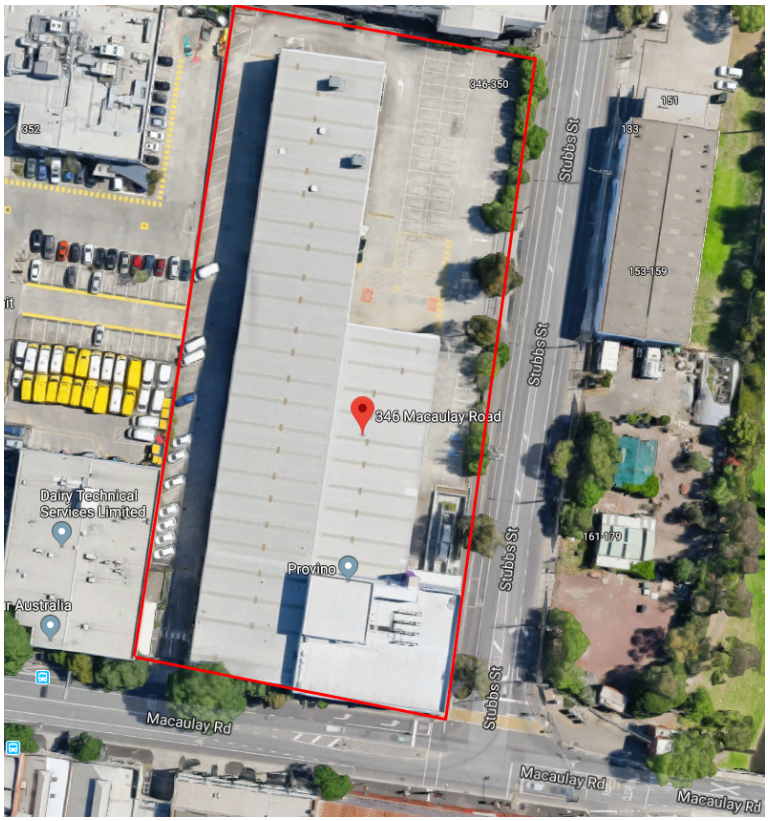


Figure B.2 Existing Site (346-350 Macaulay Road, Kensington)

The project design incorporates a rainwater tank of capacity 80kL to store rainwater and re-use within the development. All rainwater from the rooftop will be collected in a rainwater tank. Rainwater will be reused for irrigation. A SPEL Hydrosystem 800 is also proposed in the design which will filter stormwater from site surfaces before it exits the site. Additionally the project team is investigating inclusion of rain garden within the project boundary to help replace the proprietary filtration system.

Table B.1 Stormwater capture and re-use

	Ruyton Girls School PAC & LRC
Roof catchment area	4196 m2
Site impervious surfaces	3397 m2
Softscape area	1233 m2
Tank storage volume	80,000 L
Non-potable water reuse	Irrigation
Non-potable water demand met with rainwater	241 kL/year

MUSIC Modelling

The stormwater treatment system modelling has been completed using computer software MUSIC (Model for Urban Stormwater Improvement Conceptualisation v6.3) which is a product of eWater (http://www.toolkit.net.au/music). Metrological data used in the MUSIC model has been acquired from the Bureau of Meteorology (BOM). Through review of rainfall distribution across Melbourne, the site is seen to receive mean annual rainfall between 400-500 mm.

The efficacy of the project stormwater treatment measures has been assessed using MUSIC v6.3. Modelling results demonstrate compliance with the current best practice performance objective (Table 2).

Table B.2 Stormwater contaminant reduction

Pollutant	***% of the typical urban annual load***	
	Current best practice performance objective	Project Performance
Total Suspended Solids	80%	86.2%
Total Phosphorous	45%	73.3%
Total Nitrogen	45%	60.4%
Gross Pollutants	70%	99.4%
Flows	Maintain discharges for the 1.5 year ARI at pre-development levels	31.8% reduction from pre-development levels

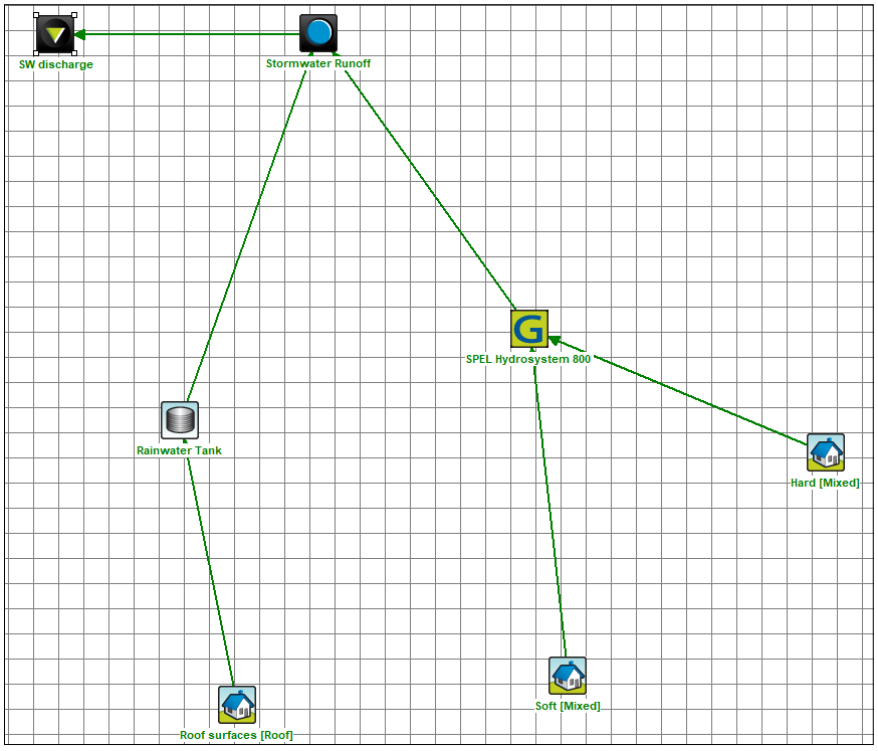


Figure B.3 Screenshot of MUSIC Modelling parameters

NOTE: THE BUILDING SHALL ADOPT ALL RECOMMENDATIONS OF THE ACOUSTIC ASSESSMENT, PREPARED BY ACOUSTIC LOGIC, DATED 28 JUNE 2019 (OR AS REVISED)

