

SUSTAINABLE MANAGEMENT PLAN

PROPOSED MIXED USE DEVELOPMENT

40 UPPER HEIDELBERG ROAD, IVANHOE

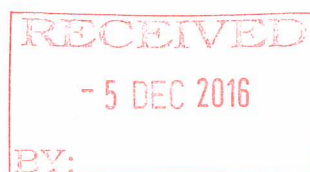
GIW12776

Revision B

As at:
30 November 2016

Prepared for
SB&G Group

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Revision History

| Revision Number | Date Issued | Author | Checked | Approved | Comments |
|-----------------|-------------|--------|---------|----------|-------------------|
| A | 29/11/2016 | IB | NP | GW | Draft |
| B | 30/11/2016 | IB | NP | GW | For DA Submission |

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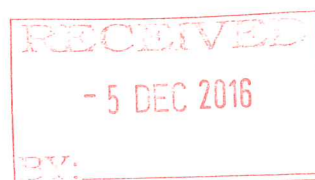
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CONTENTS

| | | |
|---|---|----|
| | Limitations | 1 |
| | Copyright..... | 1 |
| | Revision History | 1 |
| 1 | INTRODUCTION..... | 3 |
| | Project Information | 3 |
| | Location..... | 3 |
| | Built Environment Sustainability Scorecard (BESS) | 4 |
| | Responsibilities & Implementation..... | 4 |
| | Sources of Information | 4 |
| 2 | ESD SUMMARY | 5 |
| 3 | BESS PERFORMANCE..... | 6 |
| 4 | ESD ASSESSMENT | 7 |
| | Indoor Environment Quality | 7 |
| | Energy | 10 |
| | Water..... | 13 |
| | Stormwater | 14 |
| | Transport | 15 |
| | Waste Management | 17 |
| | Urban Ecology..... | 18 |
| | Innovation..... | 20 |
| | Management | 21 |
| 5 | APPENDICES | 22 |
| | APPENDIX A: DAYLIGHT MODELLING..... | 22 |
| | APPENDIX B: RENEWABLE ENERGY | 26 |
| | APPENDIX C: RAINWATER COLLECTION & REUSE | 27 |
| | APPENDIX D: STORM RATING | 28 |

1 INTRODUCTION

Project Information

GIW Environmental Solutions Pty Ltd ("GIW") has been engaged by SB&G Group to provide Environmentally Sustainable Design (ESD) consulting services for the proposed mixed use development at 40 Upper Heidelberg Road, Ivanhoe.

The proposed development will include 111 apartments, 1 café tenancy and 1 office tenancy constructed over 8 levels plus 5 levels of basement carpark and will consist of the following:

- ✕ 5 x 1 bedroom apartments
- ✕ 96 x 2 bedroom apartments
- ✕ 10 x 3 bedroom apartments
- ✕ 275m² retail area
- ✕ 450m² office area

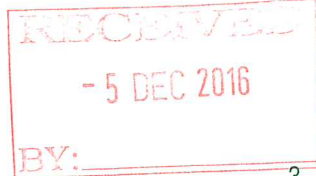
This Sustainable Management Plan (SMP) has been prepared to inform City of Banyule of the proposed development's sustainability credentials and performance targets. The project team is committed to achieving a building solution which responds to City of Banyule's Planning Scheme - Clause 22.05 Environmentally Sustainable Development.

Location

The site located at 40 Upper Heidelberg Road, Ivanhoe has an approximate surface area of 2,445m² and is currently the location of undeveloped land. Distance from the site to Melbourne CBD is approximately 8.5km.



Figure 1: Pre-existing sites at 40 Upper Heidelberg Road, Ivanhoe.



Built Environment Sustainability Scorecard (BESS)

The proposed mixed use development will be assessed against the Built Environment Sustainability Scorecard (BESS) guidelines. The BESS tool addresses nine key environmental categories as follows:



Figure 2: BESS Environmental Categories (www.bess.net.au)

All ESD measures described under the nine key environmental categories are to be suitably incorporated into relevant project documentation at the appropriate project phase.

Responsibilities & Implementation

SB&G Group will be responsible for the suitable implementation of the requirements of this report throughout the design and development phases. Should the development be sold the responsibility will pass to the new owner.

At such time as a builder is novated or a building contract is put in place the builder will be responsible for implementation during the construction phase. At occupancy, the Owners Corporation and individual lot owners and or tenants will be responsible for the correct use of installed equipment and building systems in line with the provided Building User's Guide.

Sources of Information

The following 'Sources of Information' have been used to guide the design solutions:

- ✗ John Demos Architects – Project No. 2039 – Drawing No. TP.A02-TP.A03 Rev B; TP.A04-TP.A05 Rev A; TP.A06-TP.A14 Rev A; TP.A16 rev A.
- ✗ Municipal Association of Victoria - SDAPP Explained; Building Design for a Sustainable Future
- ✗ Built Environment Sustainability Scorecard (BESS)
- ✗ Green Star Design & As Built v1.1 Submission Guidelines
- ✗ CSIRO 1999, Urban Stormwater – Best Practise Environmental Management Guidelines

2 ESD SUMMARY

The proposed mixed use development at 40 Upper Heidelberg Road, Ivanhoe will implement the following ESD initiatives:

1. The project achieves a total BESS score of 72% with no mandatory category (IEQ, Energy, Water, Stormwater) below 50%.
2. All of the development's apartments are naturally cross-ventilated.
3. Daylight modelling has been conducted for a representative sample of apartments. The summary result is as follows:

| % of living floor area above DF 1.0 | % of bedroom floor area above DF 0.5 |
|--|---|
| 82.0% | 100% |

4. The non-residential areas are targeting a 2% DF to 30% of the nominated area.
5. 25% (28 out of 111) of apartments achieve at least 3 hours of sunlight.
6. The development is provided with a comprehensive shading strategy.
7. The apartments are currently achieving a 6.8 Star average.
8. The buildings thermal fabric of the non-residential areas aims to reduce heating and cooling energy consumption 10% below the reference case (BCA Section J).
9. The development is to utilise a centralised gas hot water system.
10. A 25kW Solar PV system is to be located on the roof of the proposed development.
11. Individual cold and hot water, electricity meters will be provided to the apartments and communal areas.
12. Water efficient fixtures are applied throughout.
13. A 30,000 litre rainwater tank will harvest rainwater from the upper and lower roof. This tank will be connected to all commercial and apartment WC's and landscape irrigation.
14. A Melbourne STORM rating of 100% is achieved.
15. Landscaping irrigation is to be connected to the rainwater tank.
16. In total 37 visitor bicycle spaces are to be provided.
17. 120 bicycle spaces for residents and employees are provided.
18. The development is provided with end of trip facilities at level 1-4 basement. Facilities will include 4 showers, 8 lockers and changing facilities.
19. 1,165m² of public use plaza and 162m² of communal private garden space will be provided at ground level.
20. 75m² of communal outdoor terrace area will be included on level 6.
21. Each residential level will have a distinct indoor communal space ranging from 22m² - 35m² (in total 190m²).
22. 51m² of communal food production area will be provided at ground level public plaza, private garden area and communal terrace at level 6.