Project Title
2339

346-350 Macaulay Rd

Drawing Title
ROOF PLAN

Status
TOWN PLANNING

Project No	Drawing No	Revision
2339	TP01.11	12

Melbourne : 4/135 Sturt Street Southbank,VIC 3006 T +61 3 9699 3644
Sydney : GroundFloor11-1 Buckingham Street,Surry Hills, NSW 2010T +61 2 9660 9329
Brisbane : Level 12,324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

ABN: 84006394261 NSW Nominated Architects:Tom Jordan 7521,
Richard Leonard 7522, David Tordoff 8028

Drawn By	Author
Checked By	Checker
Date Printed	20-Nov-19 11:13:27 AM
Scale	1 : 200@ A1

Rev	Date	Description
9	16.04.19	WORK IN PROGRESS - CLIENT REVIEW
10	23.05.19	CONSULTANT SET
11	18.09.19	COUNCIL RFI'S
12	07.11.19	COUNCIL RFI'S

UNITED ASIA GROUP
BCS
BATTERSBY CHOW STUDIO

Potable Water Performance Pathway (18A)

				Weighted Points Achieved	5
Links to - Building and climate data:	Building input, areas and operation	Irrigation and landscaping			
Links to - Water demand:	Fixtures	Whitegoods	Heat Rejection	Washdown	Landscape Irrigation
	Swimming pools	Fire Protection System	Process Cooling		
Links to - Reclaimed water supply:	Reclaimed water use	Rainwater collection	Greywater collection	Blackwater collection	Stormwater and off-site reclaimed water supply
Links to - Results:	Checklist	Demand summary	Results for Performance Pathway (18A) only	Results for Domestic hot water	Results for Sewerage

Instructions: Enter information into light blue cells

For details on what information is required and how this information is used to calculate the reduction in potable water consumption against the Standard Practice Benchmark, please refer to the Green Star - Potable Water Calculator Guide, available from the GBCA website.

0. GENERAL

BUILDING OCCUPANCY, AREAS AND OPERATION

Space type description	Area (m²)	Peak days of operation (remaining days assumed off-peak)	Occupancy profile	Maximum design occupancy used in water use		Percentage of building users who occupy the space continually for periods greater than one hour.
				Proposed Building design occupancy (m2/person)	Default design occupancy (Not applicable for residential areas)	
Apartments	30854	7 days a week	Class 1, 2 or 3 residential	39	Please select	98%
Retail	391.5	7 days a week	NCC Table 2c (Class 6 shop or shopping centre)		Retail / Showroom (5m2/person)	1%
Community	151.5	2 days a week	NCC Table 2f (Class 9b theatre or cinema)		Art gallery, exhibition area, museum (4m2)	1%
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
		Please Select	Please Select		Please select	
Non occupied areas		n/a	n/a			
TOTAL AREA	31397					

BUILDING CHECKLIST

Please provide responses to the following questions. Detailed inputs will be requested further on in the calculator.

WATER USES - ALL QUESTIONS MUST BE ANSWERED

1. Sanitation	
Are fixtures and fittings provided for building occupant sanitation?	Yes
Does the project provide for sports activities?	Yes
Have showers been installed for post/pre activity use?	Yes

2. White Goods	
Does the project include any dishwashers or washing machines?	Yes

3. Heat Rejection	
Does the project utilise water based heat rejection (building cooling)?	No
Does the project have cooling towers?	No

5. Landscape Irrigation	
Are there any landscaped areas within the project?	Yes
Are any irrigation systems included in the project?	Yes

6. Swimming Pools	
Are there any swimming pools within the project?	Yes

7. Fire Protection System	
Does the project include a fire protection system?	Yes

8. Process Cooling

Does the project contain any other water cooled systems that are not conventional cooling towers?	No

Does the project include any water based process cooling?	No

4. Wash Down	
Does the project include wash down areas?	No

WATER REUSE - ALL QUESTIONS MUST BE ANSWERED

9. Water Reclamation	
Does any water collection, reclamation and/or reuse occur on the project site?	Yes
Does the project include rainwater capture and reuse systems?	Yes
Does the project include greywater capture, treatment and reuse systems?	No
Does the project include blackwater capture, treatment and reuse systems?	No
Does the project include other stormwater reuse or an off-site supply of non-potable water?	No

1. SANITATION FIXTURE EFFICENCY

WATER DEMAND FROM FIXTURES AND FITTINGS: (Annual water demand from fixtures and fittings is calculated using assumed usage rates based on the space types and occupancies entered above. Please see pages 10-13 of the Green Star - Potable Water Calculator Guide for further details.)

	Water efficiency		Resulting water efficiency used in calculator (l/min, except for toilets, L/flush)	Percentage of each type	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)	
	Manual entry from manufacturer's data sheet (l/min, or L/flush for toilets)	WELS Star Rating selection					
Toilets							
4.5l/2.5l	4.5	5 Star	4.5	75%			
Half flush	2.5	5 Star	2.5	25%			
<enter description>		Select star rating					
<enter description>		Select star rating					
			Total	100%	2015.8	2015.8	(The Standard Practice Benchmark is based on 3 StarWELS rated toilets)
	Are urinals installed?	No	**Would urinals normally be installed in the building type?**	No	(Note: if "No" is selected, the project team should provide justification within the short report as to why the standard practice building does not have urinals.)		
Urinals							
1l/flush		Select star rating		100%			
<enter description here>		Select star rating					
<enter description here>		Select star rating					
<enter description here>		Select star rating					

Urinals on auto timer	**Enter average L/flush**	0	
	Enter number of urinals on autotimer	0	
	Percentage of total number of Urinals	0	
		Total	100%

			0			
			0			
			0			
		Total	100%	0.0	0.0	(The Standard Practice Benchmark is based on 3 Star WELS rated urinals)