3 BESS PERFORMANCE

The project achieves a total BESS score of 72% with no mandatory category (IEQ, Energy, Water, Stormwater) below 50%. This figure represents a percentage improvement over a benchmark project. A score of 70% and higher equates to BESS 'Excellence' and exists as a higher benchmark in the tool.

BESS Report



40 Upper Heidelberg Rd, Ivanhoe 3079 Ivanhoe ·
Site area: 2445 m² · Building Floor Area: 1020 m² ·
Date of Assessment: 02 Dec 2016 · Version: V3, 1.4.0-B131 ·
Applicant: info@giw.com.au

Project number

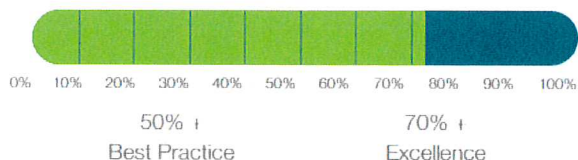
5287

Published

<http://bess.net.au/projects/5287>

Your BESS score is

+ 72%



| % of Total | Category | Score | Pass |
|------------|---------------|-------|------|
| 2 % | Management | 59 % | |
| 6 % | Water | 75 % | ✓ |
| 18 % | Energy | 66 % | ✓ |
| 13 % | Stormwater | 100 % | ✓ |
| 13 % | IEQ | 81 % | ✓ |
| 5 % | Transport | 56 % | |
| 5 % | Waste | 100 % | |
| 4 % | Urban Ecology | 87 % | |
| 2 % | Innovation | 30 % | |



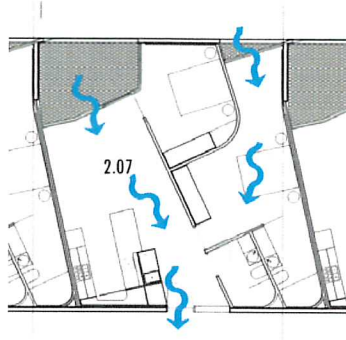

4 ESD ASSESSMENT

Indoor Environment Quality

Council ESD objectives:

- ✕ to achieve a healthy indoor environment quality for the wellbeing of building occupants.
- ✕ to provide a naturally comfortable indoor environment will lower the need for building services, such as artificial lighting, mechanical ventilation and cooling and heating devices.

COUNCIL BEST PRACTICE STANDARD

| CRITERIA | DEVELOPMENT PROVISION | | | | | |
|-------------------------------------|---|---|-------------------------------------|--------------------------------------|-------|------|
| NATURAL VENTILATION | <p>At least 60% of a development's apartments should be naturally ventilated.</p> | <p>All of the development's apartments and commercial tenancies are naturally cross-ventilated. Apartments are provided with windows or mesh pull out security doors on opposite or adjacent facades.</p> <p>All corridors are to be naturally ventilated with operable windows adjacent to the voids.</p> <div></div> <p>Example of mesh sliding security doors provided to all single aspect apartments at entry.</p> <p>Typical natural cross-flow ventilation strategy for apartment.</p> | | | | |
| DAYLIGHT | <p>80% of dwellings achieve a daylight factor greater than 1% to 90% of the floor area of each living area, including kitchens.</p> <p>80% of dwellings achieve a daylight factor greater than 0.5% to 90% of the</p> | <p>Daylight modelling has been conducted for a representative sample of apartments. Summary results are as follows:</p> <table><tr><th>% of living floor area above DF 1.0</th><th>% of bedroom floor area above DF 0.5</th></tr><tr><td>82.0%</td><td>100%</td></tr></table> <p>Refer Appendix A - Daylight Modelling for detailed assessment.</p> | % of living floor area above DF 1.0 | % of bedroom floor area above DF 0.5 | 82.0% | 100% |
| % of living floor area above DF 1.0 | % of bedroom floor area above DF 0.5 | | | | | |
| 82.0% | 100% | | | | | |

| | | |
|-----------------------------------|---|---|
| | <p>floor area in all bedrooms.</p> <p>>30% of the nominated non-residential area achieves a daylight factor of at least 2%</p> | <p>The non-residential areas are targeting a 2% DF to 30% of the nominated area.</p> |
| | <p>90% of bedrooms have an external window.</p> | <p>NIL internal bedrooms.</p> |
| | <p>Courtyards and light courts in multi-storey buildings are surrounded by a maximum of four storeys.</p> | <p>No apartments are reliant on the central atrium for access to daylight. The proposed atrium delivers circulation space, daylight and natural ventilation to the corridors.</p> |
| <p>WINTER SUNLIGHT</p> | <p>70% of dwellings receive at least 3 hours of direct sunlight in all living areas between 9am and 3pm in mid-winter.</p> | <p>25% (28 out of 111) of apartments achieve at least 3 hours of sunlight between 9am and 3pm in mid-winter. This is balanced with the need to shade from direct solar gains along the elongated east-west facades.</p> |

**THERMAL
COMFORT**

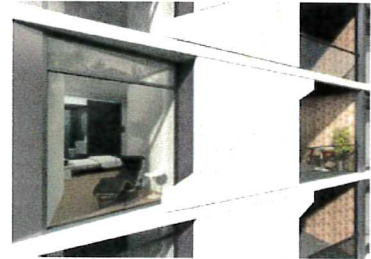
Appropriate external shading is provided to east, west and north facing living area and bedroom windows,

The development is provided with a comprehensive shading strategy:



Vertical screening is applied to the west façade.

Horizontal overhangs are applied to level 6 and 7.



Recessed east oriented windows will be shaded by an overhang and wing walls.



Trees will be planted along the west façade to shade the west oriented commercial windows.



Vertical fins are applied to east oriented commercial windows

Energy

Council ESD objectives:

- ✗ To ensure the efficient use of energy
- ✗ To reduce total operating greenhouse emissions
- ✗ To reduce energy peak demand
- ✗ To reduce associated energy costs

COUNCIL BEST PRACTICE STANDARD

CRITERIA

DEVELOPMENT PROVISION

THERMAL PERFORMAN- CE RATING

Demonstrate energy efficiencies beyond minimum BCA compliance benchmarks (e.g. 10% or + 1 star).

The buildings thermal fabric of the non-residential areas aims to reduce heating and cooling energy consumption 10% below the reference case (BCA Section J).

The National Construction Code (NCC) Class 2 – Sole Occupancy Unit(s) residential building component is to be designed in accordance with NCC Section J (2016) NatHERS requirements. The residential units must achieve an average 6.5 Star rating, with no unit achieving below 5 Stars.

The apartments are currently achieving a 6.8 Star average. This represents > 24% improvement on minimum NCC compliance benchmarks. The below sample ratings demonstrate the developments ability to achieve this average.

| Apartment No. | ACE Total MJ/M2 | ACE Heating | ACE Cooling | ACE NCFA | Star Rating |
|----------------|-----------------|-------------|-------------|-------------|-------------|
| 1.05 | 77.7 | 66.6 | 11.1 | 61.7 | 7.4 |
| 1.18 | 113.6 | 91.1 | 22.5 | 66.2 | 6.3 |
| 2.09 | 76.8 | 65.7 | 11.2 | 60.9 | 7.4 |
| 2.16 | 96 | 76.2 | 19.8 | 66.2 | 6.9 |
| 3.01 | 100.8 | 69.2 | 31.6 | 47.1 | 6.7 |
| 4.05 | 76.6 | 65.8 | 10.8 | 61.7 | 7.4 |
| 4.18 | 96.2 | 76.2 | 20 | 66.2 | 6.8 |
| 5.09 | 85.1 | 72.9 | 12.2 | 60.8 | 7.2 |
| 5.16 | 137.3 | 114.8 | 22.5 | 65.9 | 5.7 |
| 6.02 | 94.7 | 66.2 | 28.5 | 105.3 | 6.9 |
| 7.06 | 139.1 | 85.5 | 53.5 | 125.8 | 5.6 |
| AVERAGE | 99.4 | 77.3 | 22.2 | 71.6 | 6.8 |

*Apartments are assessed using FirstRate5 v5.2.3b

COUNCIL BEST PRACTICE STANDARD

CRITERIA

DEVELOPMENT PROVISION

Construction assumptions for preliminary FirstRate ratings are listed below. These assumptions are not to be relied upon for any other purpose beyond Town Planning assessment.

| Element | Material | Value |
|----------------|---|---|
| Floor | Concrete | R1.4 |
| External Walls | Concrete | R1.2 + double reflective airgap |
| External Walls | Lightweight | R2.5 |
| Internal Walls | Lightweight | R2.5 |
| Roof | Concrete | R4.0 |
| Fixed Windows | Aluminium framed, Double glazed, Low-e, Clear | Total System: U-value: 2.91 SHGC:0.58 |
| Awning Windows | Aluminium framed, Double glazed, Low-e, Clear | Total System: U-value: 4.55 SHGC:0.4 |
| Sliding Doors | Aluminium framed, Double glazed, Low-e, Clear | Total System: U-value: 3.37 SHGC:0.48 |
| Louvres | Aluminium framed, Single glazed, Clear | Total System: U-value: 5.98 SHGC:0.67 |

HOT WATER SYSTEM

Install energy efficient (high star rating) HWS

The development is to utilise a centralised gas hot water system, with either:

- ✕ 6 Star energy rating for instantaneous units; or
- ✕ Minimum 80% energy efficiency for a single water heater

PEAK ENERGY DEMAND

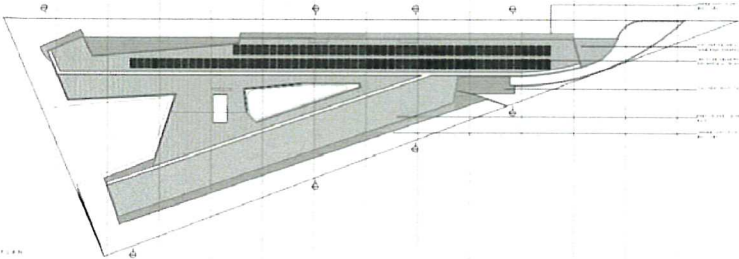
Demonstrate Instantaneous (peak-hour) demand has been reduced by >25%

High performance thermal envelope in conjunction with high efficiency HVAC systems and lighting systems reduce energy demand at peak times.

EFFICIENT HVAC

Specify energy efficient (high star

When outdoor conditions are not conducive to natural ventilation, air conditioning will be used. Inverter split system units are to be installed and

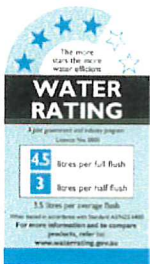
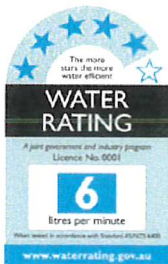
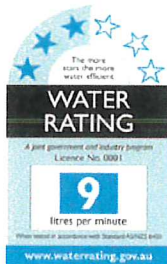