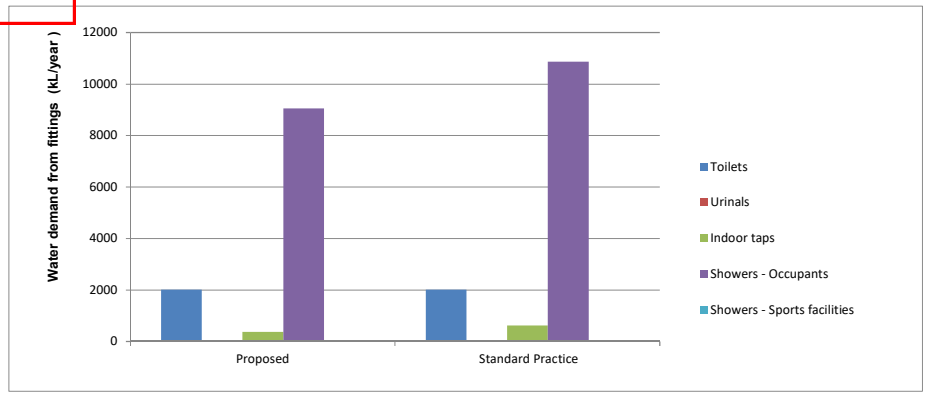
Indoor taps							
4.5 l/min	4.5	6 Star	4.5	100%			
<enter description>		Select star rating					
<enter description>		Select star rating					
<enter description>		Select star rating					
			Total	100%	369.8	616.3	(The Standard Practice Benchmark is based on 4 Star WELS rated taps)

	Shower demand by occupants (reference)		100.0%		For residential buildings Enter 100% for both "reference" and "current" shower demand		
Showers - Occupants	**Shower demand by occupants (current)**		100.0%		For other building Types Use the reference and proposed building bicycle accommodation percentage from the Sustainable Transport Calculator, or percentages determined under 17.B.4 'Active Transport Facilities' criterion to determine the number of building occupants that are likely to shower each day.		
4.5 6LPM	7.5	3 Star	7.5	100%			
<enter description>		Select star rating					
<enter description>		Select star rating					
<enter description>		Select star rating					
			Total	100%	9053.1	10863.7	(The Standard Practice Benchmark is based on 3 Star WELS rated showers)

	Indicate the number of people expected to participate in sporting activities each day. (Use an average based on weekly figures if required)			Indicate the number of days/year that the sports facilities are in use		
Showers - Sports facilities						
4.5 6LPM		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
<enter description>		Select star rating				
		Total	0%	0.0	0.0	(The Standard Practice Benchmark is based on 3 Star WELS rated showers)
			Please ensure the total equals 100%			

RESULTS: WATER DEMAND FROM FITTINGS

	Proposed Building water demand (kL/year)	Standard Practice Building water demand (kL/year)
Toilets	2015.8	2015.8
Urinals	0.0	0.0
Indoor taps	369.8	616.3
Showers - Occupants	9053.1	10863.7
Showers - Sports facilities	0.0	0.0
TOTAL	11438.7	13495.8



2. WHITE GOODS

Water Demand from Washing Machines

The project team is to provide documentary evidence in accordance with the water calculator guide and technical manual to substantiate the number of

	Water efficiency								
Clothes washing machines	**Manual entry from manufacturer's data sheet**	**WELS Star Rating selection**	**Machine capacity (kg)**	**Resulting water efficiency used in calculator (L/kg)**	**Number of each type**	**Number of cycles per year (leave blank if unknown)**	**Proportion of water per cycle that is sourced from DHW (%)**	**Proposed Building water demand (kL/year)**	**Standard Practice Building water demand (kL/year)**
<enter description>		5 Star	6	7.2	426			6,720.0	13714.2
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
				Total	426			6719.97	13714.2

Water Demand from Dishwashers

	Water efficiency								
Dishwashers	**Manual entry from manufacturer's data sheet**	**WELS Star Rating selection**	**Machine capacity (number of place settings)**	**Resulting water efficiency used in calculator (L/cycle)**	**Number of each type**	**Number of cycles per year (leave blank if unknown)**	**Proportion of water per cycle that is sourced from DHW (%)**	**Proposed Building water demand (kL/year)**	**Standard Practice Building water demand (kL/year)**
10.6 L/CYCLE		5 Star	10	8.6	316			988.5	1319.1
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
<enter description>		Select star rating						0.0	0.0
				Total	316			988.48	1319.1

3. HEAT REJECTION

This section requires outputs from the energy simulation undertaken for Conditional Requirement and Greenhouse Gas Emissions (Credit 15).

GENERAL INFORMATION

Site elevation (m above sea level)	
Maximum combined cooling tower air flow (L/s)	
Peak building cooling load (kW)	

Standard Practice Building HVAC system	
Select one of the following building types:	
Standard Practice HVAC system type assumed for Energy and Water Category	
Maximum combined cooling tower air flow (L/s)	
Peak building cooling load (kW)	

Water Demand from Cooling Towers

THE PROJECT TEAM HAS INDICATED THAT THERE ARE NO WATER BASED HEAT REJECTION SYSTEMS INCLUDED IN THE PROJECT, PLEASE COMPLETE THE STANDARD PRACTICE BUILDING COOLING LOAD.

Please enter the average air temperture, relative humidity and heat rejection laod for the standard practice building.

#N/A

Data required for calculation of EVAPORATION:

Inputs	Proposed Building monthly cooling load (kWh/month)	Average dry bulb temperature (°C)	Average relative humidity (%)	Standard Practice Building monthly cooling load (kWh/month)
January				
February				
March				
April				
May				
June				
July				
August				
September				
October				
November				
December				

Visit the Bureau of Meteorology's website to obtain average dry bulb and relative humidity data relevant to your site:
http://www.bom.gov.au/climate/data/index.shtml?bookmark=200

Data required for calculation of DRIFT:

	Proposed Building	Standard Practice Building	
Condenser Water Δt (°C)		5.5	(as per the requirements of the Greenhouse Gas Emissions Calculator Guide)
Drift coefficient (%)		0.00002	(as required in AS3666.1 clause 4.4)

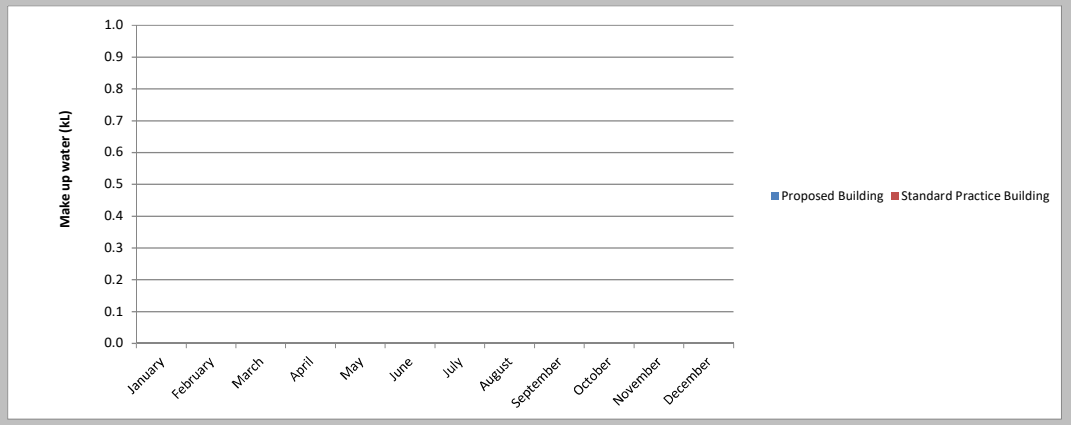
Data required for calculation of BLEED:

	Proposed building	Standard Practice Building	
Cycles of concentration		6	Standard practice cycles of concentration

	Proposed Building				Standard Practice Building			
	Evaporation (kL)	Drift (kL)	Bleed (kL)	TOTAL kL/month	Evaporation (kL)	Drift (kL)	Bleed (kL)	TOTAL kL/month
January				0.00	0.00	0.00	0.00	0.00
February				0.00	0.00	0.00	0.00	0.00
March				0.00	0.00	0.00	0.00	0.00
April				0.00	0.00	0.00	0.00	0.00
May				0.00	0.00	0.00	0.00	0.00
June				0.00	0.00	0.00	0.00	0.00
July				0.00	0.00	0.00	0.00	0.00
August				0.00	0.00	0.00	0.00	0.00
September				0.00	0.00	0.00	0.00	0.00
October				0.00	0.00	0.00	0.00	0.00
November				0.00	0.00	0.00	0.00	0.00
December				0.00	0.00	0.00	0.00	0.00
TOTAL (kL/year)	0.00	0.00	0.00	**0.00**	0.00	0.00	0.00	0.00

Water demand from heat rejection systems that are not conventional cooling towers

THE PROJECT TEAM HAS INDICATED THAT THERE ARE NO WATER BASED HEAT REJECTION SYSTEMS THAT ARE NOT CONVENTIONAL COOLING TOWERS INCLUDED IN THE PROJECT, PLEASE PROCEED TO THE NEXT SECTION.



4. WASHDOWN

THE PROJECT TEAM HAS INDICATED THAT WASHDOWN AREAS ARE NOT INCLUDED IN THE PROJECT, PLEASE PROCEED TO THE NEXT SECTION.

5. LANDSCAPE IRRIGATION

(The irrigation requirement for the site is calculated for each month of the year, for each landscaped 'zone' in the site (a zone being a landscaped area that has the same soil type, irrigation system and as far as possible, types of plants). Please see pages 17-22 of the Green Star- Calculator Guide for further details.)

Climate data	Monthly rainfall (mm)	Monthly evapotranspiration (point potential) (mm)
January	33.6	69.7

February	59.1	58.4
March	26.3	45.2
April	56.0	55.2
May	29.3	26.3
June	40.9	25.5
July	60.3	27.2
August	45.1	31.6
September	41.6	39.3
October	55.2	52.5
November	50.2	60.9
December	53.0	66.8

Data on each landscaped zone				Irrigation system water application efficiency	
Zone name and description	**Area of zone (m^2)**	**Percentage of zone undercover (%)**	**Weighted average crop coefficient in zone**	**Default water application efficiency for common irrigation systems**	**User determined application efficiency**
Trees	500	50%	0.6	Subsurface drip (SDI) (90%)	
Turf	733	50%	0.6	Subsurface drip (SDI) (90%)	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
				Please select	
Standard practice landscape irrigation assumptions:	(Same as Proposed Building)	(Same as Proposed Building)	(0.6)	(75%)	

RESULTS: WATER DEMAND FROM IRRIGATION

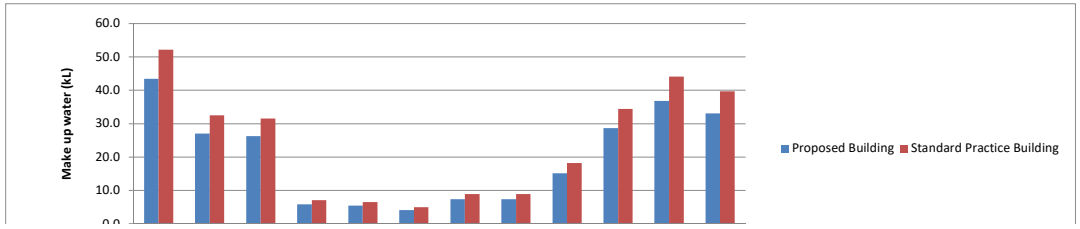
Annual irrigation requirement from each zone

	Annual irrigation requirement for each zone (kL/year)	
Zone name and description	**Proposed Building**	**Standard Practice Building**
Trees	97.8	117.4
Turf	143.4	172.1
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
0	0.0	0.0
TOTAL for all zones (kL/year)	**241.2**	**289.5**

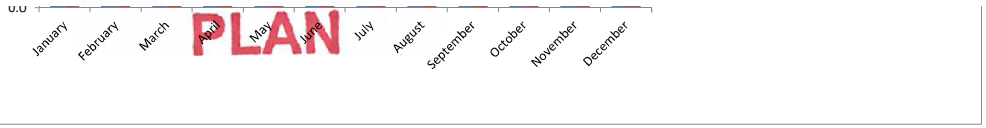
Note: The irrigation requirement for a particular zone will only be computed once every field related to that zone has been completed in the table above.