| COUNCIL BEST PRACTICE STANDARD | | |
|----------------------------------|---|--|
| | CRITERIA | DEVELOPMENT PROVISION |
| SYSTEMS | rating) heating and cooling systems. | sized to maintain conditions of the main living space of each apartment. The efficiency of the air conditioning system is to be within 1 star rating of best available under MEPS Post-October 2012 measurement standard. |
| | Carpark ventilation is either fully naturally ventilated or uses CO monitoring to control the operation of the ventilation fans | The carpark is partially naturally ventilated and partially mechanically ventilated with fans supplied with VSDs coupled with CO sensors. |
| EFFICIENT LIGHTING | Maximum illumination power density (W/m ²) in at least 90% of the relevant Building Class is at least 20% lower than required by current BCA requirements | <p>Lighting for the residential and non-residential development is to be LED types. High efficiency fluorescent T5 type lighting will be provided to the carpark and services areas only.</p> <p>Lighting power density shall be as follows:</p> <ul style="list-style-type: none"> ✕ Dwellings: No greater than average 4W/m² ✕ Veranda/balcony/terrace: No greater than average 4W/m² ✕ Back of house and indoor car parks: No greater than average 5W/m² <p>All common area, external and carpark lighting is to be controlled with daylight, motion sensors or timers (whichever is deemed appropriate).</p> |
| RENEWABLE ELECTRICITY GENERATION | Solar power system provides 5% of the building's energy consumption. | <p>A 25kW Solar PV system is to be located on the roof of the proposed development. The system is expected to generate approximately 36,040kWh and will be provide 10% of common area lighting and power.</p>  <p style="text-align: center;">Location Solar PV System</p> <p style="text-align: center;">Refer Appendix B – Renewable Energy</p> |

Water

Council ESD objectives:

- ✗ To ensure the efficient use of water
- ✗ To reduce total operating potable water use
- ✗ To encourage the collection and reuse of stormwater
- ✗ To encourage the appropriate use of alternative water sources (e.g. grey water)
- ✗ To minimize associated water costs

COUNCIL BEST PRACTICE STANDARD

| CRITERIA | | DEVELOPMENT PROVISION | | | |
|------------------------------------|--|---|---|--|--|
| POTABLE WATER REDUCTION | >25% potable water reduction. | WELS 4 Star - Toilets | WELS 5 Star - Taps | WELS 3 Star - Showerhead | WELS 5 Star - Dishwasher |
| | |  |  |  |  |
| RAINWATER COLLECTION & REUSE | 25-75% reduction of potable water demand due to rainwater collection and reuse systems. | <p>A 30,000 litre rainwater tank will harvest rainwater from the upper and lower roof. This tank will be connected to all commercial and apartment WC's and landscape irrigation. It is estimated that this will save more than 527kL of potable water every year and meet 24% of the demand in these areas.</p> <p>Refer Appendix C – Rainwater Collection & Reuse</p> | | | |
| WATER METERING | The installation of separate water meters in individual dwellings within the same development. | The apartments and commercial tenancies are to have individual cold and hot water meters. This measure is aimed at encouraging user awareness and accountability and it is likely to lead to more responsible water use. | | | |
| LANDSCAPE IRRIGATION | Are water efficiency principles used for landscaped areas. | Landscaping irrigation is to be connected to the rainwater tank. | | | |

Stormwater

Council ESD objectives:

- ✗ To reduce the impact of stormwater run-off
- ✗ To improve the water quality of stormwater run-off
- ✗ To achieve best practice stormwater quality outcomes
- ✗ To incorporate water sensitive urban design principles

COUNCIL BEST PRACTICE STANDARD

CRITERIA

DEVELOPMENT PROVISION

STORM RATING

Exceed Victoria's best practice standards by achieving a MUSIC / STORM rating of at least 100% or equivalent modelling results.

The Melbourne Water - Stormwater Treatment Objective Relative Measure (STORM) tool has been applied to determine performance relative to Best Practice Environmental Management Guidelines (Victoria Stormwater Committee, 1999). As per City of Banyule Planning Scheme Clause 56.07-4 Integrated Water Management, the development is required to achieve a STORM rating of 100% or greater.

A Melbourne STORM rating of 100% is achieved via the following:

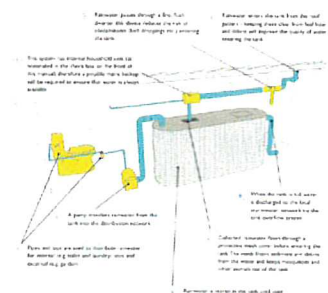
- ✗ Rainwater is to be collected from the upper and lower roof and directed into the 30,000 litre rainwater tank. All commercial and apartment WC's and landscape irrigation are to be connected to the rainwater tank.

Note: landscape irrigation is not included in the STORM rating.

Refer Appendix D – STORM Rating.



Location rainwater tanks



Rainwater tank

Transport

Council ESD objectives:

- ✕ To minimise car dependency.
- ✕ To ensure that the built environment is designed to promote the use of public transport, walking and cycling.

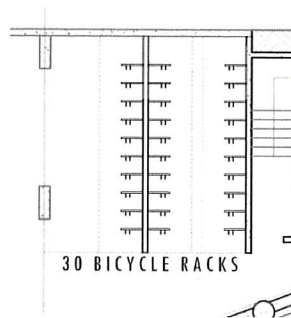
COUNCIL BEST PRACTICE STANDARD

CRITERIA

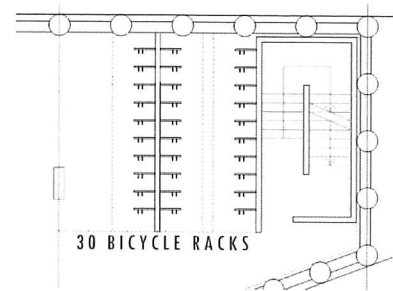
DEVELOPMENT PROVISION

BICYCLE FACILITIES

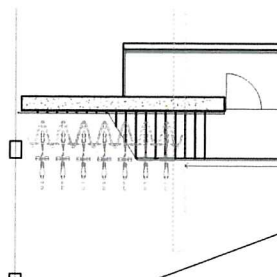
For residential developments, provide at least one secure bicycle parking space per dwelling for residents and one bicycle space per 4 dwellings for visitors



In total 30 visitor bicycle spaces are provided at level 5 basement for ease of access.



120 (30 x 4) bicycle spaces for residents and employees are provided at level 1-4 basement delivering a ratio >1:1.



7 visitor bicycle spaces (café) will be provided at the public plaza.

END OF TRIP FACILITIES

Provide accessible showers (1 per 10 bicycles spaces), changing facilities and one secure locker per bicycle space in the changing facilities.

The development is provided with end of trip facilities at level 1-4 basement. Facilities will include 4 showers, 8 lockers and changing facilities.