Total irrigation requirement for all zones by month

	Irrigation requirement for all zones per month (kL/month)	
	Proposed Building	**Standard Practice Building**
January	43.5	52.2
February	27.1	32.6
March	26.3	31.6
April	5.9	7.1
May	5.4	6.5
June	4.2	5.0
July	7.4	8.9
August	7.5	8.9



September	15.1	18.2
October	28.7	34.1
November	36.8	44.2
December	33.1	39.7
Total make up water (kL/year)	**241.2**	**289.5**



6. SWIMMING POOLS

Is the swimming pool outdoor or indoor	Outdoor
Enter the project height above sea level (m)	34
Is a pool cover provided	No
Enter the volume of the swimming pool (m^3)	72
Enter the surface area of the swimming pool (m^2)	48
Enter the annual **minimum** pool hall exhaust air volume based on the requirements of AS1668.2 (m^3)	0
Enter the annual proposed design pool hall exhaust air volume (m^3)	0
Enter the average pool hall temperature while pool exhaust is operating	0
Enter the water consumption for filter cleaning (backwash) (L)	72
Enter the number of times/year that filter cleaning will take place	52

Reference swimming pool water consumption (L/day)	6.1
Proposed swimming pool water consumption (L/day)	12.9

Enter climate data relevant to the project location

"Enter the evapotranspiration and rainfall data below"	Monthly rainfall (mm)	Monthly evapotranspiration (point potential) (mm)
January	33.6	69.7
February	50.2	58.1
March	26.3	45.2
April	50.0	32.2
May	39.3	26.3
June	40.9	25.5
July	36.3	27.2
August	45.1	31.6
September	41.6	39.3
October	55.2	62.5
November	50.2	69.9
December	53.0	66.8
TOTAL	521.68	554.3

Visit the Bureau of Meteorology's website to obtain rainfall and evapotranspiration data relevant to your site:
http://www.bom.gov.au/climate/data/index.shtml

7. FIRE PROTECTION SYSTEMS

Is the building required under part E of the National	Yes
Does the building's sprinkler system discharge water during	Yes
Is greater than 80% of discharged water captured for reuse?	Yes
Testing frequency (enter number of tests per year)	
Volume discharged per test (L)	
Proportion of water captured per test (%)	
Fire protection system water point achieved	Yes

8. PROCESS COOLING

THE PROJECT TEAM HAS INDICATED THAT THERE IS NO PROCESS COOLING IN THE PROJECT, PLEASE PROCEED TO THE NEXT SECTION.

9. RECLAIMED WATER

Note: All systems entered into this calculator must comply with local EPA requirements.

Reclaimed Water Use

How are the water demands from uses assessed in Potable Water credit met?

Water use (assessed in Potable Water, Credit 18)	Percentage of fittings/systems connected to the following water sources				
	Rainwater	Greywater	Blackwater	Stormwater recycling or other off-site reclaimed water	Mains water only (this column must be completed - please enter a figure of between 0% and 100% for each water use)
Toilets					100%
Urinals					
Indoor Taps					100%
Showers - occupants					100%
Showers - sports					100%
Laundries					100%
Dishwashers					100%
Heat rejection					
Wash down					
Landscape irrigation	100%				0%
Fire system water					
Swimming pools					
Process cooling					

Note: Where fittings or systems are supplied with water from more than one source, it is assumed that the they are first supplied with water from any greywater and blackwater systems, followed by rainwater, stormwater and off-site reclaimed water systems.

Note: If there is insufficient rain/grey/black water to service the indicated percentage of each water use, mains water will applied by the calculator to make up the difference.

Total monthly water demands from water uses not assessed in the Potable Water credit (kL) whose demands are completely or partially met by reclaimed water:

Note: The demand for reclaimed water from water uses assessed under other credits will be met before any water uses assessed under the Potable Water Credit.

	Monthly water demand (kL/month)		
	<Enter description of any other uses of rainwater or re-used water>	**<Enter description of any other uses of rainwater or re-used water>**	**<Enter description of any other uses of rainwater or re-used water>**
January			
February			
March			
April			
May			
June			
July			
August			
September			
October			
November			
December			

Note: This table only needs to be filled in if reclaimed water is used to meet the demand of these end uses.

If reclaimed water is not used for these end uses, leave these cells blank.

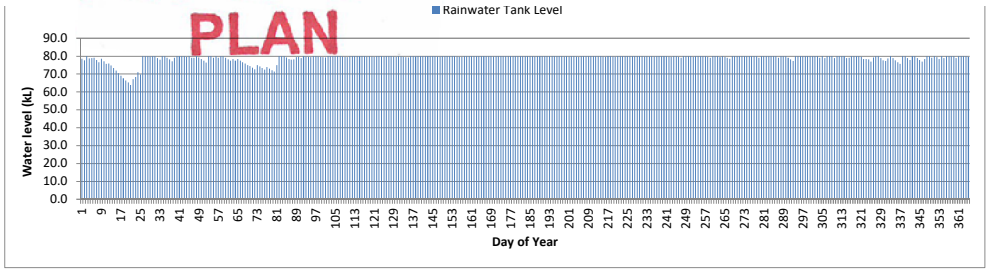
When reclaimed water is used, enter the total demand for each month regardless of whether it is fully or partially met by the reclaimed water supply. In the table below, the percentage of the demand met by reclaimed water/connected to the reclaimed water supply is entered.

How are the water demands from the Non-Potable water uses met?

Water use	**Rainwater**	**Greywater**	**Blackwater**	**Stormwater recycling or other off-site reclaimed water**	**Mains water only (this column must be completed - please enter a figure of between 0% and 100% for each water use)**
<Enter description of any other uses of rainwater or re-used water>					
<Enter description of any other uses of rainwater or re-used water>					
<Enter description of any other uses of rainwater or re-used water>					

Rainwater Collection

Rainfall collection area (m2)		1500
Run-off co-efficient	Flat roof with gravel	0.9
Storage capacity (kL)		80
Rainwater tank reliability %		100%



Grey Water Collection	**THE PROJECT TEAM HAS INDICATED THAT NO GREYWATER COLLECTION IS INCLUDED IN THE PROJECT, PLEASE PROCEED TO THE NEXT SECTION.**

Black Water Collection	**THE PROJECT TEAM HAS INDICATED THAT NO BLACKWATER COLLECTION IS INCLUDED IN THE PROJECT, PLEASE PROCEED TO THE NEXT SECTION.**

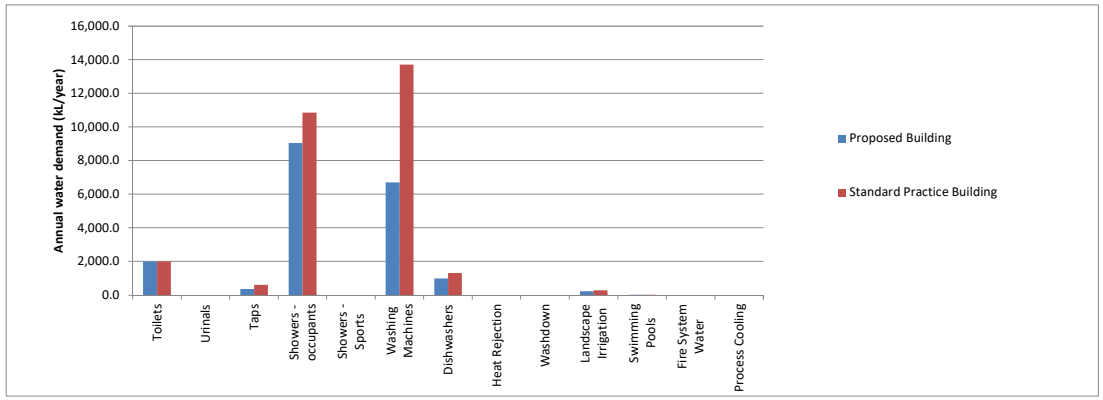
Stormwater and Off-site reclaimed water supply	THE PROJECT TEAM HAS INDICATED THAT NO STORMWATER OR OFFSITE COLLECTION IS INCLUDED IN THE PROJECT, PLEASE PROCEED TO THE NEXT SECTION.