ELECTRIC VEHICLE CHARGING

Provide facilities for charging of electric vehicles.

No car parking spaces are specifically intended for electric vehicles.

COUNCIL BEST PRACTICE STANDARD

CRITERIA

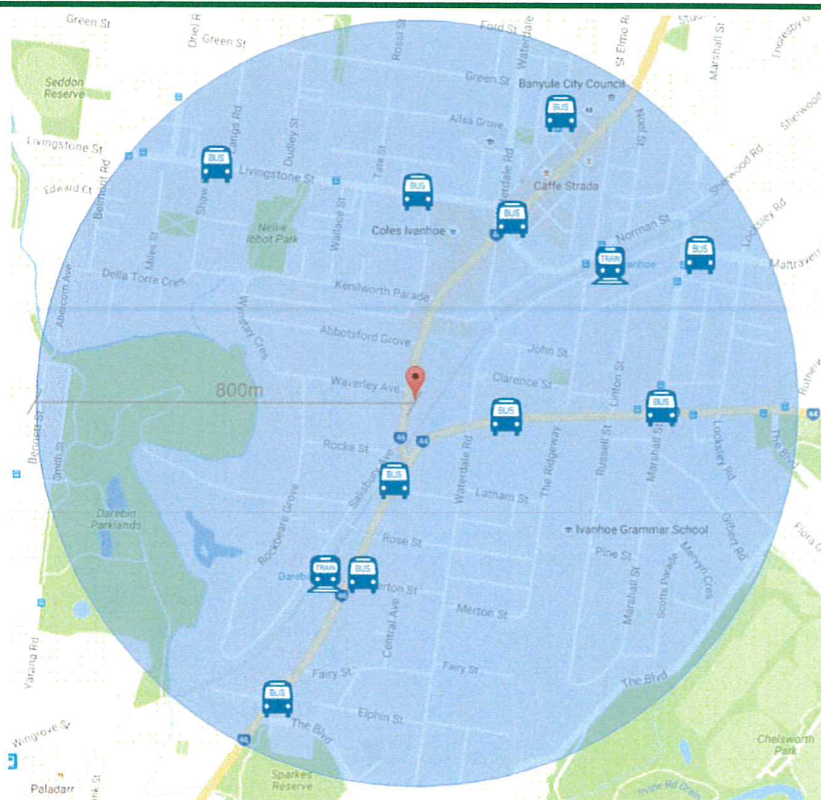
DEVELOPMENT PROVISION

**MOTORBIKES/
MOPEDS**

Are a minimum of
5% of vehicle
parking spaces
designed and
labelled for
motorbikes?

25 motorbike/moped parking spaces are provided at level 1-5 basement.

**CAR SHARE &
PUBLIC
TRANSPORT**



Car Share Scheme



Flexicar



GoGet Car Share



Green Share Car

Public Transport



Bus Stop



Tram Stop



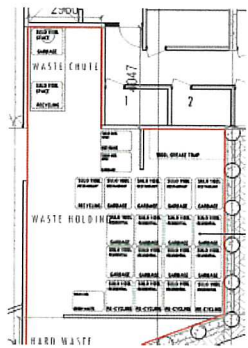
Train Station

Waste Management

Council ESD objectives:

- ✗ To ensure waste avoidance, reuse and recycling during the design, construction and operation stages of development.
- ✗ To ensure long term reusability of building materials.
- ✗ To meet Councils' requirement that all multi-unit developments must provide a Waste Management Plan in accordance with the *Guide to Best Practice for Waste Management in Multi-unit Developments 2010*, published by Sustainability Victoria.

COUNCIL BEST PRACTICE STANDARD

| CRITERIA | DEVELOPMENT PROVISION |
|--------------------------------------|---|
| CONSTRUCTION WASTE MANAGEMENT | <p>Adopt a recycling target of at least 70% for all demolition and construction waste (by mass.)</p> <p>The contractor will implement a waste management plan to ensure that at least 80% of demolition and construction waste (by mass) is recycled. The waste management plan will be developed in accordance with the MBAV Guidelines.</p> <p>If the development is on a site that has been previously developed, has at least 30% of the existing building been re-used.</p> <p>There is no existing building on the proposed site.</p> |
| OPERATIONAL WASTE MANAGEMENT | <p>Are the recycling facilities at least as convenient for occupants as facilities for general waste.</p>  <p>Separate general, recycling and green waste storage will be provided at level 5 basement. Each residential level will be provided with waste chutes.</p> <p>Are facilities provided for on-site management of food and garden waste.</p> <p>See above.</p> |



Urban Ecology

Council ESD objectives:

- ✗ To protect and enhance biodiversity.
- ✗ To provide sustainable landscaping.
- ✗ To protect and manage all remnant indigenous plant communities.
- ✗ To encourage the planting of indigenous vegetation.

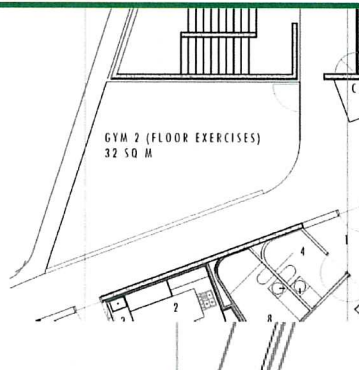
COUNCIL BEST PRACTICE STANDARD

| CRITERIA | DEVELOPMENT PROVISION |
|-------------------------|---|
| ECOLOGICAL VALUE | <p>Enhance the ecological value of your site through the protection of existing vegetation.</p> <p>The proposed site is currently the location of an undeveloped site. Redeveloping the site will reduce urban sprawl and enhance this important landmark location by creating a more socially cohesive and environmentally friendly residential community.</p> |
| VEGETATION | <p>Provide additional vegetation that serves the amenity and environmental performance of the development.</p> <p>Planter boxes are to be located at ground floor public communal area and ground floor residential / commercial communal area.</p> <p>Private terraces on level 6 and 7 will be provided with fixed circular planter boxes.</p> <p>Landscaped area with trees is to be located along the west site boundary and in the centre of the public plaza and private garden.</p> <p>Proposed trees will be deciduous in order to provide shading and optimise thermal comfort.</p> |
| COMMUNAL SPACES | <p>Is there a tap and floor waste on every balcony / in every courtyard</p> <p>Balconies have been provided with a tap allowing residents to cultivate their own gardens.</p> <p>Common space : - 1m² for each of the first 50 occupants - Additional 0.5m² for each occupant between 51 and 250 - Additional 0.25m² for each occupant above 251</p> <p>1,165m² of public use plaza and 162m² of communal private garden space will be provided at ground level. Communal space will include the following amenities: Kiosk, fruit trees and food cultivation opportunities and water feature.</p> <p>75m² of communal outdoor terrace area will be included on level 6. This area will be equipped with barbeques, communal herb garden and seating opportunities.</p> <p>Additionally, each residential level will have a distinct indoor communal space ranging from 22m² - 35m² (190m² in total). Amenities include: gym, residents lounge, meeting room, craft room and meditation rooms.</p> |