9. SUMMARY OF WATER DEMAND

Summary of demand from each Potable water use

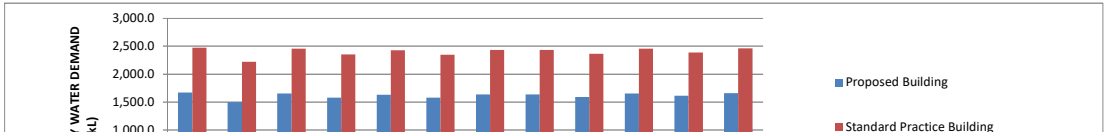
Annual water demand from each Potable water use (kL/year)

	Proposed Building	Standard Practice Building
Toilets	2,015.8	2,015.8
Urinals	0.0	0.0
Taps	369.8	616.3
Showers - occupants	9,053.1	10,863.7
Showers - Sports	0.0	0.0
Washing Machines	6,720.0	13,714.2
Dishwashers	988.5	1,319.1
Heat Rejection	0.0	0.0
Washdown	0.0	0.0
Landscape Irrigation	241.2	289.5
Swimming Pools	4.7	2.2
Fire System Water	0.0	0.0
Process Cooling	0.0	0.0
TOTAL	19,393.1	28,820.8

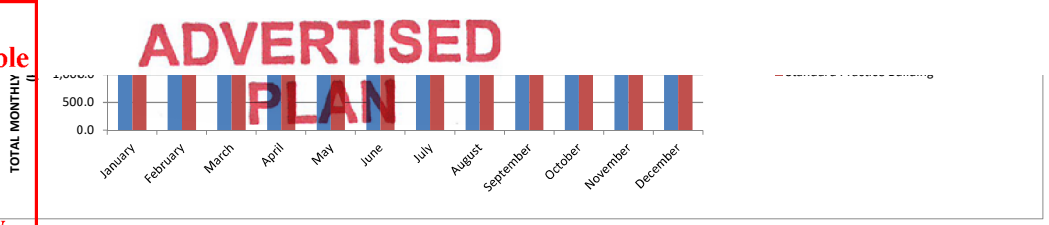


Summary of demand from all Potable water uses per month

	Monthly water demand from all Potable water uses (kL/month)	
	Proposed Building	Standard Practice Building
January	1,670.1	2,475.4
February	1,496.3	2,221.3
March	1,652.9	2,454.8
April	1,580.0	2,352.2



May	1,631.1	2,429.8
June	1,578.3	2,350.0
July	1,634.0	2,432.2
August	1,634.0	2,432.2
September	1,589.3	2,363.0
October	1,655.3	2,457.7
November	1,611.0	2,389.2
December	1,659.7	2,463.0
TOTAL	19,393.1	28,820.8



10. RESULTS

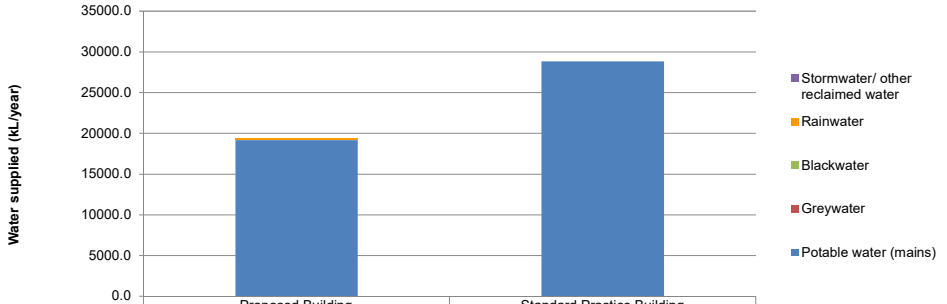
	Proposed Building						Standard Practice Building
	Total water demand	Rainwater used to meet demand	Greywater used to meet demand	Blackwater used to meet demand	Stormwater and off-site reclaimed water used	Potable water demand	Potable water demand
January	1,670	43	0	0	0	1,627	**2,475**
February	1,496	27	0	0	0	1,469	**2,221**
March	1,653	26	0	0	0	1,627	**2,455**
April	1,580	6	0	0	0	1,574	**2,352**
May	1,632	5	0	0	0	1,627	**2,430**
June	1,578	4	0	0	0	1,574	**2,350**
July	1,634	7	0	0	0	1,627	**2,432**
August	1,634	7	0	0	0	1,627	**2,432**
September	1,589	15	0	0	0	1,574	**2,363**
October	1,655	29	0	0	0	1,627	**2,458**
November	1,611	37	0	0	0	1,574	**2,389**
December	1,660	33	0	0	0	1,627	**2,463**
TOTAL	**19,393**	**241**	**0**	**0**	**0**	**19,152**	**28,821**

Percentage reduction in Potable Water Consumption compared to the Standard Practice Building	34%

Points Achieved - General	**4**
Points Achieved - Fire system test water	**1**
Points Achieved - Process cooling	**N/A**

Points Allocation		
Percentage reduction compared to standard practice benchmark	kL/year	Points awarded
0%	28821	0.0
5%	27380	1.1
15%	24498	2.2
25%	21616	3.3
35%	18734	4.4
45%	15851	5.5
55%	12969	6.6
65%	10087	7.7
75%	7205	8.8
85%	4323	9.9
95%	1441	11.0

Water supplied to the Proposed and Standard Practice Buildings



	Proposed Building	Standard Practice Building
Stormwater/ other reclaimed water	0.0	0.0
Rainwater	241.2	0.0
Blackwater	0.0	0.0
Greywater	0.0	0.0
Potable water (mains)	19151.8	28820.8

Outputs from this calculator required for Ene-Conditional Requirement and Credit 15: Greenhouse Gas Emissions.

The annual domestic hot water usage figures determined in this calculator must be used in the energy modelling required for Ene-Conditional Requirement and Credit 15: Greenhouse Gas Emissions to estimate the domestic hot water energy requirement of the Proposed and Standard Practice Buildings. For more details see the Green Star - Greenhouse Gas Emissions Calculator Guide, available www.gbca.org.au.

The estimates of annual hot water consumption usage of the Proposed Building are based on the water efficiency of the fittings entered into this calculator. The estimates for the Standard Practice Building are based on the Standard Practice Building's fittings - for further details see the Green Star - Potable Water Calculator Guide, available www.gbca.org.au.

	Proposed Building	Standard Practice Building
Annual Domestic Hot Water Usage (kL/year)	4711.42	5739.98

NOTE: THESE FIGURES CAN ONLY BE USED IF the 'Building occupant numbers and occupancy' and 'Water consumption due to fittings' sections of THIS CALCULATOR are COMPLETED.

11. SEWAGE

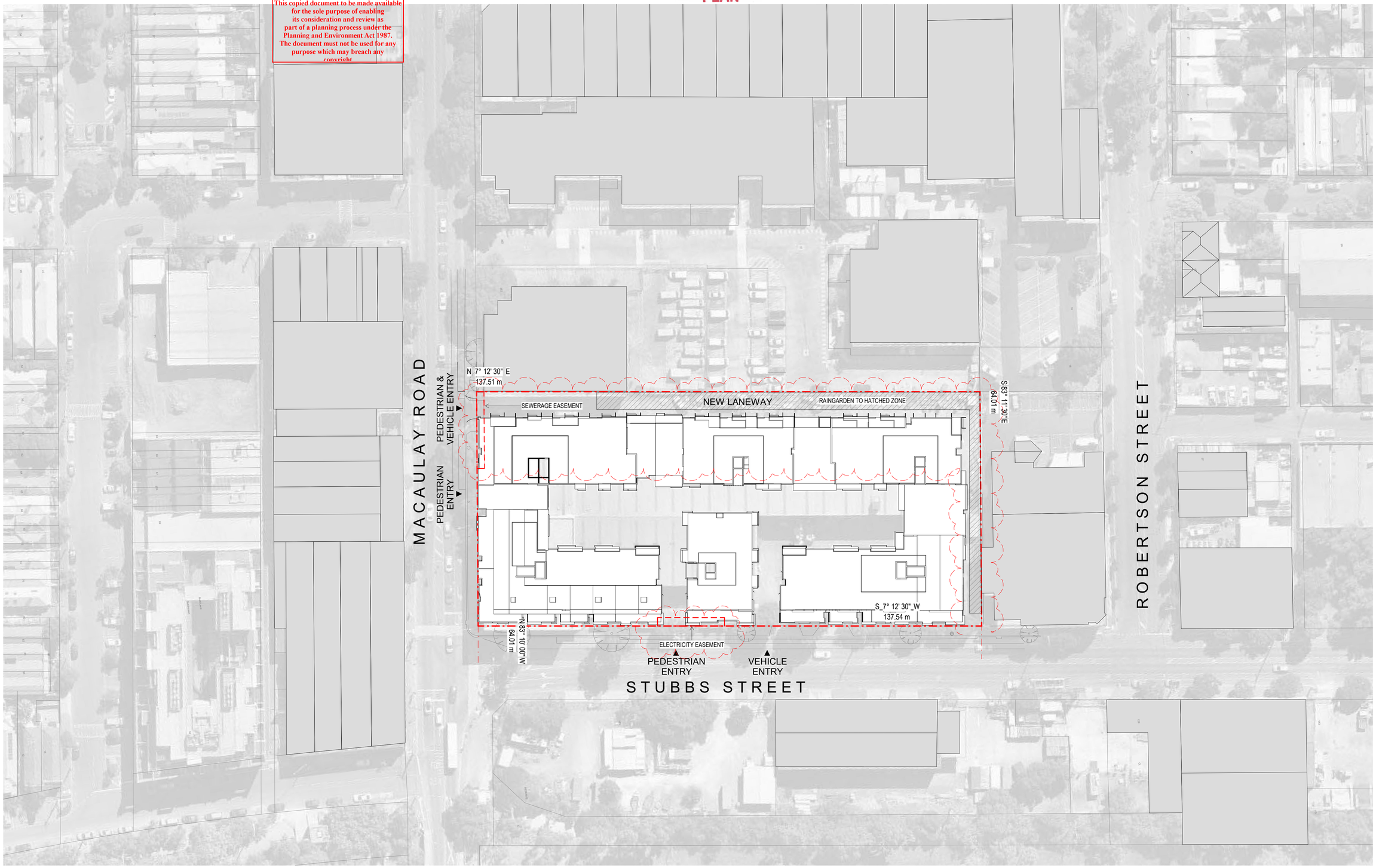
SEWERAGE REDUCTION DUE TO WATER RECYCLING

Percentage reduction in discharge to sewer compared to	32.7%
Innovation Point Achieved	

An innovation point may be claimed for a 90% of greater reduction in flow to sewer

Raingarden to Hatched zone

ADVERTISED PLAN



Project Title	Drawing Title	Project No	Drawing No	Revision
2339	SITE PLAN	2339	TP01.00	12
346-350 Macaulay Rd	**Status** TOWN PLANNING			

Melbourne : 4/135 Sturt Street Southbank,VIC 3006 T +61 3 9699 3644
Sydney : GroundFloor11-1 Buckingham Street,Surry Hills, NSW 2010T +61 2 9660 9329
Brisbane : Level 12,324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

ABN: 84006394261 NSW Nominated Architects:Tom Jordan 7521,
Richard Leonard 7522, David Tordoff 8028

Drawn By	Author
Checked By	Checker
Date Printed	30-Oct-19 11:02:48 AM
Scale	1 : 500@ A1

Rev	Date	Description
9	09.04.19	WORK IN PROGRESS - CLIENT REVIEW
10	16.04.19	WORK IN PROGRESS - CLIENT REVIEW
11	18.09.19	COUNCIL RFI'S
12	30.10.19	RAINGARDEN REVISION