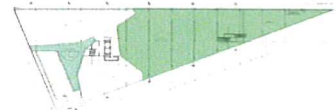
COUNCIL BEST PRACTICE STANDARD

CRITERIA

DEVELOPMENT PROVISION



Indoor communal space will be provided at each residential level.



Ground level outdoor communal space.

GREEN WALLS / ROOF

Green wall or façade and / or green roof are included in the development.



The proposed development will incorporate a green wall adjacent to the carpark entry.

The roof covering will be of a light colour; this will reduce the heat island effect and therefore the development meets the objectives under Urban Ecology 2.2 Green Roofs.

FOOD PRODUCTION

0.25m² of space per resident dedicated to food production.



51m² of communal food production area will be provided at ground level public plaza and private garden area. Additionally, communal herb gardens will be included on level 6 communal terrace.

Innovation

Council ESD objectives:

- ✕ To encourage innovative technology, design and processes in all development, which positively influence the sustainability of buildings.

| COUNCIL BEST PRACTICE STANDARD | | |
|---------------------------------------|--|---|
| CRITERIA | | DEVELOPMENT PROVISION |
| ENHANCEMENTS | Significant enhancements to a building's environmental performance. | This has been addressed throughout this Sustainable Management Plan. Refer specific sections for relevant details. |
| INNOVATIVE SOCIAL IMPROVEMENTS | Introduction of measures that stimulate social cohesion and interaction. | The proposed development is to be provided with public and residential communal space. This space will allow residents to engage with nature, stimulate social cohesion, neighbourhood interaction and increased sense of community. |
| NEW TECHNOLOGY | Introduction of new building technologies. | As building technologies continue to evolve, the development will commit to implementing the most current ESD relevant technologies at the time of construction. This will include HVAC systems, ventilation and lighting control systems, building materials, renewable energy technologies, lift systems etc. |
| DESIGN APPROACH | A new design approach that reflects the Australia Dream of the 21 st century. | <p>The proposed development is consistent in providing the Australian Dream of the 21st century as follows:</p> <ul style="list-style-type: none"> ✕ It responds to social equity in a much greater way than that of freestanding housing within the area; ✕ It is consistent with the principles of urban consolidation. |

Management

Council ESD objectives:

- ✕ To encourage a holistic and integrated design and construction process and ongoing high performance.

CONSTRUCTION AND BUILDING MANAGEMENT ACTIONS

METERING

Electricity and cold / hot water metering is to be provided to each individual apartment and commercial tenancy. This measure is aimed at encouraging user awareness and accountability and it is likely to lead to more responsible energy use.

Each apartment and commercial tenancy will be provided with a visual display which shows real-time consumption of electricity, gas and hot water.

Lighting and general power to common areas is to be separately metered to quantify energy used for common areas spaces.

The entrance lobby is to be provided with a centralised building management display. The total amount of electricity, gas and hot water used, renewable energy generated and rainwater harvested will be displayed.

SHUTDOWN SWITCHES

Each apartment and commercial tenancy will be provided with a shutdown switch located at the entrance area. This shutdown switch is to be connected to all lighting.

BUILDING TUNING

Provision of comprehensive pre-commissioning, quality monitoring and building tuning for all building services in accordance with CIBSE and ASHRAE (for mechanical systems) guidelines will be the responsibility of the development team. This is in line with the Green Star Design & As-Built tool credit criteria 'Building Commissioning' and 'Building System Tuning'.

BUILDING USER'S GUIDE

A Building User's Guide will be provided to all occupants explaining the correct use of installed equipment and building systems. This shall cover at a minimum:

- ✕ Energy and Environmental Strategy
- ✕ Monitoring and Targeting
- ✕ Building Services
- ✕ Transport Facilities
- ✕ Materials and Waste Policy
- ✕ Expansion/Re-fit Considerations
- ✕ References and Further Information

ISO14001 ACCREDITATION BUILDER

ISO14001 Accreditation will be positively weighted as part of the selection criteria.

CONSTRUCTION MANAGEMENT PLAN

A site specific Environmental Management Plan in accordance with Section 3 of the NSW Environmental Management System guidelines 2007 will be implemented for the development. This is in line with the Green Star Design & As-Built tool credit 'Environmental Management Plan'.

5 APPENDICES

APPENDIX A: DAYLIGHT MODELLING

The following daylight modelling is provided at the request of SB&G Group in respect to daylight amenity of apartments for the proposed mixed use residential development at 40 Upper Heidelberg Rd, Ivanhoe.

We have undertaken daylight modelling for three apartments, assessing both living/kitchen and bedroom areas. Apartments 1.04, 1.06 and 1.16 have been selected with consideration of the internal layout, orientation and inherent building shading features. These apartments are a representative sample of the units in the building. A render of the proposed building can be seen below:



Figure 3: 3D render of proposed building (east façade)

Analysis

The daylight levels in apartments are benchmarked against the best practice requirements as set out under the Built Environment Sustainability Scorecard (BESS) tool: Indoor Environment Quality (IEQ) – Daylight Access Living Areas and Bedrooms. These levels are as follows:

“At least 80% of the dwellings should achieve the following daylight factors (DF):

- $\geq 1.0\%$ for living areas for 90% of the habitable floor area*
- $\geq 0.5\%$ for bedrooms for 90% of the habitable floor area”.*

The daylight modelling has been completed using the Radiance software suite, an accurate computing program used to predict light levels in a space prior to construction. Scene geometric data and material properties are interfaced into the Radiance software using DesignBuilder.