Outdoor Communal space

Indoor Communal space

Project Title	Drawing Title	Project No	Drawing No	Revision
2339 346-350 Macaulay Rd	GROUND FLOOR Status: TOWN PLANNING	2339	TP01.04	17

Melbourne : 4/135 Sturt Street Southbank,VIC 3006 T +61 3 9699 3644
Sydney : GroundFloor11-1 Buckingham Street,Surry Hills, NSW 2010T +61 2 9660 9329
Brisbane : Level 12,324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

ABN: 84006394261 NSW Nominated Architects:Tom Jordan 7521, Richard Leonard 7522, David Tordoff 8028

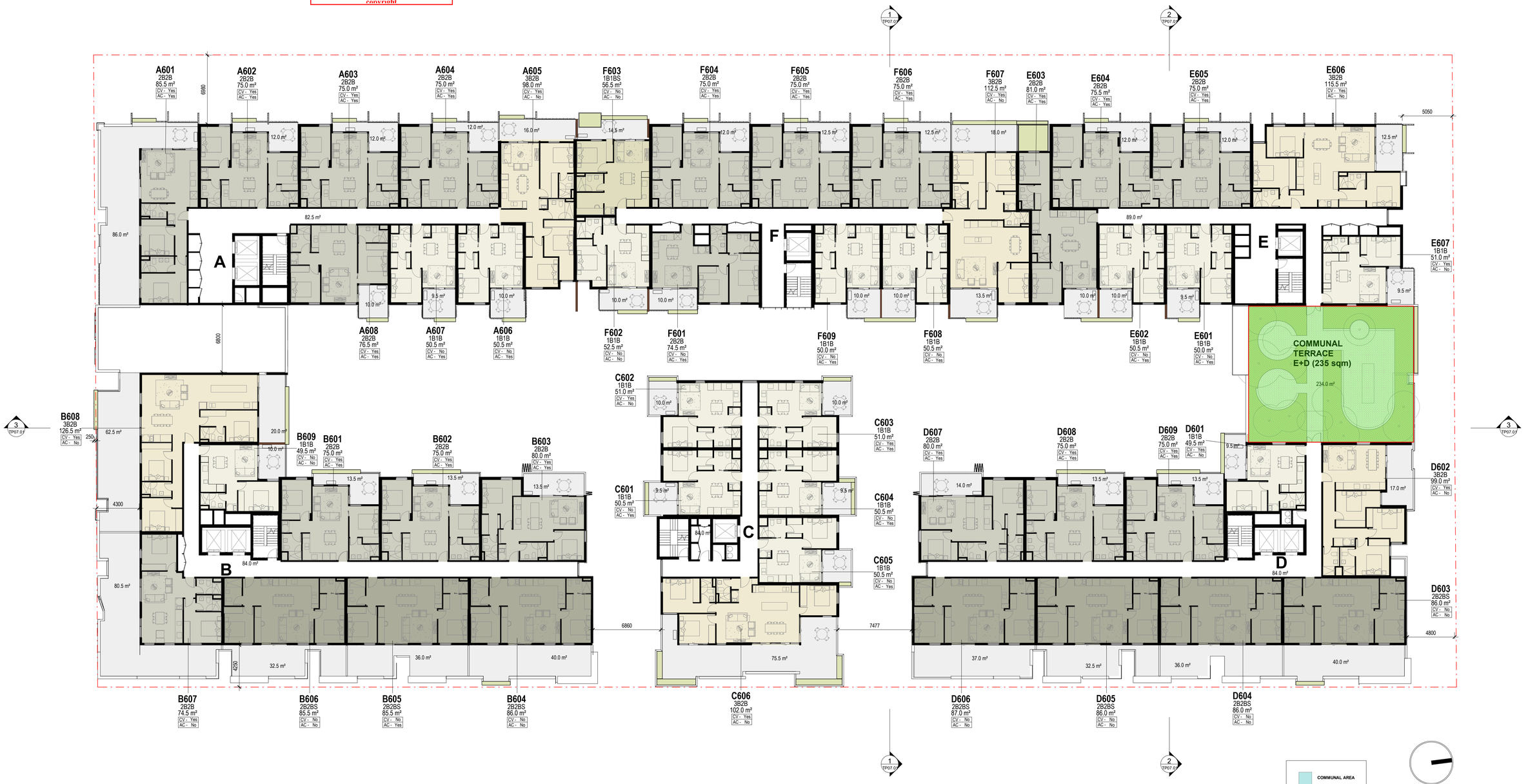
hayball

UNITED ASIA GROUP BCS BATTERSBY CHOW STUDIO

Drawn By	Author
Checked By	Checker
Date Printed	07-Nov-19 10:02:42 AM
Scale	1 : 200@ A1

Rev	Date	Description
13	16.04.19	WORK IN PROGRESS - CLIENT REVIEW
14	23.05.19	CONSULTANT SET
15	13.06.19	TRAFFIC ENGINEER SET
16	21.06.19	FINAL TP CONSULTANT SET
17	18.09.19	COUNCIL RFI'S

ADVERTISED PLAN



Outdoor Communal space

Indoor Communal space

NOTE: THE BUILDING SHALL ADOPT ALL RECOMMENDATIONS OF THE ACOUSTIC ASSESSMENT, PREPARED BY ACOUSTIC LOGIC, DATED 28 JUNE 2019 (OR AS REVISED)

Project Title
2339

346-350 Macaulay Rd

Drawing Title
LEVEL 6

Status
TOWN PLANNING

Project No	Drawing No	Revision
2339	TP01.09	13

Melbourne : 4/135 Sturt Street Southbank,VIC 3006 T +61 3 9699 3644
Sydney : GroundFloor11-1 Buckingham Street,Surry Hills, NSW 2010T +61 2 9660 9329
Brisbane : Level 12,324 Queen Street, Brisbane Qld 4000 T +61 7 3211 9821

ABN: 84006394261 NSW Nominated Architects:Tom Jordan 7521,
Richard Leonard 7522, David Tordoff 8028

Drawn By	Author
Checked By	Checker
Date Printed	07-Nov-19 7:21:56 PM
Scale	1 : 200@ A1

Rev	Date	Description
10	16.04.19	WORK IN PROGRESS - CLIENT REVIEW
11	23.05.19	CONSULTANT SET
12	21.06.19	FINAL TP CONSULTANT SET
13	18.09.19	COUNCIL RFI'S