Daylight Factor has been calculated using a CIE uniform cloudy sky.

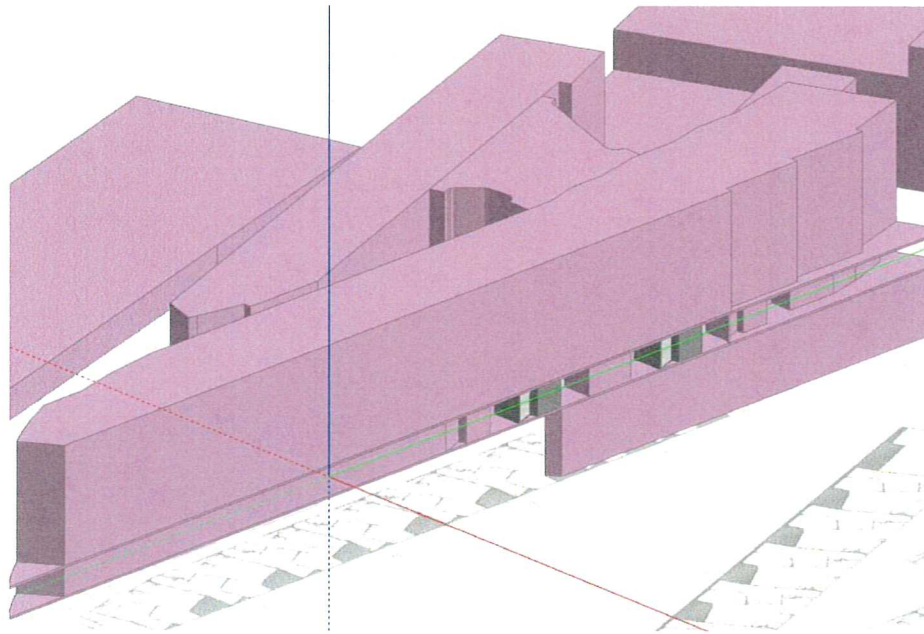


Figure 4: DesignBuilder model of the proposed development

Modelling Assumptions

The following assumptions have been made with respect to the modelling:

- Modelled window dimensions are as depicted on the Architectural drawings.
- The glazing performance used for external windows on the façade is representative of a double glazed, Low-E clear system with a total system VLT of 0.55.
- The reflectance of all materials is in accordance with the Green Star Multi Unit Residential credit IEQ-4 Daylight.
- The reflectance of external buildings and structures is assumed to be 0.6.
- Transient and unoccupied spaces such as corridors and wardrobes have been excluded from the modelled area.

Additionally, the following assumptions and modifications have been applied to the external shading for apartment 1.16:

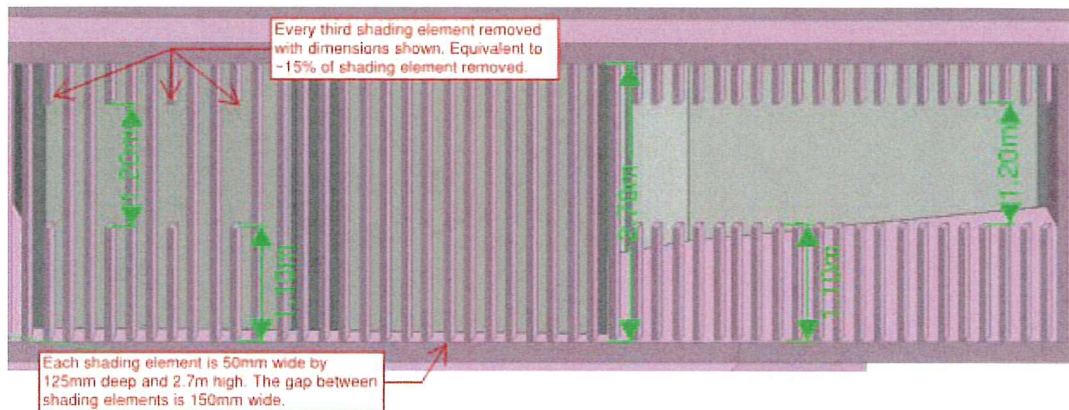


Figure 5: Assumptions included in modelling west facing apartment 1.16

Results – Numerical

The results below demonstrate that the apartments achieve the BESS performance levels, with the exception of one living area in apartment 1.04.

| Apartment | % of Living Area over DF 1.0% | % of Bedroom Area above DF 0.5% |
|--|----------------------------------|------------------------------------|
| Apartment 1.04 | 80.2% | 100% |
| | | 100% |
| Apartment 1.06 | 98.4% | 100% |
| | | 100% |
| Apartment 1.16 | 96.1% | 91.0% |
| | | 100% |
| Area weighted % of apartments which meet the BESS guidelines* | 82.0% | 100% |

*Results assume that living areas in apartments 1.02, 1.03, 1.04 and 1.13 are below the required daylight coverage on levels 1– 5. This estimation is based on the daylight results generated for apartment 1.04. All other apartments are assumed to have compliant daylight results due to the similar depth of the living area from the edge of the external balcony as apartment 1.06 and 1.16.



Figure 6: Daylight maps for modelled apartments

Conclusion

The development will achieve compliant daylight factors to >80% for the dwelling living and bedroom areas as prescribed under BESS and therefore the development will meet the BESS IEQ guidelines for daylight.

APPENDIX B: RENEWABLE ENERGY

Solar PV

Inputs Solar PV

| | |
|------------------------|------------|
| Peak Wattage of System | 25.0 kWp |
| Azimuth | 0 degrees |
| Inclination | 30 degrees |

Outputs Solar PV

| | |
|-------------------------------|---------------|
| Electricity Produced per Year | 36,040 kWh |
| No. Panels Required | 100 |
| Total Roof Area Required | 207 sqm |
| Annual Carbon Savings | 47,213 kg CO2 |

Economic Output

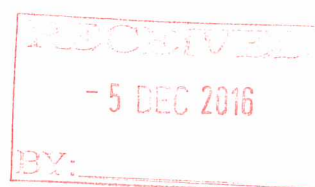
| | |
|----------------|-----------|
| Cost of System | 75,000 \$ |
| Annual Savings | 7,208 \$ |
| Simple Payback | 10 Years |

Annual Common Area Demand

| | |
|---|------------------|
| Annual Demand Class 2 Non-Residential Areas | 79,743 kWh/year |
| Annual Demand Carpark / Services | 267,926 kWh/year |
| Total Annual Demand | 347,669 kWh/year |

Demand / Supply

| | |
|--|-----|
| Contribution Solar PV to Communal Area Power | 10% |
|--|-----|



APPENDIX C: RAINWATER COLLECTION & REUSE

Rainwater Collection & Reuse

Inputs

| | |
|--------------------|--------------|
| Catchment Area | 1,678 sqm |
| Number of Bedrooms | 277 |
| Bin Washout | No |
| Irrigation Area | 400 sqm |
| Tank Capacity | 30,000 Litre |

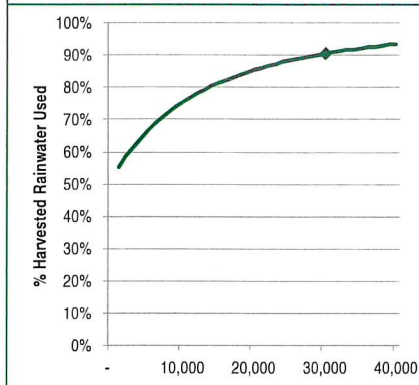
Outputs

| | |
|----------------------------|---------------|
| % Served by Rainwater | 23.8% |
| % Harvested Rainwater Used | 90.6% |
| Total Potable Water Saved | 527,145 Litre |

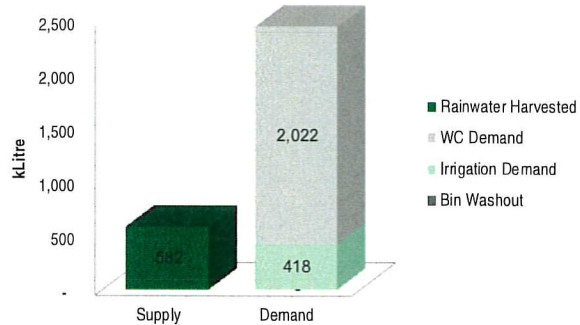
Rainwater Balance (Monthly Averages)

| Month | Rainwater Harvested (L) | Irrigation Demand (L) | WC Demand (L) | Bin Washout (L) |
|----------------------------|----------------------------|--------------------------|------------------|--------------------|
| Jan | 37,828 | 61,887 | 171,740 | - |
| Feb | 46,442 | 56,062 | 155,120 | - |
| Mar | 42,750 | 28,758 | 171,740 | - |
| Apr | 51,252 | 27,531 | 166,200 | - |
| May | 45,597 | 28,407 | 171,740 | - |
| Jun | 49,084 | 12,945 | 166,200 | - |
| Jul | 37,415 | 13,189 | 171,740 | - |
| Aug | 47,807 | 13,189 | 171,740 | - |
| Sep | 49,918 | 37,839 | 166,200 | - |
| Oct | 51,292 | 38,553 | 171,740 | - |
| Nov | 71,501 | 37,601 | 166,200 | - |
| Dec | 50,824 | 62,366 | 171,740 | - |
| Total | 581,709 | 418,327 | 2,022,100 | - |
| STORM tool "bedroom" | | 57.3 | | 0.0 |

Tank Sizing



Supply-Demand



APPENDIX D: STORM RATING



STORM Rating Report

TransactionID: 411298
Municipality: BANYULE
Rainfall Station: BANYULE
Address: 40 Upper Heidelberg Rd

Ivanhoe
VIC 3079

Assessor: GIW
Development Type: Residential - Mixed Use
Allotment Site (m2): 2,445.00
STORM Rating %: 100

| Description | Impervious Area (m2) | Treatment Type | Treatment Area/Volume (m2 or L) | Occupants / Number Of Bedrooms | Treatment % | Tank Water Supply Reliability (%) |
|------------------|----------------------|----------------|---------------------------------|--------------------------------|-------------|-----------------------------------|
| Upper Roof | 714.00 | Rainwater Tank | 10,000.00 | 100 | 136.80 | 70.00 |
| Impervious Areas | 712.00 | None | 0.00 | 0 | 0.00 | 0.00 |
| Lower Roof | 250.00 | Rainwater Tank | 10,000.00 | 70 | 170.00 | 82.00 |
| Upper Roof | 714.00 | Rainwater Tank | 10,000.00 | 100 | 136.80 | 70.00 |

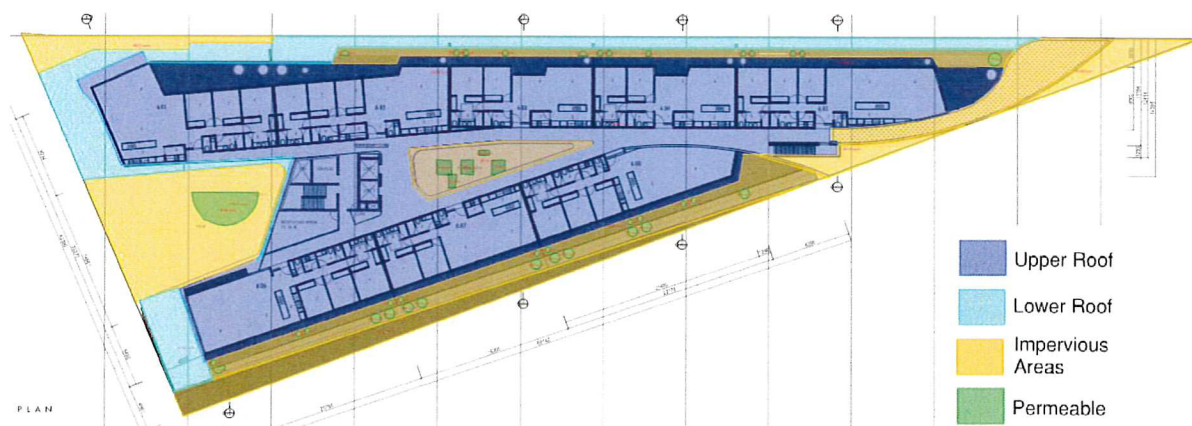


Figure 7: Proposed site rainwater water catchment and impervious areas

